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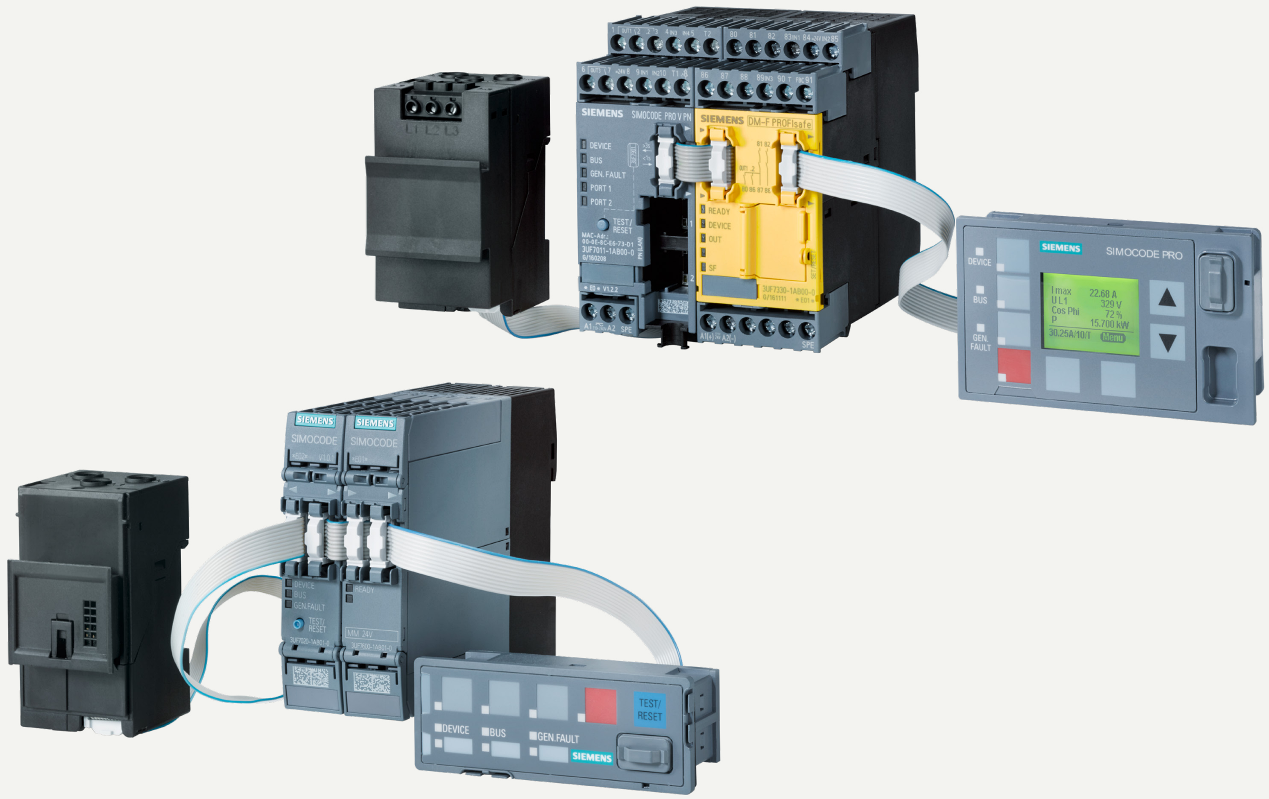

Edition 10/2022

This document contains a compilation of all manuals for the SIMOCODE pro system family.
Use the bookmarks on the left edge of the screen to navigate.

MANUAL COLLECTION

Industrial Controls

Motor Management and Control Devices

SIMOCODE pro

siemens.com

SIEMENS

Industrial Controls

Motor management and control devices SIMOCODE pro

Getting Started

10/2022

A5E40507294002A/RS-AF/006

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Ⓟ 10/2022 Subject to change

Table of contents

Introduction 1

1.1 Important notes

Scope of application

This manual is applicable to the listed SIMOCODE pro system components. It contains a description of the components applicable at the time of printing the manual. SIEMENS reserves the right to include updated information about new components or new versions of components in a Product Information.

Manual Collection

A Manual Collection (https://support.industry.siemens.com/cs/ww/en/view/109743951), a collection of the following five SIMOCODE pro manuals is at your disposal in Industry Online Support:

- SIMOCODE pro - 1 Getting Started
- SIMOCODE pro - 2 System Manual
- SIMOCODE pro - 3 Parameterization
- SIMOCODE pro - 4 Applications
- SIMOCODE pro - 5 Communication

SIMOCODE pro response tables

Specific responses (deactivated, signaling, warning, tripping) can be parameterized for various SIMOCODE pro functions, such as overload. These are always displayed in tabular form:

- "X" = Applicable
- "—" = Not applicable
- Default values are marked "d" for "default" in parentheses.

Response	Function 1	Function 2	Function 3
Tripping	—	X (d)	X
Warning	X (d)	X	—
Signaling	X	X	—
Deactivated	X	X	X (d)
Delay	0 ... 25.5 s (default: 0)	—	—

Brief description of the responses:

- Tripping: The contactor controls QE* are tripped. A fault message is generated which is available as a diagnosis via PROFIBUS DP. The fault message and the device-internal signal remain on until the appropriate length of time has elapsed or the cause of the fault has been eliminated and acknowledged.
- Warning: In addition to the device-internal signal, a warning signal is generated that is available as diagnostics via the communication bus.
- Signaling: Only a device-internal signal is generated, which can be further processed as required.
- Deactivated: The appropriate function is switched off, no signals are generated.

A delay time can also be set for specific responses.

Further information

Please read the operating instructions of the respective components. You can find the operating instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man).

You can find further information on the Internet:

- SIMOCODE pro (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Siemens Industry Online Support (SIOS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

Disclaimer of liability

The products described here have been developed to carry out safety-related functions as part of a complete plant or machine. In general, a complete safety system consists of sensors, evaluation units, signaling devices and methods for safe tripping. The manufacturer is responsible for ensuring safe functioning of the complete plant or machine. Siemens AG, its subsidiaries, and associated companies (hereinafter referred to as "Siemens") are not in a position to guarantee every characteristic of a complete plant or machine not designed by Siemens.

Siemens also denies all responsibility for any recommendations that are made or implied in the following description. No new guarantee, warranty, or liability claims above those beyond the scope of the Siemens general terms of delivery can be derived from the following description.

1.2 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

Link: Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en)

Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**

  Answers to frequently asked questions
- **Manuals/operating instructions**

  Read online or download, available as PDF or individually configurable.
- **Certificates**

  Clearly sorted according to approving authority, type and country.
- **Characteristics**

  For support in planning and configuring your system.
- **Product announcements**

  The latest information and news concerning our products.
- **Downloads**

  Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**

  Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**

  Technical product data for support in planning and implementing your project

Link: Product support (https://support.industry.siemens.com/cs/ww/en/ps)

mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**

  Search for request number, product or subject

- **My filters**

  With filters, you limit the content of the online support to different focal points.

- **My favorites**

  With favorites you bookmark articles and products that you need frequently.

- **My notifications**

  Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.

- **My products**

  With product lists you can virtually map your control cabinet, your system or your entire automation project.

- **My documentation**

  Configure your individual documentation from different manuals.

- **CAx data**

  Easy access to CAx data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams

- **My IBase registrations**

  Register your Siemens products, systems and software.

1.3 Siemens Industry Online Support app

Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:

Android

iOS

1.4 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

1.5 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert.

1.6 Current information about operational safety

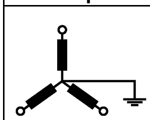
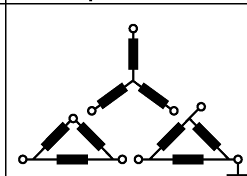
Important note for maintaining operational safety of your system

> **DANGER**
>
> **Hazardous Voltage**
>
> **Can Cause Death, Serious Injury or Risk of Property Damage**
>
> **Please take note of our latest information!**
>
> Systems with safety-related characteristics are subject to special operational safety requirements on the part of the operator. The supplier is also obliged to comply with special product monitoring measures. We therefore also provide information in the newsletters Industrial controls (https://new.siemens.com/global/en/products/automation/industrial-controls/forms/newsletter.html) and Safety Integrated (https://new.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/newsletter.html) about new products, further technical developments as well as standards and guidelines.

1.7 Information for SIMOCODE pro regarding IEC60947-4-1:2018

1.7.1 Line system configurations

The voltage information regarding the SIMOCODE pro current and current/voltage measuring modules is valid for the following line system configurations according to IEC 60947-4-1:

Three-phase four-wire systems	Three-phase three-wire systems
	
[V]	[V]
--	230
230 / 400	400
260 / 440	440
--	500
400 / 690	600

The nameplates of the current/voltage measuring modules state a maximum line voltage of 400/690 V.

1.7.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

1.7.3 Touch current

A protective impedance is present in each of the 3UF711x-1xA01-0 / 3UF712x-1xA01-0 current/voltage measuring modules. This protective impedance is 7.2 MΩ per phase (product version E04 and higher).

DANGER

Hazardous touch current

When connecting multiple SIMOCODE systems in parallel, make sure that no hazardous touch current occurs.

The SIMOCODE basic units in the 110-240 V AC/DC version include galvanic isolation. This avoids the effect of parallel connection via a central supply voltage for multiple systems when these basic units are used.

The SIMOCODE basic units in the 24 V DC version do not include galvanic isolation.

NOTICE

PELV power supply required

When using numerous current/voltage measuring modules with these basic devices, deploy a PELV power supply, for example, to prevent a potential touch current.

NOTICE
Ground leakage current
Pay attention to any resulting ground leakage current that may occur.

1.8 Recycling and disposal

For environmentally-friendly recycling and disposal of your old device, contact a company certified for the disposal of used electrical and electronic equipment, and dispose of the device as specified in the regulations for your particular country.

Configuring a reversing starter 2

2.1 Introduction and objective of the example

Introduction

The following simple example of a reversing starter demonstrates step-by-step how to commission SIMOCODE pro. In this context, the reversing starter will be equipped with:

- Initially, one local control station - Local Control
- Followed by a second control station with PROFIBUS DP and PROFINET IO.

SIMOCODE ES (TIA Portal) software is used for parameterization.

The PC / PG is connected to the basic unit via a PC cable.

Objective of the example

This example is intended to:

1. Show you how to implement a standard switching operation with a reversing starter using SIMOCODE pro in just a few steps.
2. Help you modify this example for your application.
3. Help you implement other applications easily.

Fundamental steps

The two fundamental SIMOCODE pro steps are always:

- Implementation of external wiring (for control and feedback of main current switching devices and control and signaling devices)
- Implementation / activation of internal SIMOCODE pro functions (function blocks), with control and evaluation of the SIMOCODE pro inputs/outputs (internal SIMOCODE pro wiring).

Requirements

- Load feeder / motor is present
- PLC / PCS with PROFIBUS DP interface or PROFINET interface is present
- The main circuit of the reversing circuit, including the current measuring module, has already been wired. In this case, the 3 cables leading to the motor must be led through the feed-through openings of the current measuring module.
- PC / PG is present
- The SIMOCODE ES (TIA Portal) software is installed.
- The basic unit has the factory settings. You can find out how to restore the basic factory settings in the manual SIMOCODE pro - application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959).

2.2 Reversing starter with motor feeder and local control station

Required components

The following table lists the components required for this example:

Table 2- 1 Required components for the example of the reversing starter with motor feeder and local control station

Item	Ordering data	Order number
1	SIMOCODE pro C, pro S or pro V PB basic unit	3UF7000-1AU00-0 (pro C) 3UF7020-1AU01-0 (pro S) 3UF7010-1AU00-0 (pro V)
	SIMOCODE pro V PN basic unit	3UF7011-1AU00-0
	SIMOCODE pro V PN GP basic unit	3UF7011-1AU00-1 (2 ports) 3UF7011-1AU00-2 (1 port)
2	0.3 A to 3 A current measuring module	3UF7100-1AA00-0
3	Connecting cable for connecting basic unit to the current measuring module, depending on length	3UF793.-0.A00-0
4	SIMOCODE ES V17 (TIA Portal) Basic, Standard or Premium software for parameterization via the system interface or	• Basic: Free download • Professional: – 3ZS1322-6CC15-0YA5 – 3ZS1322-6CE15-0YB5
	"SIMOCODE ES 2007 Standard" software for parameterization via the system interface with graphic editor or	3ZS1312-5CC10-0YA5
	"SIMOCODE ES 2007 Premium" software for parameterization via PROFIBUS DP and the system interface with the graphic editor, includes STEP -7 Object Manager	3ZS1312-6CC10-0YA5
	Upgrade for SIMOCODE ES 2007 Premium	3ZS1322-6CC15-0YE5
5	PC cable for connecting the basic unit to a PC / PG	3UF7941-0AA00-0 (USB)

Reversing starter circuitry with SIMOCODE pro

The following schematic shows the circuitry of the main circuit and the control circuit:

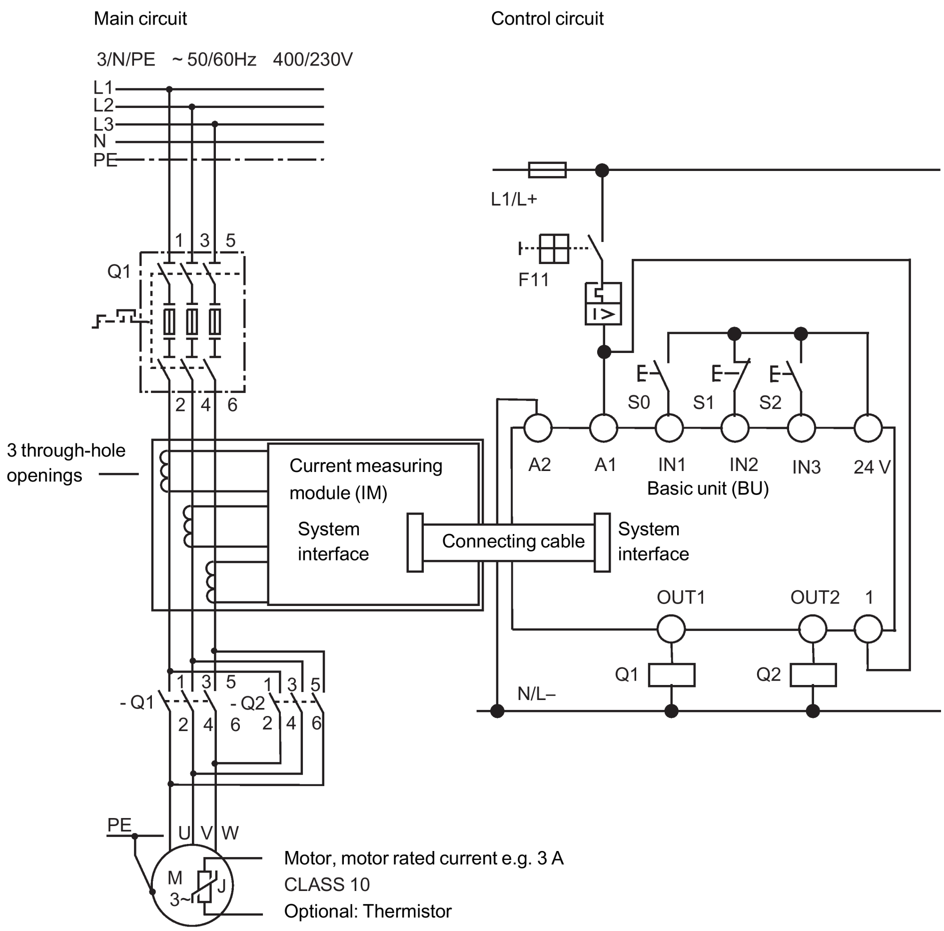


Figure 2-1 Wiring of the main circuit and the control circuit with SIMOCODE pro

Circuit diagram of a reversing starter control circuit

The following schematic shows the circuit diagram of the control circuit with a local control station for the commands:

- CCW
- OFF
- CW

Displays, messages, etc, have not been taken into account.

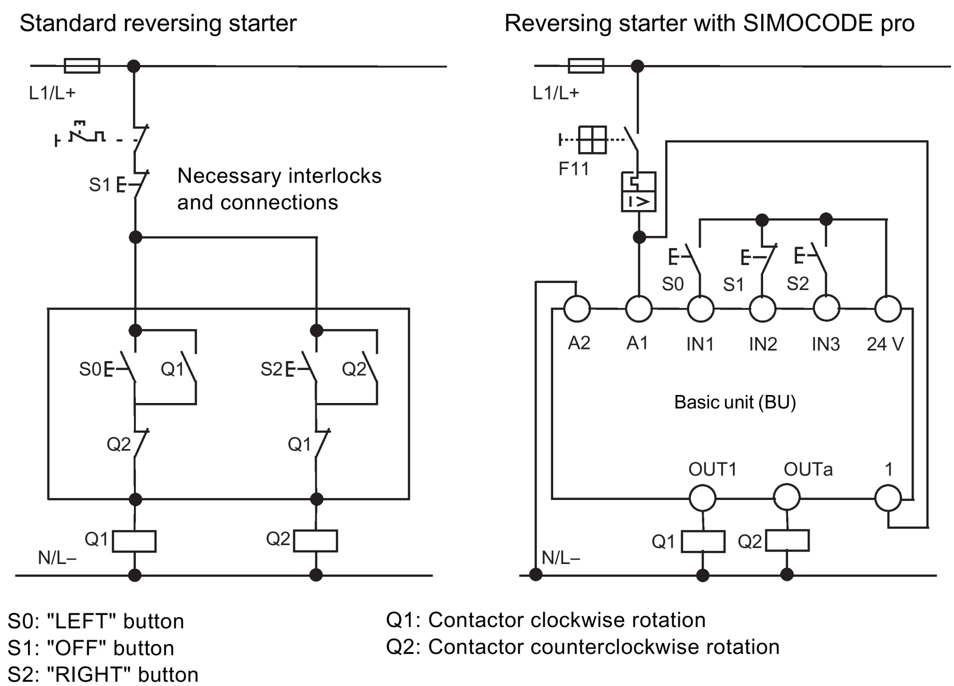


Figure 2-2 Circuit diagram of a reversing starter control circuit

The necessary interlocks and connections are carried out in the basic unit via software.

2.3 Parameterization

The basics of parameterization

After the external wiring connections have been made (contactor coils connected, current measuring module integrated in the main circuit), SIMOCODE pro is then parameterized. For this purpose, you need to understand the following points:

Table 2- 2 Schematic of the various SIMOCODE pro function blocks

Point	Description
1	Function blocks are stored internally in the SIMOCODE pro system, e.g. for control stations, control functions and motor protection.
2	Function blocks have names.
3	Function blocks may have set values, e.g. the type of control function and the set current for overload protection.
4	Function blocks are equipped with plugs and sockets. These are clearly designated.
5	To achieve the desired functionality, proceed as follows: 1. Interconnect the function blocks by connecting specific plugs to specific sockets (i.e "plug the plugs into the sockets"). 2. If required, set values in the function blocks, e.g. the set current, type of control function.
6	The inputs of the function blocks in the basic unit are designated as plugs and labeled as follows:
7	The outputs of the function blocks in the basic unit are designated as sockets and labeled as follows:
8	The plugs and sockets of the device inputs and outputs are not connected as factory defaults. If you press a button now, the contactors will not be energized.

General procedure for parameterizing the reversing starter

Parameterization means:

- Setting values
- Connecting function blocks

Where this example is concerned, this means:

1. Select the control function "Reversing Starter". This establishes all the interlocks and connections for the reversing starter in the basic unit.
2. Determine the set current I_s for motor protection. In this case, the set current corresponds to the rated motor current, i.e. 3 A.
3. The "BU Outputs" function block must be connected to the sockets of the "Protection / Control" function block via the software, i.e:
   - "BU Output 1" plug to "Contactor Control QE1" socket (right)
   - "BU Output 2" plug to "Contactor Control QE2" socket (left)
4. The plugs on the "Protection / Control" function block must be connected via software to the sockets on the "BU Inputs" function block, i.e.
   - Control station plug - Local Control [LC] ON< to "BU Input 1" socket
   - Control station plug - Local Control [LC] OFF to "BU Input 2" socket
   - Control station plug - Local Control [LC] ON> to "BU Input 3" socket

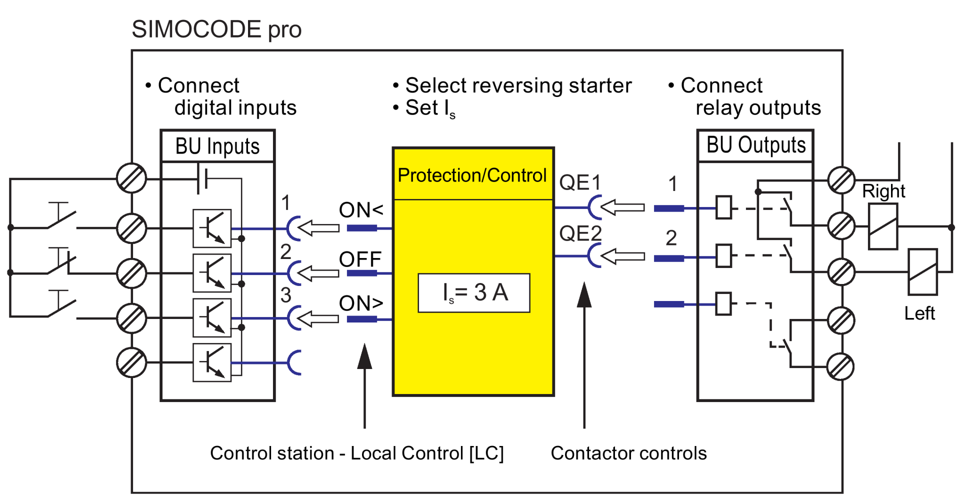


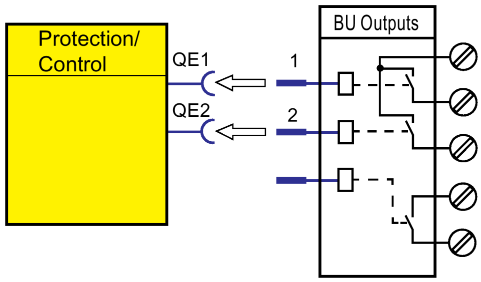
Figure 2-3 Schematic of a parameterization example

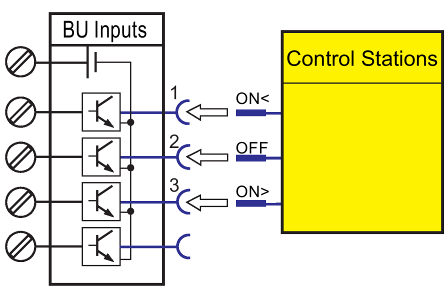
The assignment of the contactor controls QE depends on the parameterized control function. See Manual SIMOCODE pro - application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959).

Concrete procedure for parameterization with SIMOCODE ES (TIA Portal)

Proceed as follows:

Step	Description
1	Start SIMOCODE ES on your PC / PG.
2	• Select "Create new project" in the portal view and enter the project name and, if applicable, a description • Click the "Generate" button
3	Switch to the project navigator ("Project view" button)
4	Double-click "Add new device" in the project view.
5	With the "Start device wizard" option activated, select the SIMOCODE device you wish to add in the product tree of the "Controllers" and confirm your selection with "OK"
6	• Select an application (e.g. reversing starter) in the device wizard and close the dialog by selecting "Finish". When you select this application, a range of presets will be automatically carried out that you will have to check later. You will find the device wirings corresponding to the applications in the manual SIMOCODE pro - application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959). The SIMOCODE device has now been added to the project navigator. • You can change the device name "Control_device_1" to a device and application-specific name via the shortcut menu. • Expanding the device in the project navigator reveals the following entries: – Device configuration – Online & diagnostics – Parameters – Commissioning – Charts – Traces. Select the entries by double-clicking.
7	Add further components to the selected basic unit in the device configuration, for example the current measuring module IM 0.3 - 3A
8	In "Parameters", under "Motor protection → Overload/Unbalance/Stalled Rotor", set the current setting Is 1 to 3 A
9	Under "Charts → Chart_1", open the graphical parameter view (editor "CFC")

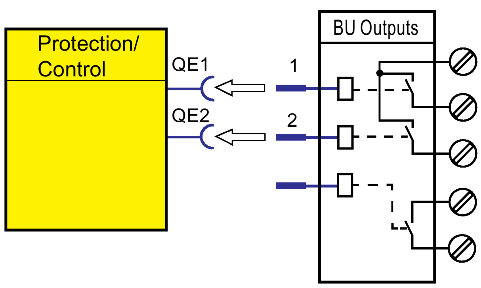
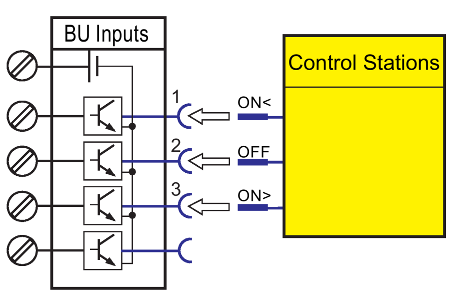
<table>
<tr><td>10</td><td>Check the following settings:
• BU - Output 1 → Contactor Control QE1
• BU - Output 2 → Contactor Control QE2


The relay outputs are connected to the contactor controls.
Note
By choosing a preset application (Step 6), other presets might be made when the BU outputs are assigned to the contactor controls.</td></tr>
<tr><td>11</td><td>Check the following settings:
• Local Control [LC] ON<: BU - Input 1
• Local Control [LC] OFF: BU - Input 2
• Local Control [LC] ON>: BU - Input 3


The control station "Local Control" is now connected with the binary inputs of the basic unit.
Check whether the enables for "ON" and "OFF" for operating mode "Local2" are set.</td></tr>
<tr><td>12</td><td>As required, further protection and monitoring functions can be activated or further logic and standard functions from the function block library can be used in the chart.
Parameterization is complete. Save your project by selecting Project → Save.</td></tr>
</table>

Specific procedure for parameterization with SIMOCODE ES 2007

Proceed as follows:

Step	Description
1	Start SIMOCODE ES on your PC / PG.
2	Select the control function "Reversing Starter" as application. When you select this application, a range of presets will be automatically carried out that you will have to check later.
3	Select SIMOCODE pro C, SIMOCODE pro S or SIMOCODE pro V under "Device Configuration". Deactivate the operator control block if this is not installed.
4	• Open the "Device Parameters → Motor Protection → Overload / Unbalance / Stalled Rotor" dialog box. • Set the current setting $I_{s}1$ to 3 A.
5	Check the following settings: • BU - Output 1 → Contactor Control QE1 • BU - Output 2 → Contactor Control QE2  The relay outputs are connected to the contactor controls. **Note** By choosing a preset application (Step 2), other presets might be made when the BU outputs are assigned to the contactor controls.
6	Check the following settings: • Local Control [LC] ON<: BU - Input 1 • Local Control [LC] OFF: BU - Input 2 • Local Control [LC] ON>: BU - Input 3  The control station "Local Control" is now connected with the binary inputs of the basic unit. Check whether the enables for "ON" and "OFF" for operating mode "Local2" are set.
7	Parameterization is complete. Save the parameter file on your PC / PG using "Switching Device → Save".

Transferring parameters to the basic unit and commissioning with SIMOCODE ES (TIA Portal)

After creating the parameter file, you can now transfer it to the SIMOCODE pro, and commission the reversing starter. To do so, proceed as follows:

Step	Description
1	Switch on the power supply of the basic unit.
2	Connect the USB interface of the PC / PG to the system interface of the basic unit using the SIRIUS USB PC cable. You may have to install a device driver for the parameterization cable when using the USB PC cable for the first time.
3	Observe the status LED on the basic unit. The "Device" LED should light up green. SIMOCODE pro is ready.
4	Transfer the parameter file to the basic unit as follows: • Click on the "Download to device" icon or the "Online → Download to device" menu item. • The dialog that follows asks you for the type of the connection between the PC and the device - select Sirius PtP (Point-to-Point) here and the applicable virtualized COM interface and click on the "Start search" button. All accessible devices are now displayed in the list.
5	You can now start downloading parameters via the "Load" button.
6	After transferring the data to the basic unit, you will receive a message confirming successful downloading under "Info → General".

Note

Switching between "RIGHT" and "LEFT" is only possible via "OFF" after the preset, 5-second interlocking time has expired.

Transferring parameters to the basic unit and commissioning with SIMOCODE ES 2007

After creating the parameter file, you can now transfer it to the SIMOCODE pro, and commission the reversing starter. To do so, proceed as follows:

Step	Description
1	Switch on the power supply of the basic unit.
2	Connect the serial interface of the PC / PG to the system interface of the basic unit using the USB PC cable.
3	Observe the status LED on the basic unit. The "Device" LED should light up green. SIMOCODE pro is ready.
4	• Transfer the parameter file to the basic unit, e.g. using "Target System → Load to Switching Device". • Go online, e.g. via "Online → Connect online" • Select the type of interface (SIRIUS PtP or PN/IE) • Select the PG/PC interface • Click the "Start search" button. A search is made for compatible stations. • Select a station • Download the parameter file to the device (using the "Load to device" button)
5	After transferring the data to the basic unit, you will receive the message "Download to device successfully accomplished".

Note

Switching between "RIGHT" and "LEFT" is only possible via "OFF" after the preset, 5-second interlocking time has expired.

Configuration with local control station completed

The configuration with SIMOCODE pro is now complete. You now have a functional reversing starter with a local control station. If the wiring and parameterization are correct, the contactors for clockwise and counterclockwise rotation will be activated when the corresponding buttons are pushed.

2.4 Adding a control station to the reversing starter using PROFIBUS DP

In this section

In this section, you will find out how a control station can be added to the previously configured example by means of PROFIBUS DP. You can switch between the local control station (local) and PLC / PCS (remote). SIMOCODE pro can then be controlled locally via the buttons and via the PLC/PCS.

The necessary connections are preset as factory defaults in SIMOCODE pro. Therefore, you only have to set the PROFIBUS DP address for SIMOCODE pro so that it can be recognized correctly as a DP slave on the PROFIBUS DP.

Requirements

The following requirements must be fulfilled:

- The motor is switched off.
- The supply voltage for the basic unit is switched on. The "Device" LED lights up green
- You have connected the basic unit to the PROFIBUS DP. The PROFIBUS DP interface is on the front (9-pin D-sub connector)
- SIMOCODE pro is integrated in your automation system. Further information on integrating DP slaves can be found in the automation system documentation.

Setting the PROFIBUS DP address

First, set the PROFIBUS DP address of the basic unit. This can be done in the following ways:

- With SIMOCODE ES (TIA Portal) or SIMOCODE ES 2007
- Via the addressing plug

Setting the PROFIBUS DP address with SIMOCODE ES (TIA Portal)

Proceed as follows:

Step	Description
1	Switch on the power supply of the basic unit.
2	Connect the USB interface of the PC / PG to the system interface of the basic unit using the SIRIUS USB PC cable. You may have to install a device driver for the parameterization cable when using the USB PC cable for the first time. In addition you can also change the PROFIBUS address without a SIRIUS PC cable, directly via the PROFIBUS interface. Requirement: PROFIBUS interface in PC/laptop. Procedure: See step 4
3	Observe the status LED on the basic unit. The "Device" LED should light up green. SIMOCODE pro is ready.
4	Set the address of a device configured in SIMOCODE ES (as started under Parameterization (Page 19)): • Select the device configuration of the created device • Mark the SIMOCODE basic unit and navigate to "Properties → General → PROFIBUS address" in the status window. In this view the PROFIBUS address can be entered in the field "Address". • Then load the parameterization into the device. Selecting the PROFIBUS node in the network view • Double-click on "Control Device_1" • Modify the PROFIBUS address • Select "Download to device" in the overview. • With extended download: Select "Start search" • Under device type select the corresponding PROFIBUS node • Then load the parameterization into the device.
5	After transferring the data to the basic unit, you will receive a message confirming successful downloading under "Info → General".

Setting the PROFIBUS-DP address with SIMOCODE ES 2007

Proceed as follows:

Step	Description
1	Plug the USB PC cable into the system interface.
2	Start SIMOCODE ES.
3	Open menu Switching device → Open online.
4	Select RS232 and the corresponding COM interface. Confirm with OK.
5	Open the Device Parameters → Bus Parameters dialog box.
6	Select the DP address.
7	• Save the data in the basic unit with Target System → Load to Device. The address is set. • Confirm the change of address.

Setting the PROFIBUS DP address via the addressing plug

Proceed as follows:

Table 2- 3 Setting the PROFIBUS DP address via the addressing plug

Step	Description
1	Set the desired valid address on the DIP switches. The switches are numbered. For example, address 21: Put the "16"+"4"+"1" switches in the "ON" position.
2	If necessary, remove the PC cable from the system interface.
3	Plug the addressing plug into the system interface. The "Device" LED lights up yellow
4	Briefly press the "TEST/RESET" button. The address you set is now stored. The "Device" LED flashes yellow for approx. 3 seconds.
5	Remove the addressing plug from the system interface.

Additional internal components of the basic unit

The local control [LC] station is already wired, the external components are connected and the necessary internal connections have been made. The following additional internal components, which have already been connected as factory defaults and do not have to be parameterized, are now required:

- PROFIBUS DP bit 0.0, bit 0.1 and bit 0.2 for the commands "LEFT", "OFF" and "RIGHT"
- PROFIBUS DP bit 0.5 for switching between the local control station [LC] and PLC/PCS [DP] (remote)
  - Bit 0.5=0: Local control station [LC] active
  - Bit 0.5=1: PLC/PCS [DP] control station active.

The PLC/PCS [DP] control station and the change-over (plug S1) have already been connected as factory defaults with the bits (sockets) of PROFIBUS DP cyclic send data. The assignments can be found in SIMOCODE ES (TIA Portal) under "Parameters → Motor Control → Control Stations".

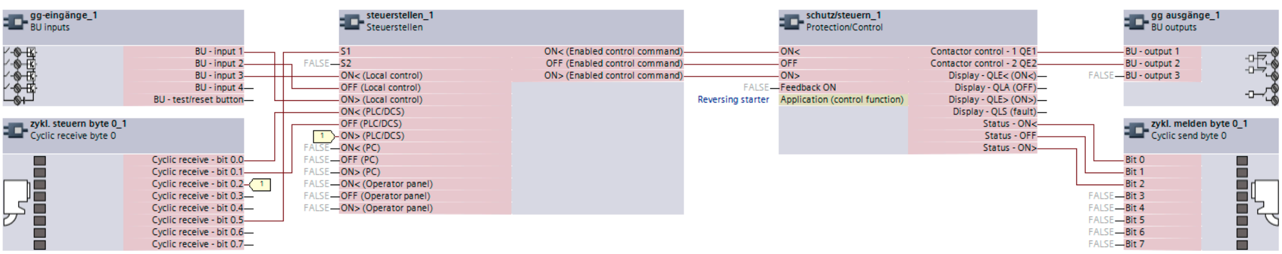


Figure 2-4 Functional diagram of reversing starter

Not all pre-assigned cyclic send data is shown here. The assignments can be found in SIMOCODE ES under "Function Blocks > Outputs > Cyclic Send Data".

Configuration with PLC/PCS [DP] control station is complete

The configuration with SIMOCODE pro is now complete. You now have a reversing starter with an additional control station implemented via PROFIBUS DP. The contactors for clockwise and counterclockwise rotation are controlled by setting the corresponding bits.

2.5 Adding a control station to the reversing starter using PROFINET

In this section

In this section, you will find out how a control station can be added to the previously configured example by means of PROFINET. You can switch between the local control station (local) and PLC/PCS (remote). SIMOCODE pro can then be controlled locally via the buttons and via the PLC/PCS.

The necessary connections are preset as factory defaults in SIMOCODE pro.

Requirements

The following requirements must be fulfilled:

- The motor is switched off.
- The supply voltage for the basic unit is switched on. The "Device" LED lights up green
- You have connected the basic unit to the automation system via PROFINET. The two PROFINET interfaces are located on the front (RJ-45 female connector). It is immaterial which of the two PROFINET interfaces you use.
- You have integrated SIMOCODE pro into your automation system and defined the IP configuration and the PROFINET IO station name for SIMOCODE pro V PN and transferred it into the device. Further information on integrating PROFINET IO devices can be found in the automation system documentation.

Setting the IP configuration and station names with SIMOCODE ES (TIA Portal)

The precondition for communication between the automation system and SIMOCODE pro via PROFINET is definition of the IP configuration and the PROFINET station name. This can be done in the following ways:

- With the configuration tool of your automation system
- With SIMOCODE ES (TIA Portal).

Proceed as follows:

Step	Description
1	Switch on the power supply of the basic unit.
2	Connect the USB interface of the PC / PG to the system interface using the SIRIUS USB PC cable. You may have to install a device driver for the parameterization cable when using the USB PC cable for the first time.
3	Observe the status LED on the basic unit. The "Device" LED should light up green. SIMOCODE pro can be started up.
4a	Set the address of a device configured in SIMOCODE ES (as started in step 3): • Select the IP parameters under "Parameters → PROFINET parameters" to match the configuration in the automation system. To this end, you must set the check mark next to "Overwrite IP parameters in device" • Enter the IP address • Enter the subnet mask • In the "Station" section, define the PROFINET device name to match the configuration in the automation system. To this end, you must set the check mark next to "Overwrite device name in device" • Load the parameterization into the device
4b	Set the address of a SIMOCODE device without integrating it into the current project: • In the project navigator, open "Online access". Here, by means of "COM<x> [SIRIUS PtP] → Update accessible devices", you can access the device connected to the serial interface. If the serial interface COM<x> should indicate a protocol other than SIRIUS PtP, you can change this via "Properties" in the shortcut menu: There, select the "IP parameters" under "Parameters → PROFINET parameters" to match the configuration in the automation system. To this end, you must set the check mark next to "Overwrite IP parameters in device" • Enter the IP address • Enter the subnet mask • In the "Station" section, define the PROFINET device name to match the configuration in the automation system. To this end, you must set the check mark next to "Overwrite device name in device" • Download the changes to the device
5	After transferring the data to the basic unit, you will receive a message confirming successful downloading under "Info → General"

Additional internal components of the basic unit

The local control [LC] station is already wired, the external components are connected and the necessary internal connections have been made. The following additional internal components, which have already been connected as factory defaults and do not have to be parameterized, are now required:

- Cycl. Receive bit 0.0, bit 0.1 and bit 0.2 for the commands "LEFT," "OFF," and "RIGHT"
- Cycl. Receive bit 0.5 for switching between the local control station [LC] and PLC/PCS [DP] (remote)
  - Bit 0.5=0: Local control station [LC] active
  - Bit 0.5=1: PLC/PCS [PN] control station active.

The PLC/PCS [PN] control station and the change-over (plug S1) have already been connected as factory defaults with the bits (sockets) of the cyclic receive data. The assignments can be found in SIMOCODE ES under "Parameters → Motor Control → Control Stations".

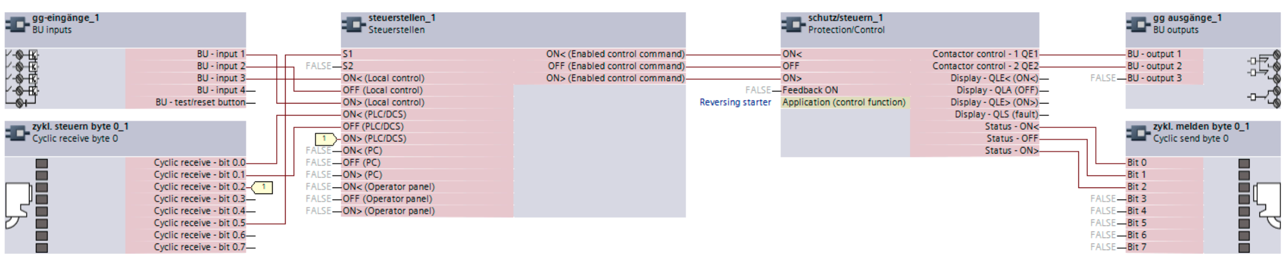


Figure 2-5 Functional diagram of reversing starter

Not all pre-assigned cyclic send data is shown here. The assignments can be found in SIMOCODE ES under "Function Blocks > Outputs > Cyclic Send Data".

The configuration with SIMOCODE pro is now complete. You now have a reversing starter with an additional control station implemented via PROFINET.

The contactors for clockwise and counterclockwise rotation are controlled by setting the corresponding bits.

Setting the IP configuration and station names with SIMOCODE ES 2007

The precondition for communication between the automation system and SIMOCODE pro via PROFINET is definition of the IP configuration and the PROFINET station name. This can be done in the following ways:

- With the configuration tool of your automation system
- Via SIMOCODE ES.

Proceed as follows:

Table 2- 4 Set IP parameters and PROFINET IO device names with SIMOCODE ES

Step	Description
1	Plug the PC cable into the system interface.
2	Start SIMOCODE ES.
3	Open the "Switching Device → Open Online" menu.
4	• Go online, e.g. via "Online & diagnostics" • Select the type of interface (SIRIUS PtP or PN/IE) • Select the PG/PC interface • Click the "Start search" button. A search is made for compatible stations • Select a station
5	Open the "Device Parameters → PROFINET Parameters" dialog box.
6	Choose the IP parameters to match the configuration in the automation system. Select the "Overwrite IP parameters in device" parameter. If the IP parameters are assigned by the IO Controller in the automation system, no setting is necessary here and the "Overwrite IP parameters in device" parameter must not be selected.
7	Select the PROFINET device name to match the configuration in the automation system. Select the "Overwrite device name in device" parameter. If the device name is assigned by the configuration tool of the automation system (e.g. STEP 7), no setting is required here and the parameter "Overwrite device names in device" must not be set.
8	Save the data in the basic unit with "Target System → Load to Device". The address is set. Confirm the change of address.

Setting IP parameters and PROFINET device names with STEP 7 HW Config

It is possible to set this parameter with the STEP 7 HW Config function "Target system → Edit Ethernet station."

The precondition for using this function is that the PG or the PC is also connected to SIMOCODE pro via Ethernet.

If the MAC address of the SIMOCODE pro V PN basic unit is used, you can assign the IP parameters and the PROFINET device names. You will find the MAC address on the front of the basic unit.

Alternatively, you can read the MAC address out via the local device interface with SIMOCODE ES with "Switching device → Open online" under PROFINET parameters.

Additional internal components of the basic unit

The local control [LC] station is already wired, the external components are connected and the necessary internal connections have been made. The following additional internal components, which have already been connected as factory defaults and do not have to be parameterized, are now required:

- Cycl. Receive bit 0.0, bit 0.1 and bit 0.2 for the commands "LEFT," "OFF," and "RIGHT"
- Cycl. Receive bit 0.5 for switching between the local control station [LC] and PLC/PCS [DP] (remote)
  - Bit 0.5=0: Local control station [LC] active
  - Bit 0.5=1: PLC/PCS [PN] control station active.

The PLC/PCS [PN] control station and the change-over (plug S1) have already been connected as factory defaults with the bits (sockets) of the cyclic receive data. The assignments can be found in SIMOCODE ES under "Device Parameters → Motor Control → Control Stations".

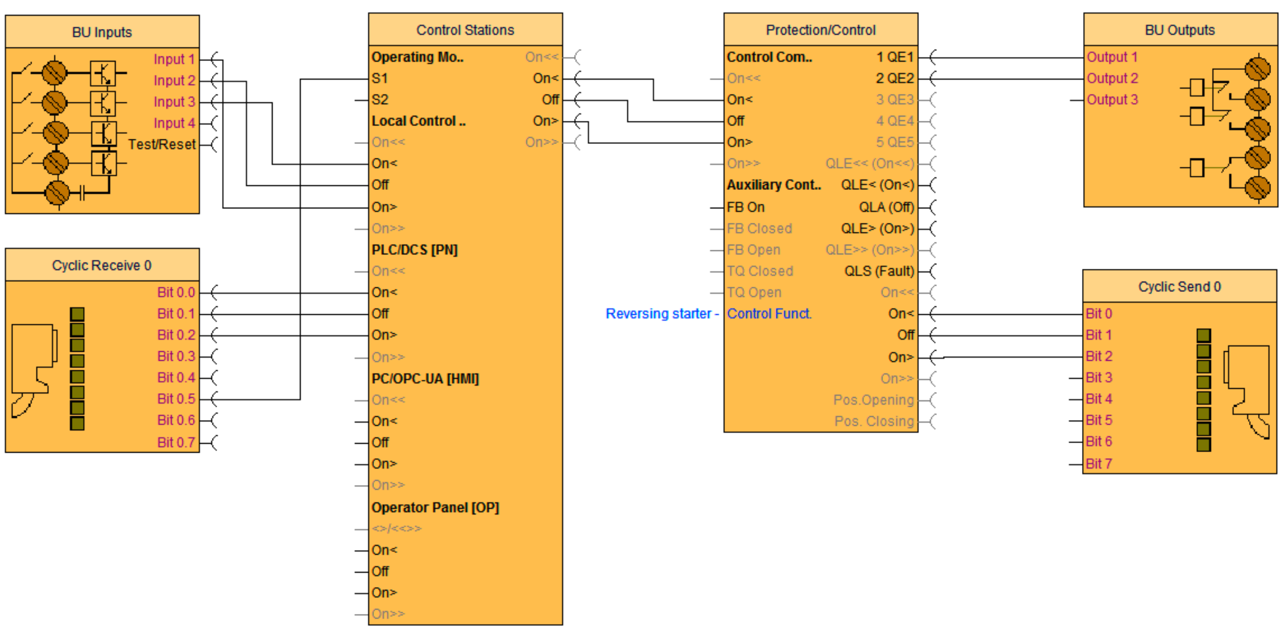


Figure 2-6 Functional diagram of reversing starter

Not all pre-assigned cyclic send data is shown here. The assignments can be found in SIMOCODE ES under "Function Blocks > Outputs > Cyclic Send Data".

The configuration with SIMOCODE pro is now complete. You now have a reversing starter with an additional control station implemented via PROFINET.

The contactors for clockwise and counterclockwise rotation are controlled by setting the corresponding bits.

List of abbreviations

A

A.1 List of abbreviations

See SIMOCODE pro – System Manual
(https://support.industry.siemens.com/cs/ww/en/view/109743957).

Index

C

D

F

L

M

P

R

S

T

SIEMENS

Industrial Controls

Motor management and control devices
SIMOCODE pro

System Manual

10/2022
A5E40507475002A/RS-AF/006

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Smart Infrastructure
Electrical Products
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GERMANY

A5E40507475002A/RS-AF/006
Ⓟ 10/2022 Subject to change

Table of contents

1 Introduction

1.1 What is SIMOCODE pro?

SIMOCODE pro (SIRIUS Motor Management and Control Device) is a flexible motor management system for motors with constant speeds in low-voltage applications.

SIMOCODE pro optimizes the link between the control system and the motor feeder, increases plant availability and allows significant savings to be made during installation, commissioning, operation and maintenance.

SIMOCODE pro is installed in the motor control center or in the low-voltage switchgear system and links the higher-level automation system and the motor feeder intelligently. It comprises the following functions:

- Multifunctional and electronic full motor protection, independently of the automation system
- Integrated control functions for motor control instead of hardware
- Detailed operational data, service data, and diagnostic data
- Fail-safe shutdown up to SIL3
- Open communication through PROFINET, Modbus TCP, and EtherNet/IP
- Parameterization with the SIMOCODE ES (TIA Portal) software package

Only the switching and short-circuit protection mechanisms of the main circuit (contactors, circuit breakers, fuses) are additionally needed.

1.2 Important notes

Purpose of this manual

The SIMOCODE pro System Manual describes in detail the motor management system and its functions. It contains information about configuring, commissioning, service and maintenance.

In addition to help on how to identify and rectify faults in the event of a malfunction, you will also find information specifically intended for service and maintenance personnel.

Required basic knowledge

To understand this manual you will require basic knowledge of low-voltage controls and distribution, digital circuit engineering and automation technology.

Scope of validity of the system manual

The system manual is applicable for the specified system components of SIMOCODE pro. It contains descriptions of the components that are valid at the time of publication.

Manual Collection

A Manual Collection (https://support.industry.siemens.com/cs/ww/en/view/109743951), a collection of the following five SIMOCODE pro manuals, is available in Industry Online Support:

- SIMOCODE pro - 1 Getting Started
- SIMOCODE pro - 2 System Manual
- SIMOCODE pro - 3 Parameterization
- SIMOCODE pro - 4 Applications
- SIMOCODE pro - 5 Communication.

SIMOCODE pro response tables

You can parameterize specific responses (deactivation, signaling, warning, tripping, delaying) for various SIMOCODE pro functions, such as overload. These responses are always displayed in tabular form:

- "X" = Applicable
- "—" = not applicable
- Factory settings are identified with a "d" for "default" in parentheses.

Response	Function 1	Function 2	Function 3
Tripping	—	X (d)	X
Warning	X (d)	X	—
Signaling	X	X	—
Deactivated	X	X	X (d)
Delay	0 to 25.5 s (default: 0)	—	—

Brief description of the responses:

- Tripping: The QE* contactor controls are tripped. A fault message is generated which is available as diagnostics via the communication bus. The fault message and the device-internal signal remain on until the appropriate length of time has elapsed or the cause of the fault has been eliminated and acknowledged.
- Warning: In addition to the device-internal signal, a warning signal is generated that is available as diagnostics via the communication bus.
- Signaling: Only a device-internal signal is generated, which can be further processed as required.
- Deactivated: The appropriate function is switched off, no signals are generated.

A delay time can also be set for specific responses.

Operating instructions and further information

- Please read the operating instructions of the respective components (Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man))
- In addition to the SIMOCODE pro manual collection, the following manuals are available to you:
  - The system manual "SIMATIC PROFINET System Description" (https://support.automation.siemens.com/WW/view/en/19292127)
  - The manual "Fault-tolerant S7-400H systems" (https://support.automation.siemens.com/WW/view/en/1186523)
  - Programming manual "PROFINET IO - from PROFIBUS DP to PROFINET IO" (https://support.automation.siemens.com/WW/view/en/19289930)
  - The application description "Saving Energy with SIMATIC S7 and ET200 S" (https://support.automation.siemens.com/WW/view/en/41986454)

More information

You can find more information on the internet at:

- SIMOCODE pro (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Siemens Industry Online Support (SIOS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert).

Disclaimer of liability

The products described have been developed to implement safety-related functions as part of a complete plant or machine. In general, a complete safety system consists of sensors, evaluation units, signaling devices and methods for safe tripping. The manufacturer is responsible for ensuring safe functioning of the complete plant or machine. Siemens AG, its subsidiaries, and associated companies (hereinafter referred to as "Siemens") are not in a position to guarantee every characteristic of a complete plant or machine not designed by Siemens.

Nor can Siemens assume liability for recommendations that appear or are implied in the following description. No new guarantee, warranty, or liability claims beyond the scope of the Siemens general terms of supply are to be derived or inferred with regard to the following description.

1.3 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

Link: Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en)

Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**
  Answers to frequently asked questions
- **Manuals/operating instructions**
  Read online or download, available as PDF or individually configurable.
- **Certificates**
  Clearly sorted according to approving authority, type and country.
- **Characteristics**
  For support in planning and configuring your system.
- **Product announcements**
  The latest information and news concerning our products.
- **Downloads**
  Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
  Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**
  Technical product data for support in planning and implementing your project

Link: Product support (https://support.industry.siemens.com/cs/ww/en/ps)

mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**
  Search for request number, product or subject
- **My filters**
  With filters, you limit the content of the online support to different focal points.

- **My favorites**
  With favorites you bookmark articles and products that you need frequently.
- **My notifications**
  Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.
- **My products**
  With product lists you can virtually map your control cabinet, your system or your entire automation project.
- **My documentation**
  Configure your individual documentation from different manuals.
- **CAx data**
  Easy access to CAx data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams
- **My IBase registrations**
  Register your Siemens products, systems and software.

1.4 Siemens Industry Online Support app

Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:

Android

iOS

1.5 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

1.6 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert.

1.7 Current information about operational safety

Important note for maintaining operational safety of your system

DANGER

Hazardous Voltage

Can Cause Death, Serious Injury or Risk of Property Damage

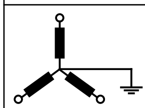
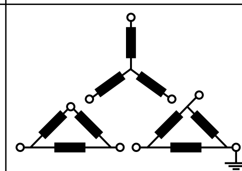
Please take note of our latest information!

Systems with safety-related characteristics are subject to special operational safety requirements on the part of the operator. The supplier is also obliged to comply with special product monitoring measures. We therefore also provide information in the newsletters Industrial controls (https://new.siemens.com/global/en/products/automation/industrial-controls/forms/newsletter.html) and Safety Integrated (https://new.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/newsletter.html) about new products, further technical developments as well as standards and guidelines.

1.8 Information for SIMOCODE pro regarding IEC60947-4-1:2018

1.8.1 Line system configurations

The voltage information regarding the SIMOCODE pro current and current/voltage measuring modules is valid for the following line system configurations according to IEC 60947-4-1:

Three-phase four-wire systems	Three-phase three-wire systems
	
[V]	[V]
--	230
230 / 400	400
260 / 440	440
--	500
400 / 690	600

The nameplates of the current/voltage measuring modules state a maximum line voltage of 400/690 V.

1.8.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

1.8.3 Touch current

A protective impedance is present in each of the 3UF711x-1xA01-0 / 3UF712x-1xA01-0 current/voltage measuring modules. This protective impedance is 7.2 MΩ per phase (product version E04 and higher).

DANGER

Hazardous touch current

When connecting multiple SIMOCODE systems in parallel, make sure that no hazardous touch current occurs.

The SIMOCODE basic units in the 110-240 V AC/DC version include galvanic isolation. This avoids the effect of parallel connection via a central supply voltage for multiple systems when these basic units are used.

The SIMOCODE basic units in the 24 V DC version do not include galvanic isolation.

NOTICE

PELV power supply required

When using numerous current/voltage measuring modules with these basic devices, deploy a PELV power supply, for example, to prevent a potential touch current.

NOTICE

Ground leakage current

Pay attention to any resulting ground leakage current that may occur.

1.9 Information about third-party software

Third-party software components

This product, this solution or this service ("product") contains the third-party software components listed below. These consist either of open source software that is licensed under a license recognized by Open Source Initiative (http://www.opensource.org) or a license defined by Siemens as being comparable ("OSS") and/or commercial software or freeware. With regard to the OSS components, the relevant OSS terms and conditions take priority over all other terms and conditions applicable to this product.

SIEMENS is providing you with the OSS portions of this product at no additional cost. Insofar as SIEMENS has combined or linked, according to the definition of the applicable license, specific components of the product with OSS components that are licensed under GNU LGPL Version 2 or a later version, and insofar as the applicable object file may not be used without restrictions ("LGPL-licensed module", whereby the LGPL-licensed module and the components with which the LGPL-licensed module is combined are hereinafter referred to as "combined product") and the applicable LGPL license criteria are fulfilled, you may additionally (i) edit the combined product for your own purposes and may in particular acquire the right to edit the combined product to link it with a modified version of the LGPL-licensed module and (ii) reverse engineer the combined product, but solely for the purpose of error correction of your edits. The right to edit shall not include the right to distribute. You must treat as confidential all information you acquire from reverse engineering of the combined product.

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Use the Support Request online form to send your query directly to our Technical Support. After describing your query in a few guided steps, you will immediately be provided with possible suggestions for solving the problem.

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1.10 Recycling and disposal

For environmentally-friendly recycling and disposal of your old device, contact a company certified for the disposal of used electrical and electronic equipment, and dispose of the device as specified in the regulations for your particular country.

1.11 Device series

The following functionally graduated device series are available for SIMOCODE pro:

- Basic units:
  SIMOCODE pro C - the compact system for PROFIBUS DP communication with a direct-on-line and reversing starter function and/or for controlling a circuit breaker (MCCB).
- General Performance units:
  - SIMOCODE pro S - the smart system for PROFIBUS DP with direct-on-line, reversing, and star-delta starter function or for controlling a circuit breaker or soft starter. Its expandability with a multifunction module ensures there are always plenty of inputs and outputs. It enables precise ground-fault monitoring via the 3UL23 residual current transformer and temperature measurement.
  - SIMOCODE pro V PN GP - the smart system for PROFINET with direct-on-line, reversing, and star-delta starter function or for controlling a circuit breaker or soft starter. Its expandability with an expansion module ensures there are always plenty of inputs and outputs, precise ground-fault monitoring via the 3UL23 residual current transformer and temperature measurement.
- High Performance units:
  SIMOCODE pro V – the variable system that offers numerous functions, such as voltage measurement and fail-safe shutdown, in addition to all the SIMOCODE pro C/pro S functions. Devices are available for the following communication protocols:
  - PROFIBUS DP
  - Modbus RTU
  - PROFINET
  - EtherNet/IP.

See Check list for selecting a device series (Page 53).

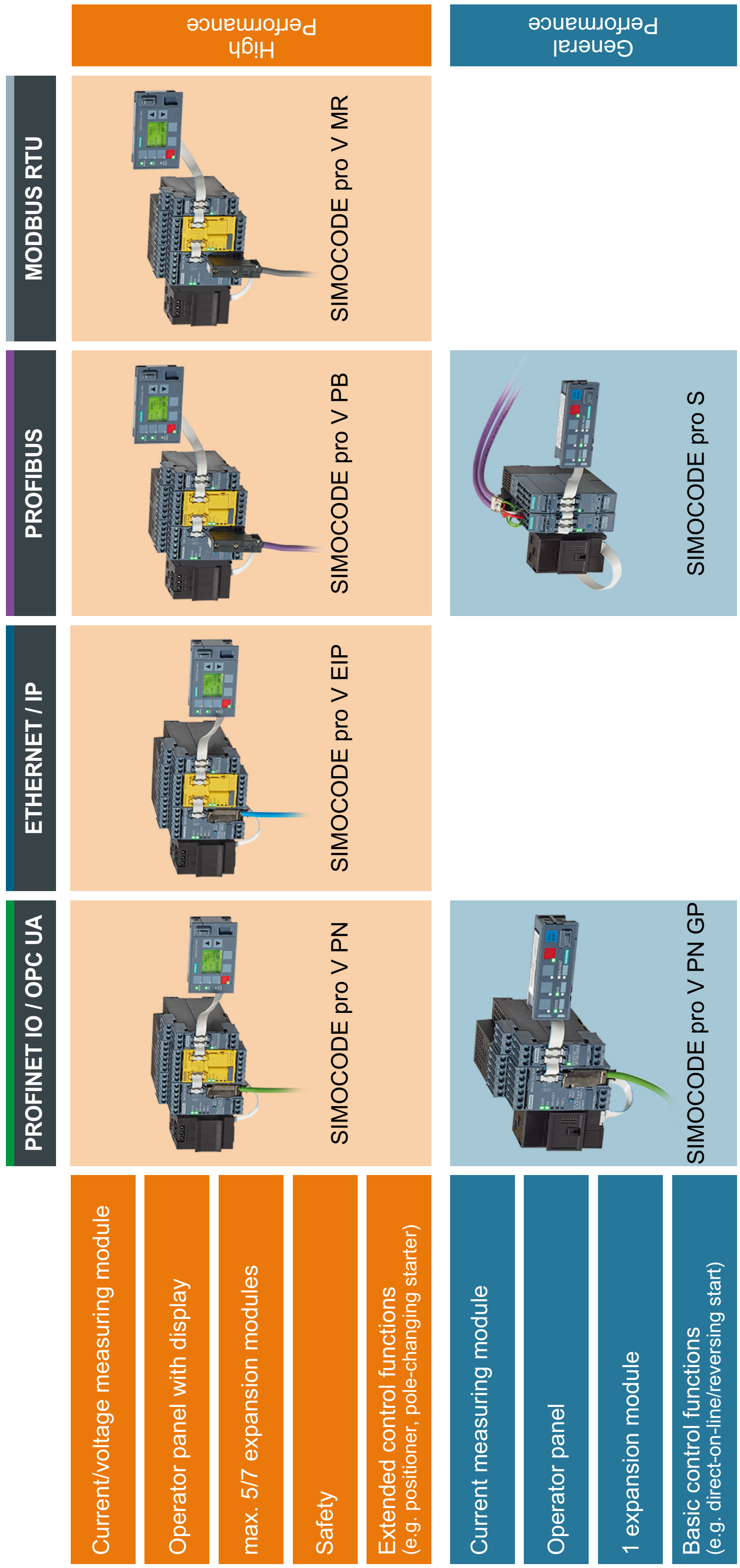

Figure 1-1 SIMOCODE pro device series

1.12 Modules, interfaces, configuration options

For each feeder, every system comprises a basic unit and a separate current measuring module. Both modules are connected to each other electronically via the system interface, by means of a connecting cable, and can be installed together as a unit (behind one another) or separately (side-by-side). An operator panel can also be connected optionally via the second system interface on the basic unit, and installed in the switchgear cabinet door. The current measuring module and the operator panel are connected to the basic unit via connecting cables, which also supply the power. More inputs, outputs and functions can be added to the SIMOCODE pro S, pro V PB, pro V MR, pro V EtherNet/IP and pro V PN /pro V PN GP basic units by means of optional expansion modules, thus supplementing the inputs and outputs already existing on the basic unit. All modules are connected by connecting cables. The connecting cables are available with different lengths (ribbon cable 0.025 m, 0.1 m, 0.15 m, 0.3 m, 0.5 m; round cable 0.5 m, 1.0 m, 2.5 m).

NOTICE
Maximum length of the connecting cable
The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit!

NOTICE
The maximum distance between modules
The maximum distance between the modules (e. g. between the basic unit and the current measuring module) must not exceed 2.5 m.

Additional control programs (star-delta starters, Dahlander starters, pole-changing starters, soft starters, each program also possible in combination with reversing starter, solenoid valve and positioner) are integrated in SIMOCODE pro V High Performance units. The SIMOCODE pro V device type is also particularly versatile. Its functionality can be expanded, if required, for example:

- The number and type of binary inputs and outputs can be increased in stages and adapted.
- A current/voltage measuring module can be used for additional voltage measurement and for monitoring power-related measured values (power management).
- A temperature module enables the evaluation of several analog temperature sensors.
- A ground-fault detection system can be integrated together with a residual-current transformer.
- An analog module extends the system by additional analog inputs and outputs, for example, for fill-level or flow-rate monitoring.
- An operator panel with display (OPD) is available as an alternative to the standard operator panel (OP) (restriction in the case of the SIMOCODE pro V PB: from version *E03*).

A special current/voltage measuring module for dry-running protection of centrifugal pumps in hazardous areas by monitoring the active power can be used in combination with the following high performance devices with PTB 18 ATEX 5003 X/ ITS21UKEX0455X:

- SIMOCODE pro V PB from version *E16*
- SIMOCODE pro V PN from version *E13*
- SIMOCODE pro V EIP from version *E04*

SIMOCODE pro C and SIMOCODE pro S are upwardly-compatible with SIMOCODE pro V. This means you can combine different series in your plant according to functional requirements.

Depending on functional requirements, the systems can be used simultaneously in a low-voltage switchboard without any problems and without any additional effort.

Parameterization of SIMOCODE pro C or SIMOCODE pro S can be transferred without a problem.

Advantages/bene its/con iguration with SIMOCODE pro

2

2.1 Advantages/benefits

- The quantity of cabling required between the motor feeder and the PLC is reduced significantly by connecting the entire motor feeder to the process control system via the fieldbus (see Figures "SIMOCODE pro, integrated in the main circuit, control circuit and at automation level (PLC)")
- Automated processes are decentralized by means of configurable control and monitoring functions in the feeder. This saves automation system resources and ensures that the feeder is fully functional and protected even if the control system or bus system fails.
- By recording and monitoring operating, service and diagnostics data in the feeder and process control system, plant availability is increased, and the feeder is easier to service and maintain.
- The user can implement plant-specific requirements for every motor feeder thanks to the high degree of modularity.
- SIMOCODE pro provides compact solutions and different levels of functions for every customer application.
- By replacing the control circuit hardware with an integrated control function, the quantity of required hardware components with wiring is reduced. This drives down storage costs and limits potential wiring errors.
- Using electronic full motor protection allows the motors to be used more efficiently and ensures that the tripping characteristic remains stable and the tripping response stays the same, even after many years.

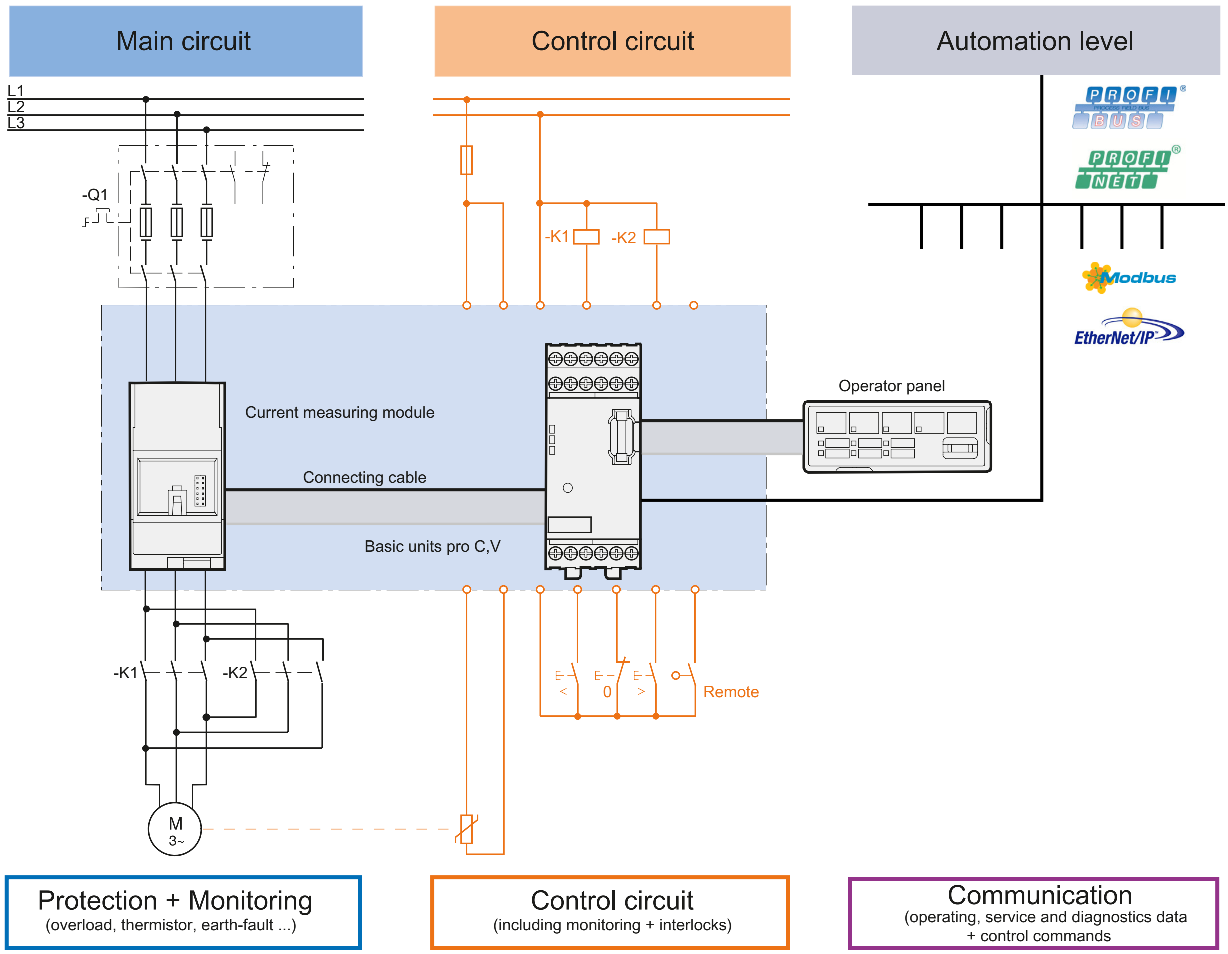

Figure 2-1 SIMOCODE pro C, pro V, integrated in the main circuit, control circuit and at automation level (PLC)

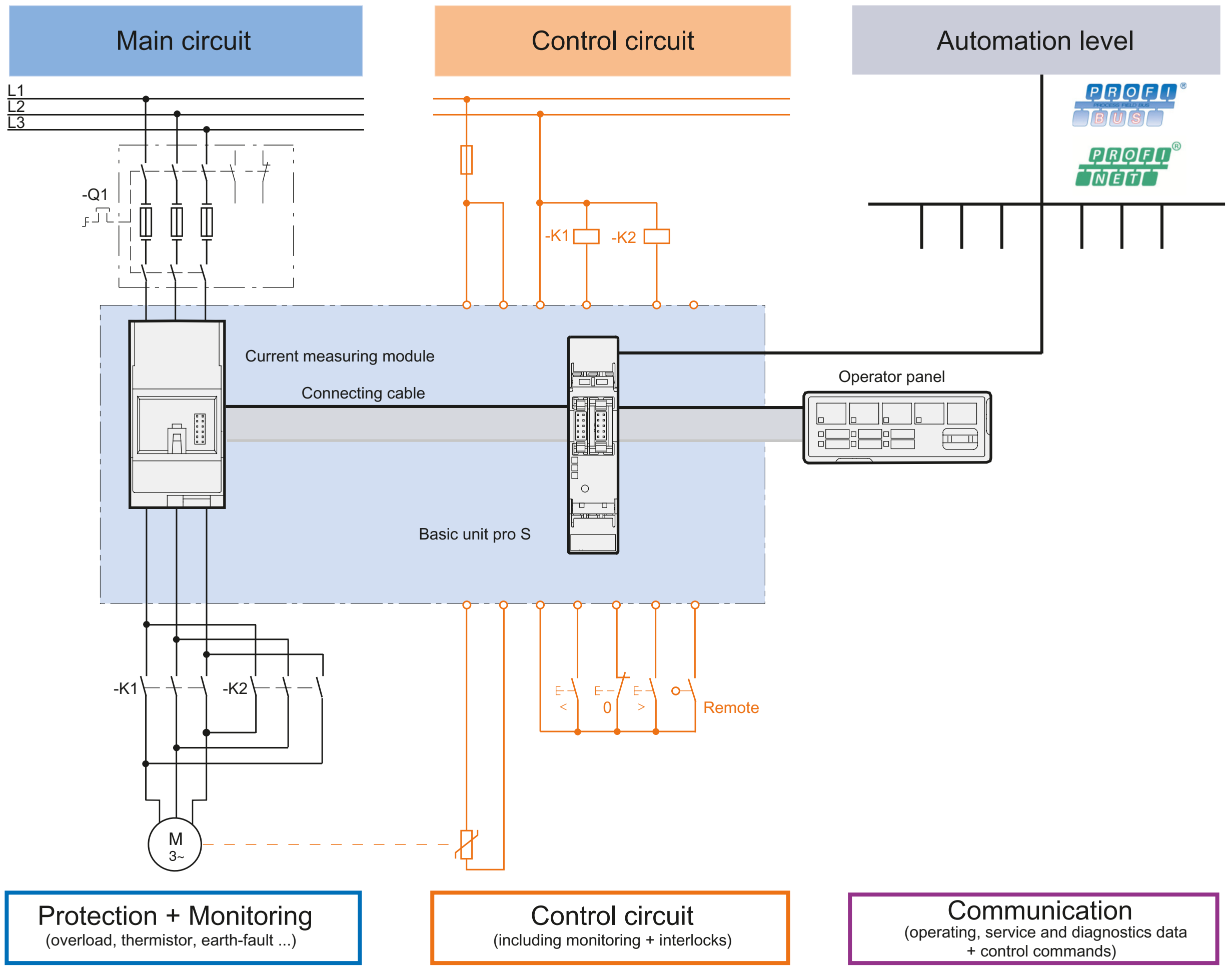

Figure 2-2 SIMOCODE pro S, integrated in the main circuit, control circuit and at automation level (PLC)

2.2 Independent operation

SIMOCODE pro protects and controls the motor feeder, independently of the automation system. Even if the automation system (PLC) fails, or if communication is disrupted, the motor feeder remains fully protected and controllable. SIMOCODE pro can be used without being connected to the fieldbus. This can easily be connected later, if required.

2.3 Simplifying configuration with SIMOCODE pro

Conventional configuration without SIMOCODE pro

Individual components are used for control, monitoring and signal pre-processing. The component and wiring requirements for this type of configuration are as follows:

- Use and wiring of overload relays, thermistor evaluation devices, current transformers and analog/digital converters
- Wiring of the control circuit
- Connection of start / stop control devices
- The contactor must be brought into locking mode via the auxiliary switches
- Wiring of the interlocks

The following figure illustrates the conventional configuration of a direct starter:

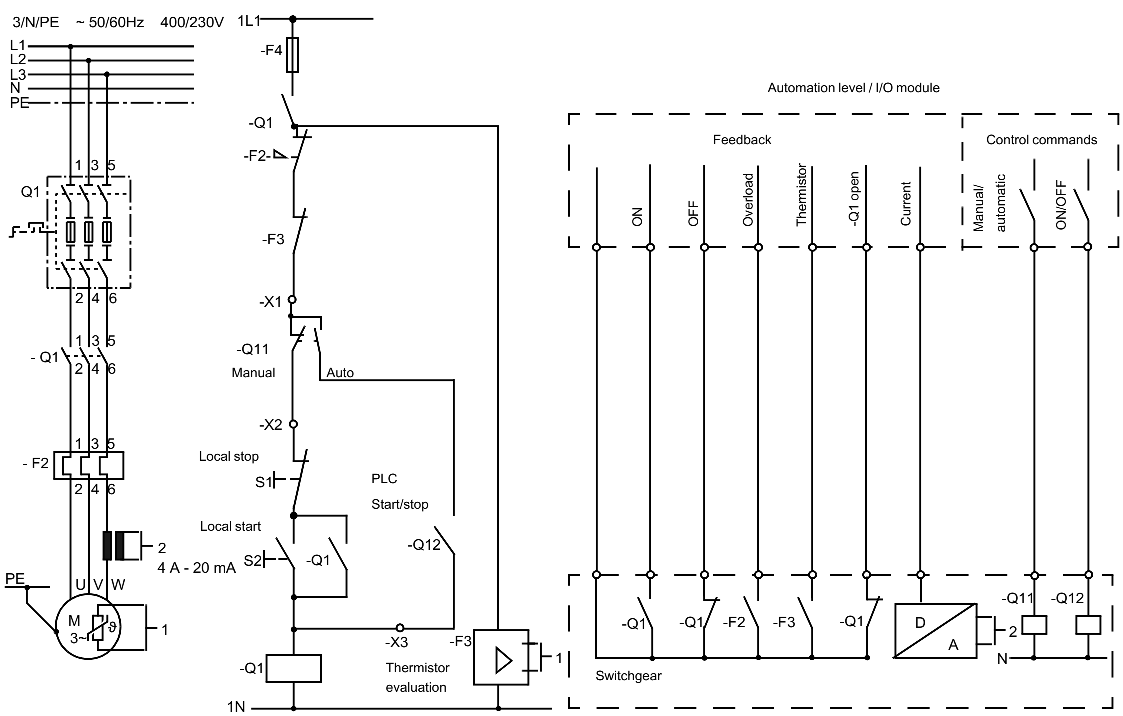

Figure 2-3 Conventional configuration of a motor feeder (direct starter)

Configuration with SIMOCODE pro

SIMOCODE pro only is used to perform all control, monitoring and signal pre-processing functions.
The advantages of this configuration are as follows:

- Additional overload relays, thermistor evaluation devices, current transformers and analog/ digital converters are not necessary.
- The wiring of the control circuit (interlocking) is simplified.

- The start and stop switches are wired directly to the inputs of the basic unit.
- The contactor coil is energized via the output of the basic unit. An auxiliary contact for locking is not required.

The following figure illustrates a configuration with SIMOCODE pro connected to PROFIBUS:

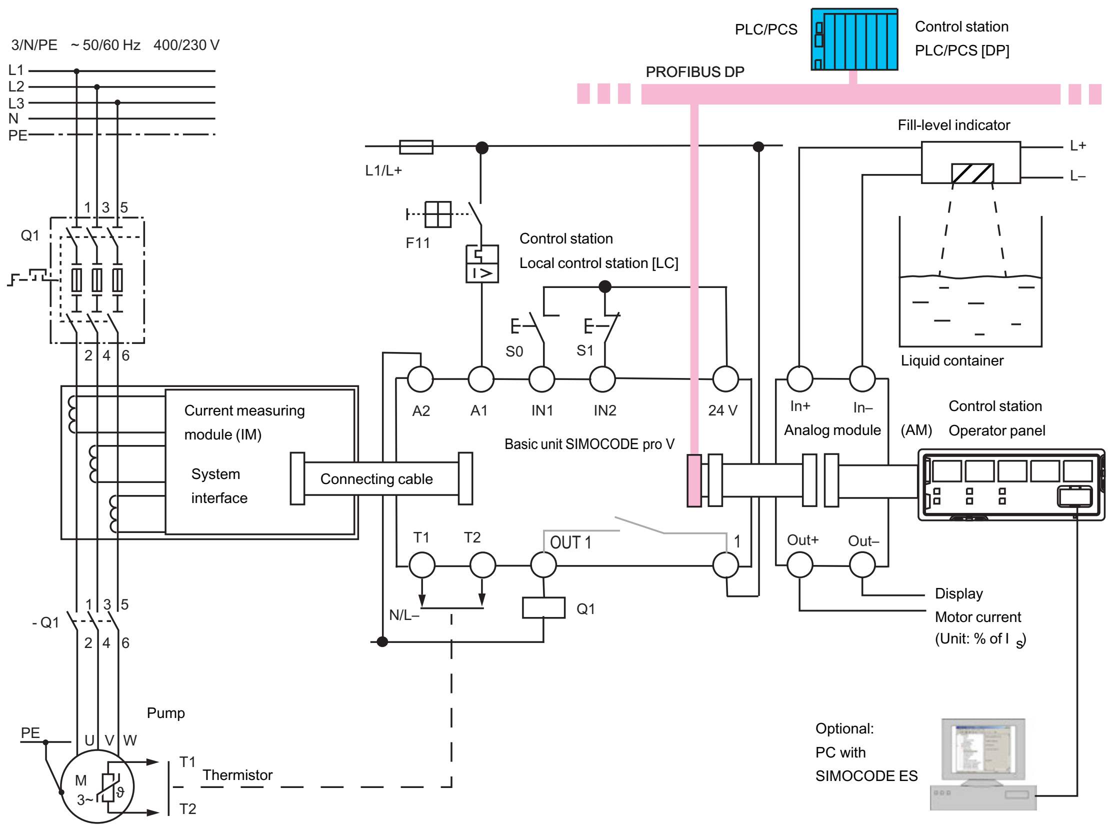

Figure 2-4 Configuration of a load feeder (direct-on-line starter) with SIMOCODE pro

2.4 Typical configuration

The following figures show typical hardware configurations:

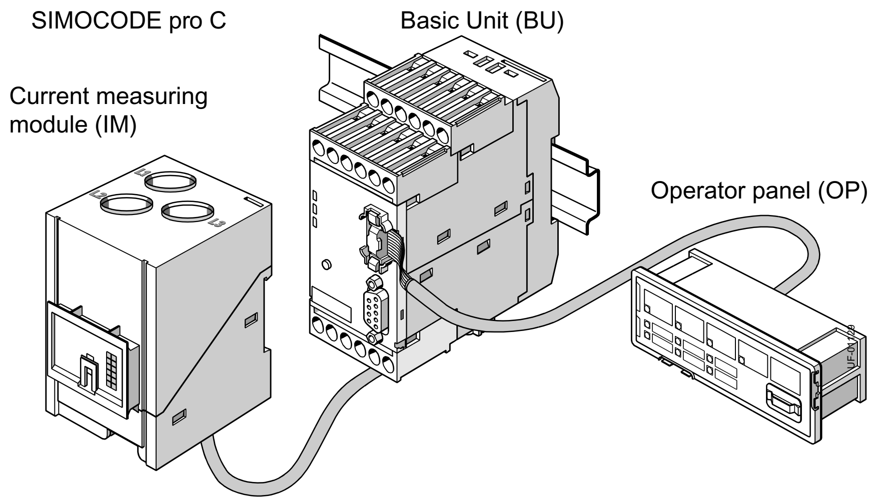

Figure 2-5 Typical SIMOCODE pro C hardware configuration

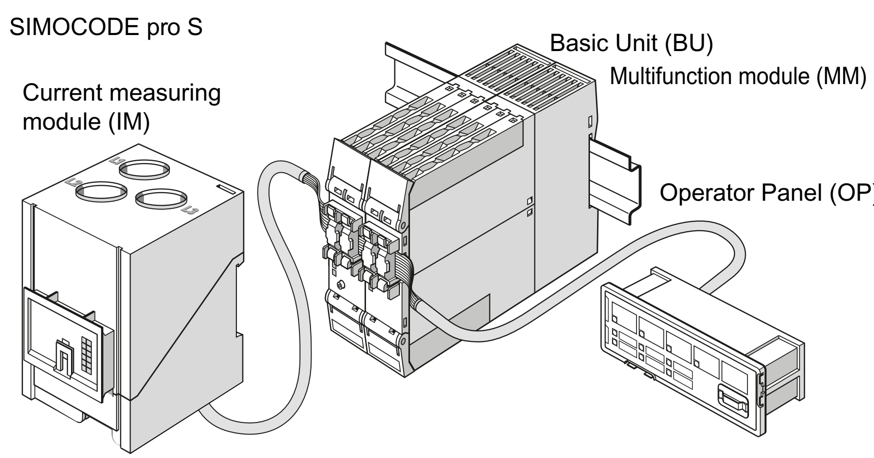

Figure 2-6 Typical SIMOCODE pro S hardware configuration

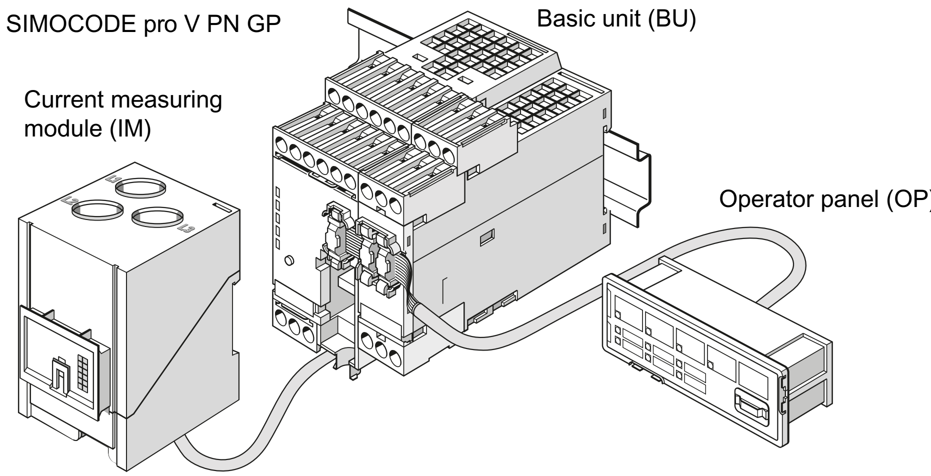

Figure 2-7 Typical SIMOCODE pro V PN GP hardware configuration

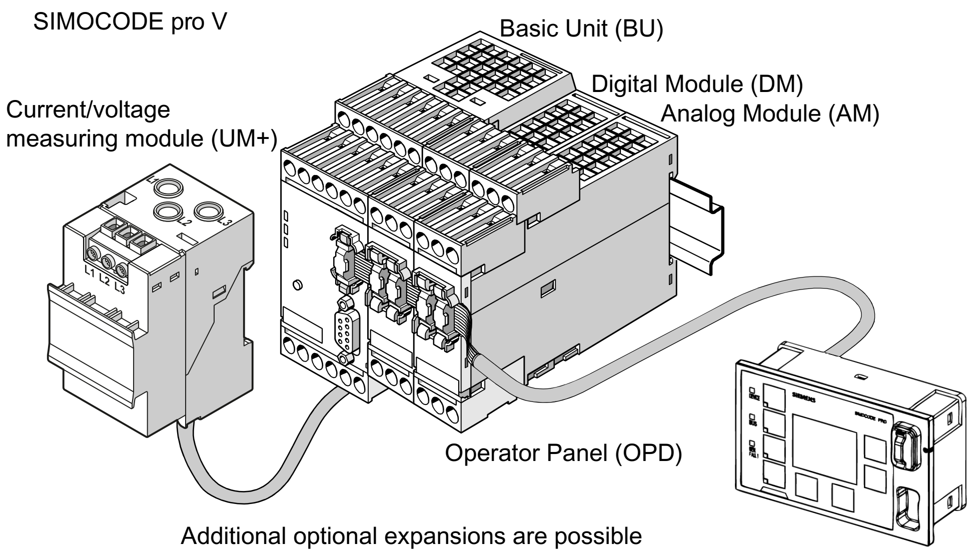

Figure 2-8 Typical SIMOCODE pro V PROFIBUS/Modbus RTU hardware configuration

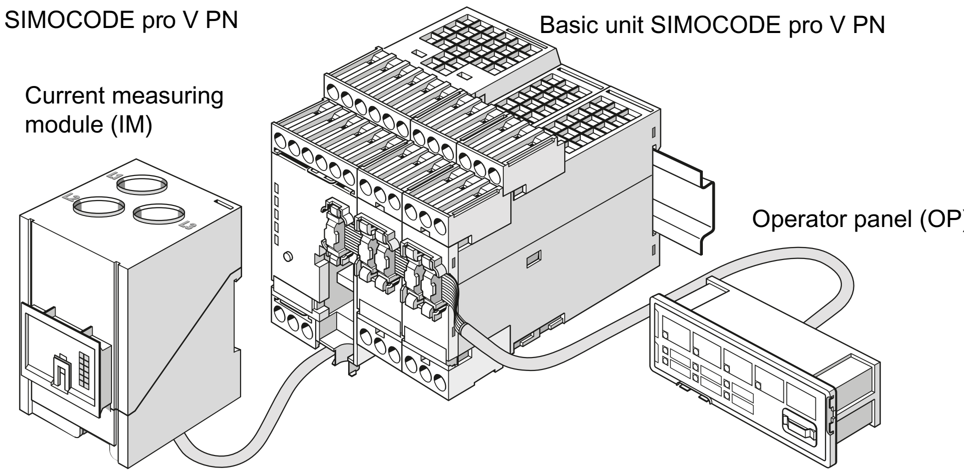

Figure 2-9 Typical SIMOCODE pro V PN/EtherNet/IP hardware configuration

For information about system components, see Chapter Description of system components (Page 73).

Areas of application 3

SIMOCODE pro is often used for automated processes where plant downtimes are very expensive (e.g. steel or cement industry) and where it is important to prevent plant downtimes through detailed operating, service and diagnostics data or to localize the fault very quickly in the event of a fault.

SIMOCODE pro is modular and space-saving and suited especially for operation in motor control centers (MCC) in the process industry and in power plants.

Applications:

- Protection and control of motors:
  - in hazardous areas for different types of protection according to the ATEX Directive 2014/34/EU (see also Section Safety and commissioning information for Ex areas (Page 279))
  - in hazardous areas in accordance with the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016:1107), and associated amendments
  - Heavy-starting motors (paper, cement and metal industries; water management)
  - In high-availability plants (chemical, oil, and raw material processing industry, power plants)
- Dry-running protection of centrifugal pumps by active power monitoring of motors and shutdown if power consumption falls below a minimum value – especially also including hazardous areas
  - Type of ignition protection b "Control of ignition sources", ignition protection system b1, approval according to DIN EN ISO 80079-37
  - Approval according to ATEX Directive 2014/34/EU and IEC Ex
  - Approval in accordance with the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016:1107), and associated amendments

  See also Chapter Dry-running protection for centrifugal pumps by active power monitoring (Page 289) in the safety and commissioning information for Ex areas.

SIMOCODE pro is especially designed for the chemical industry (including oil and gas), the steel industry, water management, and the paper, pharmaceutical, cement and glass industries. Further applications include power plant engineering and diamond, gold and platinum mines. Based on the experience gained with the predecessor system SIMOCODE DP, SIMOCODE pro has been tailored even more specifically to the requirements of these industries. The availability of motors and thus the entire process plays an important role in these industries. Downtimes caused by faults often lead to high costs. This is why it is even more important to detect potential faults early on and to initiate targeted, preventative measures. SIMOCODE pro provides the user with a motor management system based on years of experience and the latest technology.

Features

4

Multifunction, electronic full motor protection for rated motor currents up to 820 A

SIMOCODE pro provides comprehensive protection of the motor feeder by means of a combination of delayable, multi-level protection and monitoring functions:

- Current-dependent delayed electronic overload protection (CLASS 5E to 40E)
- Thermistor motor protection
- Phase failure/unbalance protection
- Stalled rotor protection
- Monitoring of adjustable limit values for the motor current
- Voltage monitoring
- Active power monitoring
- Dry-running protection for centrifugal pumps by means of active power monitoring
- Monitoring of cos phi (no-load operation/load shedding)
- Ground-fault monitoring
- Temperature monitoring, e.g. using Pt100/Pt1000
- Monitoring of operating hours
- Monitoring of downtimes
- Monitoring the number of starts within a specific period of time
- Safety-related tripping of motor feeders, e.g. fail-safe tripping in the process industry, locally or via fieldbus (see manual "SIMOCODE pro Safety fail-safe digital modules" (https://support.automation.siemens.com/WW/view/en/50564852))

Recording of measured curves

SIMOCODE pro is able to record measured curves and can, for example, illustrate the characteristic curve of the motor current during motor startup.

Flexible motor control with integrated control functions (instead of extensive hardware interlocks):

SIMOCODE pro has many pre-defined, integrated motor control functions, including all necessary connections and interlocks:

- Overload relay
- Direct starter (direct-on-line starter)
- Reversing starter
- Star-delta starter, also with direction reversal
- Two speeds, motors with separate windings (pole-changing starter), also with direction of rotation reversal

- Two speeds, motors with separate Dahlander windings, also with direction of rotation reversal
- Positioner control
- Solenoid valve control
- Actuation of a circuit breaker
- Soft starter control, possibly combined with reversing starter

These control functions are pre-defined in SIMOCODE pro and can be assigned freely to device inputs and outputs.

These pre-defined control functions can also be adjusted flexibly to meet customer requirements of the motor feeder, without requiring additional auxiliary relays in the control circuit. This is achieved by means of freely parameterizable logic modules (truth tables, counters, timers, pulse width modulators, etc.) and standard functions (power failure monitoring, emergency start, external fault monitoring, etc.).

Detailed operating, service and diagnostics data:

SIMOCODE pro provides a range of operating, service and diagnostics data and helps to detect impending faults in good time and stop these occurring with preventative measures. If a fault occurs, it can be diagnosed, traced and resolved within a short period of time. Plant downtime is thus reduced to a minimum or does not occur at all. See Chapter Overview of functions (Page 39).

Communication:

The SIMOCODE pro basic units have integrated communication bus interfaces and are thus able to replaces all individual wiring and distribution boxes normally required to exchange data with a higher-level automation system with a single bus cable.

Communication through PROFIBUS:

PROFIBUS stands for Process Field Bus. PROFIBUS is a multi-vendor standard for the networking of field devices (e.g. PLCs, drives, actuators, or sensors) in compliance with the European process and fieldbus standard (PROFIBUS standard EN 50170, Volume 2, -PROFIBUS). It specifies the functional, electrical and mechanical characteristics of a bit-serial fieldbus system.

PROFIBUS is a bus system that networks PROFIBUS-compatible automation systems and field devices at the cell and field level. PROFIBUS is available with the DP (= Distributed Peripherals), FMS (= Fieldbus Message Specification), PA (= Process Automation), or TF (= Technological Functions) protocol.

PROFIBUS DP is a bus system with the DP (distributed I/O) protocol. The main task of PROFIBUS DP is to manage the fast, cyclic data exchange between the central DP devices and the I/O devices.

PROFIBUS DPV1 is the extension of the DP protocol. It enables acyclic data exchange of parameter, diagnostic, receive and test data.

SIMOCODE pro C, pro S and pro V support, among others:

- Baud rates up to 1.5 Mbit / s or 12 Mbit / s
- Automatic baud rate detection
- Communication with one master (class 1) and up to two masters (class 2)
- Time stamp with high timing precision (SIMATIC S7) for SIMOCODE pro V

- Cyclic services (DPV0) and acyclic services (DPV1)
- DPV1 communication downstream from the Y-Link.

See Chapter "PROFIBUS communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Communication via PROFINET:

PROFINET (Process Field Network) is the open Industrial Ethernet Standard from Profibus & Profinet International (PI) for automation.

Within the context of Totally Integrated Automation (TIA), PROFINET is the systematic continuation of PROFIBUS DP, the established fieldbus, and Industrial Ethernet, the communication bus for the cell level. Experiences from both systems have been and are being integrated in PROFINET.

SIMOCODE pro V PN (High Performance unit) has two integrated PROFINET interfaces and provides communication functions via PROFINET IO with the following properties:

- Integrated switch with two ports
- Device replacement without removable medium/programming device
- Shared device in combination with DF-FP modules
- Media redundancy
- System redundancy
- RT communication
- Support for PROFIenergy

SIMOCODE pro V PN GP (General Performance unit) has one/two integrated PROFINET interface(s) and provides communication functions via PROFINET IO with the following properties:

- Integrated switch with two ports (device with two ports)
- Device replacement without removable medium/programming device
- Shared device in combination with DF-FP modules
- Media redundancy (device with two ports)
- System redundancy
- RT communication
- Support for PROFIenergy

See Chapter "PROFINET communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Communication via Modbus:

Modbus RTU (Remote Terminal Unit) is a standard protocol for network communication and uses the electrical RS485 connection for serial data transmission between Modbus devices in the network.

Modbus RTU uses a master/slave network in which the entire communication is triggered by only one master device while the slaves can only respond to the request of the master. The master sends a request to a slave address and only this slave address responds to the command (exception: broadcast frames to slave address 0 that are not acknowledged by the slaves).

SIMOCODE pro V Modbus devices have been developed in accordance with the "MODBUS over serial line specification and implementation guide" (available at www.modbus.org (http://www.modbus.org)). You can find the relevant information on establishing Modbus RTU communication in this specification. The key points for a Modbus RTU communication network ("Multipoint System requirements") listed in the specification apply equally for a communication network with SIMOCODE devices.

See Chapter "Modbus communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Communication via EtherNet/IP:

EtherNet/IP (EtherNet Industrial Protocol, often simply called EIP) is a real-time Ethernet that is used mainly in automation engineering. EtherNet/IP was developed by Allen-Bradley and was later handed over to the Open DeviceNet Vendor Association (ODVA) as an open standard. See Open DeviceNet Vendor Association (http://www.odva.org).

Besides PROFINET and Modbus/TCP, EtherNet/IP is an Ethernet-based fieldbus that is currently widely spread.

SIMOCODE pro V EtherNet/IP devices were developed in compliance with the EtherNet/IP standard and have the following properties:

- Integrated switch with two ports
- Media redundancy via Device Level Ring (DLR)
- System redundancy (as of E03).

See Chapter "EtherNet/IP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Overview of functions 5

5.1 Protection functions

Detailed description: See Chapter "Motor protection" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

Overload protection

Current-dependent electronic protection of three-phase and AC motors with adjustable tripping characteristics (class times) according to IEC 60947-4-1 requirements.

Unbalance protection

Protects motors from excessive temperatures caused by excessive phase unbalance.

Phase failure protection

Protects motors from excessive temperatures caused by phase failure.

Stalled rotor protection

Immediate trip after the motor current overshoots an adjustable threshold.

Thermistor protection

SIMOCODE pro provides the option of connecting thermistor sensors (binary PTC) for monitoring the motor temperature.

Dry-running protection for centrifugal pumps

The following high performance devices with PTB 18 ATEX 5003 X / ITS21UKEX0455X can be used to implement dry-running protection of centrifugal pumps (non-electrical devices) through active power monitoring and motor shutdown:

- SIMOCODE pro V PB from version *E16*
- SIMOCODE pro V PN from version *E13*
- SIMOCODE pro V EIP from version *E04*

This applies to centrifugal pumps with progressive flow characteristics, which are also suitable for pumping flammable media and are also installed in hazardous areas.

⚠ WARNING
Installation in potentially explosive atmospheres
SIMOCODE pro itself is not suitable for installation in potentially explosive atmospheres!

If the active power, and thus the flow rate, falls below a minimum value, the motor - and thus the centrifugal pump - is switched off The devices support monitoring of the minimum flow rate for a freely selectable minimum value. A delay time (effective during operation including the pump's regular switch-off) can be specified to minimize the probability of incorrect tripping in addition to the parameter for the trip level of the minimum active power (which corresponds to a minimum flow rate). During the start-up procedure, operation with active power below the trip level can constitute a regular operating status of short duration (depending on the procedure used to open the pressure-side shut-off valve). For this reason, a start-up bridging time can be specified to prevent incorrect tripping during the start-up procedure.

The parameters can be entered using the "SIMOCODE ES" (TIA Portal) engineering software.

It is also possible to determine the trip level in a "teach-in" and to enter the further parameters with the aid of menu-guided input screens. Using this method, the operating point with optimum flow rate and the point with minimum flow rate are started up with real operating medium, as a result of which the trip level of the minimum active power is determined. The teach-in has to be repeated following any changes in the pump or system characteristics (e.g. as a result of changing the operating medium or of intervention in the plant configuration).

With regard to dry-running protection for centrifugal pumps, a current/voltage measuring module especially intended for this function is also required in addition to the basic unit.

See also:

- Chapter "Dry-running protection for centrifugal pumps by active power monitoring (Page 289)" in the safety and commissioning information for Ex areas
- Chapter "Dry-running protection for centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

5.2 Monitoring functions

Detailed description: See Chapters "Monitoring functions" and "Logic blocks" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

Current limit monitoring

Current limit monitoring is used for process monitoring. This enables incipient anomalies in the system to be detected in good time. If a current limit is exceeded but still below the overload limit, it can, for example, indicate a dirty filter on a pump, or an increasingly sluggish motor bearing. If the current limit is undershot, it can be the first sign of a worn-out drive motor belt.

Ground-fault monitoring

Residual current monitoring relays are used in industry to

- Protect systems from damage caused by residual currents
- Prevent production losses caused by unplanned downtime
- Perform maintenance to meet all demands.

Basic units have:

- An internal ground-fault monitoring system: For motors with a 3-wire connection, the basic unit calculates a possible fault current/ground-fault current from the total current via a current measuring module or a current / voltage measuring module. Internal ground-fault monitoring is only possible for motors with a 3-phase connection in networks that are either grounded directly or grounded with low impedance.
- External ground-fault monitoring in SIMOCODE pro S and SIMOCODE pro V [4)] : The external ground-fault monitoring using residual current transformer 3UL23 and ground-fault module is normally used in the following cases:
  - in cases in which power systems are grounded with high impedance
  - in cases, in which precise detection of the ground-fault current is necessary, for example, for condition monitoring.

  A ground-fault module can be used to create an additional input on the SIMOCODE pro V and SIMOCODE pro V PN GP basic units to connect a 3UL23 residual current transformer.
  A multifunction module can be used to create an additional input on the SIMOCODE pro S basic unit to connect a 3UL23 residual current transformer.
  With ground-fault detection using the 3UL23 residual current transformer, it is possible to determine the precise residual current as a measured value, and to define freely selectable warning and trip limits in a wide range from 30 mA - 40 A.
  See also Chapter "External ground-fault monitoring with 3UL23 residual current transformer" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

Voltage monitoring [1)]

High Performance SIMOCODE pro V allows voltage monitoring of a three-phase current network or a single-phase network for undervoltage or further availability:

- Monitoring for undervoltage: Two-level monitoring for freely selectable limits. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized.
- Monitoring for further availability: Even when the motor is switched off, SIMOCODE pro can indicate the further availability of the feeder by measuring the voltage directly at the circuit breaker or fuses.

Temperature monitoring [2)]

The SIMOCODE pro S, SIMOCODE pro V and SIMOCODE pro V PN GP devices offer the option of implementing analog temperature monitoring, e.g. of the motor windings or the bearings - SIMOCODE pro S with the multifunction module, SIMOCODE pro V/SIMOCODE pro V PN with the temperature module.

SIMOCODE pro S and SIMOCODE pro V support two-level monitoring for overtemperature for freely selectable limit values. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized and delayed. Temperature monitoring takes into account the highest temperature of all the sensor measuring circuits in use.

Active power monitoring [1)]

The active power curve of a motor reflects its actual load. Excess load results in increased wear of the motor and, thus, may lead to premature motor failure. Excessively low active power can indicate no-load operation of the motor, for example.

High Performance SIMOCODE pro V offers the option of two-level active power monitoring for freely selectable upper and lower limits respectively. The response on reaching a prewarning level or trip level can be freely parameterized and delayed.

Cos phi monitoring [1)]

The power factor fluctuates more than the motor current, particularly in the low-end performance range of a motor. For this reason, the monitoring of the power factor comes into consideration for the detection of faults. Examples: Breakage of a drive belt or drive shaft

High Performance SIMOCODE pro V enables two-level monitoring of the power factor cos phi for freely selectable minimum limits. The devices' response on reaching a prewarning level or trip level can be freely parameterized and delayed.

Monitoring operating hours, stop time, and number of starts

SIMOCODE pro can monitor the operating hours and stop times of a motor to avoid plant downtimes due to failed motors caused by either running too long (wearing out) or being stopped for too long. For example, if an adjustable limit value is exceeded, a signal indicating that the relevant motor requires maintenance or replacement can be generated. After the motor has been replaced, the operating hours and stop times can be reset.

To avoid excessive thermal loads and premature aging of a motor, the number of motor starts in a selected time frame can be limited. The limited number of possible starts can be indicated by pre-warnings.

Monitoring additional process variables via the analog module [3)]

High Performance SIMOCODE pro V allows measuring and monitoring of any other process variables via the analog module.

For example, the fill level can be monitored to protect a pump against dry operation, or a differential pressure transducer can be used to monitor the degree of pollution in a filter. If the fill level undershoots a specified level, the pump can be switched off and, if a specific differential pressure value is exceeded, the filter should be cleaned.

The devices support two-phase monitoring of the applicable process variable for freely selectable upper and lower current limits. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized and delayed.

Phase sequence identification [1)]

SIMOCODE pro allows the direction of rotation of a motor to be determined by identification of the phase sequence. If the direction of rotation is wrong, a signal can be generated or the motor switched off. See Chapter Menu of the operator panel with display (Page 84).

Monitoring any measured values using unrestricted limit monitors

SIMOCODE pro can monitor every measured value in the system for undershooting or overshooting a set threshold value by means of unrestricted limit monitors, e.g. the frequency [1)]. Further information can be found in Chapter "Limit monitors" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

1) For use with current / voltage measuring module

2) Temperature module or multifunction module additionally required

3) Analog module additionally required

4) SIMOCODE pro V and pro S device types: Ground-fault module or multifunction module and residual current transformer additionally required

5.3 Safety-oriented tripping

The SIMOCODE pro motor management system has two modules for the safety-related tripping of motors:

- Fail-safe digital module DM-F local: For applications requiring safety-related tripping of a motor feeder via a hardware signal that is acquired and evaluated by the module.
- DM-F PROFIsafe fail-safe digital module: For applications that require the safety-related tripping of a motor feeder by a fail-safe controller (F-CPU) via the communication bus with the fail-safe PROFIsafe profile.

These modules conform to the general requirements for EMERGENCY STOP devices or safety circuits described in EN 418 and EN 60204-1 (06.2006).

Depending on the external circuit, the following Performance Level / Safety Integrity Level can be achieved:

- PL e with Category 4 according to ISO 13849-1 or
- SIL 3 according to IEC 61508/62061

Safety technology and safety-related functions

- Are exclusively restricted to the fail-safe digital modules.
- Do not directly affect existing SIMOCODE pro components and concepts.

A more detailed description is provided in the documentation listed below

- Manual Fail-safe Digital Modules SIMOCODE pro, German (https://support.automation.siemens.com/WW/view/de/50564852)
- Manual Fail-safe Digital Modules SIMOCODE pro, English (https://support.automation.siemens.com/WW/view/de/50564852/0/en)
- Manual Fail-safe Digital Modules SIMOCODE pro, French (https://support.automation.siemens.com/WW/view/de/50564852/0/fr)
- Manual Fail-safe Digital Modules SIMOCODE pro, Spanish (https://support.automation.siemens.com/WW/view/de/50564852/0/es)
- Operating instructions "Fail-Safe Digital Module DM-F Local" (https://support.automation.siemens.com/WW/view/en/49222263)
- Operating instructions "Fail-Safe Digital Module DM-F PROFIsafe" (https://support.automation.siemens.com/WW/view/en/49222281).

You will find the System Manuals and Operating Instructions at Manuals/operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

CAUTION

Loss of safety function is possible

For the 24 V DC power supply, always use an SELV or PELV power supply unit!

For capacitive and inductive loads, an adequate protective circuit is required!

5.4 Control functions

Depending on the device series, the following parameterizable control functions are available:

Table 5-1 Control functions

Control function	SIMOCODE pro			
	BP	GP		HP
	C	S	V PN GP	V PB, V MR, V PN, V EIP
Overload relay	✓	✓	✓	✓
Direct starter (direct-on-line starter)	✓	✓	✓	✓
Reversing starter	✓	✓	✓	✓
Molded case circuit breaker (MCCB)	✓	✓	✓	✓
Star-delta starter	—	✓	✓	✓
Star-delta reversing starter	—	—	—	✓
Dahlander starter, combinable with reversing starter	—	—	—	✓

Control function	SIMOCODE pro			
	BP	GP		HP
	C	S	V PN GP	V PB, V MR, V PN, V EIP
Pole-changing starter, combinable with reversing starter	—	—	—	✓
Solenoid valve	—	—	—	✓
Positioner	—	—	—	✓
Soft starter	—	✓	✓	✓
Soft starter with reversing contactor	—	—	—	✓

All the necessary protection functions and interlocks are already available and can be flexibly adapted and expanded.

For a detailed description of the individual control functions: See Chapter "Motor control" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

5.5 Communication

PROFIBUS DP

SIMOCODE pro has an integrated PROFIBUS DP interface (SUB D socket or terminal connection on the basic units). SIMOCODE pro supports the following services, for example:

Table 5-2 PROFIBUS DP services

Service	SIMOCODE pro		
	C	S	V PB
Baud rates of up to 12 Mbit / s via Sub-D socket	✓	—	✓
Baud rates of up to 1.5 Mbit / s via terminal connection	✓	✓	✓
Automatic baud rate detection	✓	✓	✓
Cyclic services (DPV0) and acyclic services (DPV1)	✓	✓	✓
Operation as DPV1 slave downstream from the Y link	✓	✓	✓
Alarms according to DPV1	✓	✓	✓
Time synchronization via PROFIBUS DP	—	—	✓
3UF50 compatibility mode	—	—	✓
Safety-related tripping "PROFIsafe"	—	—	✓

Detailed description: See Chapter "PROFIBUS DP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Modbus RTU

SIMOCODE pro V Modbus RTU possesses integrated Modbus RTU communication functions.

Detailed description: See Chapter "Modbus communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

PROFINET

PROFINET IO

SIMOCODE pro V PN and pro V PN GP have integrated PROFINET IO device communication functions, such as:

- Integrated switch with two RJ45 ports
- Ethernet services: ping, arp, network diagnostics (SNMP) / BIB-2, LLDP, NTP
- Port diagnostics
- Deactivation of ports
- Media redundancy
- Shared device
- Device replacement without PG/PC
- I/O data
- Diagnostics and maintenance alarms
- Data records
- PROFIenergy
- PROFIsafe

Note

Use of PORT connections with SIMOCODE pro V PN GP basic units

Only PORT 1 can be used with SIMOCODE pro V PN GP 3UF7011-1A.00-2 basic units

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OPC UA

In addition to the PROFINET IO device communication functions, SIMOCODE pro V PN also has OPC UA server functions. Using these functions, an OPC UA client can access SIMOCODE pro V PN data.

Web server

In addition to the PROFINET IO device communication functions, both the SIMOCODE pro V PN High Performance device and the SIMOCODE pro V PN General Performance device have an integrated web server function that permits access to the service and diagnostic data from a PC on which a web browser is installed.

Detailed descriptions: See Chapter "PROFINET communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

EtherNet/IP

SIMOCODE pro V EtherNet/IP has integrated EtherNet/IP communication functions:

- Integrated switch with two RJ45 ports
- Assembly objects for integration in cyclic communication with the controller
- CIP objects
- Application objects for access to SIMOCODE data such as measured values, statistics data, diagnostics and selected parameters
- Device Level Ring support
- Ethernet services: ping, arp, network diagnostics (SNMP)/BIB-2, LLDP, NTP
- Port diagnostics
- Deactivation of ports

Detailed description: See Chapter "EtherNet/IP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Web server

In addition to the EtherNet/IP communication functions, SIMOCODE pro V EIP has an integrated web server function that permits access to the service and diagnostic data from a PC on which a web browser is installed.

Detailed descriptions: See Chapter "EtherNet/IP communication" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960)"SIMOCODE pro - Communication".

5.6 Analog value recording

The "Analog Value Recording" function can be used to record any analog values (2 bytes / 1 word) in SIMOCODE pro over a set period of time, for example the development of the motor current on starting the motor.

Detailed description: See Chapter "Analog value recording" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

5.7 Standard functions

Standard functions are pre-defined functions that can be easily activated, e.g. time-staggered restart of the drives after a power failure. SIMOCODE pro has the following standard functions:

Table 5-3 Standard functions

Standard function	SIMOCODE pro						
	BP	GP		HP			
	C Number	S Number	V PN GP Number	V PB Number	V MR Number	V PN Number	V EIP Number
Test	2	2	2	2	2	2	2
Reset	3	3	3	3	3	3	3
Test Position Feedback (TPF)	1	1	1	1	1	1	1
External fault	4	4	4	6	6	6	6
Operational Protection Off (OPO)	—	—	—	1	1	1	1
Power failure monitoring (UVO)	—	—	—	1	1	1	1
Emergency start	1	1	1	1	1	1	1
Watchdog (PLC / PCS monitoring)	1	1	1	1	1	1	1
Time stamping	—	—	—	1	—	—	—
Safety-related tripping "Local"	—	—	—	1	1	1	1

Detailed description: See Chapter "Standard functions" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

5.8 Freely-programmable logic modules

If you need any other additional functions for your application, you can use the freely programmable logic modules. These can be used, for example, to implement logical operations, time relay functions and counter functions. Furthermore, limit monitors can monitor any value in SIMOCODE pro for undershooting or overshooting of a freely selected limit. Depending on the device series, the system provides several freely parameterizable logic modules:

Table 5-4 Freely-programmable logic modules

Logic module	SIMOCODE pro						
	BP	GP		HP			
	C Number	S Number	V PN GP Number	V PB Number	V MR Number	V PN Number	V EIP Number
Truth table 3 inputs / 1 output	3	4	4	6	6	8	8
Truth table 2 inputs / 1 output	—	2	2	2	2	2	2

Logic module	SIMOCODE pro						
	BP	GP		HP			
	C Number	S Number	V PN GP Number	V PB Number	V MR Number	V PN Number	V EIP Number
Truth tables 5 inputs/2 outputs	—	—	—	1	1	1	1
Timers	2	2	2	4	4	6	6
Counters	2	2	2	4	4	6	6
Signal conditioning	2	4	4	4	4	6	6
Non-volatile elements	2	2	2	4	4	4	4
Flashing	3	3	3	3	3	3	3
Flicker	3	3	3	3	3	3	3
Limit monitor	—	—	—	4	4	6	6
Calculation modules (calculators)	—	—	—	2 1)	2	4	4
Analog multiplexer	—	—	—	—	—	1	1
Pulse width modulator	—	—	—	—	—	1	1
1) from version *E03*							

Detailed description: See Chapter "Logic blocks" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

5.9 Operating, service and diagnostics data

SIMOCODE pro supplies a large amount of detailed operating, service and diagnostics data.

Operating data

- Motor switching state (ON, OFF, LEFT, RIGHT, SLOW, FAST), derived from the current flow in the main circuit: thus, feedback via auxiliary contacts of circuit breakers and contactors is not necessary.
- Current in phases 1, 2 and 3 and maximum current in % of current setting
- Voltage in phases 1, 2 and 3 in V 1)
- Frequency 7)
- Active power in W 1)
- Apparent power in VA 1)
- Power factor in % 1)
- Phase unbalance in %
- Phase sequence 1)

- Ground-fault current [6)]
- Temperature in the respective sensor measuring circuits, and maximum temperature in K [3)]
- Current analog signal values [4)]
- Time to trip in s
- Temperature rise for motor model in %
- Remaining cooling down period of the motor in s, etc.

It is possible to adapt the units via the device-internal conversion of individual measured values with the help of the logic modules (calculators) provided by SIMOCODE pro. For example, the temperature recorded by SIMOCODE pro can be calculated in either °F or °C and transmitted to the automation system via PROFIBUS DP.

Service data

Among other things, SIMOCODE pro provides the following relevant data for maintenance:

- Number of motor operating hours, also resettable
- Motor stop times, also resettable
- Number of motor starts, also resettable
- Number of permissible starts remaining
- Number of overload trips, also resettable
- Feeder power consumption in kWh, also resettable [2)]
- Internal feeder-related comments stored in the device, e.g. information regarding maintenance events, etc.
- Safety-related tripping monitoring in h, also resettable [5)]

Diagnostics data

- Numerous detailed early warning and fault messages, also for further processing in the device or in the control system
- Device-internal error logging with time stamp
- Value of the last trip current
- Feedback faults (e.g. no current flow in the main circuit after switch-on command), etc.
- "Local" and "PROFIsafe" diagnostic messages

1) When using SIMOCODE pro V High Performance basic units with current / voltage measuring module

2) When using SIMOCODE pro V PB basic units from version *E03* current / voltage measuring module

3) When using the SIMOCODE pro V basic units with the 3UF77 temperature module or the SIMOCODE pro S basic unit with multifunction module

4) When using SIMOCODE pro V High Performance basic units with analog module

5) When using SIMOCODE pro V High Performance basic units together with DM-F fail-safe digital module

6) When using the SIMOCODE pro V basic units with the 3UF7510 ground-fault module or the SIMOCODE pro S basic unit with a multifunction module and 3UL23 residual current transformer

7) 2nd generation current / voltage measuring module necessary

Check list for selecting a device series 6

The following check list should help you decide upon the optimum device series for your requirements:

Function/component		**SIMOCODE pro**						
		BP	**GP**		**HP**			
		C	**S**	**V PN GP**	**V PB**	**V MR**	**V PN**	**V EIP**
Control functions	Intelligent overload relay	✓	✓	✓	✓	✓	✓	✓
	Direct starter, reversing starter	✓	✓	✓	✓	✓	✓	✓
	Star-delta starter	—	✓	✓	✓	✓	✓	✓
	Dahlander starter	—	—	—	✓	✓	✓	✓
	Pole-changing starter	—	—	—	✓	✓	✓	✓
	Soft starter	—	✓	✓	✓	✓	✓	✓
	Solenoid valve	—	—	—	✓	✓	✓	✓
	Positioner	—	—	—	✓	✓	✓	✓
	Can be combined with reversing function	—	—	—	✓	✓	✓	✓
Protection functions	Overload protection	✓	✓	✓	✓	✓	✓	✓
	Thermistor motor protection with PTC (binary)	✓	✓	✓	✓	✓	✓	✓
	Stalled rotor	✓	✓	✓	✓	✓	✓	✓
	Unbalance	✓	✓	✓	✓	✓	✓	✓
	Phase failure	✓	✓	✓	✓	✓	✓	✓
Dry-running protection for centrifugal pumps by means of active power monitoring	Minimum level; in combination with current/voltage measuring modules for dry-running protection	—	—	—	✓	—	✓	✓
Measurement functions	Current measurement	✓	✓	✓	✓	✓	✓	✓
	Current/voltage/power measurement	—	—	—	✓	✓	✓	✓

Function/component		SIMOCODE pro						
		BP	GP		HP			
		C	S	V PN GP	V PB	V MR	V PN	V EIP
Monitoring functions	Current limit monitoring	✓	✓	✓	✓	✓	✓	✓
	Ground-fault monitoring (internal)	✓	✓	✓	✓	✓	✓	✓
	Ground-fault monitoring (residual current transformer)	—	✓	✓	✓	✓	✓	✓
	Voltage monitoring	—	—	—	✓	✓	✓	✓
	Temperature monitoring	—	✓	✓	✓	✓	✓	✓
	Active power monitoring	—	—	—	✓	✓	✓	✓
	Power factor (cos phi) monitoring	—	—	—	✓	✓	✓	✓
	Monitoring operating hours, stop time, and number of starts	✓	✓	✓	✓	✓	✓	✓
	Monitoring additional process variables via the analog module	—	—	—	✓	✓	✓	✓
	Phase sequence detection	—	—	—	✓	✓	✓	✓
	Monitoring any measured values using unrestricted limit monitors	—	—	—	✓	✓	✓	✓
	Frequency measurement (with the 2nd generation current/voltage measuring modules)	—	—	—	✓	✓	✓	✓
Safety functions	Safety-related tripping	—	—	—	✓	✓	✓	✓
Number of inputs/ outputs	Number of digital inputs of basic unit	4	4	4	4	4	4	4
	Max. number of digital inputs with expansion modules	4	8	8	12	12	12	12
	Number of outputs of basic unit	3	2	3	3	3	3	3
	Max. number of digital outputs with expansion modules	3	4	5	7	7	7	7

Function/component		SIMOCODE pro						
		BP	GP		HP			
		C	S	V PN GP	V PB	V MR	V PN	V EIP
Expansion modules	Multifunction module; monostable relay; 24 V DC inputs, temperature measurement, ground-fault monitoring	—	✓	—	—	—	—	—
	Multifunction module; monostable relay; 110 - 240 V AC/DC inputs, temperature measurement, ground-fault monitoring	—	✓	—	—	—	—	—
	Digital module; monostable relay; 24 V DC inputs	—	✓	✓	✓	✓	✓	✓
	Digital module; bistable relay; 24 V DC inputs	—	—	—	✓	✓	✓	✓
	Digital module; monostable relay; 110 to 240 V AC/DC inputs	—	✓	✓	✓	✓	✓	✓
	Digital module; bistable relay; 110 to 240 V AC/DC inputs	—	—	—	✓	✓	✓	✓
	DM-F LOCAL fail-safe digital module	—	—	—	✓	✓	✓	✓
	DM-F PROFIsafe fail-safe digital module	—	—	—	✓	—	✓	—
	Analog module: Measuring, processing and outputting analog values	—	—	—	✓	✓	✓	✓
	Ground-fault module: Residual current monitoring using a residual current transformer	—	✓	✓	✓	✓	✓	✓
	Temperature module: Analog temperature monitoring of three measuring circuits with NTC, PT100, PT1000, and KTY	—	✓ 1)	✓	✓	✓	✓	✓

1) only 1 sensor can be connected

An overview of system components 7

Modules

Selection and ordering data: See also Catalog IC10 (https://www.siemens.com/ic10).

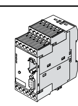
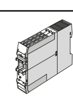
For simple product selection, we recommend the TIA Selection Tool (https://www.siemens.com/TIA-Selection-Tool).

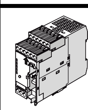
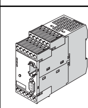
Note

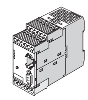
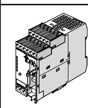
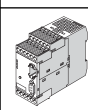
Product version data

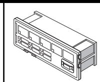
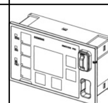
The product version data (*Exx*) refer to the device series (pro C, pro S, etc.).

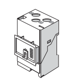
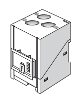
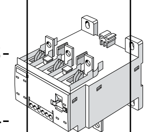
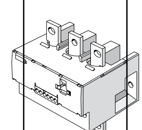
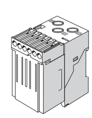
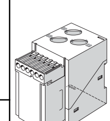
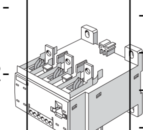
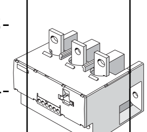
Table 7-1 Modules

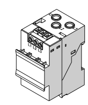
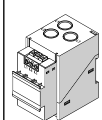
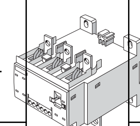
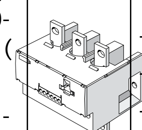
Module	Control supply voltage	MLFB	Diagram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
Basic units (BU)										
SIMOCODE pro C The compact Basic Performance system for PROFIBUS and direct-on-line and reversing starters and/or for controlling a circuit breaker. 4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs				—	—	—	—	—	—	—
	24 V DC	3UF7000-1AB00-0								
	110-240 V AC/DC	3UF7000-1AU00-0								
SIMOCODE pro S The smart General Performance system for PROFIBUS and for direct-on-line, reversing and star-delta starters or for controlling a circuit breaker or soft starter. 4 inputs/2 outputs freely parameterizable, input for thermistor, expandable with expansion modules				—	—	—	—	—	—	—
	24 V DC	3UF7020-1AB01-0								
	110-240 V AC/DC	3UF7020-1AU01-0								

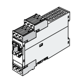
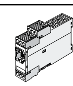
Module	Control supply voltage	MLFB	Diagram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
SIMOCODE pro V PN GP The smart General Performance system for PROFINET and for direct-on-line, reversing and star-delta starters or for controlling a circuit breaker or soft starter. 4 inputs/3 outputs freely parameterizable, input for thermistor, expandable with 1 expansion module				—	—	—	—	—	—	—
	24 V DC	3UF7011-1AB00-1 (2 ports) 3UF7011-1AB00-2 (1 port)								
	110-240 V AC/DC	3UF7011-1AU00-1 (2 ports) 3UF7011-1AU00-2 (1 port)								
SIMOCODE pro V PB The variable High Performance system for PROFIBUS, which offers numerous functions in addition to all of the SIMOCODE pro C/S functions. 4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules From product version *E16* with PTB 18 ATEX 5003 X / ITS21UKEX0455X: Suitable for dry-running protection for centrifugal pumps by means of active power monitoring				—	—	—	—	—	—	—
	24 V DC	3UF7010-1AB00-0								
	110-240 V AC/DC	3UF7010-1AU00-0								

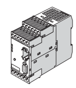
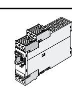
Module	Control supply voltage	MLFB	Diagram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
SIMOCODE pro V MR The variable High Performance system for Modbus RTU that offers numerous functions in addition to all of the SIMOCODE pro C/S functions. 4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules				—	—	—	—	—	—	—
	24 V DC	3UF7012-1AB00-0								
	110-240 V AC/DC	3UF7012-1AU00-0								
SIMOCODE pro V PN The variable High Performance system for PROFINET with extensive functions. 4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules From product version *E13* with PTB 18 ATEX 5003 X / ITS21UKEX0455X: Suitable for dry-running protection for centrifugal pumps by means of active power monitoring				—	—	—	—	—	—	—
	24 V DC	3UF7011-1AB00-0								
	110-240 V AC/DC	3UF7011-1AU00-0								
SIMOCODE pro V EIP The variable High Performance system for EtherNet/IP that offers numerous functions in addition to all of the SIMOCODE pro C/S functions. 4 inputs/3 outputs freely parameterizable, input for thermistor, monostable relay outputs, expandable with expansion modules From product version *E04* with PTB 18 ATEX 5003 X / ITS21UKEX0455X: Suitable for dry-running protection for centrifugal pumps by means of active power monitoring				—	—	—	—	—	—	—
	24 V DC	3UF7013-1AB00-0								
	110-240 V AC/DC	3UF7013-1AU00-0								

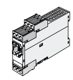
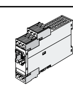
Module	Control supply voltage	MLFB	Diagram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
Operator panel (OP) Installation in control cabinet door or front plate, for connection to basic unit, system interface for connecting a PC, 10 LEDs for status indication and user-assignable buttons for controlling the motor.										
	—	3UF7200-1AA00-0		1	1	1	1	1	1	1
	—	3UF7200-1AA01-0		1	1	1	1	1	1	1
Operator panel with display (OPD) 4) Installation in control cabinet door or front panel, for connection to a pro V basic unit, system interface for connecting a PC, 7 LEDs for status indication and user-assignable buttons for controlling the motor, multiple-language display, e.g. for indication of measured values, status information or fault messages.										
	—	3UF7210-1AA00-0		—	—	—	1 (from *E03*)	1	1	1
	—	3UF7210-1BA00-0		—	—	—	1 (from *E03*)	1	1	1
	—	3UF7210-1AA01-0 (titanium gray)		—	—	—	1 (from *E03*)	1	1	1
	—	3UF7210-1BA01-0 (t itanium gray)		—	—	—	1 (from *E03*)	1	1	1

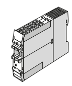
Module	Control supply voltage	MLFB	Dia-gram	Number that can be connected to						
				pro C	pro S	pro V P N GP	pro V P B	pro V M R	pro V P N	pro V EI P
Current measuring module (IM) Current measuring with through-hole or bus connection system.										
0.3 A to 3 A (straight-through transformer)	—	3UF7100-1AA00-0		1	1	1	1	1	1	1
2.4 A to 25 A (straight-through transformer)		3UF7101-1AA00-0		1	1	1	1	1	1	1
10 A to 100 A (straight-through transformer)		3UF7102-1AA00-0		1	1	1	1	1	1	1
20 A to 200 A (straight-through transformer)		3UF7103-1AA00-0		1	1	1	1	1	1	1
20 A to 200 A (bar connection)		3UF7103-1BA00-0		1	1	1	1	1	1	1
63 A to 630 A (bar connection)		3UF7104-1BA00-0		1	1	1	1	1	1	1
Current/voltage measuring module (UM) Can only be mounted next to the basic unit, otherwise like current measuring modules. Additionally: • Voltage measurement • Power measurement • Power factor (cos phi) measurement • Phase sequence			 							
0.3 A to 3 A (through-hole transformer)	—	3UF7110-1AA00-0		—	—	—	1 (from *E02*)	1	1	1
2.4 A to 25 A (through-hole transformer)		3UF7111-1AA00-0		—	—	—	1 (from *E02*)	1	1	1
10 A to 100 A (through-hole transformer)		3UF7112-1AA00-0		—	—	—	1 (from *E02*)	1	1	1
20 A to 200 A (through-hole transformer)		3UF7113-1AA00-0		—	—	—	1 (from *E02*)	1	1	1
20 A to 200 A (bus connection)		3UF7113-1BA00-0		—	—	—	1 (from *E02*)	1	1	1
63 A to 630 A (bus connection)		3UF7114-1BA00-0		—	—	—	1 (from *E02*)	1	1	1

Module	Control supply voltage	MLFB	Dia-gram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
2nd generation current/voltage measuring modules (UM+) Can be mounted below / next to the basic unit, otherwise like current measuring modules. In addition to current measurement: • Voltage measurement • Frequency measurement • Power measurement • Power factor (cos phi) measurement • Phase sequence detection • Dry-running protection for centrifugal pumps by means of active power monitoring (DRP device)			   							
0.3 A to 4 A (straight-through transformer) 1) 3 A to 40 A (straight-through transformer) 1) 10 A to 115 A (straight-through transformer) 20 A to 200 A (straight-through transformer) 20 A to 200 A (bar connection) 63 A to 630 A (bar connection)	—	3UF7110-1AA01-0, 3UF7120-1AA01-0 (DRP) 3UF7111-1AA01-0, 3UF7121-1AA01-0 (DRP) 3UF7112-1AA01-0, 3UF7122-1AA01-0 (DRP) 3UF7113-1AA01-0, 3UF7123-1AA01-0 (DRP) 3UF7113-1BA01-0, 3UF7123-1BA01-0 (DRP) 3UF7114-1BA01-0, 3UF7124-1BA01-0 (DRP)		— — — — — —	— — — — — —	— — — — — —	1 (from *E15*) 1 (from *E15*) 1 (from *E15*) 1 (from *E15*) 1 (from *E15*) 1 (from *E15*)	1 (from *E03*) 1 (from *E03*) 1 (from *E03*) 1 (from *E03*) 1 (from *E03*) 1 (from *E03*)	1 (from *E10*) 1 (from *E10*) 1 (from *E10*) 1 (from *E10*) 1 (from *E10*) 1 (from *E10*)	1 1 1 1 1 1

Module	Control supply voltage	MLFB	Diagram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
Decoupling module (DCM) [1)] For connecting on the line side of a current/ voltage measuring module of the 1st generation UM at the system interface for use of voltage measurement in isolated-neutral systems, systems with high-impedance resistive or asymmetrical grounding, and in single-phase systems.										
	—	3UF7150-1AA00-0		—	—	1	1	1	1	1
Digital modules (DM) 2)										
You add additional binary inputs and relay outputs to the basic unit with up to 2 digital modules. The input circuits of the digital modules are powered by an external source. 4 binary inputs and 2 relay outputs.										
Input voltage 24 V DC; monostable relay outputs Input voltage 110 V-240 V AC/DC; monostable relay outputs	—	3UF7300-1AB00-0 3UF7300-1AU00-0		— —	1 1	1 1	2 2	2 2	2 2	2 2
Input voltage 24 V DC; bistable relay outputs Input voltage 110 V-240 V AC/DC; bistable relay outputs	—	3UF7310-1AB00-0 3UF7310-1AU00-0		— —	— —	— —	2 2	2 2	2 2	2 2
Fail-safe digital module (DM-F)										

Module	Control supply voltage	MLFB	Diagram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
DM-F Local fail-safe digital module [2)] For fail-safe tripping via hardware signal. 2 relay enabling circuits, wired in parallel; 2 relay outputs, common ground, fail-safe tripping. Inputs for sensor circuit, start signal, cascading and feedback circuit Safety function via DIP switch										
	Rated control supply voltage Us:									
	24 V DC 110 to 240 V AC/DC	3UF7320-1AB00-0 3UF7320-1AU00-0		— —	— —	— —	1 (from *E07*) 1 (from *E07*)	1 1	1 1	1 1
DM-F PROFIsafe fail-safe digital module [2)] For fail-safe tripping via PROFIBUS/PROFIsafe: 2 relay enabling circuits, wired in parallel 2 relay outputs, common ground, fail-safe tripping 1 input for feedback circuit; 3 binary standard inputs.										
	24 V DC 110 to 240 V AC/DC	3UF7330-1AB00-0 3UF7330-1AU00-0		— —	— —	— —	1 (from *E07*) 1 (from *E07*)	— —	1 1	— —
Analog module (AM)										
By means of the analog module, the basic unit is optionally expanded by analog inputs and outputs (0 to 20 mA). 2 inputs (passive) for inputting and 1 output for outputting 0/4 to 20 mA signals.										
	—	3UF7400-1AA00-0		—	—	—	1	1	2	2
Ground-fault module (EM)										

Module	Control supply voltage	MLFB	Diagram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
The external ground-fault monitoring using residual current transformer and ground-fault module is used in the following cases: • in cases in which power systems are grounded with high impedance • in cases, in which precise detection of the ground-fault current is necessary, for example, for condition monitoring.										
	—	3UF7500-1AA00-0 for connecting a 3UL22 residual-current transformer		—	—	—	1 (from *E02*)	1	1	1
	—	3UF7510-1AA00-0 for connecting a 3UL23 residual-current transformer		—	1	1	1 (from *E10*)	1	1 (from *E04*)	1
Temperature module (TM)										
Irrespective of the thermistor protection of the basic units, an additional max. 3 analog temperature sensors can be evaluated using a temperature module. Sensor types: PT100/PT1000, KTY83/KTY84 or NTC 3 inputs for connecting up to 3 analog temperature sensors.										
	—	3UF7700-1AA00-0		—	1 [3)]	1 [3)]	1 (from E*E02*)	1	2	2
Multifunction module										

Module	Control supply voltage	MLFB	Dia-gram	Number that can be connected to						
				pro C	pro S	pro V PN GP	pro V PB	pro V MR	pro V PN	pro V EIP
To expand • the number of inputs and outputs • the functional scope the SIMOCODE pro S basic units. The following inputs and outputs are available: • 4 digital inputs • 2 relay outputs • 1 input for connecting an analog temperature sensor (sensor types: PT100/ PT1000, KTY83/KTY84 or NTC) • 1 input for connecting a 3UL23 residual current transformer										
Input voltage 24 V DC		3UF7600-1AB01-0		—	1	—	—	—	—	—
Input voltage 110-240 V AC/DC		3UF7600-1AU00-0		—	1	—	—	—	—	—

1)

Note

When using the 2nd generation current / voltage acquisition modules (UM+), no decoupling module must be connected.

Detailed description: See Description of system components (Page 73)

Dimension drawings: See CAx data, dimension drawings (Page 337)

Mounting instructions See Mounting (Page 163)

Configuration information for SIMOCODE pro V PB when using an operator panel with display and/or a decoupling module: See Chapter Configuration information for SIMOCODE pro V when using an older basic unit (Page 135) and Configuration notes for use of a SIMOCODE pro V MR and SIMOCODE pro V EIP basic unit (Page 137).

2)

Note

Use of a DM-F instead of a DM

You use a fail-safe digital module (DM-FL or DM-FP) instead of a digital module (DM).

3) Only one temperature sensor can be connected

4)

Note

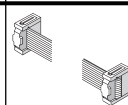
Usage restrictions concerning the operator panel with display

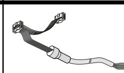
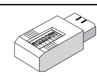
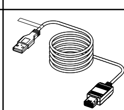
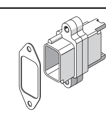
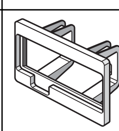
- SIMOCODE pro V PB basic unit: You only use the operator panel with display with SIMOCODE pro V PB basic unit from version *E03*.
- SIMOCODE pro V PN, pro V EIP basic unit: An operator panel with display from version *E07* is required for use with these basic units.
- In combination with the SIMOCODE pro PN basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- In combination with the SIMOCODE pro MR basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- When using the "Dry-running protection by means of active power monitoring" function, the following operator panels with display are permitted:
  - 3UF7210-1AA00-0: ≥ E12
  - 3UF7210-1AA01-0: ≥ E03
  - 3UF7210-1BA00-0: ≥ E04
  - 3UF7210-1BA01-0: ≥ E03

Accessories

Selection and ordering data: See also Catalog IC10 (https://www.siemens.com/ic10).

Table 7-2 System components, accessories that can be connected

System component, accessory	MLFB	Diagram	for pro C	for pro S	for V PN GP	for pro V PB	for pro V MB RTU	for pro V PN	for pro V EIP
Connecting cable for connecting the basic unit, current measuring module, current/voltage measuring module, operator panel, and decoupling module			✓	✓	✓	✓	✓	✓	✓
0.025 m ribbon 0.1 m ribbon 0.15 m ribbon 0.3 m ribbon 0.5 m ribbon 0.5 m round 1.0 m round 1.5 m round 2.5 m round	3UF7930-0AA00-0 3UF7931-0AA00-0 3UF7935-0AA00-0 3UF7932-0AA00-0 3UF7932-0BA00-0 3UF7937-0BA00-0 .... 3UF7933-0BA00-0								
Interface covers For covering unused system interfaces	3UF7950-0AA00-0 (light gray) 3RA6936-0B (titanium gray)		✓	✓	✓	✓	✓	✓	✓
Memory module Backup of the full set of parameters of a SIMOCODE pro system when the device is replaced. If a device is replaced, parameter transfer without PC.	3UF7900-0AA00-0 (light gray) 3UF7900-0AA01-0 (titanium gray) 3UF7901-0AA00-0 (light gray) 3UF7901-0AA01-0 (titanium gray)		✓ ✓ — —	✓ ✓ ✓ ✓	— — ✓ ✓	✓ ✓ ✓ 1) ✓ 1)	✓ ✓ ✓ ✓	— — ✓ ✓	— — ✓ ✓
Initialization module Storage and initialization of device parameters and device addressing in motor control centers.	3UF7902-0AA00-0		—	✓	✓	✓ 1)	✓	✓	✓

System component, accessory	MLFB	Diagram	for pro C	for pro S	for V PN GP	for pro V PB	for pro V MB RTU	for pro V PN	for pro V EIP
Y connecting cable Connection of the basic unit and current or current/voltage measuring module with the initialization module when using the initialization module			—	✓	✓	✓	✓	✓	✓
Length of system interface / Length of open cable end 0.1 m / 1.0 m 0.5 m / 1.0 m 1.0 m / 1.0 m	3UF7931-0CA00-0 3UF7932-0CA00-0 3UF7937-0CA00-0								
Addressing plug Assigning the PROFIBUS/ Modbus RTU address without using a PC/PG to SIMOCODE pro through the system interface	3UF7910-0AA00-0		✓	✓	✓	✓	✓	—	—
USB PC cable for connecting SIMOCODE pro to the USB interface of a PC/PG	3UF7941-0AA00-A		✓	✓	✓	✓	✓	✓	✓
USB-to-serial adapter For connecting an RS 232 PC cable to the interface of a PC.	3UF7946-0AA0-0		✓	✓	✓	✓	✓	✓	✓
Door adapter For bringing out the system interface, e.g. out of a cabinet	3UF7920-0AA00-0		✓	✓	✓	✓	✓	✓	✓
Adapter for operator panel Enables use of the smaller operator panel (OP) after system replacement in a front panel cutout in which, for example, a larger 3UF5 2 operator panel of SIMOCODE DP had previously been used. Degree of protection: IP54.	3UF7922-0AA00-0		✓	✓	✓	✓	✓	✓	✓

System component, accessory	MLFB	Diagram	for pro C	for pro S	for V PN GP	for pro V PB	for pro V MB RTU	for pro V PN	for pro V EIP
Labeling strips for pushbuttons of the operator panel 3UF7 20 for pushbuttons of the operator panel with display 3UF7 21 for LEDs of the operator panel 3UF7 20	3UF7925-0AA00-0 3UF7925-0AA01-0 3UF7925-0AA02-0		✓	✓	✓	✓	✓	✓	✓
Push-in lugs for screw mounting e.g. on mounting plate; 2 units required per device									
Can be used for the current measuring modules and current/voltage measuring modules 3UF7 1.0, 3UF7 1.1 and 3UF7 1.2	3RV2928-0B		✓	✓	✓	—	✓	✓	✓
Can be used for 3UF700, 3UF701, 3UF7 3, 3UF7 4, 3UF7 5 and 3UF7 7	3RP19 03		✓	—	—	✓	✓	✓	✓
Can be used for 3UF7020-1A.01-0 and 3UF7600-1A.01-0	3ZY1311-0AA00		—	✓	✓	—	—	—	—
Terminal covers									
Covers for cable lug and busbar connections: Length 100 mm, can be used for 3UF7 1.3-1BA00-0 Length 120 mm, can be used for 3UF7 1.4-1BA00-0	3RT1956-4EA1 3RT1966-4EA1		✓	✓	✓	✓	✓	✓	✓
Covers for box terminals: Length 25 mm, can be used for 3UF7 1.3-1BA00-0 Length 30 mm, can be used for 3UF7 1.4-1BA00-0	3RT1956-4EA2 3RT1966-4EA2		✓	✓	✓	✓	✓	✓	✓

System component, accessory	MLFB	Diagram	for pro C	for pro S	for V PN GP	for pro V PB	for pro V MB RTU	for pro V PN	for pro V EIP
Covers for screwed connection: between contactor and current measuring module or between current/voltage measuring module with direct mounting can be used for 3UF7 1.3-1BA00-0 can be used for 3UF7 1.4-1BA00-0	3RT1956-4EA3 3RT1966-4EA3		✓	✓	✓	✓	✓	✓	✓
Box terminal blocks for round and ribbon cable conductors up to 70 mm2, can be used for 3UF7 1.3-1BA00-0 up to 120 mm2, can be used for 3UF7 1.3-1BA00-0 up to 240 mm2, can be used for 3UF7 1.4-1BA00-0	3RT1955-4G 3RT1956-4G 3RT1966-4G		✓	✓	✓	✓	✓	✓	✓
Bus termination module with dedicated power supply; for bus connection after the last device on the bus Supply voltage: 115/230 V AC 24 V DC **Note** The use of bus connection modules is recommended, in particular, when using SIMOCODE pro S.	3UF1900-1KA00 3UF1900-1KB00		✓	✓	✓	✓	✓	✓	✓
Bus connecting terminal For securing the PROFIBUS cable on the SIMOCODE pro S basic unit.	3UF7960-0AA00-0		—	✓	✓	—	—	—	—

1) For basic unit SIMOCODE pro V PB from version *E09*

Software, selection and ordering data:

Parameterization software, control, diagnostics and testing: See Manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

Selection and ordering data: See Catalog IC10 (https://www.siemens.com/ic10).

Description of system components

8

8.1 Basic units (BU)

Types of basic units

The basic units are the fundamental components of the SIMOCODE pro system. Basic units are always necessary when using SIMOCODE pro. They contain the processor in which all protection, control and monitoring functions of the SIMOCODE system are executed.

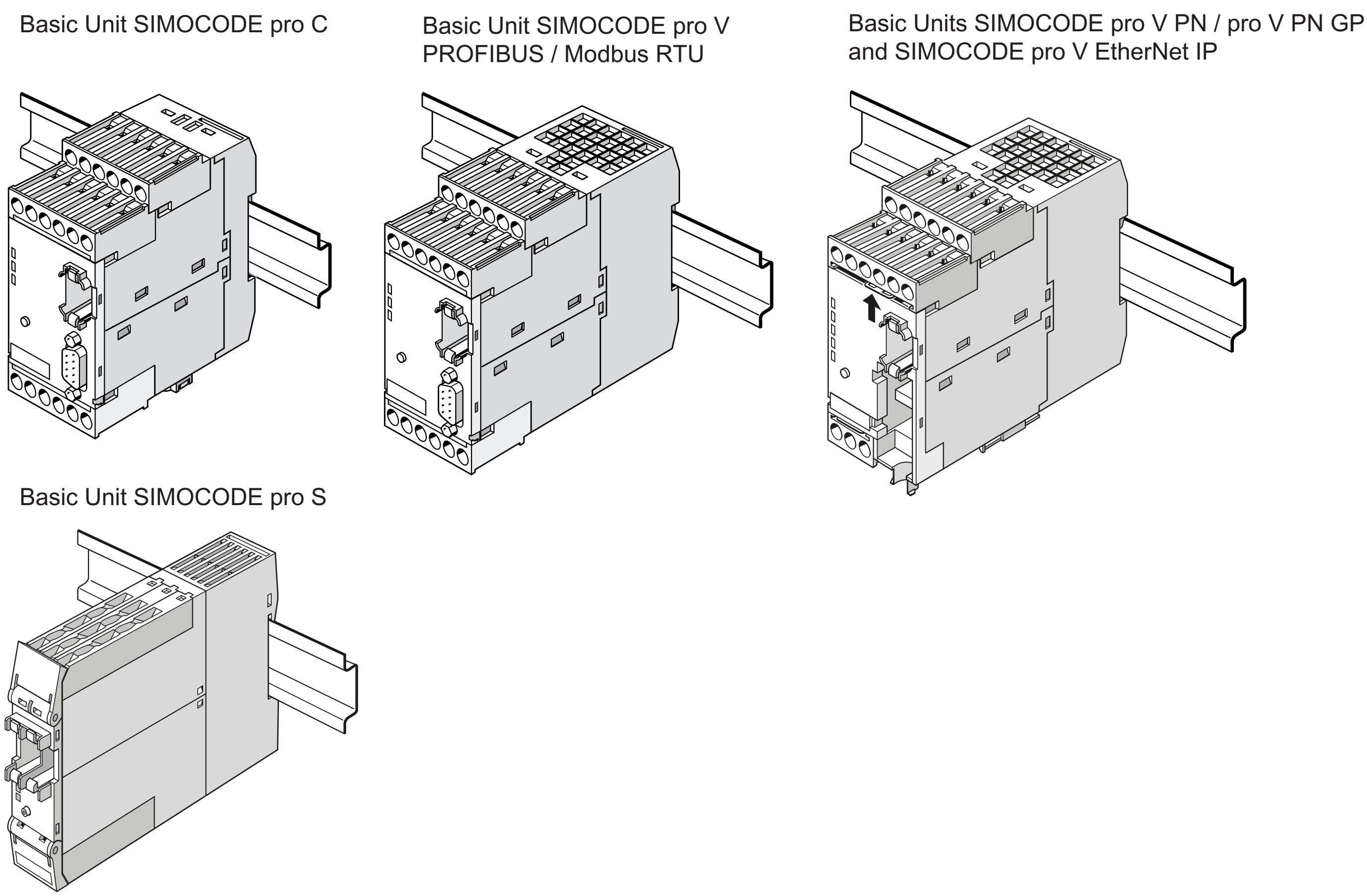


Figure 8-1 Basic units

The basic units are suitable for DIN rail mounting or with additional push-in lugs for mounting on a mounting plate. They are always equipped with removable terminals.

The basic units are available in different types for the following supply voltages:

- 24 V DC
- 110 to 240 V AC / DC

SIMOCODE pro C basic unit

Basic unit pro C is the fundamental component of the SIMOCODE pro C device series and is used in conjunction with a current measuring module and optional operator panels.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Circuit breaker control (MCCB).

SIMOCODE pro S basic unit

Basic unit pro S is the fundamental component of the SIMOCODE pro S device series and is used in conjunction with a current measuring module and an optional operator panel. As compared with the basic unit, SIMOCODE pro C provides the following expansion options by means of connecting a multifunction / expansion module:

- Increased device functionality with additional inputs and outputs
- Connection of a residual current transformer
- Connection of a temperature sensor.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Star-delta starter
- Circuit breaker control (MCCB)
- Control of a soft starter.

SIMOCODE pro V PN GP basic unit

The SIMOCODE pro V PN GP General Performance basic unit for PROFINET is used in combination with a current measuring module and an optional operator panel. It provides the following expansion options by means of connecting an expansion module:

- Increased device functionality with additional inputs and outputs
- Connection of a residual current transformer
- Connection of a temperature sensor.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Star-delta starter
- Circuit breaker control (MCCB)
- Control of a soft starter.

SIMOCODE pro V High Performance basic unit

The SIMOCODE pro V High Performance basic units are the fundamental components of the SIMOCODE pro V device series and are used in combination with a current measuring module or current / voltage measuring module and optional operator panel.

The following motor control functions are supported:

- Overload relay
- Direct starter (direct-on-line starter) and reversing starter
- Star-delta starter, possibly combined with reversing starter
- 2 speeds, motors with separate windings (pole-changing starters), possibly combined with reversing starter
- 2 speeds, motors with separate Dahlander windings, possibly combined with reversing starter
- Positioner control
- Solenoid valve control
- Circuit breaker control (MCCB)
- Soft starter control, possibly combined with reversing starter

The SIMOCODE pro V High Performance basic units provide the following expansion options not offered by the SIMOCODE pro C, SIMOCODE pro S and SIMOCODE PRO V PN GP basic units:

- Increased device functionality via various expansion modules according to need
- Use of a current / voltage measuring module in place of a current measuring module
- Additional inputs and outputs, as required
- Larger number of inputs and outputs
- Use of an operator panel with display in place of a standard operator panel.

Operator controls and display elements, system interfaces basic units

LEDs for device diagnostics (DEVICE, BUS, GEN. FAULT)

These LEDs on the front of the device are used for device and fault diagnostics, and indicate the basic status:

- Of the device itself via the "DEVICE" LED
- For bus communication via the "BUS" LED
- By displaying the activity at the two ports via the LEDs "PORT 1" and "PORT 2"
- Of any motor feeder faults via the "GEN. FAULT" FAULT" LED

For further information, refer to Chapters Diagnostics via LED display on the basic unit and on the operator panel (PROFIBUS) (Page 238) and Diagnostics via LED display on the basic unit and on the operator panel (PROFINET) (Page 243).

"TEST/RESET" button

Enables the device to be reset after tripping or after a fault has occurred and makes it possible to test the device/motor feeder with or without tripping the contactor control. If a memory module or addressing plug is plugged in, parameterization can be initiated via the TEST/RESET button or, for example, by accepting the PROFIBUS address.

You will find further information in Chapter "Test/Reset" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958), in Chapters Setting the PROFIBUS DP address (Page 236) and Setting IP parameters and PROFINET device name (Page 240) and in Chapter Backing up and saving parameters (Page 255).

System interfaces

2 system interfaces for connecting

- a current measuring module or a current / voltage measuring module and
- an operator panel or expansion modules

8.2 Operator panel (OP)

Function of the operator panel

The operator panel controls the motor feeder from the switchgear cabinet. It has an external system interface on the front to allow easier parameterization or diagnostics via a PC / programming device. This system interface (with cover for IP54) can be used to connect (by means of the PC cable) a PC with the SIMOCODE ES (TIA Portal) software installed or the memory module or the addressing plug.

On the rear system interface, it is connected to the basic unit or to an expansion module via a connecting cable. It is supplied with power via the basic unit.

The operator panel is frequently installed in the front panels of motor control centers. It is used in all device series. It also contains all the status LEDs available on the basic unit and the "TEST/RESET" button, and facilitates access to the system interface from outside the control cabinet.

The following are available:

- 5 buttons, of which 4 are freely parameterizable
- 10 LEDs, of which 7 are freely parameterizable

The following figure shows an operator panel:

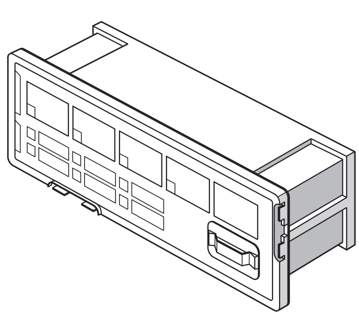


Figure 8-2 Operator panel

Labeling strips:

Labeling strips are enclosed for designating buttons 1 to 4 and the yellow LEDs 1 to 3:

- Buttons 1 to 4: 6 pre-assigned labeling strips and 1 individually inscribable labeling strip
- LEDs 1 to 3: 1 individually inscribable labeling strip

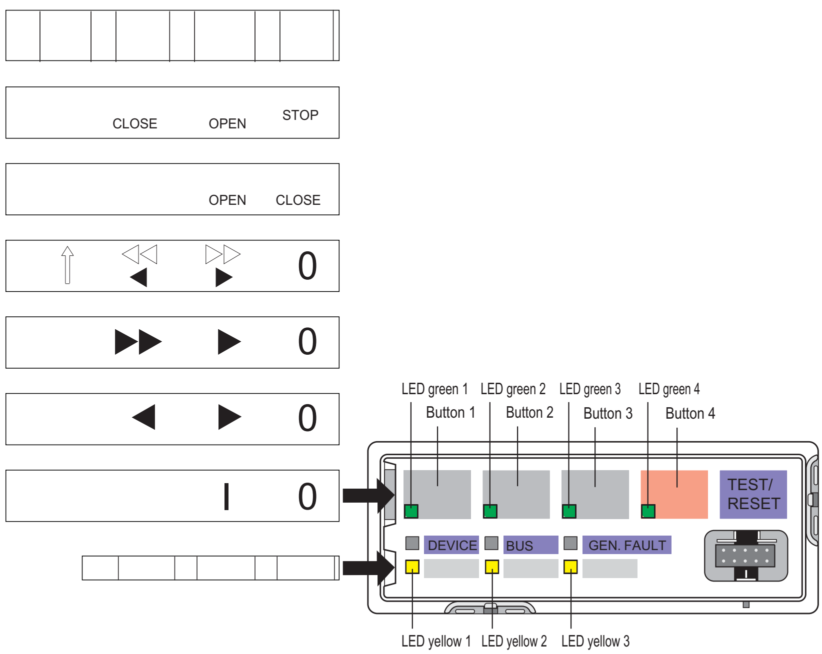


Figure 8-3 Labeling strips for operator panel buttons and LEDs

Unused labeling strips can be stored on the back of the operator panel:

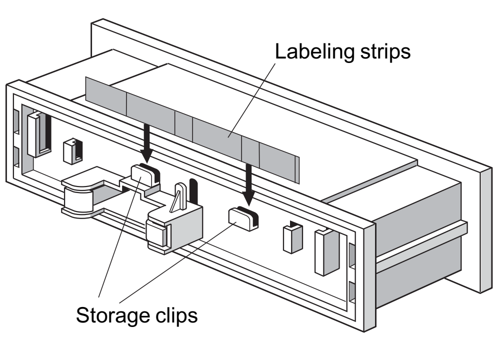


Figure 8-4 Storage clips for labeling strips for pushbuttons and LEDs of the operator panel

"Park position" for memory module:

The memory module can be protected from unauthorized use by "parking" it on the rear of the operator panel inside the switchgear cabinet. In this case, the storage clips for the labeling strips cannot be used.

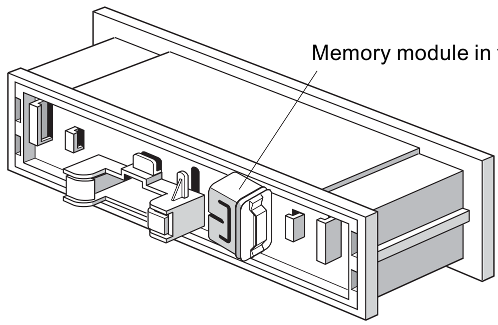


Figure 8-5 "Park position" for memory module

8.3 Operator panel with display

8.3.1 Functions and possible applications of the operator panel with display

Apart from the standard operator panel (OP), an optional operator panel with display (OPD) is also available for the SIMOCODE pro V High Performance device series. This operator panel can additionally display current measured values, operating data, diagnostics data or status information of the motor feeder on the cabinet. It also contains all the status LEDs that are present on the basic unit and facilitates access to the system interface from outside the cabinet. The motor can be controlled via the buttons on the operator panel. Current measured values, status information, fault messages or the device-internal error log are simultaneously shown on the display.

Note

Usage restrictions concerning the operator panel with display

- SIMOCODE pro V PB basic unit: The operator panel with display can only be used with SIMOCODE pro V PB basic unit from version *E03*.
- SIMOCODE pro V PN, pro V EIP basic unit: An operator panel with display from version *E07* is required for use with these basic units.
- In combination with the SIMOCODE pro PN basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- In combination with the SIMOCODE pro MR basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- When using the "Dry-running protection by means of active power monitoring" function, the following operator panels with display are necessary:
  – 3UF7210-1AA00-0: ≥ E12
  – 3UF7210-1AA01-0: ≥ E03
  – 3UF7210-1BA00-0: ≥ E04
  – 3UF7210-1BA01-0: ≥ E03

The following are available:

- 4 freely parameterizable buttons for controlling the motor feeder
- 4 keys for navigating the display menu, 2 of these are softkeys with different functions (e g. test / reset)
- 2 system interfaces (front and back)
- 7 LEDs, 4 of which are freely parameterizable (4 green LEDs integrated in the motor control buttons, primarily for feedback regarding the switching state, e.g. ON, OFF, CCW, CW, etc.)

Note

Modification of selected device parameters via the operator panel with display

Modification of selected device parameters is possible via the operator panel with display (see Parameters (Page 110))

The following figure shows an operator panel with display:

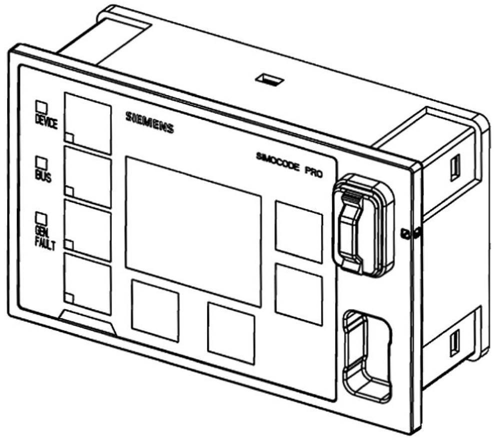


Figure 8-6 Operator panel with display

The operator panel with display can be connected directly to basic unit SIMOCODE pro V or an expansion module via the rear system interface. Voltage is supplied by the basic unit. This front system interface (with cover for IP54) can be used to connect (by means of the PC cable) a PC with the SIMOCODE ES (TIA Portal) software installed or the memory module and the addressing plug.

NOTICE
Active operation
You must not remove or plug in the operator panel with display during operation!

Note

When using an operator panel with display, you may have to consider restrictions in the type and number of expansion modules that can be connected to a basic unit!

See Chapter Configuration information for SIMOCODE pro V when using an older basic unit (Page 135).

Labeling strips:

Labeling strips for labeling buttons 1 to 4 (6 pre-assigned and 1 that can be labeled individually) are included:

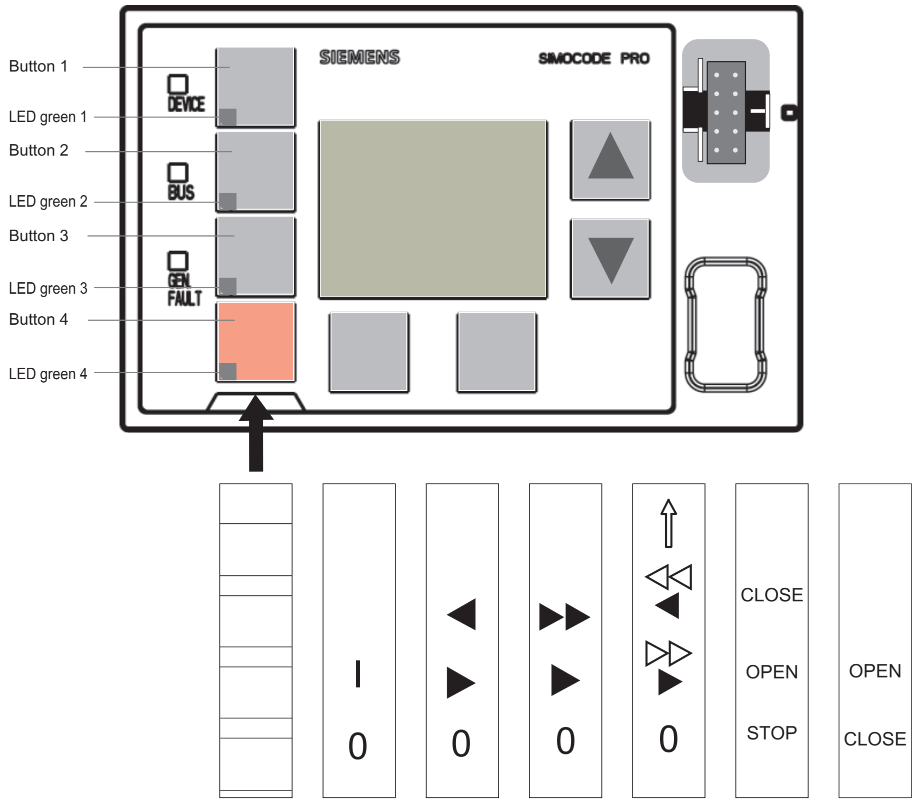


Figure 8-7 Labeling strips for the buttons of the operator panel with display

Unused labeling strips can be stored on the back of the operator panel with display:

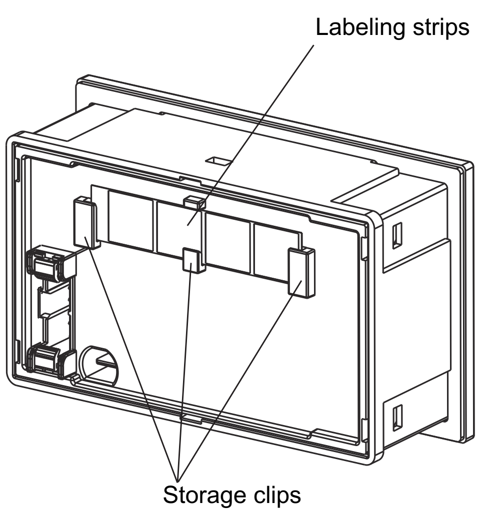


Figure 8-8 Storage clips for labeling strips

"Park position" for memory module:

The memory module can be "parked" on the front of the operator panel with display beneath the system interface:

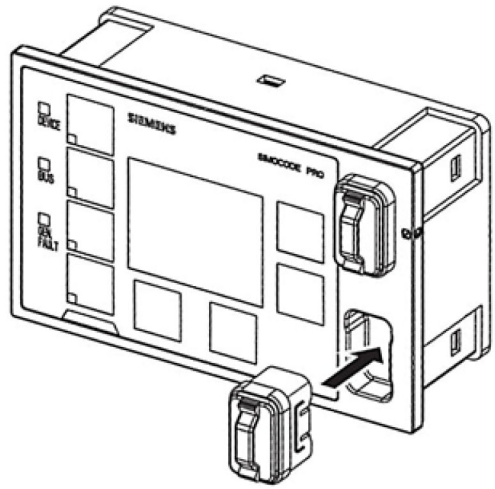


Figure 8-9 "Park position" for memory module

8.3.2 Operator controls and display elements of the operator panel with display

Displays of the operator panel with display

The display shows current measured values, operating data and diagnostics data as well as the status information of the motor feeder in plain text or with the aid of symbols.

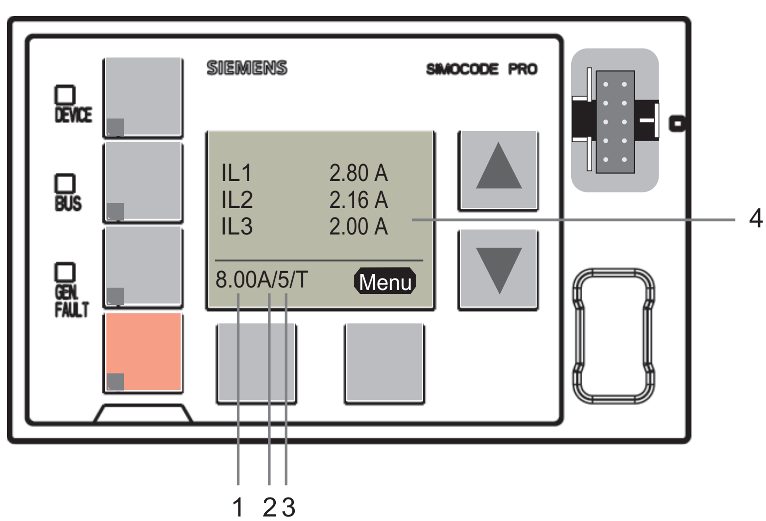


Figure 8-10 Display elements of the operator panel with display

1

Shows the **current setting Is** / rated motor current in A. For motors with two speeds, the relevant current setting Is1 or Is2 is always displayed depending on whether the current speed is slow or fast, e.g. **8 A.** For motors with two speeds, the left-hand softkey can be used when the motor is stopped to alternate between the display of the two current settings. When running, the current setting for the active motor speed is always displayed.

2

Shows the set **class time** of the overload protection, e.g.: **10** = class 10E (class = trip class)

3

Indicates that temperature monitoring is active, e.g. the motor temperature is being monitored by thermistors or analog temperature sensors (Pt100, Pt1000, KTY, NTC). (**T**= temperature monitoring active.)

4

The **main display** enables customized depiction of different measured values when running. This is the standard display at the topmost menu level. Predefined profiles in the display settings can be selected for this purpose. By pressing the "Menu" softkey on the right, you can navigate through the submenus of the main display (see Chapter Read and adapt main display (Page 101)).

Operator controls of the operator panel with display

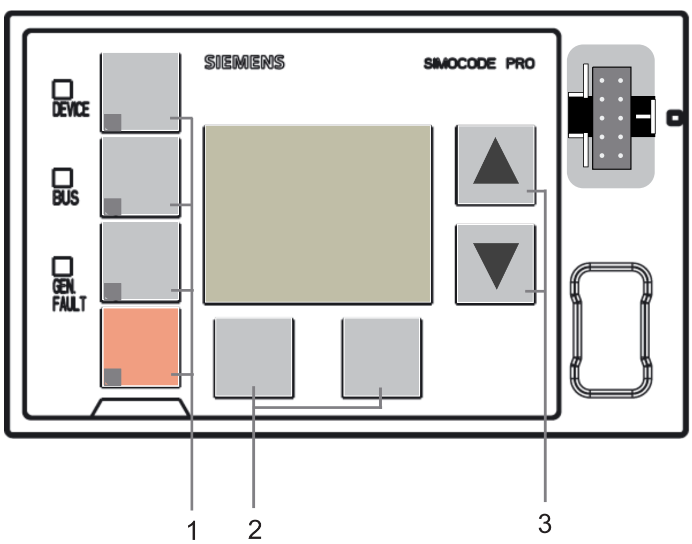


Figure 8-11 Operator controls of the operator panel with display

1

Four freely parameterizable **operator keys** with status LED**.** These operator keys are used to control the motor with integrated status LEDs for any status feedback. The functions can be user-defined. Labeling can be either freely chosen or achieved using the labeling strips supplied with the device (see also Chapter Operator panel with display (Page 79)) and Chapters "Operator panel LED" and "Operator panel buttons" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958))

2

Two **softkeys.** They can have different functions depending on the menu displayed (e.g. open menu, exit menu, TEST/RESET). The currently assigned functions are shown on the lower left or right edge of the display.

3

Two **arrow keys** (one upwards arrow and one downwards arrow). They serve to navigate the menu or change the display settings, e.g. to adjust the contrast or to select a profile for the main display.

8.3.3 Menu of the operator panel with display

8.3.3.1 Timing charts

Main menu, operator panel with display

Details: See Displays of the operator panel with display (Page 99).

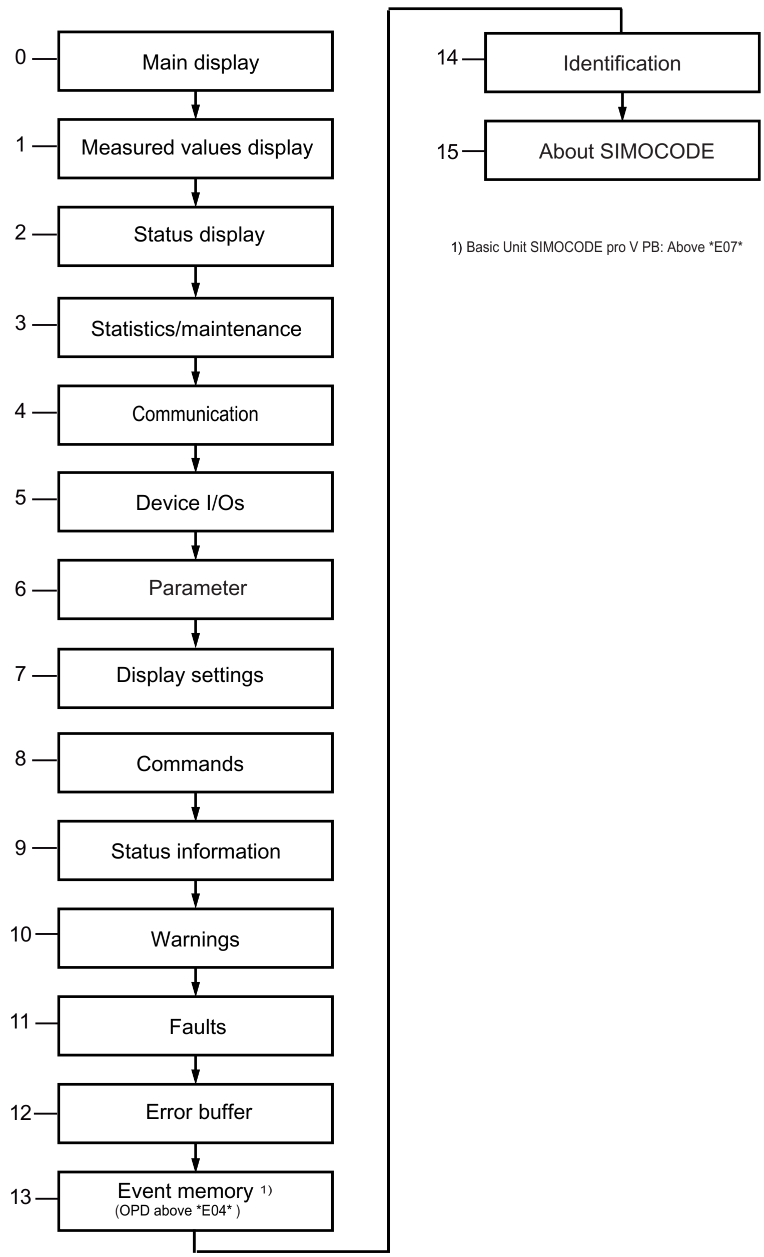


Figure 8-12 Main menu, operator panel with display

Main display, operator panel with display

Details: See Read and adapt main display (Page 101).

1 Measured values, operator panel with display

Details: See Display of measured values in the measured values display (Page 103).

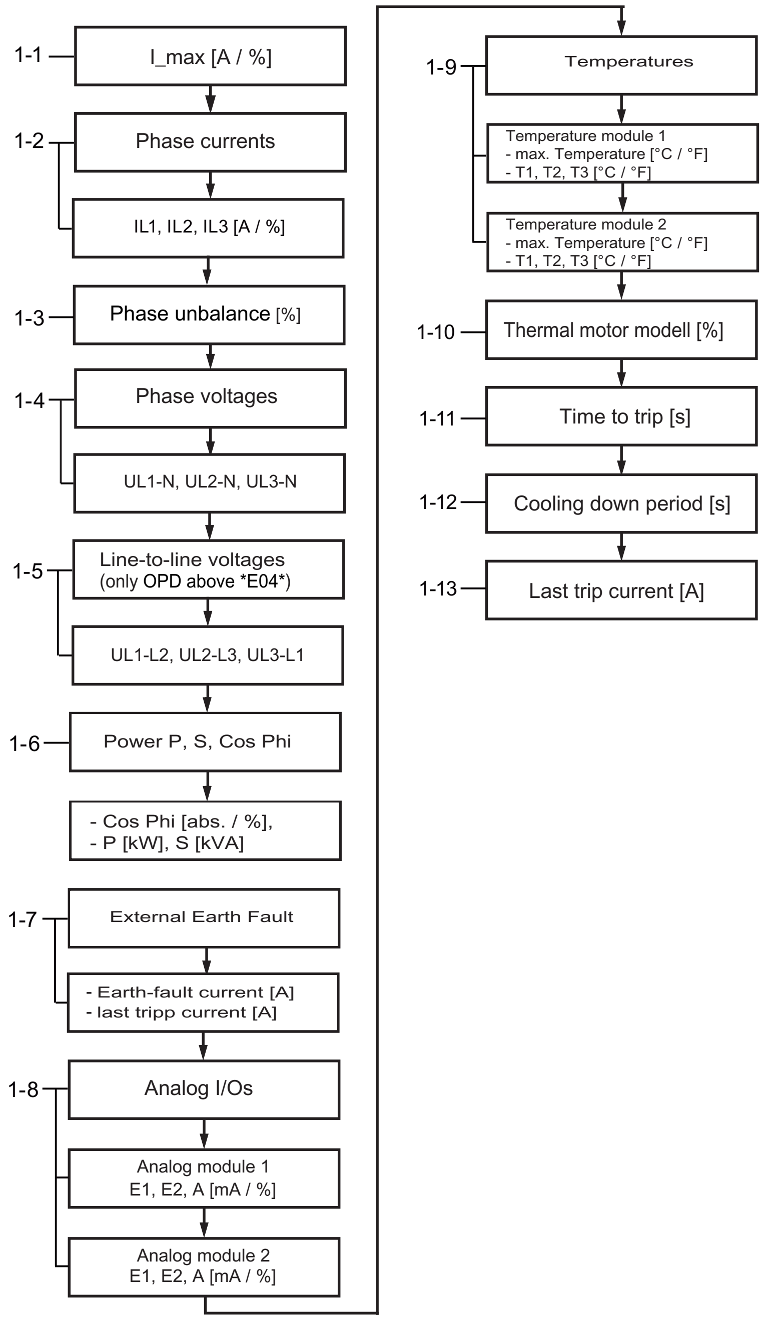


Figure 8-13 Measured values, operator panel with display

Note

Numbering of the displays

The numbering is valid with the maximum expansion.

---

2 Status motor protection/motor control, operator panel with display

Details: See Motor protection and motor control status (Page 105).

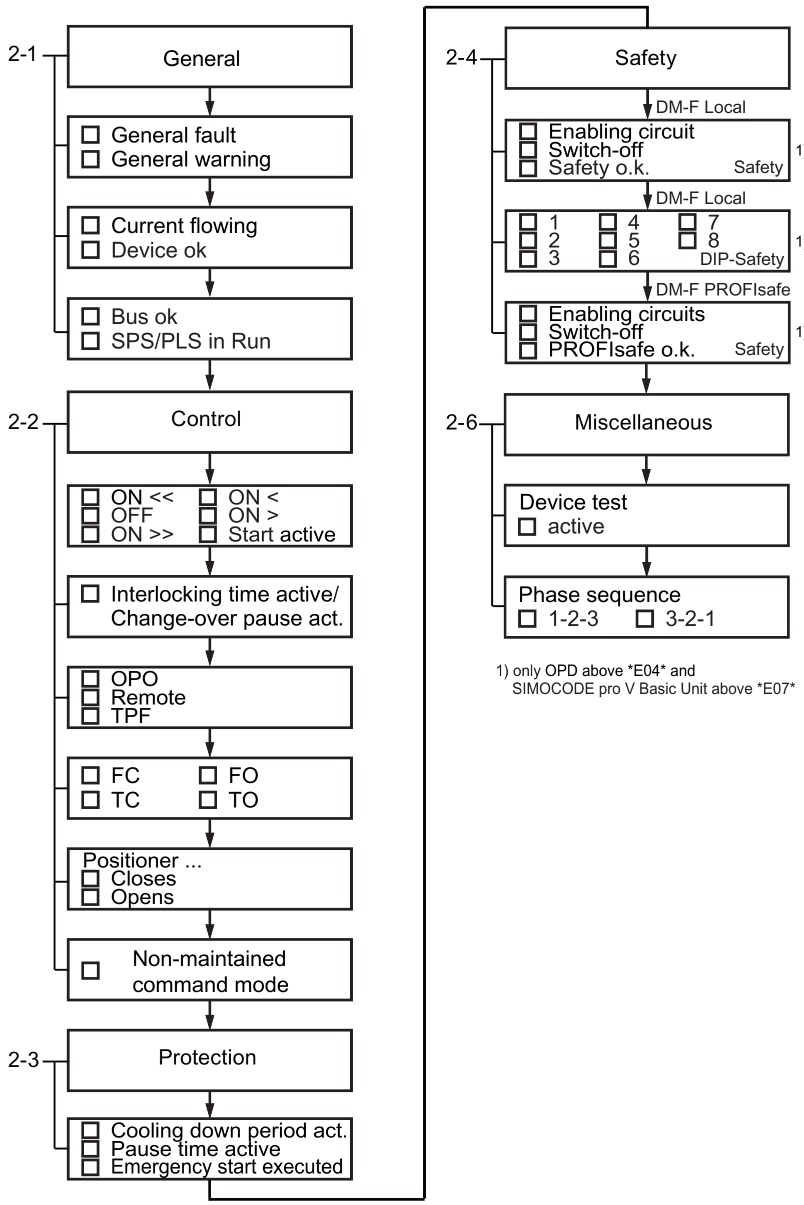


Figure 8-14 Status motor protection/motor control, operator panel with display - PROFIBUS / Modbus RTU

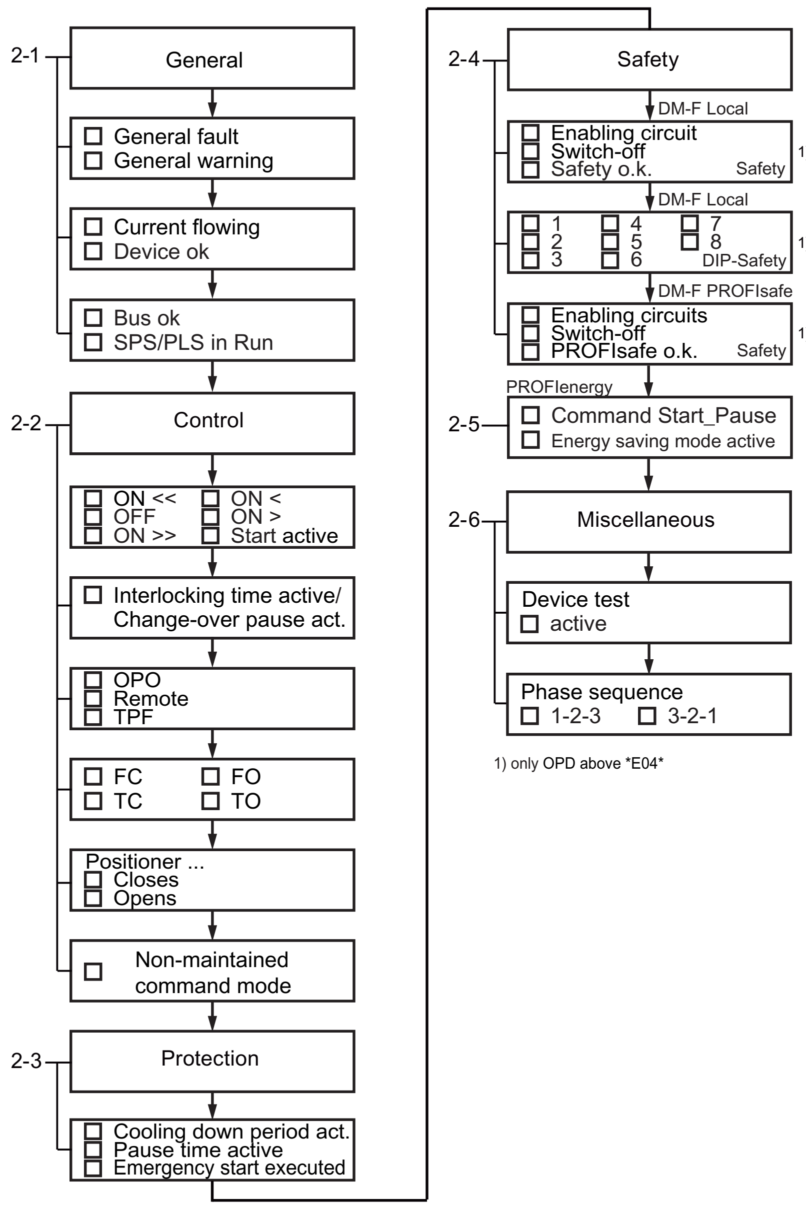


Figure 8-15 Status motor protection/motor control, operator panel with display - PROFINET / EtherNet/IP

3 Statistics/maintenance, operator panel with display

Details: See Display of statistical and maintenance-relevant information on the statistics/maintenance display (Page 106).

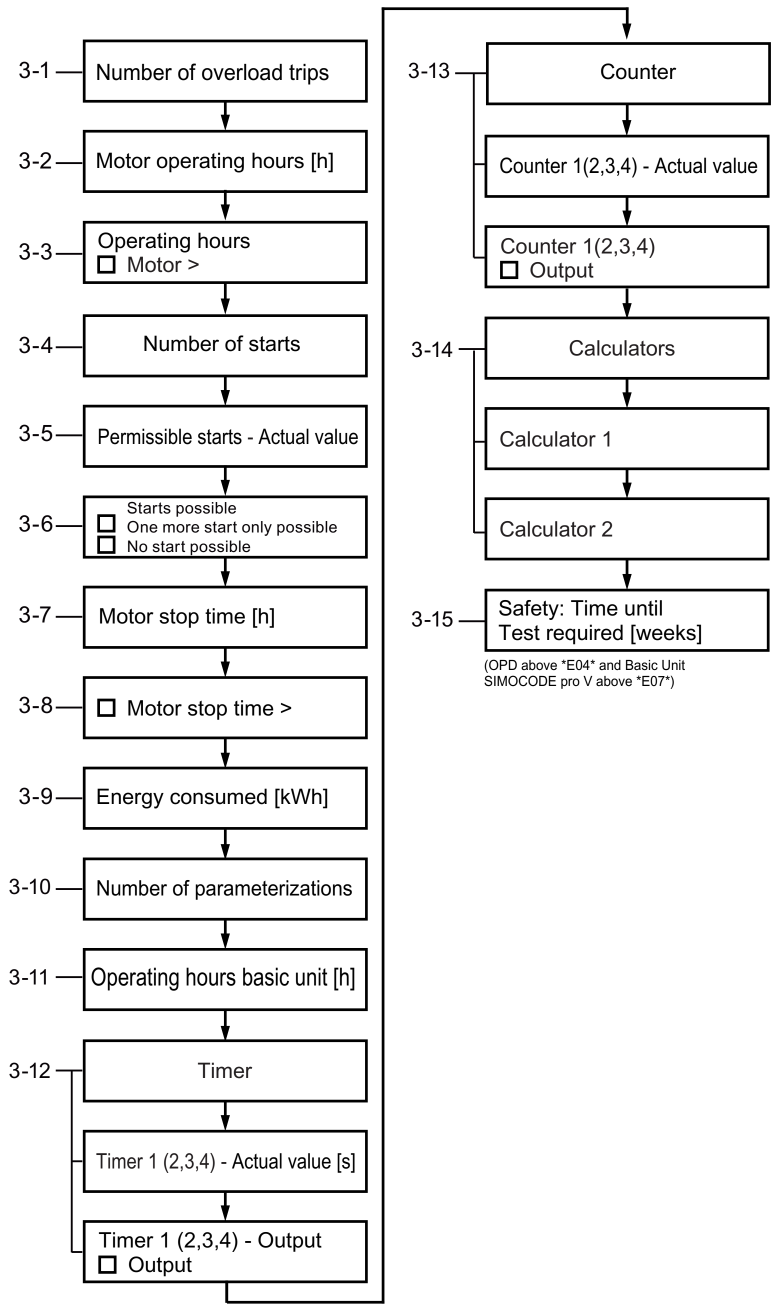


Figure 8-16 Statistics/maintenance, operator panel with display - PROFIBUS / Modbus

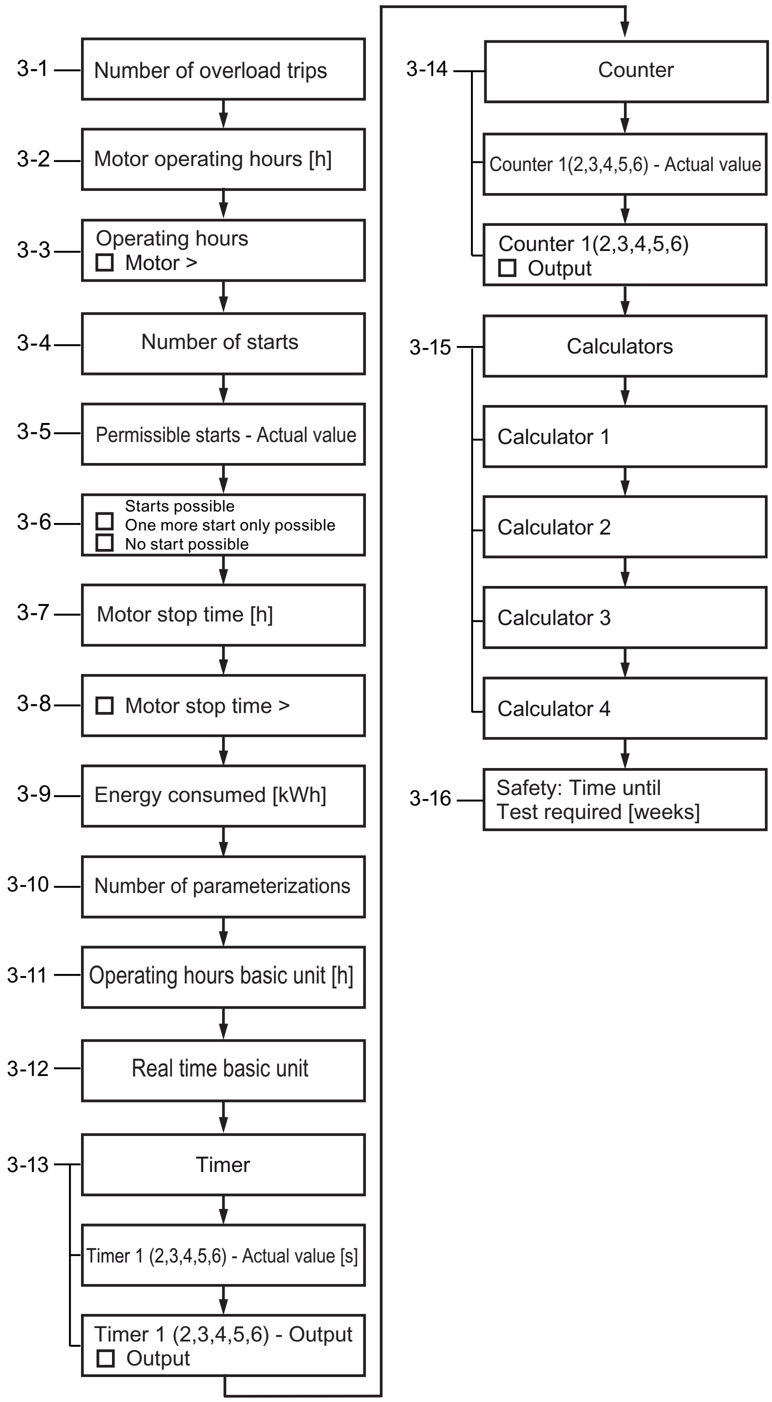


Figure 8-17 Statistics/maintenance, operator panel with display - PROFINET / EtherNet/IP

4 Communication on the fieldbus, operator panel with display

Details: See Status display for fieldbus communication (Page 107).

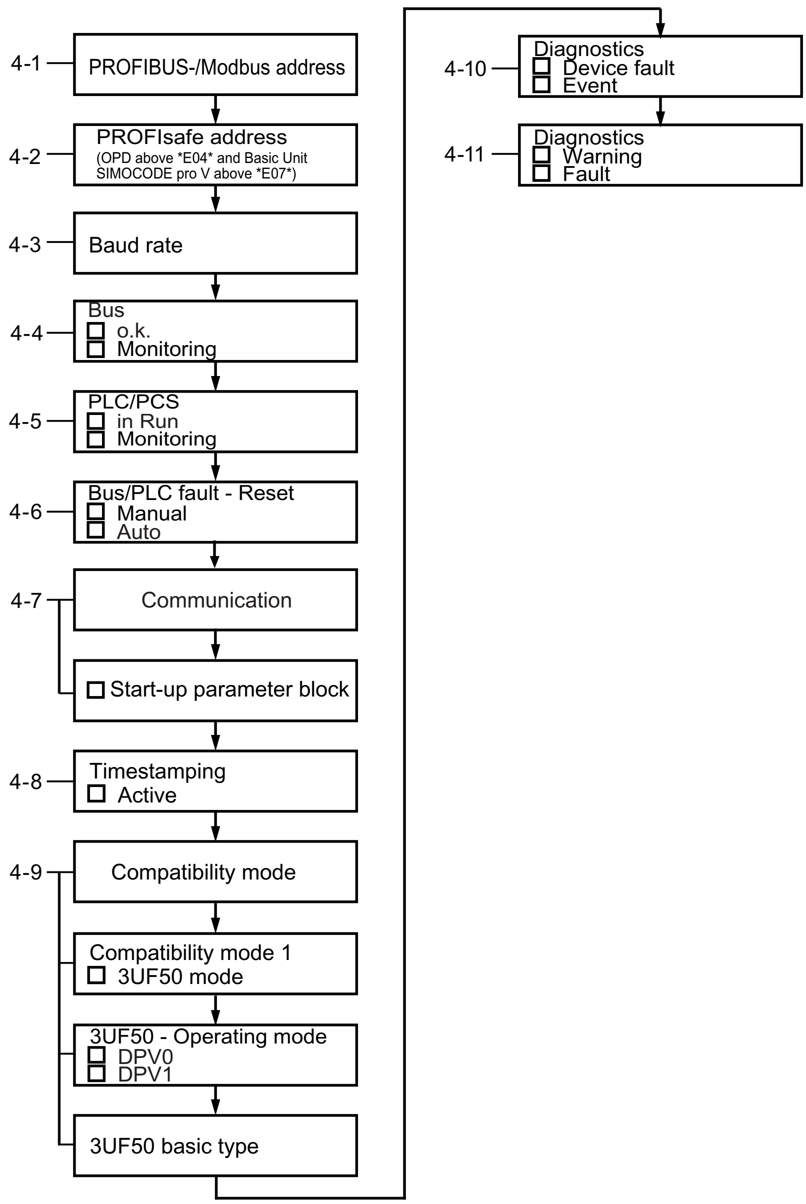


Figure 8-18 Communication on PROFIBUS / Modbus, operator panel with display

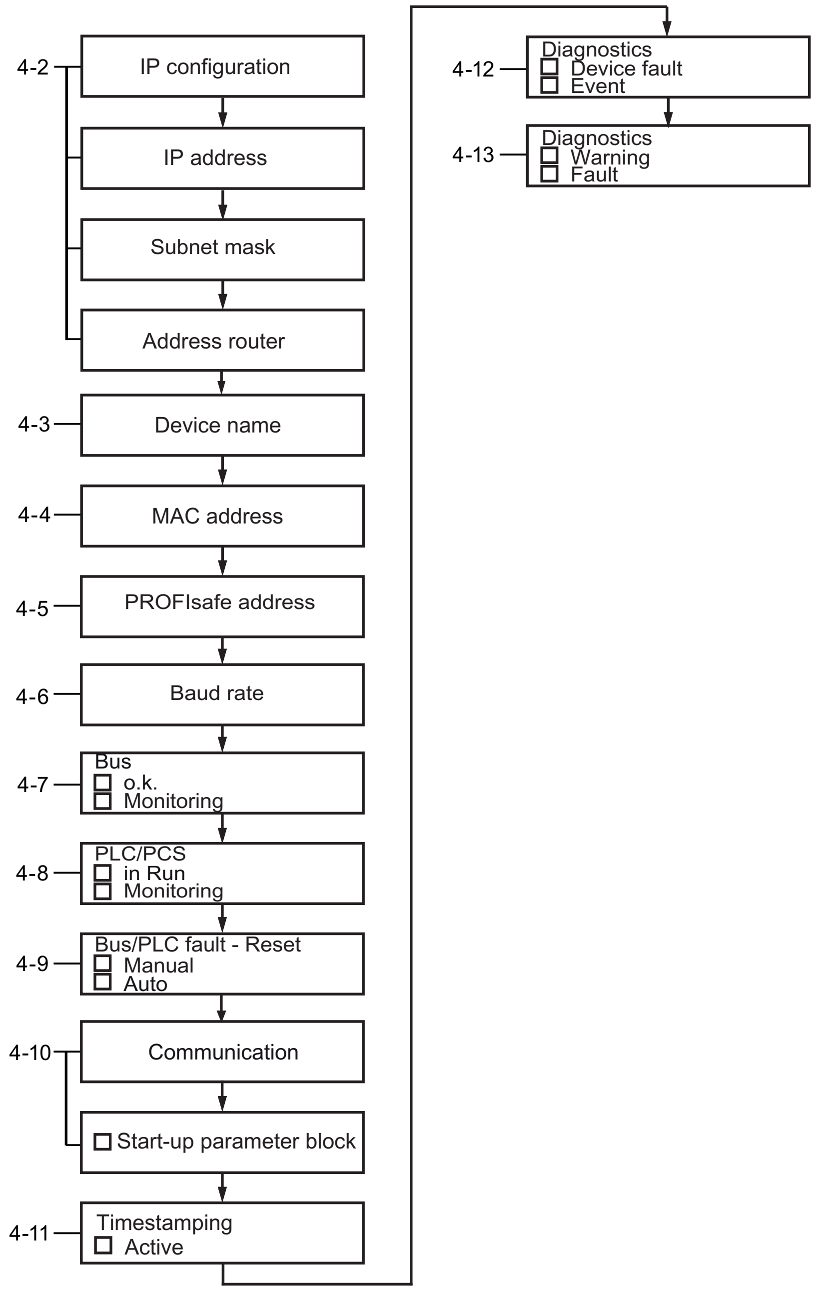


Figure 8-19 Communication on PROFINET/EtherNet/IP, operator panel with display

5 Device I/Os, operator panel with display

Details: See Displays the current status of all device I/Os (Page 108).

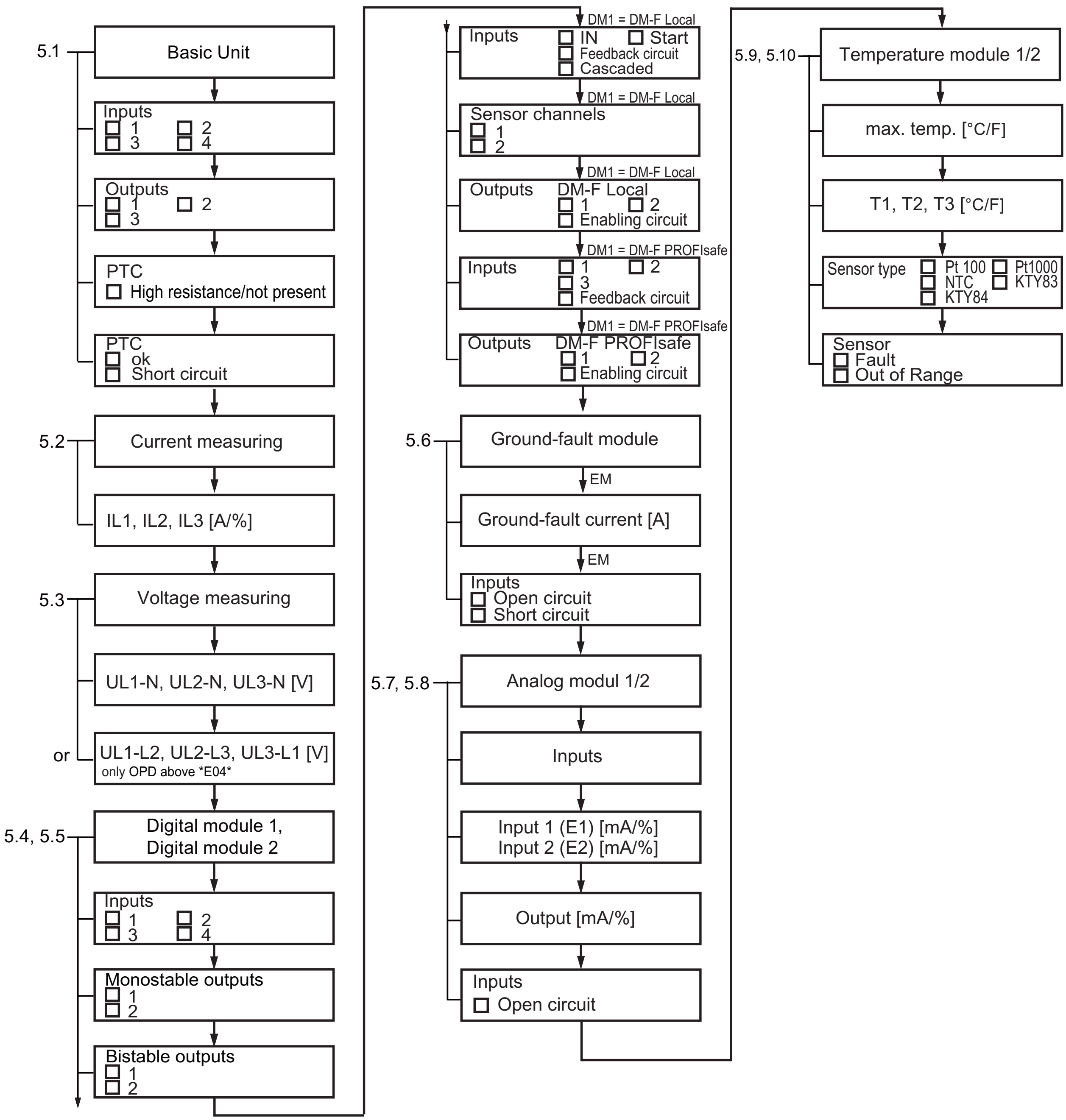


Figure 8-20 Device I/Os, operator panel with display

6 Parameters, operator panel with display

SIMOCODE pro V allows selected parameters to be set using the operator panel with display [1)].

Details: See Parameters (Page 110)

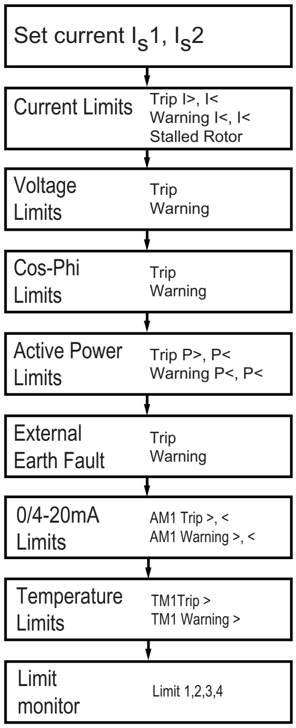


Figure 8-21 Parameter settings, operator panel with display

1)

Overview of the basic units and operator panels and their product versions, which permit the setting of parameters via the operator panel with display:

			Operator panel			
			3UF7210-1AA00-0	3UF7210-1BA00-0	3UF7210-1AA01-0	3UF7210-1BA01-0
SIMOCODE pro V PN	3UF7011-1A.00-0	E01	E07	E01	E01	E01
SIMOCODE pro V EIP	3UF7013-1A.00-0	E01	E07	E01	E01	E01
SIMOCODE pro V PROFIBUS	3UF7010-1A.00-0	E15	E10	E02	E01	E01
SIMOCODE pro V MR	3UF7012-1A.00-0	E03	E10	E02	E01	E01

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 79).

7 Display settings, operator panel with display

Details: See Adapt display settings (Page 112).

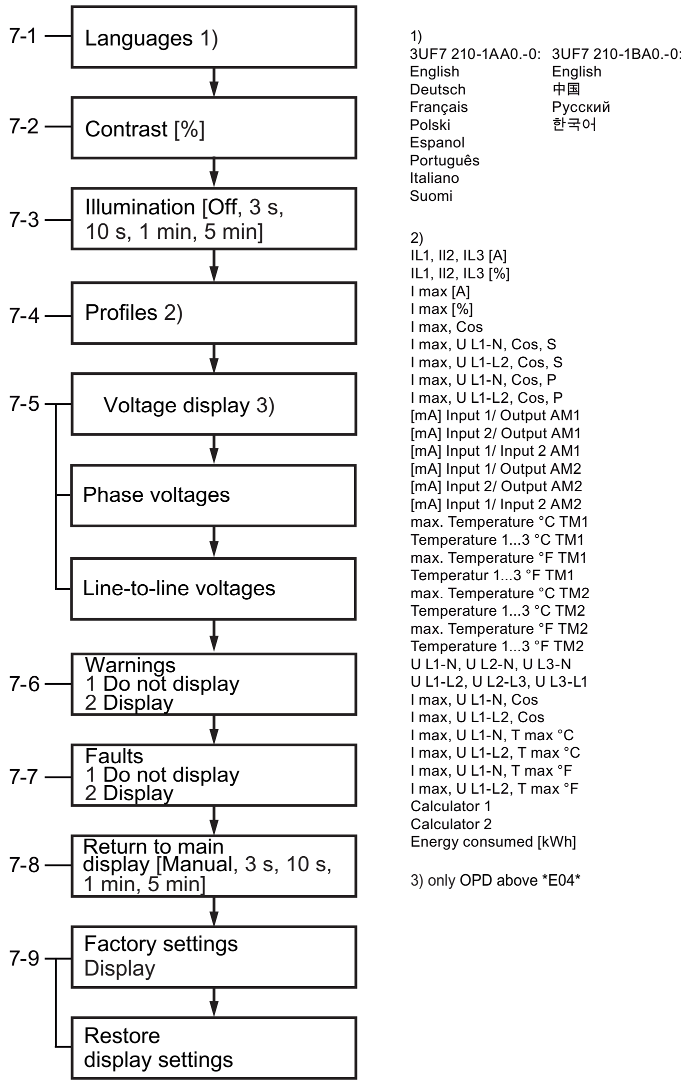


Figure 8-22 Display settings, operator panel with display

8 commands, operator panel with display (for pro V PB / pro V MR basic units)

Details: See Resetting, testing and parameterizing via commands (Page 114).

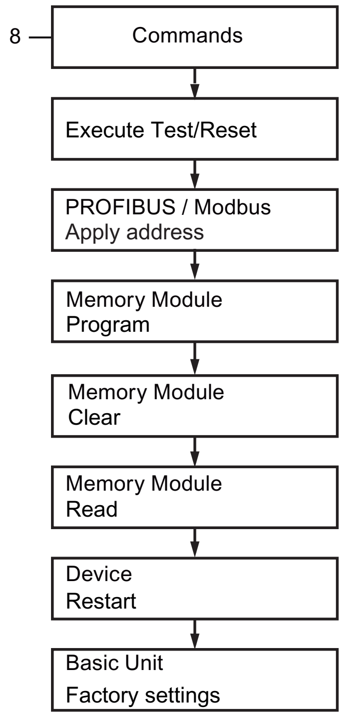


Figure 8-23 Commands, operator panel with display

9 Messages, operator panel with display

Details: See Display of all pending status information (Page 115).

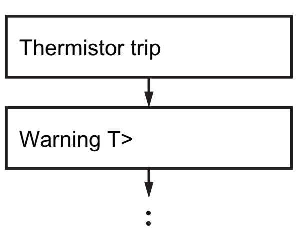


Figure 8-24 Messages, operator panel with display

10 Warnings, operator panel with display

Details: See Display of all pending warnings (Page 115).

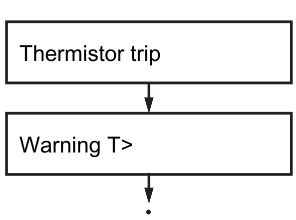


Figure 8-25 Warnings, operator panel with display

11 Faults, operator panel with display

Details: See Display of all pending faults (Page 116).

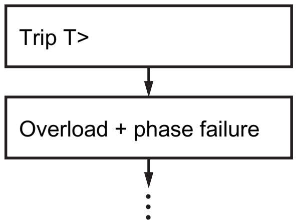


Figure 8-26 Faults, operator panel with display

12 Fault memory, operator panel with display

Details: See Reading the device's internal error buffer (Page 116)

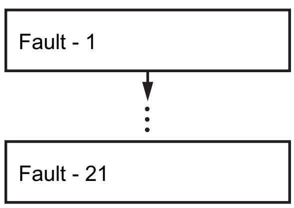


Figure 8-27 Fault memory, operator panel with display

13 Event memory, operator panel with display (only for OPD as from *E06* and BU2 as from *E07*)

Details: See Reading out the device-internal event memory (Page 116).

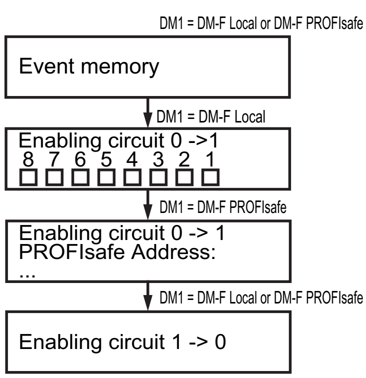


Figure 8-28 Event memory, operator panel with display

14 Identification, operator panel with display

Details: See Identification of the motor feeder and the SIMOCODE pro components (Page 117).

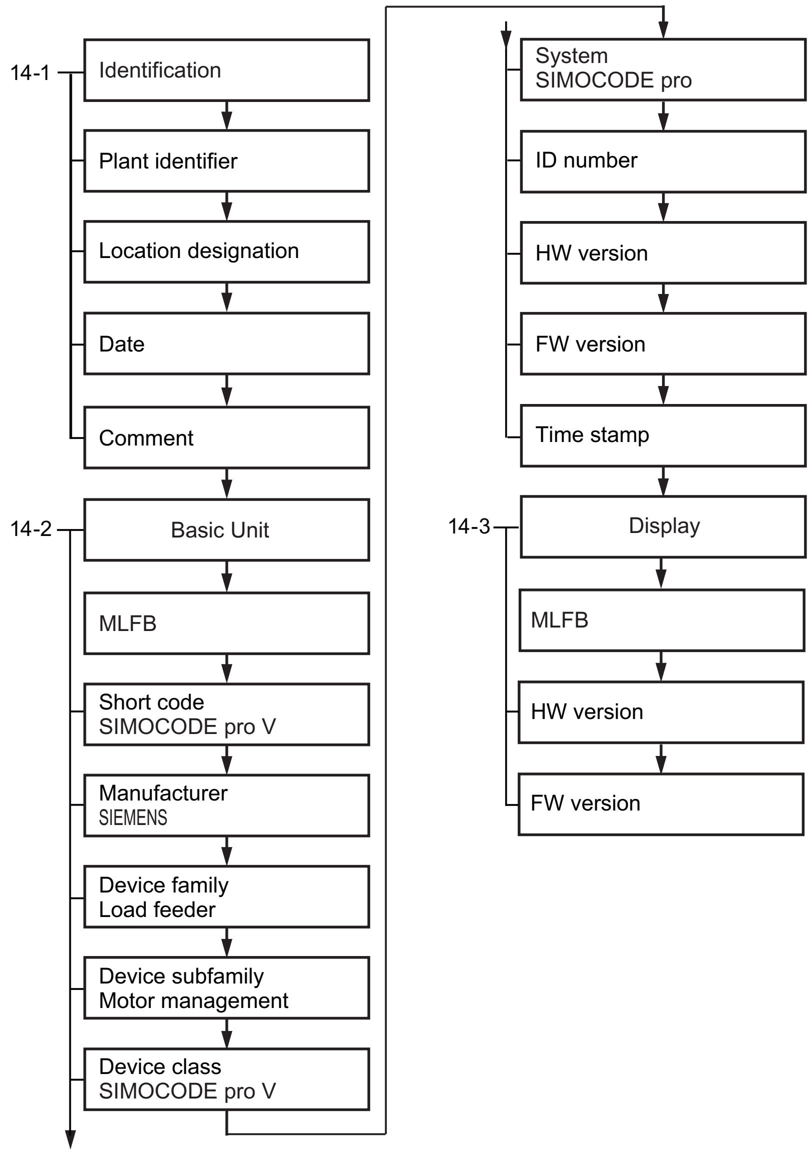


Figure 8-29 Identification, operator panel with display

8.3.3.2 Displays of the operator panel with display

You can navigate through the menu using the arrow keys and softkeys. Each menu item may have one or more submenus. The menu structure and display are, in part, directly dependent on the device parameterization (e. g. selected control function) and hardware configuration (e.g. type and number of expansion modules used).

- Main display
  The "main display" is the standard display of the SIMOCODE pro. It displays current measured values, which can be selected via profiles predefined to meet user-specific requirements. For detailed information: See "Read and adapt main display (Page 101)"
- Measured values display
  The "Measured values display" provides an overview of all values measured by SIMOCODE pro. For example, all phase currents, phase voltages, power-related measured values or temperatures. For detailed information: See "Display of measured values in the measured values display (Page 103)."
- Status display
  The "Status display" shows all higher-level status information, i.e. all status information relevant to the protection and control of the motor. For detailed information: See "Motor protection and motor control status (Page 105)."
- Statistics/Maintenance
  The "Statistics/Maintenance" menu item provides an overview of all SIMOCODE pro information that is primarily relevant to maintenance. For detailed information: See "Display of statistical and maintenance-relevant information on the statistics/maintenance display (Page 106)."
- Communication
  The "Communication" menu item displays all important information concerning fieldbus communication. For detailed information: See Status display for fieldbus communication (Page 107)
- Device I/Os
  The "Device I/Os" menu item provides a complete overview of the current status of all inputs and outputs of the basic unit as well as any connected expansion modules. For detailed information: See Displays the current status of all device I/Os (Page 108)
- Parameters
  SIMOCODE pro V allows selected parameters to be set using the operator panel with display: For detailed information: See Parameters (Page 110)

The parameterization is possible with the following combinations of basic unit/operator panel with display:

			Operator panel			
			3UF7210-1AA00-0	3UF7210-1BA00-0	3UF7210-1AA01-0	3UF7210-1BA01-0
SIMOCODE pro V PN	3UF7011-1A.00-0	E01	E07	E01	E01	E01
SIMOCODE pro V EIP	3UF7013-1A.00-0	E01	E07	E01	E01	E01

SIMO-CODE pro V PROFI-BUS	3UF7010-1A.00-0	E15	E10	E02	E01	E01
SIMO-CODE pro V Mod-bus RTU	3UF7012-1A.00-0	E03	E10	E02	E01	E01

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 79).

- Display settings
  All settings relevant to the operator panel with display can be carried out via "Display Settings". In addition to selecting the language and adjusting the contrast or illumination, it is also possible to select the profiles here that are relevant for adjusting the main display. For detailed information: See also "Adapt display settings (Page 112)."
- Commands
  The "Commands" menu item contains all commands relating to SIMOCODE pro, e.g. for testing the feeder, resetting after tripping and/or transferring parameters into the memory module or into SIMOCODE pro. For detailed information: See "Resetting, testing and parameterizing via commands (Page 114)."
- Messages
  The "Status Information" menu item provides an overview of all pending status information. For detailed information: See "Display of all pending status information (Page 115)."
- Warnings
  The "Warnings" menu item provides an overview of all pending warnings. For detailed information: See "Display of all pending warnings (Page 115)."
- Faults
  The "Faults" menu item provides an overview of all pending faults. For detailed information: See "Display of all pending faults (Page 116)."
- Error buffer
  The "Error buffer" menu item displays the SIMOCODE pro device-internal error buffer. For detailed information: See "Reading out the device-internal error buffer (Page 116)."
- Event memory
  The "Event Memory" menu item enables access to the SIMOCODE pro device-internal event memory. For detailed information: See "Reading out the device-internal event memory (Page 116)."

  Note

  Precondition for event memory display

  Is only displayed if DM-F present.

- Identification
  In the "Identification" menu item, you will find detailed information/labeling regarding SIMOCODE pro hardware components (basic unit, operator panel with display). For detailed information: See "Identification of the motor feeder and the SIMOCODE pro components (Page 117)."
- About SIMOCODE
  The "About SIMOCODE" menu item displays further information about SIMOCODE pro.
  See Timing charts (Page 84).

8.3.3.3 Read and adapt main display

To enable users speedy viewing of the measured values typically shown on their switchboard, various profiles are stored in the operator panel with display that enable user-specific adaptation of the standard measured values displayed in the SIMOCODE pro main display. The profile is selected in the menu "Display settings" → Profiles (see Section Adapt display settings (Page 112)).

The set current, the selected class time for the overload protection system and the use of temperature monitoring based on thermistors or analog temperature sensors are displayed (if programmed) at the bottom left of the main display. The submenus of the main display can be navigated with the right-hand softkey. For motors with two speeds, the left-hand softkey can be used to alternate between the display of the two set currents.

- **IL1, IL2, IL3 [A]** 1)

Shows the currents in all three phases in A.

- **IL1, IL2, IL3 [%]** 1)

Displays the currents in all three phases as a percentage of the set current.

- **Imax [A]** 1)

Shows the maximum current of all three phases in A.

- **Imax [%]** 1)

Displays the maximum current of all three phases as a percentage of the set current.

- **Imax, Cos phi** 2)

Displays the maximum current of all three phases in amps and the power factor.

- **Imax, UL1-N, Cos phi, S** 3)

Shows the maximum current of all three phases in amps, the phase voltage UL1 in V, the power factor, and the apparent power in kVA.

- **Imax, UL1-L2, Cos phi, S** 4)

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V, the power factor, and the apparent power in kVA.

- **Imax, UL1-N, Cos phi, P** 3)

Shows the maximum current of all three phases in amps, the phase voltage UL1 in V, the power factor, and the active power in kW.

- **Imax, UL1-L2, Cos phi, P** 4)

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V, the power factor, and the active power in W.

- **In1/output AM1 / In1/output AM2** 5) **[mA]**

Shows the current value at input 1 of analog module 1 / 2 and at the output of analog module 1 / 2 in mA.

- **In2/output AM1 / In2/output AM2** 5) **[mA]**

Shows the current value at input 2 of analog module 1 / 2 and at the output of analog module 1 / 2 in mA.

- **Inputs AM 1 / inputs AM2** 5) **[mA]**

Shows the current value at the two inputs of analog module 1 / 2 in mA.

- **Max. temp. °C TM 1 / TM2** [6)]

Shows the maximum temperature of all used sensor measuring circuits of the temperature module 1 / 2 in °C.

- **Temperatures °C TM 1 / TM2** [6)]

Shows the individual temperatures of all used sensor measuring circuits of the temperature module 1 / 2 in °C.

- **Max. temp. °F TM 1 / TM2** [6)]

Shows the maximum temperature of all used sensor measuring circuits of the temperature module 1 / 2 in °F.

- **Temperatures °F TM 1 / TM2** [6)]

Shows the individual temperatures of all used sensor measuring circuits of the temperature module 1 / 2 in °F.

- **UL1-N, UL2-N, UL3-N** [3)]

Shows all phase voltages in V.

- **UL1-L1, UL2-L3, UL3-L1** [4)]

Shows line-to-line voltages UL1-L2, UL2-L3, UL3-L1 in V.

- **Imax, UL1-N, Cos phi** [3)]

Shows the maximum current of all three phases in amps, the phase voltage UL1-N in V, and the power factor as absolute values.

- **Imax, UL1-L2, Cos phi** [4)]

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V and the power factor.

- **Imax, UL1-N, °C** [7)]

Shows the maximum current of all three phases in amps, the phase voltage UL1-N in V, and the maximum temperature of all used sensor measuring circuits of the temperature module in °C.

- **Imax, UL1-L2, °F** [7)]

Shows the maximum current of all three phases in A, the line-to-line voltage UL1-L2 in V, and the maximum temperature of all used sensor measuring circuits of the temperature module in °F.

- **Calculator 1**

Shows the calculated result that the function block Calculator 1 provides without units in the range 0 ... 65535.

Permits display, for example, of a 2-byte value sent directly from the automation system on the display of the switchboard or the display without units of each 2-byte value in SIMOCODE pro.

- **Calculator 2**

Shows the calculated result that the function block Calculator 2 provides without units in the range 0 ... 65535.

Permits display, for example, of a 2-byte or 4-byte value sent directly from the automation system on the display of the switchboard or the display without units of each 2-byte and 4-byte value in SIMOCODE pro.

- **Energy consumed** [2)]

Note

Modified system expansion or hardware configuration

If the main display permanently fails to show measured values, this indicates that a profile has been selected in the display settings that is no longer supported, due, for example, to a changed system expansion or changed hardware configuration. The profile must be reselected.

---

1) Possible only if a current measuring module or current / voltage measuring module is used

2) Possible only if a current / voltage measuring module is used

3) Possible only if a current / voltage measuring module is used Values will only be displayed if phase voltage is set/configured

4) Possible only if a current / voltage measuring module is used and line-to-line voltage is set/configured

5) Possible only if the analog module is used

6) Possible only if the temperature module is used

7) Possible only if a current / voltage measuring module and temperature module are used Values will only be displayed if phase voltage is set/configured

8.3.3.4 Display of measured values in the measured values display

The "Measured Values" menu item displays all current SIMOCODE pro measured values. Depending upon the type of expansion modules used, all or only some of the values listed here will be available. These are the most important menus by way of example:

- Imax [1)]
  Shows the maximum current of all three phases and can be switched between A or % of I_s
- IL1, IL2, IL3 [1)]
  Shows the currents of all three phases and can be switched between A or % of I_s.
- Phase unbalance [1)]
  Shows the current phase unbalance as a percentage.
- UL1-N, UL2-N, UL3-N [2)]
  Shows all phase voltages in V.
- U L1-L2, U L2-L3, U L3-L1 [3)]
  Shows all line-to-line voltages in V.
- Cos phi, P, S [4)]
  Shows the power factor (0 to 100 % or absolute, switchable using the right softkey), the active power in kW, and the apparent power in kVA.
- Frequency [Hz] [7)]

- Ground-fault current [mA]
  Shows the measured value of the residual current.
- Last trip current [mA]
  Shows the last measured value of the residual current.
- Analog input 1, analog input 2, analog output (for AM1) 5)
  Shows the current values at both inputs and the actual value at the output of analog module 1 and can be switched over between mA and %.
- Analog input 1, analog input 2, analog output (for AM2) 5)
  Shows the actual values at both inputs and the actual value at the output of analog module 2 and can be switched over between mA and %.
- Max. temperature 6)
  Shows the maximum temperature of all used sensor measuring circuits of the temperature module 1 in °C (can be switched to °F).
- Max. temperature 6)
  Shows the maximum temperature of all used sensor measuring circuits of the temperature module 2 in °C (can be switched to °F).
- T1, T2, T3 6)
  Shows the individual temperatures of all used sensor measuring circuits of the temperature module 1 in °C (can be switched to °F).
- T1, T2, T3 6)
  Shows the individual temperatures of all used sensor measuring circuits of the temperature module 2 in °C (can be switched to °F).
- Thermal motor model
  Shows the current temperature rise of the internal thermal motor model in %.
- Time to trip
  Shows the estimated time to trip.
- Cooling down period
  Displays the cooling down period remaining before the motor can be switched on again after an overload trip.
- Last trip current
  Shows the magnitude of the current that was measured at the moment of the overload trip, unit of measurement can be switched between A and % of I_s.

1) Possible only if a current measuring module or current / voltage measuring module is used

2) Possible only if a current / voltage measuring module is used Values will only be displayed if phase voltage is set/configured

3) Possible only if a current / voltage measuring module is used and line-to-line voltage is set/configured

4) Possible only if a current / voltage measuring module is used

5) Possible only if the analog module is used

6) Possible only if the temperature module is used

7) 2nd generation current / voltage measuring module necessary

8.3.3.5 Motor protection and motor control status

The status display shows all higher-level status information, i.e. all status information relevant to the protection and controlling of the motor. The type of status information depicted is, therefore, in part directly dependent upon the parameterized control function and the hardware configuration of SIMOCODE pro, and may vary.

These are the most important menus by way of example:

General

- General fault, general warning
- Current flowing, device ok
- Bus ok, PLC/PCS in Run

Control

Note

Display status information

The display of the status information can vary according to the control function.

- ON<<, ON<, OFF, ON>, ON>>, start active
- Interlocking time active, change-over pause active
- OPO, Remote, TPF
- FC, FO, TC, TO: Only for "Positioner" control functions.
- Positioner runs in CLOSED direction, positioner runs in OPEN direction: Only for "Positioner" control functions.
- Non-maintained command mode

Protection

- Cooling down period active, pause time active, emergency start executed

Other

- Device test active
- Phase sequence 1-2-3, phase sequence 3-2-1

Possible only if a current / voltage measuring module is used.

Safety

- Safety DM-F Local: Status of enabling circuit, shutdown "Safety," "Safety o.k." (only with an OPD as from product version *E04*, a SIMOCODE pro V MR / PN / EIP basic unit or a SIMOCODE pro V PB basic unit as from product version *E07* and a DM-F Local)
- DIP switches, DM-F Local: Status of DIP switches 1, 2, 3, 4, 5, 6, 7, 8 (only with an OPD as from product version *E04*, a SIMOCODE pro V MR/PN/EIP basic unit or a SIMOCODE pro V PB basic unit as from product version *E07* and a DM-F Local)
- Safety DM-F PROFIsafe: Status of enabling circuit, shutdown "Safety," "PROFIsafe active" (only with an OPD as from product version *E04*, a SIMOCODE pro V PN basic unit or a SIMOCODE pro V PB basic unit as from product version *E07* and a DM-F PROFIsafe).

8.3.3.6 Display of statistical and maintenance-relevant information on the statistics/maintenance display

The "Statistics/Maintenance" menu item gives an overview of all SIMOCODE pro information that is primarily relevant to maintenance. The states of timers and counters, etc. are displayed, as well as operating hours, stop times and the number of starts.

These are the most important menus by way of example:

General

- Number of overload trips
- Motor operating hours
- Motor operating hours >: Displays overshooting of the set limit for operating hours monitoring.
- No. of starts - actual value
- Permissible starts - actual value
- One more start only, no start
- Stop time: Displays overshooting of the set limit for motor stop time monitoring.
- Energy consumed (possible only if a current / voltage measuring module is used)
- Number of parameterizations
- Motor operating hours basic unit
- Real time basic unit
- Timer
- Timer 1 (2, 3, 4, 5, 6) actual value
- Timer 1 (2, 3, 4, 5, 6) output
- Counter
- Counter 1 (2, 3, 4, 5, 6) actual value
- Counter 1 (2, 3, 4, 5, 6) output

Calculators

- Calculator 1
- Calculator 2
- Calculator 3
- Calculator 4

Safety

- Time until test requirement: Remaining time until next test requirement in weeks (displayed only when DM-F is installed).

8.3.3.7 Status display for fieldbus communication

The "Communication" menu item displays all important information concerning fieldbus communication.

PROFIBUS/Modbus:

In addition to the current PROFIBUS/Modbus device address, the baud rate or fieldbus-relevant settings concerning process and diagnostic alarms to the automation system.

These are the most important menus by way of example:

- PROFIBUS/Modbus address
- PROFIsafe address: Indicates the PROFIsafe address (only for OPD versions as from *E04*, SIMOCODE pro V PB basic unit as from *E07* and an available with a DM-F PROFIsafe)
- Baud rate
- Bus ok, Bus monitoring
- PLC/PCS in Run, PLC/PCS monitoring
- Bus/PLC fault - reset
- Startup parameter block
- Time stamping active
- Compatibility mode
- Compatibility mode 1, 3UF50 Mode
- 3UF50 mode DPV0, DPV1
- 3UF50 basic type
- Diagnostics device error, diagnostics message: Displays which diagnostic information of type "device error" and/or "message" is sent by SIMOCODE pro to a higher-level automation system via PROFIBUS.
- Diagnostics warning, diagnostics trip: Displays which diagnostic information of type "warning" and/or "trip" is sent by SIMOCODE pro to a higher-level automation system via PROFIBUS.

PROFINET:

Not only information about IP configuration, device name, MAC address, PROFIsafe address but also settings about the status of communication and the response of SIMOCODE pro if communication failures are displayed.

These are the most important menus by way of example:

- IP configuration
- Device name
- MAC address
- PROFIsafe address: Shows the PROFIsafe address (only when DM-F PROFIsafe is installed)
- Baud rate
- Bus OK, bus monitoring
- PLC/PCS in Run, PLC/PCS monitoring
- Bus/PLC fault - reset
- Startup parameter block
- Diagnostics device error, diagnostics message: Shows which type of diagnostic information is sent by SIMOCODE pro to a higher-level automation system via PROFINET.
- Diagnostics warning, diagnostics trip: Shows which type of diagnostic information is sent by SIMOCODE pro to a higher-level automation system via PROFINET.

8.3.3.8 Displays the current status of all device I/Os

The "Device I/Os" menu item provides a complete overview of the current status of all inputs and outputs of the basic unit as well as any connected expansion modules. The type of status information displayed is directly dependent upon the SIMOCODE pro hardware configuration.

These are the most important menus by way of example:

Basic unit

- Inputs 1 (2, 3, 4)
- Outputs 1 (2, 3)
- PTC high resistance/not present
- PTC ok, PTC short circuit

Current measurement

IL1, Il2, IL3: Displays the currents (in A) in all three phases (possible only if a current measuring module or current / voltage measuring module is used).

Voltage measurement

- UL1-N, UL2-N, UL3-N: Displays all line-to-line voltages in V (possible only if a current / voltage measuring module is used and the OPD is version *E04* or higher and line-to-line voltage is set/configured).
- U L1-L2, U L2-L3, U L3-L1: Displays all line-to-line voltages in V (possible only if a current / voltage measuring module is used, line-to-line voltage is set/configured and the OPD used is version *E04* or higher).

Digital module 1, digital module 2

- Inputs 1 (2, 3, 4): Inputs 1, 2, 3, 4 "monostable" or "bistable."
- Outputs 1, 2 "monostable" (possible only if digital module 1 is used as "monostable").

Note

Display

For OPD up to product version *E03*, the display is different.

- Outputs 1, 2 "bistable" (possible only if digital module 1 is used as "monostable" or "bistable").

Digital module 1 as DM-F Local

Possible only if digital module 1 is "Local," an OPD as from version *E04* and a SIMOCODE pro V (PB basic unit as from product version *E07*) is used.

- Inputs DM-F Local: Inputs "IN," "Start," "Feedback circuit," "Cascaded."
- Sensor channels DM-F Local: Sensor channels 1, 2
- Outputs DM-F Local: Outputs 1, 2, "Enabling circuit."

Digital module 1 is DM-F PROFIsafe

Possible only if digital module 1 is "PROFIsafe", an OPD as from version *E04* and a SIMOCODE pro V PB / PN basic unit (PB as from product version *E07*) is used.

- Inputs DM-F PROFIsafe: Inputs 1, 2, 3, "Feedback circuit".
- Outputs DM-F PROFIsafe: Outputs 1, 2, "Enabling circuit."

Ground-fault module

Possible only if the ground-fault module is used.

- Ground-fault current [mA]
- Inputs
  - Open circuit
  - Short-circuit.

Analog module

Possible only if the analog module is used.

- Input 1, input 2
- Output
- Open circuit

Temperature module

Possible only if the temperature module is used.

- Max. temperature
- T1, T2, T3
- Sensor type Pt100, Pt1000, NTC, KTY83, KTY85
- Sensor fault sensor out of range

8.3.3.9 Parameters

You can set the following parameters using the operator panel with display:

Parameters	Range	Note
Overload protection → current settings		Possible only if a current measuring module is configured
Current setting Is1	0.00 - 9,999.00 A	-
Current setting Is2	0.00 - 9,999.00 A	Possible only in conjunction with the following control functions: • Dahlander starter • Dahlander reversing starter • Pole-changing starter • Pole-changing reversing starter
Current limits		Possible only if a current measuring module is configured
Monitoring of current limits → trip level I > (upper limit)	0 - 1020 % of Is	-
Monitoring of current limits → warning level I > (upper limit)	0 - 1020 % of Is	-
Monitoring of current limits → trip level I < (lower limit)	0 - 1020 % of Is	-
Monitoring of current limits → warning level I < (lower limit)	0 - 1020 % of Is	-
Motor protection → stalled rotor protection level	0 - 1020 % of Is	-
Voltage monitoring → voltage limits		Possible only if a current / voltage measuring module is configured
Trip level U < (lower limit)	0 - 2040 V	-
Warning level U < (lower limit)	0 - 2040 V	-

Parameters	Range	Note
Cos phi monitoring → Cos phi limits		Possible only if a current / voltage measuring module is configured
Trip level cos phi < (lower limit)	0 - 100 %	-
Warning level cos phi < (lower limit)	0 - 100 %	-
Active power monitoring → Active power limits		Possible only if a current / voltage measuring module is configured
Trip level P > (upper limit)	0.000 - 9999.000 kW	-
Warning level P > (upper limit)	0.000 - 9999.000 kW	-
Trip level P < (lower limit)	0.000 - 9999.000 kW	-
Warning level P < (lower limit)	0.000 - 9999.000 kW	-
Ground fault monitoring → Ground fault limits		Possible only if a 3UF7510 ground-fault module is configured
Trip level	0.00 - 40.00 A	-
Warning level	0.00 - 40.00 A	-
0/4-20 mA monitoring → 0/4-20 mA limits		Possible only if analog module 1 and/or 2 is configured
Analog module 1 - trip level 0/4-20 mA > (upper limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Analog module 1 - warning level 0/4-20 mA > (upper limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Analog module 1 - trip level 0/4-20 mA < (lower limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Analog module 1 - warning level 0/4-20 mA < (lower limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Analog module 2 - trip level 0/4-20 mA > (upper limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Analog module 2 - warning level 0/4-20 mA > (upper limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Analog module 2 - trip level 0/4-20 mA < (lower limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Analog module 2 - warning level 0/4-20 mA < (lower limit)	0 - 255	Represented in 0/4 - 20 mA similar to "Measured values" menu
Temperature monitoring → temperature limits		Possible only if temperature module 1 and/or 2 is configured
Temperature module 1 - trip level > (upper limit)	0 - 65,535 K	Represented in °C/F similar to "Measured values" menu
Temperature module 1 - warning level > (upper limit)	0 - 65,535 K	Represented in °C/F similar to "Measured values" menu
Temperature module 2 - trip level > (upper limit)	0 - 65,535 K	Represented in °C/F similar to "Measured values" menu
Temperature module 2 - warning level > (upper limit)	0 - 65,535 K	Represented in °C/F similar to "Measured values" menu
Limit monitor - limit monitor limit	0 - 65535	-
Limit 1	0 - 65535	-
Limit 2	0 - 65535	-
Limit 3	0 - 65535	-

Parameters	Range	Note
Limit 4	0 - 65535	-
Limit 5	0 - 65535	-
Limit 6	0 - 65535	-

Note

Password protection

It is only possible to change these parameters if password protection is not active. Only then can you choose the parameter to be modified with the "OK" button.

Proceed as follows to change a parameter:

- Choose menu item "Parameters" from the main menu
- Then choose the parameter to be changed in the relevant submenu
- Click OK to confirm the selection

You can now change the value with the ▲ and ▼ buttons. The longer you hold these buttons for, the larger the step by which the value changes.

8.3.3.10 Adapt display settings

The default settings configured in the basic unit can be modified via the display settings. However, changes made in this way do not result in a change to the configured defaults. In addition to selecting the language and adjusting the contrast or illumination, it is also possible to select the profiles here that are relevant for adjusting the main display. In the factory settings menu item, the changes made to the display settings can be reset to the values configured in the basic unit.

These are the most important menus by way of example:

Languages

English (default), German, French, Polish, Spanish, Portuguese, Italian, Finnish

or alternatively

English, Chinese, Russian, Korean.

Contrast

0 % to 100 % (default: 50 %)

Illumination

Specifies how long the backlit display will remain on on the operator panel with display after the last keystroke and enables permanent activation or deactivation of the backlit display. Off, 3 s, 10 s (default), 1 min, 5 min

Profiles

Enables selection of the display profiles for the main display. If a defined profile is no longer supported by SIMOCODE pro, for example, due to a changed hardware configuration, the start display will be shown instead of the default main display:

- IL1, IL2, IL3 [A] (default)
- Imax [A]
- IL1, IL2, IL3 [%]
- Imax [%]
- Imax, Cos phi
- Imax, UL1-N, Cos phi, S
- Imax, UL1-L2, Cos phi, S
- Imax, UL1-N, Cos phi, P
- Imax, UL1-L2, Cos phi, P
- In1/output AM1 [mA] (only if analog module 1 is present and configured)
- In2/output AM1 [mA] (only if analog module 1 is present and configured)
- In1/output AM2 [mA] (only if analog module 2 is present and configured)
- In2/output AM2 [mA] (only if analog module 2 is present and configured)
- Inputs AM 1 / inputs AM2 [mA]
- Max. temp. °C/°F TM1 (only if temperature module 1 is present and configured)
- Temperatures °C/°F TM1 (only if temperature module 1 is present and configured)
- Max. temp. °C/°F TM2 (only if temperature module 2 is present and configured)
- Temperatures °C/°F TM2 (only if temperature module 2 is present and configured)
- UL1-N, UL2-N, UL3-N
- UL1-L2, UL2-L3, UL3-L1
- Imax, UL1-N, Cos phi
- Imax, UL1-L2, Cos phi
- Imax, UL1-N °C/°F (temperature display TM1! [1)])
- Imax, UL1-L2, °C/°F [1)] (temperature display TM1! [1)])
- Calculator 1
- Calculator 2
- Energy consumed [kWh] (only if a current / voltage measuring module is configured).

See Section Read and adapt main display (Page 101).

NOTICE
1) Temperatures
The temperature from temperature module 1 is always shown in this display profile.
The temperature from temperature module 2 is not shown in this profile.

Voltage display

Switch voltage display: Defines whether "phase voltages" or "line-to-line voltages" will be displayed (available only with an OPD as from product version *E04* and a SIMOCODE pro V PB basic unit up to product version *E06*). Configuration is performed in the basic unit as from SIMOCODE pro V PB basic unit, product version *E07*.

Warnings

Determines whether, in the case of a pending general warning, the display is switched over to the menu item "Warnings" so that details are displayed (not activated per default): Do not display (default) - Display

Faults

Determines whether, in the case of a pending general fault, the display is switched over to the menu item "Faults" so that details are displayed (switched on per default, higher priority than pending warnings): Do not display - Display (default)

Return to main display

Determines whether and when to return from the current menu to the main display:

Manual, 3 s, 10 s (default), 1 min, 5 min

8.3.3.11 Resetting, testing and parameterizing via commands

The "Commands" menu item contains all commands relating to SIMOCODE pro, e.g. for testing the feeder, resetting after tripping and/or transferring parameters into the memory module or into SIMOCODE pro.

Program memory module

Parameters are transferred to memory module The memory module must be plugged into the system interface for this purpose.

Clear memory module

Parameters in memory module are reset. The memory module must be plugged into the system interface for this purpose.

Read memory module

Acceptance of the parameters from the memory module into the basic unit. The memory module must be plugged into the system interface for this purpose.

Memory module write protection on

All contents of the memory module are write-protected. This prevents any inadvertent changes to the contents of the memory module and any parameter changes to the connected SIMOCODE pro V basic unit.

An inadvertent change of parameters for a motor feeder is prevented.

SIMOCODE pro signals the successful execution of the command with the event "Memory module write-protected".

Memory module write protection off

With this command you can cancel the write protection of the memory module.

Restart

Initialization of SIMOCODE pro. New start.

Factory settings

All parameters assume their factory settings again.

Set time (= PC time)

If no NTP server address has been configured or no server has been found in the network, you can set the time of day here, that is, the real-time clock of SIMOCODE pro is set to the system time of the computer.

Test

Execute the test function. Same function as "TEST/RESET" button on the basic unit and operator panel

Reset

Execute a reset operation. Same function at "TEST/RESET" button on the basic unit and operator panel.

8.3.3.12 Displaying all pending messages

This menu item provides an overview of all pending status information. A precise description of the pending status information messages can be found in Chapter Alarms, faults, and system events - error handling (Page 269).

8.3.3.13 Displaying all pending warnings

This menu item provides an overview of all pending warnings. In the displays settings, it is possible to set that the display will automatically switch to this menu item when a new general warning occurs so that the exact cause of the general warning can be displayed. A precise description of the pending warnings can be found in Chapter Alarms, faults, and system events - error handling (Page 269).

8.3.3.14 Displaying all pending faults

This menu item provides an overview of all pending faults. In the display settings, it is possible to set that the display will automatically switch to this menu item when a new general fault occurs so that the exact cause of the general fault can be displayed. A precise description of the pending faults can be found in Chapter Alarms, faults, and system events - error handling (Page 269).

8.3.3.15 Reading the device's internal error buffer

The "Error buffer" menu item enables access to the SIMOCODE pro's internal error buffer. The time and cause of the last 21 faults are displayed here. See also Chapter Error buffer (Page 266). A precise description of the faults can be found in Chapter Alarms, faults, and system events - error handling (Page 269).

8.3.3.16 Reading the device's internal event memory

The "Event memory" menu item enables access to the SIMOCODE pro's internal event memory. The two most recent events "DM-F enabling circuit closed" and "DM-F enabling circuit open" are displayed, together with the time, for both digital modules "DM-F Local" and "DM-F PROFIsafe".

Event memory

The event memory is displayed.

Last event "Enabling circuit closed," DM-F Local

The entry contains the last event "DM-F enabling circuit closed," the time and the related DIP switch configuration.

Note

Requirements

Possible only if digital module 1 is used as a DM-F Local module.

Last event "Enabling circuit closed," DM-F PROFIsafe

The entry contains the last event "DM-F enabling circuit closed," the time and the related PROFIsafe address.

Note

Requirements

Possible only if digital module 1 is used as a DM-F PROFIsafe module.

Last event "Enabling circuit open"

The entry contains the last event "DM-F enabling circuit open" and the corresponding time.

Note

Requirements

Possible only if digital module 1 is used as a DM-F Local or DM-F PROFIsafe module.

8.3.3.17 Identification of the motor feeder and the SIMOCODE pro components

In the "Identification" menu item, you will find detailed information about the used SIMOCODE pro hardware components, e.g. hardware and firmware versions. This dialog box also enables identification of the motor feeder via a plant identifier stored in SIMOCODE pro, as well as a request for the location designation and display of the device's internal comment.
The essential menus are described by way of an example below:

Identification

- Plant identifier
- Location designation
- Date installed
- Description

Basic unit

- Order number
- Short code
- Vendor
- Device subfamily
- Device class
- System
- Ident. no.
- Hardware version
- Firmware version
- Time stamp

Display

- Order number
- Hardware version
- Firmware version

8.4 Current measuring modules (IM) for the SIMOCODE pro C, SIMOCODE pro S, and SIMOCODE pro V device series

Current measuring modules can be used together with all device series.
The current measuring module must be selected according to the current setting to be monitored for each feeder (rated operating current of the motor). The current measuring modules cover current ranges between 0.3 A and 630 A, with interposing transformers up to 820 A.
Current measuring modules are available for the following current ranges (see figure below):

- 0.3 to 3 A with through-hole connection
- 2.4 to 25 A with through-hole connection
- 10 to 100 A with through-hole connection
- 20 to 200 A with through-hole technology or bus connection system
- 63 to 630 A with bus connection system

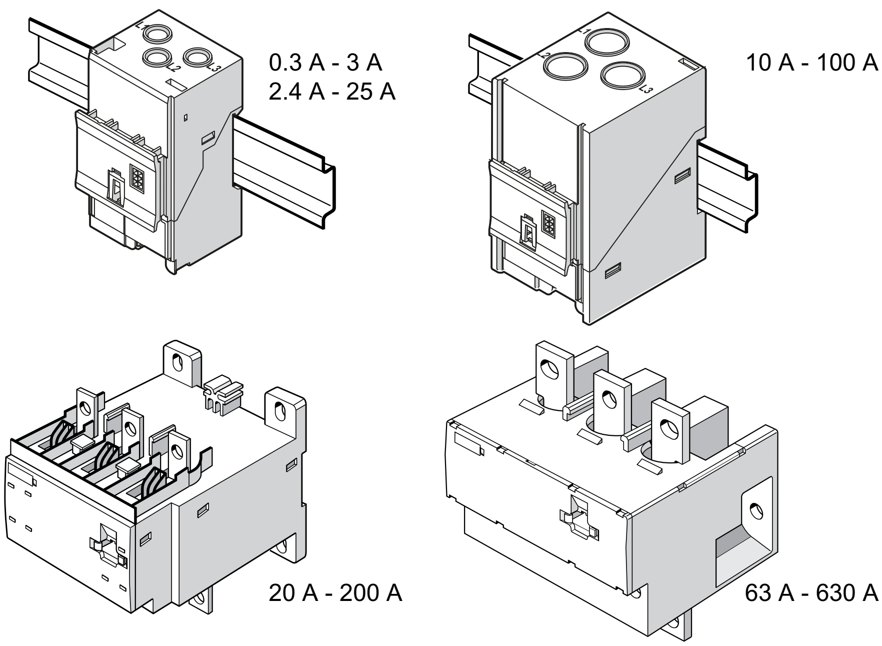


Figure 8-30 Types of current measuring modules

The current measuring module is connected to the basic unit via a connecting cable, which also supplies the power. Current measuring modules up to 100 A are suitable for standard rail mounting or can be fixed directly to the mounting plate using additional push-in lugs. Basic units can be snapped directly onto the current measuring modules. Current measuring modules up to 200 A can also be mounted on the standard mounting rail or, optionally, they can be fixed directly to the mounting plate with the screw attachments that are integrated in the enclosure.

The current measuring module up to 630 A can only be mounted using the integrated screw attachments.

Note

Current measuring modules with a current setting of up to 100 A can be connected to the basic unit mechanically and be installed as a unit (behind one another). Larger current measuring modules can only be mounted separately.

8.5 Current / voltage measuring modules (UM, UM+) for the SIMOCODE pro V High Performance device series

Variants

Two device generations of the current / voltage measuring modules are available:

1st generation: UM, MLFB ending in 000 (e.g. 3UF7110-1AA00-0).

A decoupling module may be required when using these current / voltage measuring modules. See Chapter Decoupling module (DCM) for 1st generation current/voltage measuring modules (e.g. 3UF711.1AA00-0) (Page 126).

2nd generation: UM+, MLFB ending in 010 (e.g. 3UF7110-1AA01-0).

Note

When using the 2nd generation current / voltage acquisition modules (UM+), no decoupling module must be connected.

Function

The SIMOCODE pro V High Performance device series allows use of a current / voltage measuring module instead of a current measuring module. In addition to measuring the motor current, current / voltage measuring modules also enable:

- Monitoring voltages up to 690 V (UM, UM+)
- Calculation and monitoring of power and cos phi (UM, UM+)
- Determining the frequency (UM+)
- Monitoring the phase sequence (UM, UM+)

With SIMOCODE ES (TIA Portal), you can define under "Parameters → Device configuration → Display voltage" whether the phase voltage or line-to-line voltage is to be used system-wide (when using a SIMOCODE pro V High Performance basic unit from firmware version V3.0).

Current / voltage measuring modules are available for the following current ranges:

	Current range	**Through-hole connection**	**Through-hole technology or bus connection system**	**Bus connection system**
UM	0.3 to 3 A	✓	—	—
	2.4 to 25 A	✓	—	—
	10 to 100 A	✓	—	—
	20 to 200 A	—	✓	—
	63 to 630 A	—	—	✓
UM+	0.3 to 4 A	✓	—	—
	3 to 40 A	✓	—	—
	10 to 115 A	✓	—	—
	20 to 200 A	—	✓	—
	63 to 630 A	—	—	✓

The diagram below shows the various current / voltage measuring modules:

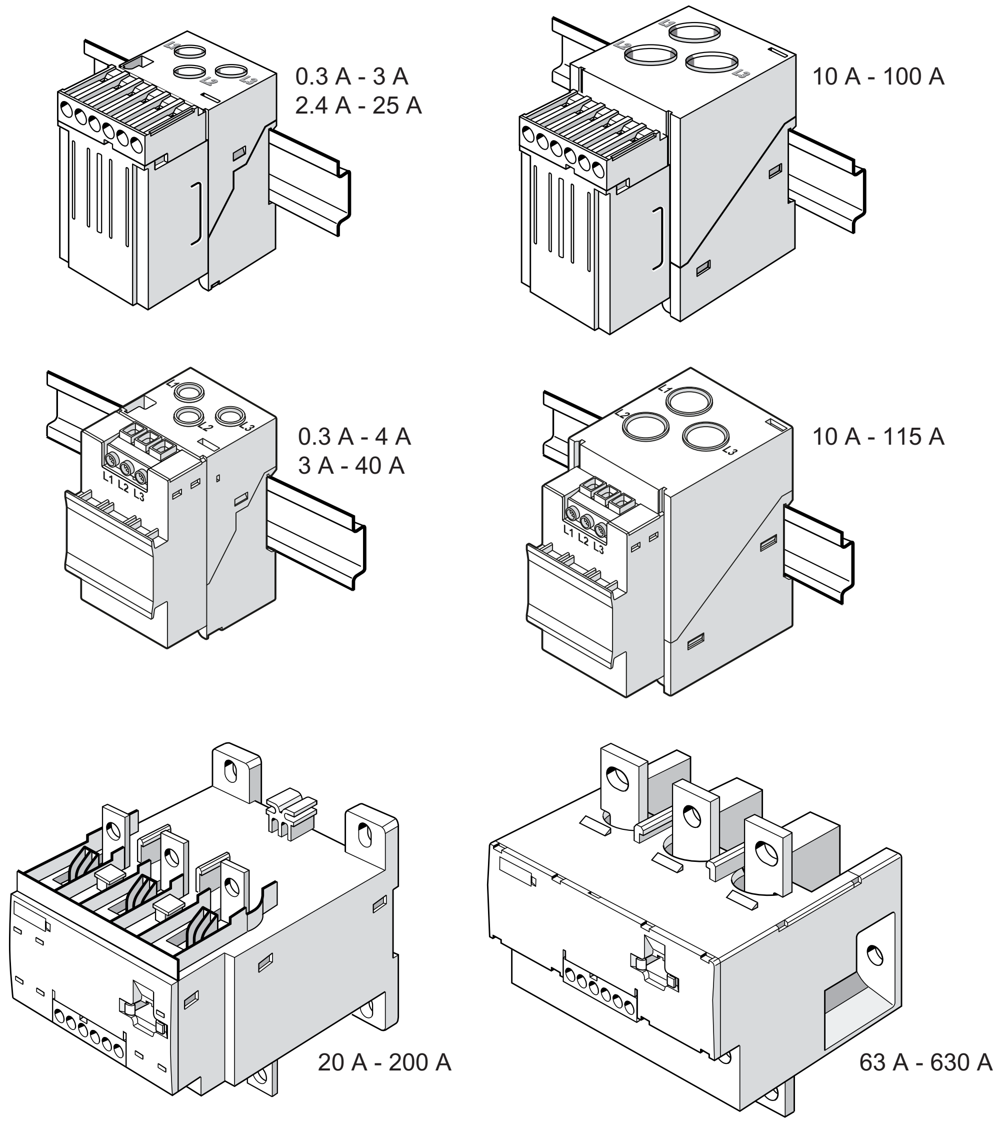


Figure 8-31 Variants of current / voltage measuring modules

Wiring:

The current / voltage measuring modules are connected to the basic unit via a connecting cable, which also supplies the power.

For the purpose of calculating or monitoring power-related measured values, current / voltage measuring modules are equipped with additional, removable terminals to which the voltages of all three phases of the main circuit are connected. An additional 3-core cable can be used, for example, to connect the main circuit directly from the bus connections of the current / voltage measuring module with the connection terminals of the voltage measuring module.

Mounting:

The current / voltage measuring modules UM / UM+ with a current setting of up to 115 A are suitable for standard rail mounting or can be fixed directly to the mounting plate using additional push-in lugs. These can be connected to the basic unit mechanically and installed as a unit (behind one another). For current / voltage measuring modules UM+ with a current setting of up to 115 A it is possible to mount the basic unit on the current / voltage measuring module.

Current / voltage measuring modules with a setting current up to 200 A can also be mounted on the standard mounting rail or, optionally, they can be fixed directly to the mounting plate with the screw attachments that are integrated in the enclosure.

The current / voltage measuring module with a current setting of up to 630 A can only be mounted using the integrated screw attachments. In this case, basic units can only be installed separately next to the current / voltage measuring modules.

Application notes when using a 2nd generation current / voltage measuring module

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Note

MLFB

The MLFBs of 2nd generation current / voltage measuring modules end in 010 (e.g. 3UF71101AA010)

Measured variables and measurement accuracies

The following new measured quantities are available:

- Frequency f of the supply voltage [1)]
- Average phase current - mean value (I1/I2/I3) I_avg:

Thanks to the internally determined ground-fault current, it is possible to monitor it by means of a warning and tripping threshold (up to max. 6x I_o). The relevant settings are made via the "Internal ground fault" function block. See Chapter "Ground fault monitoring" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

The accuracy of measured values has been improved. The following measuring accuracies are possible in the rated ranges:

- Current I: 1.5%
- Voltage U: 1.5%
- Power factor cos phi: 1.5%
- Active power P: 5%
- Active energy E: 5%
- Frequency f of the supply voltage: 1.5%
- Average phase current - mean value (I1/I2/I3) I_avg: 1.5%
- Ground-fault detection according to IEC 60947-1:
  - in the range 30% - 120% I_s: ± 10% (Class CI-A)
  - in the range 15% - 30% I_s: ± 25% (Class CI-B)

The measurement ranges of the current / voltage measuring modules have been adjusted to the current ranges of SIRIUS Innovations contactors and load feeders. This results in increases to the following measuring ranges: 0.3 to 4 A; 3 to 40 A and 10 to 115 A.

The measured values with the accuracy figures mentioned can be found in data record 94 - Measured values (from byte position 132) and in data record 95 - Statistics data in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

1)

Note

Frequency measurement

For a correct frequency measurement, the voltage measurement must be connected.

Measurement performance

The rate of measured value acquisition has been improved, and so updating of all measured values within 200 ms can be assumed.

Tripping characteristic

The overload tripping characteristic, which is calculated in the measuring modules, has been revised in the 2nd generation current / voltage measuring modules. By means of diverse analyses, the characteristic curve has been adjusted further to the actual requirements for overload release.

The tripping characteristic fulfills all basic points defined for overload protection in IEC 60947-4-1. In particular in the range of the 2-fold motor rated current, the characteristic curve was approximated to the practical conditions. Thus, the characteristic curve has steepened slightly, which produces slower tripping in the range between 1.15-fold and 6-fold motor rated current, and faster tripping in the range above 6-fold motor rated current.

The tripping characteristics can be found in Chapter "Overload protection" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

The trip classes have been extended with trip class 7. Thus, if required, finer coordination of the trip classes can be chosen in the lower range (if, for example, there is a wish to approximate to the characteristic curve of the class 10E current measuring modules).

Interaction with the SIMOCODE basic units

The 2nd generation current / voltage measuring modules operate with the new functions together with the basic units as from the following product versions:

- SIMOCODE pro V PB: From E15
- SIMOCODE pro V MR: From E03
- SIMOCODE pro V PN: From E10
- SIMOCODE pro V EIP: From E01.

NOTICE
Connecting current / voltage measuring modules to the basic unit The 2nd generation current / voltage measuring modules must be connected directly to the basic unit in order to achieve the full performance capability.

NOTICE

Compatibility/compatibility mode

- The 2nd generation current / voltage measuring modules also function with older SIMOCODE basic units. In this case, they behave compatibly with the 1st generation current / voltage measuring modules and can replace them in an application (compatibility mode). The prerequisite is that the current setting must lie within the permitted range of the 2nd generation current/voltage measuring module. Example: A 1st generation current / voltage measuring module 3UF7111-1AA00-0 (2.4 - 25 A) is to be replaced. If the current setting lies within the range of 2.4 to 3.0 A, a 2nd generation current / voltage measuring module 3UF7110-1AA01-0 (0.3 - 4 A) must be used.
- If both the SIMOCODE pro basic unit and also the current / voltage measuring module are replaced and the hardware parameterization is unchanged (the SIMOCODE ES parameterization still contains a 1st generation current / voltage measuring module), the compatibility mode of the current / voltage measuring module is also active.
- In the event that a 1st generation current / voltage measuring module is replaced by a 2nd generation current / voltage measuring module, an existing decoupling module must be removed to ensure fault-free operation.

Specifically, this means:

- The tripping characteristic remains as in the 1st generation current / voltage measuring modules.
- The measurement accuracy figures and measured values correspond to those of the 1st generation current / voltage measuring modules.
- The new measured values stored as float in the data records are not entered (see manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960) → Tables, data records - definitions").

The following restrictions still have to be observed:

NOTICE

Maximum configuration of the SIMOCODE system with older basic units SIMOCODE pro V PB (≤ E14) or pro V MR (E01) and a 2nd generation current / voltage measuring module

- When using BU / UM+: max. 4 expansion modules
- When using BU / UM+ / OP:
  - max. 4 expansion modules
  - max. 3 expansion modules when using AM, TM and EM
- when using BU / UM+ / OPD: Max. 3 expansion modules, of which one AM, TM or EM or max. 2 expansion modules from AM, TM and EM when using a BU 24 V DC
- when using BU / UM+ / OPD: Max. 2 expansion modules, of which one AM, TM or EM when using a BU 110-240 V AC/DC

In this case, the installation guidelines for configuration with the 2nd generation current / voltage measuring modules must be observed.

See also Configuration information for SIMOCODE pro V when using an older basic unit (Page 135) for more information.

NOTICE

Rated motor current is in the range from 2.4 - 2.99 A and a 1st generation current / voltage measuring module with the 2.4 - 25 A measuring range is used

In this case, the 0.3 - 4 A measuring range must be used for the 2nd generation current / voltage measuring modules.

This requires a change of the parameterization to the smaller measuring range (0.3 - 4 A). Attention must be paid to this with regard to code conversion of the MLFB numbers.

The installation width of the two measuring ranges is identical.

8.6 Decoupling module (DCM) for 1st generation current/voltage measuring modules (e.g. 3UF711.1AA00-0)

Function of the decoupling module

When measuring voltage and power with SIMOCODE pro in ungrounded networks, each current / voltage measuring module must have a decoupling module connected upstream in series at the system interface. Where voltage or power is measured with SIMOCODE pro in systems with additional insulation measurement or insulation monitoring, a decoupling module must be connected between the basic unit and each current / voltage measuring module. If using the 3UF710 current measuring module in these networks, it is imperative that an additional decoupling module is not used.

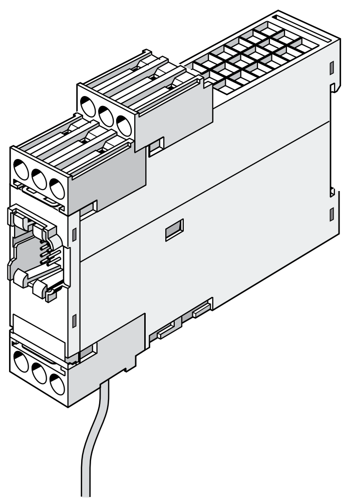


Figure 8-32 Decoupling module, SIMOCODE pro V device series

Note

Connectable expansion modules

When using a decoupling module, note that the type and number of expansion modules that can be connected to a basic unit are limited! See Chapter Configuration information for SIMOCODE pro V when using an older basic unit (Page 135).

Note

Using the decoupling module

Do not use the decoupling module with the 2nd generation current / voltage measuring modules.

In the event that a 1st generation current / voltage measuring module is replaced by a 2nd generation current / voltage measuring module, remove the decoupling module.

Using the decoupling module in different networks

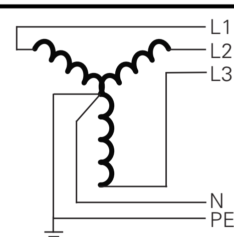
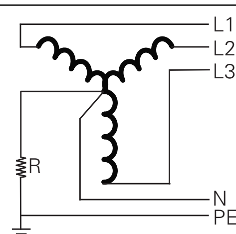
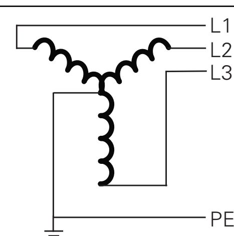
A decoupling module may be required when using a voltage measuring module, especially for the following networks:

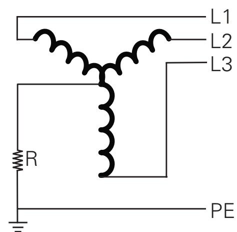
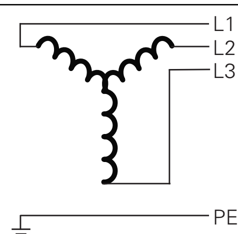
- Isolated systems
- High-impedance grounded systems
- Asymmetrically grounded systems
- Single-phase systems

The tables below show decoupling module requirements for different grounding systems and system configurations (star systems, delta systems, and single-phase systems):

Star networks:

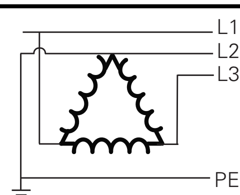
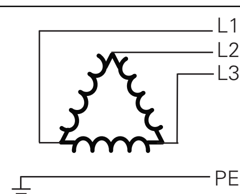
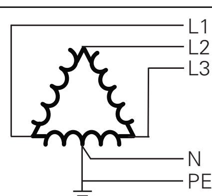
Table 8-1 Decoupling module requirements for star networks

Star configuration	Network configuration	Decoupling module required?	Note
4-wire, star, grounded with low impedance		No	"TN-S system" according to IEC 60364
4-wire, star, grounded with high impedance		Yes	—
3-wire, star, grounded with low impedance		No	"TN-C system" according to IEC 60364

Star configuration	Network configuration	Decoupling module required?	Note
3-wire, star, grounded with high impedance		Yes	—
3-wire, star, with isolated neutral		Yes	"IT system" according to IEC 60364

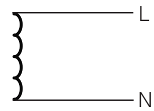
Delta configurations

Table 8-2 Decoupling module requirements for delta networks

Delta network[1)]	Network configuration	Decoupling module required?	Note
3-wire, delta, one phase grounded		Yes	Parameter "Voltage display → phase voltages" must be active.
3-wire, delta, with isolated ground		Yes	Parameter "Voltage display → phase voltages" must be active.
Center tap grounded		Yes	Parameter "Voltage display → phase voltages" must be active.
1) Mainly encountered in North America			

Single-phase systems

Table 8-3 Decoupling module requirements for single-phase networks

Single-phase network	Network configuration	Decoupling module required?	Note
		Yes	Parameter "Voltage display → Phase voltages" must be active. The voltage applied is calculated from U_L1N + U_l2N

8.7 Spectrum of the expansion modules

Expansion modules are provided as optional additions for the SIMOCODE pro S and pro V device series. The following expansion modules are available:

- Digital modules (DM) (Page 130)
- Fail-safe digital module Local (DM-F Local) (Page 131)
- PROFIsafe fail-safe digital module (DM-F PROFIsafe) (Page 131)
- Analog module (AM) (Page 132)
- Ground-fault module (EM) (Page 133)
- Temperature module (TM) (Page 134)
- Multifunction module (Page 134) (for the SIMOCODE pro S device series)

All expansion modules have an enclosure width of 22.5 mm or 45 mm. They are equipped with 2 system interfaces (incoming/outgoing) and removable terminals on the front panel. The expansion module is connected, for example, to the system interface of the basic unit via the first system interface using a connecting cable. For example, further expansion modules can be connected via the second system interface or the operator panel.

All expansion modules are suitable for DIN rail mounting or can be fastened directly to a mounting plate using additional push-in lugs.

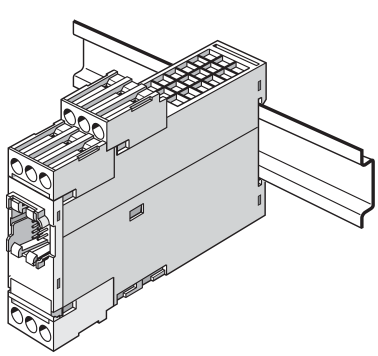


Figure 8-33 Expansion module

Note

When an operator panel with display and/or a decoupling module is used, you may have to take further restrictions into consideration concerning the number of expansion modules connectable per basic unit.

See Chapters Configuration information for SIMOCODE pro V when using an older basic unit (Page 135) and Configuration notes for use of a SIMOCODE pro V MR and SIMOCODE pro V EIP basic unit (Page 137)

8.8 Digital module (DM)

Digital modules offer the option of further increasing the types and number of binary inputs and relay outputs available at the SIMOCODE pro basic unit.

The following digital modules are available:

Table 8-4 Versions of digital modules

Inputs	Power supply	Outputs
4 inputs	External 24 V DC	2 monostable relay outputs
4 inputs	External 110 V to 240 V AC/DC	2 monostable relay outputs
4 inputs	External 24 V DC	2 bistable relay outputs
4 inputs	External 110 V to 240 V AC/DC	2 bistable relay outputs

Up to 2 digital modules can be connected to one SIMOCODE pro basic unit. 4 additional binary inputs and 2 additional binary outputs are thus provided by each module. All types can be combined with each other. SIMOCODE pro can therefore be expanded to provide a maximum of 12 binary inputs and 7 relay outputs.

With the monostable version, the relay outputs open after disconnection/failure/interruption of the supply voltage. With the bistable version, the switching state of the relay outputs is maintained even after disconnection/failure/interruption of the supply voltage.

You can set a debouncing time for the digital module inputs if required (see Chapter "Digital module inputs" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)).

Power supply to the inputs: See Chapter Wiring basic units, expansion modules and the decoupling module (Page 172).

Note

To implement some motor control functions, a further digital module is required in addition to the relay outputs on the basic unit.

Note

If 2 digital modules are being used, the digital module connected the closest to the basic unit via the system interface will be identified as digital module 1. The digital module connected next in line will be identified as digital module 2. If one digital module is connected to the front and another to the lower system interface of the basic unit, the digital module on the front system interface of the basic unit will always be identified as digital module 1.

8.9 Fail-safe digital module (DM-F)

Requirements and safety-related functions of the DM-F fail-safe digital modules

The fail-safe digital module DM-F extends the SIMOCODE pro motor management system with fail-safe functions for switching off motors:

- DM-F Local fail-safe digital module
- DM-F PROFIsafe fail-safe digital module

These modules conform to the general requirements for emergency stop devices or safety circuits described in EN 418 and EN 60204-1 (06.2006).

With appropriate external circuitry, the following performance levels / safety integrity levels can be achieved:

- PL e with Category 4 according to ISO 13849-1 or
- SIL 3 according to IEC 61508 / 62061.

Safety engineering and safety-related functions:

- These are exclusively restricted to the fail-safe digital modules.
- They therefore have no direct impact on existing SIMOCODE pro components and concepts.

LEDs for DM-F device diagnostics: See Chapter Technical specifications (Page 303) and / or Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

"TEST/RESET" DM-F button, setting the DM-F DIP switches, DM-F system interfaces: See Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

Documentation for safety-related functions and fail-safe digital modules

Safety-related functions and additional information on fail-safe digital modules can be found in the following documentation:

- Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852)
- Operating Instructions "Fail-safe Digital Module DM-F Local"
- Operating Instructions "Fail-safe Digital Module DM-F PROFIsafe"

You can find the manual and operating instructions under Manuals/operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

The fail-safe **DM-F Local digital module** facilitates safety-related tripping of a motor feeder by means of a hardware signal that is detected and evaluated by the module.

From a non-safety-related perspective, the DM-F module comprises:

Table 8-5 Inputs, outputs and voltage supply to the digital module Fail-safe Local (DM-F Local)

Inputs	Power supply	Outputs
4 non-safety-related digital inputs: • Input 1: Sensor circuit • Input 2: Start input • Input 3: Feedback circuit • Input 4: Cascading input	24 V DC	2 non-safety-related monostable relay outputs

The fail-safe **DM-F PROFIsafe digital module** provides safety-related tripping of a motor feeder by a fail-safe control (F-CPU) via PROFIBUS with the fail-safe PROFIsafe profile.

From a non-safety-related perspective, the DM-PROFIsafe module comprises:

Table 8-6 Inputs, outputs and voltage supply to the digital module Fail-safe PROFIsafe (DM-F PROFIsafe)

Inputs	Power supply	Outputs
4 non-safety-related digital inputs	24 V DC	2 non-safety-related monostable relay outputs

WARNING

Hazardous voltage

For the 24 V DC power supply, always use an SELV or PELV power supply unit!

Surge suppressors are required for inductive loads!

8.10 Analog module (AM)

By means of the analog module, the SIMOCODE pro V High Performance basic units can be optionally expanded by analog inputs and outputs (0/4 mA to 20 mA). This makes it possible to detect and monitor any process variables that can be mapped onto a 0/4 to 20 mA signal.

Typical applications are, for example, fill-level monitoring for protecting pumps from dry operation, or the monitoring of pollution in a filter using a differential pressure transducer. The automation system has free access to the measured process variables. The analog output can, for example, be used for the visualization of any process variables on a pointer instrument. The automation system can also freely access the output via the communication bus.

- 1 analog module can be connected to the SIMOCODE pro V PB and pro V MR basic units
- 2 analog modules can be connected to the SIMOCODE pro V PN and pro V EIP basic units

- For each analog module, 2 analog inputs (passive) for detecting 0/4 mA to 20 mA signals. Both inputs are set either to 0 mA to 20 mA or to 4 mA to 20 mA.
- For each analog module, 1 output for issuing a 0/4 mA to 20 mA signal.

Note

The inputs of the analog module are passive inputs that have to be supplied in each case by an external, isolated current source (e.g. isolating transformer). If the output of the analog module is not being utilized, it can be used as current source for an input.

Note

Requirements for using an analog module with SIMOCODE pro V PB

Use of an analog module requires a SIMOCODE pro V PB basic unit, at least version *E02* or later (from 04/2005).

8.11 Ground-fault module (EM)

The 3UF7 500-1AA00-0 and 3UF7 510-1AA00-0 ground-fault modules are suitable for use with the SIMOCODE pro V/pro S basic units. 1 ground-fault module can be connected to 1 basic unit.

NOTICE
Use of residual current transformers
The 3UF7 500-1AA00-0 ground-fault module requires the 3UL22 residual current transformer.
The 3UF7 510-1AA00-0 ground-fault module requires the 3UL23 residual current transformer.

Requirements for use of ground-fault modules in combination with SIMOCODE pro V basic unit:

Note

Requirements for use of a 3UF7 500-1AA00-0 ground-fault module with SIMOCODE pro V PB

Use of a ground-fault module requires a SIMOCODE pro V PB basic unit, at least version *E02* or later (from 04/2005).

Note

Requirements for use of a 3UF7 510-1AA00-0 ground-fault module with SIMOCODE pro V PB

Use of this ground-fault module requires a SIMOCODE pro V PB basic unit, with at least product version *E10* (from 09/2013).

Detailed information on ground-fault monitoring: See Chapter "Monitoring functions" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

8.12 Temperature module (TM)

The temperature module offers the option of expanding the SIMOCODE pro V/pro S device series by an analog temperature monitoring system. In addition to the thermistor monitoring system for the basic units, up to 3 analog sensor measuring circuits (in two or three-wire systems) can be connected, the temperatures in the 3 sensor measuring circuits can be measured, and the highest temperature in all sensor measuring circuits can be determined. The temperatures recorded can be fully integrated and monitored in the process and can also be transferred to a higher-level automation system via the communication bus.

You can, for example, implement analog temperature monitoring of the motor windings, bearings, coolant or gearbox oil.

Various sensor types (NTC, KTY83/84, PT100/PT1000) for use with solid, liquid, or gaseous media are supported.

Note

The same sensor type must be used in all sensor measuring circuits.

- 1 temperature module can be connected to the SIMOCODE pro V PB and pro V MR basic units
- 1 temperature module with 1 sensor to the SIMOCODE pro S basic unit
- 2 temperature modules can be connected to the SIMOCODE pro V PN and pro V EIP basic units
- 1 temperature module to the SIMOCODE pro V PN GP basic unit
- 3 sensor measuring circuits in 2 or 3-wire systems.

Note

Requirements for using a temperature module with SIMOCODE pro V PB

Use of a temperature module requires a SIMOCODE pro V PB basic unit, at least version *E02* or later (from 04/2005).

8.13 Multifunction module

The multifunction module is the expansion module of the SIMOCODE pro S device series with the following functions:

- Digital module function with four digital inputs and two monostable relay outputs
- Ground-fault module function with one input for connecting a 3UL23 residual current transformer
- Temperature module function with an input for connecting a PT100, PT1000, KTY83, KTY84, or NTC analog temperature sensor

No more than one multifunction module can be connected to one SIMOCODE pro S basic unit.

Note

Use of expansion modules of SIMOCODE pro V with the SIMOCODE pro S basic unit

One of the following expansion modules of SIMOCODE pro V can be used with the SIMOCODE pro S basic unit (3UF7020-1AB01-0 or 3UF7020-1AU01-0) instead of the 3UF76* multifunction module:

- 24 V DC digital module with monostable relay outputs (3UF7300-1AB00-0) or
  110 ... 240 V AC/DC digital module (3UF7300-1AU00-0)
- Ground-fault module (3UF7510-1AA0-0)
- Temperature module (3UF7700-1AA00-0), limited to use of one sensor input only

---

8.14 Configuration information for SIMOCODE pro V when using an older basic unit

---

Note

Restrictions for the SIMOCODE pro V device series

The restrictions mentioned here apply to the SIMOCODE pro V High Performance device series with the following product versions:

- SIMOCODE pro V PB: Before E15
- SIMOCODE pro V PN: Before E10
- SIMOCODE pro V MR: Before E03

Devices with the stated product versions or later can be used without restriction with an operator panel with display and 2nd generation current/voltage measuring modules.

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 79).

Use of a decoupling module and/or an operator panel with display

If you want to use an operator panel with display and/or a decoupling module in the SIMOCODE pro V system, then the following configuration instructions concerning the type and number of connectable expansion modules must be observed.

The following table shows the maximum possible configuration with expansion modules for the various combinations (✓ = possible, - = not possible):

Maximum configuration with expansion modules

Table 8-7 Maximum configuration with expansion modules when using an operator panel/operator panel with display, a 1st generation current/voltage measuring module and a decoupling module for SIMOCODE pro V PB basic units (3UF7010-1A.00-0) with a 24 V DC or 110 V - 240 V AC/DC supply

			SIMOCODE pro basic unit U_s = 24 V DC					**SIMOCODE pro basic unit U_s = 110-240 V AC/DC**				
OP	Meas-ure-ment	Decou-pling module	DM-F/DM	DM	AM	TM	EM	DM-F/DM	DM	AM	TM	EM
None/OP	I	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	U/I	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	U/I 4)	✓	✓ 1)	✓ 1)	✓	✓	✓	✓	✓	-	✓	✓
								✓ 1)	✓ 1)	✓	✓	-
								✓	-	✓	✓	-
								✓	-	✓	-	✓
OPD	I	-	Max. 4 modules					Max. 4 modules				
	U/I	-	Max. 4 modules					Max. 3 modules 5)				
								-	-	✓	✓	-
	U/I 4)	✓	✓	-	✓	✓	✓	✓ 2)	-	✓	✓	✓
			✓	✓	-	✓	✓	✓	✓	-	-	-
								✓ 1)	✓ 1)	✓ 3)	-	-
								✓	-	-	✓	✓

1) No bistable relay outputs and no more than 5 of 7 relay outputs active simultaneously (> 3 s)

2) No bistable relay outputs and no more than 3 of 5 relay outputs active simultaneously (> 3 s)

3) Analog module output is not used.

4) 1st generation current/voltage measuring modules; MLFB ending in 000
(e.g. 3UF7110-1AA00-0)

5) AM and TM cannot be used at the same time

Table 8-8 Maximum configuration with expansion modules when using an operator panel/operator panel with display, a 2nd generation current/voltage measuring module and a SIMOCODE pro V-PB basic unit with a product version earlier than E15 / SIMOCODE pro V Modbus basic unit with product version E01

		SIMOCODE pro basic unit U_s = 24 V DC					**SIMOCODE pro basic unit U_s = 110-240 V AC/DC**				
OP	Meas-urement	DM-F/DM	DM	AM	TM	EM	DM-F/DM	DM	AM	TM	EM
None/UI		Max. 4 modules									
OP	U/I	Max. 4 modules 1)									
		-	-	✓	✓	✓	-	-	✓	✓	✓

		SIMOCODE pro basic unit U_s = 24 V DC					SIMOCODE pro basic unit U_s = 110-240 V AC/DC
OPD	U/I	Max. 3 modules 1)					Max. 2 modules 1)
		-	-	✓	✓	-	
		-	-	✓	-	✓	
		-	-	-	✓	✓	

1) Max. 1 AM, TM, EM module

Note

Decoupling module

A decoupling module is **not** necessary for 2nd generation current/voltage measuring modules.

Configuration instructions for the use of fail-safe expansion modules

In conjunction with DM-F Local and DM-F PROFIsafe fail-safe digital modules, the expansion modules can be used as follows:

Fail-safe digital module	Number of expansion modules	Digital module 2	Analog module	Temperature module	Ground-fault module
DM-F Local	max. 4	✓	✓	✓	✓
DM-F PROFIsafe	max. 3	✓	✓	✓	—

Note

Restrictions for the SIMOCODE pro V device series

The restrictions mentioned here apply to the SIMOCODE pro V High Performance device series with the following product versions:

- SIMOCODE pro V PB: Before E15
- SIMOCODE pro V PN: Before E10
- SIMOCODE pro V MR: Before E03

Devices with the stated product versions or later can be used without restriction with an operator panel with display and 2nd generation current/voltage measuring modules.

8.15 Configuration notes for use of a SIMOCODE pro V MR and SIMOCODE pro V EIP basic unit

The following expansion modules are not supported:

- DM-F PROFIsafe fail-safe digital module (3UF7330-..)
- Ground-fault module (3UF7500-..).

You will find usage restrictions concerning the operator panel with display in Chapter Functions and possible applications of the operator panel with display (Page 79).

Compartment identification 9

9.1 Applications and advantages of compartment identification

The compartment identification described in this chapter is mainly used in application in which SIMOCODE pro is used in a withdrawable motor control center (MCC).

In withdrawable motor control centers, all components belonging to the motor feeder are grouped together as one unit in a switchboard-specific enclosure. In this way, a complete withdrawable module can be replaced very quickly and without isolating the MCC if a component is defective.

This principle is very often used in the various branches of the process industry. That is why a SIMOCODE pro with such a design is used in very many of its applications.

With the compartment identification mechanism, programming a SIMOCODE pro S/pro V device when a withdrawable module is replaced is completely automated.

The initialization module (3UF7 902-0AA00-0) permanently installed in the switchboard contains a copy of the SIMOCODE device parameters and the device addressing, which are taken over completely automatically by the new SIMOCODE pro device after replacement of the withdrawable module.

No special knowledge of SIMOCODE is necessary any longer to replace withdrawable modules and at the same time the risk of incorrect parameterization in the SIMOCODE device is reduced.

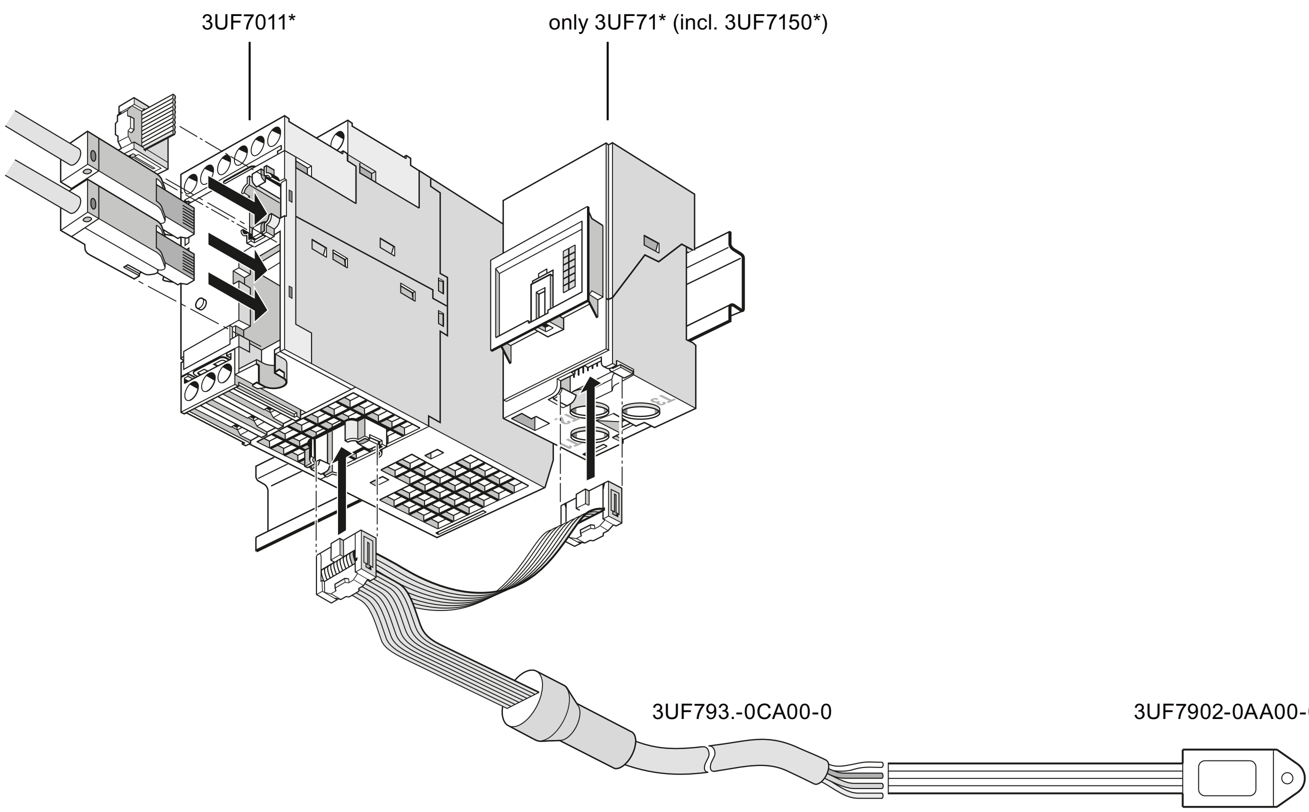


Figure 9-1 Compartment identification

> **CAUTION**
>
> **Basic units SIMOCODE pro C (3UF7000*) and basic units SIMOCODE pro V (3UF7010*) to E08, V3.0**
>
> These basic units do not support the initialization module and start with the internal parameters.

A configuration such as the one shown above ensures

- that the parameters, device addressing, and I&M data of the initialization module are downloaded to the SIMOCODE basic unit during device start-up of SIMOCODE pro
- the parameters, device addressing, and I&M data are additionally written to the initialization module when parameterizing SIMOCODE pro

This makes it simple for a user to change a withdrawable module without having to deal with further details of parameterization or address assignment.

The advantages of operation with a permanently installed initialization module in the switchboard:

- Device parameters and device addressing are automatically stored in the initialization module in the motor control center and loaded form this initialization module (initialized).
- It is possible to replace an MCC motor feeder without special knowledge of SIMOCODE pro.
- Manual addressing and parameterization are no longer necessary. The simplifies operation of the switchboard.

9.2 Hardware and software requirements for compartment identification

Basic unit versions

The compartment identification function is supported by the following basic units:

- SIMOCODE pro S basic units
- SIMOCODE pro V PB basic units as from product version E09, firmware version V3.1
- SIMOCODE pro V MR basic units
- SIMOCODE pro V PN basic units
- SIMOCODE pro V EIP basic units.

NOTICE
Basic units SIMOCODE pro C (3UF7000*) and basic units SIMOCODE pro V (3UF7010*) to E08, V3.0
These basic units do not support the initialization module and start with the internal parameters.

NOTICE
Current measuring module required
To operate SIMOCODE pro with an initialization module, a current measuring module or a current / voltage measuring module must be connected to the basic unit.

Version of the operator panel with display

The compartment identification function is supported by operator panels with display as from product version *E07*.

When using the "Dry-running protection by means of active power monitoring" function, one of the following operator panels with display is necessary:

- 3UF7210-1AA00-0: ≥ E12
- 3UF7210-1AA01-0: ≥ E03
- 3UF7210-1BA00-0: ≥ E04
- 3UF7210-1BA01-0: ≥ E03

9.3 Operating compartment identification

Safety guidelines

Note

Startup with an initialization module

During device startup with an initialization module, there must be no memory module in the system interface of the SIMOCODE basic unit.

If there is a memory module in the system interface of the SIMOCODE pro basic unit,

- the "Fault - parameterization" fault message will be output
- the "Gen.Fault" LED will flash red.

Note

Contacting of the initialization module

The initialization module must be contacted before or together with the voltage supply of the basic unit.

Loading parameters from the initialization module

As soon as contact has been established with the initialization module and the voltage has been switched on, the parameters of the initialization module are loaded into the basic unit. The previous parameterization is overwritten and the compartment identification is activated (see the following topic "Autoactivation of compartment identification").

You can also track successful read-in of the parameters from the initialization module with the "initialization module read in" event in the SIMOCODE ES (TIA Portal) online functions.

Note

Loading parameters from the initialization module into the SIMOCODE pro V basic units with an earlier product version

Basic units SIMOCODE pro C (3UF7000*) and SIMOCODE pro V (3UF7010*) to E08, V3.0 do not detect the initialization module and ignore its parameters!

Note

Connecting a SIMOCODE pro S basic unit or a SIMOCODE pro V basic unit

Because a basic unit in these device series does not find any valid parameters on start-up with an empty initialization module, "Trip - Parameterization" is signaled. The "general fault" LED of the basic unit flashes red.

Reparameterization of the device, e.g. with SIMOCODE ES (TIA Portal), writes valid parameters to the basic unit and the initialization module again.

You can then acknowledge the fault message.

Saving parameters onto the initialization module

If an initialization module is connected to a SIMOCODE pro basic unit, all parameters that are saved to the SIMOCODE basic unit, e.g. SIMOCODE ES (TIA Portal), are automatically copied into the initialization module.

You can also track successful writing of the parameters into the initialization module with the "initialization module programmed" event in the SIMOCODE ES online functions.

Parameter settings in the "SIMOCODE ES (TIA Portal)" software

From a technical point of view, the initialization module is treated like an expansion module of SIMOCODE pro.

To use the mechanism of compartment identification, choose the "initialization module" option in the "Parameter → Device configuration" dialog box in the "SIMOCODE ES" software.

Autoactivation of compartment identification

If a SIMOCODE pro S or SIMOCODE pro V basic unit detects a connected initialization module during device startup, it will automatically load the parameters stored in it and will start with these parameters.

At the same time, the "Initialization module" parameter of the device configuration in the SIMOCODE pro basic unit is activated so that, on each new device startup, an initialization module is expected.

Note

Device startup when the "initialization module" parameter is activated

If no initialization module is detected during device start-up, SIMOCODE pro will signal "Trip - Configuration fault." The "General Fault" LED of the basic unit flashes.

The basic unit can only be reset when the configuration error has been remedied by connecting an initialization module or when a configuration has been loaded into the device without the "initialization module" option.

Deactivation of the compartment identification

To prevent SIMOCODE pro V from expecting an initialization module during device startup, you clear the "Initialization module" check mark in the "Parameter → Device configuration" dialog box. In this case, no initialization module must be connected to the SIMOCODE basic unit while this configuration is being downloaded.

A further way of deactivating the compartment identification is to reset the SIMOCODE pro basic unit to the factory settings. Resetting is performed in the "Commands" dialog box. In this case, too, no initialization module must be connected to the SIMOCODE pro basic unit. The parameter settings can then also be reloaded into the SIMOCODE pro basic unit.

Commands

"Initialization module write protection on" command

All contents of the initialization module are write-protected. This prevents any inadvertent changes to the contents of the initialization module and any parameter changes to the connected SIMOCODE pro basic unit. An inadvertent change of parameters for a motor feeder is prevented. SIMOCODE pro signals successful execution of the command with the "initialization module write-protected" event.

"Initialization module write protection off" command

With this command, you can remove the write protection of the initialization module.

"Initialization module write protection identification data on" command

The device addressing stored in the initialization module and the I&M data (identification & maintenance) are write-protected. With this command, you can

- prevent inadvertent changes to the addressing and I&M data for the motor feeder.
- continue to make parameter changes in the initialization module as well as in the SIMOCODE pro basic unit if the address data and I&M data are identical to the data already contained in the device when parameters are downloaded.

SIMOCODE pro signals the successful execution of the command with the "initialization module identification data write-protected" event.

"Initialization module write protection identification data off" command

With this command, you can remove the write protection of the identification data of the initialization module.

"Clear initialization module data" command:

With this command

- all contents of the initialization module are erased
- The initialization module is reset to the as-delivered state.

SIMOCODE pro signals the successful deletion with the "Initialization module cleared" event.

On startup with an empty initialization module, the basic unit signals "Fault - parameterization." The "general fault" LED of the basic unit flashes red.

Reparameterization of the device, e.g. with SIMOCODE ES (TIA Portal), writes valid parameters to the basic unit and the initialization module again. You can then acknowledge the fault message

Messages

You can check the states of the initialization module by the following events (in the ""Commissioning → Faults, warnings, event" dialog box of the "SIMOCODE ES (TIA Portal)" software:

- Initialization module write-protected
- Initialization module write-protected, parameter changes not allowed
- Initialization module identification data write-protected

- Initialization module read in
- Initialization module programmed
- Initialization module cleared.

See Alarm, fault, and system events for compartment identification (Page 149).

9.4 Mounting, wiring, interfaces, compartment identification

Mounting the initialization module in the switchboard

Mounting the initialization module with the mounting lugs in the switchboard

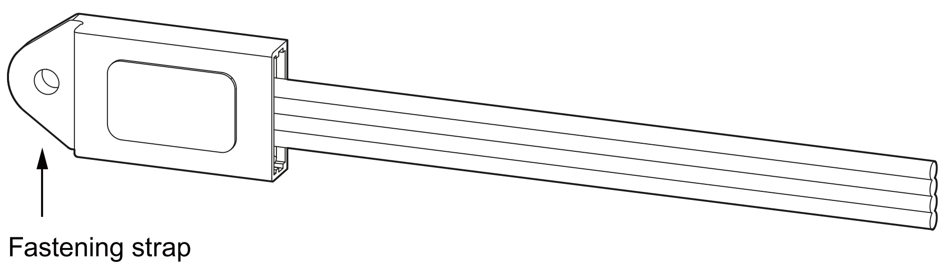


Figure 9-2 Mounting the initialization module

Wiring the initialization module

Unlike the other expansion components of the system, the initialization module does not have a connector. It is intended for installation in the fixed part of the switchboard. Connect the initialization module to a motor control center's control connector toward the switchboard using the four connecting wires.

On the mating side, there is a withdrawable module to whose control connectors the corresponding four connecting wires of the Y connecting cable are connected (see figure).

Connect each of the wires that are of the same color on the initialization module and the Y connecting cable.

NOTICE
Note the correct colors!
Incorrect wiring can destroy the initialization module.

Note

Cable routing

When wiring the initialization module make sure the individual conductors are routed as close together as possible (ribbon cable).

NOTICE
Maximum length of the connecting cable
The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit!

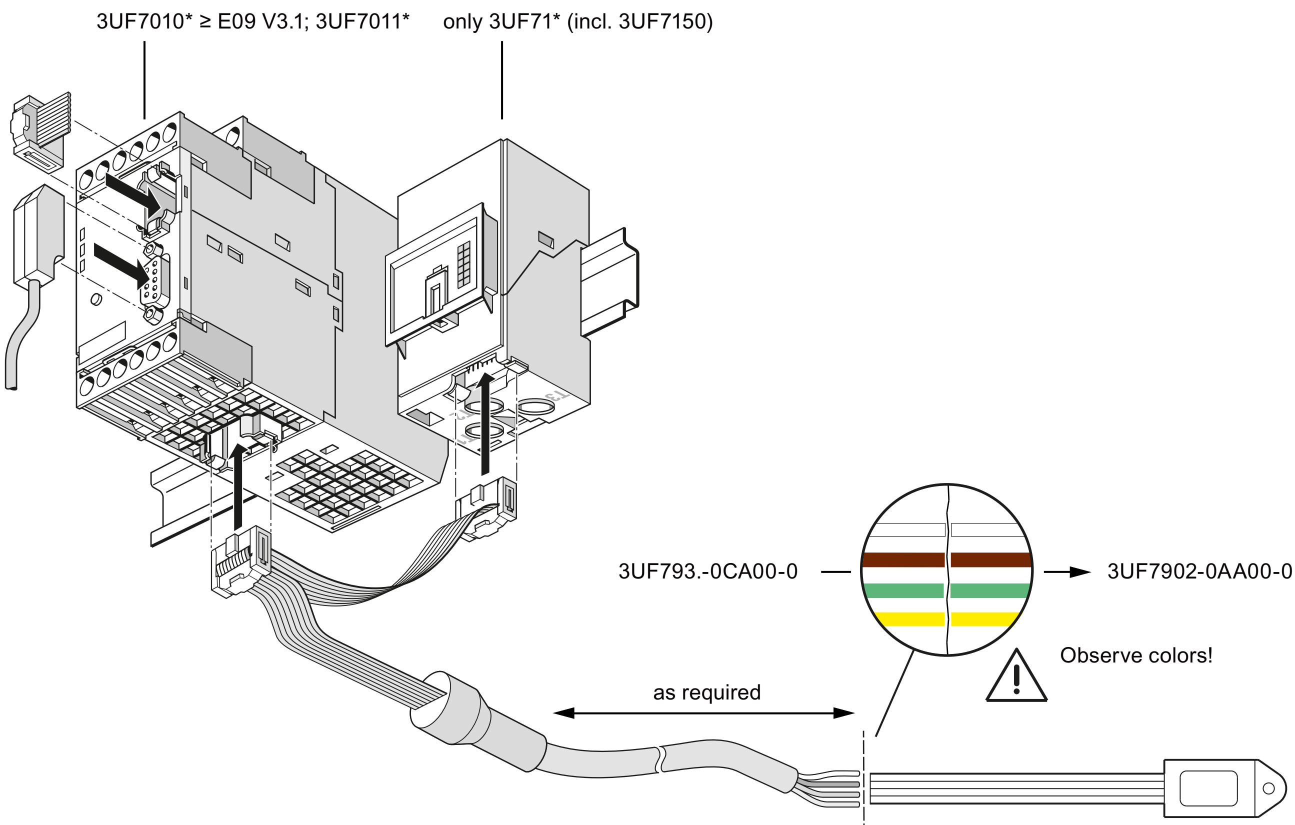


Figure 9-3 Wiring the initialization module

⚠ CAUTION
SIMOCODE pro basic units with an earlier product version
SIMOCODE pro C basic units (3UF7000*) and SIMOCODE pro V PB basic units (3UF7010*) up to E08, V3.0 do not support the initialization module and start with the internal parameters.

Connecting the Y connecting cable to the basic unit and to the current measuring module or to the current / voltage measuring module

- Connect the connector in the middle of the Y connecting cable (1) on the basic unit
- Connect the connector at the end of the Y connecting cable (2) to a current measuring module or current / voltage measuring module
- If you are using a decoupling module:
  - Connect the connector at the end of the initialization cable (2) on the decoupling module.
  - Connect the decoupling module with a system interface connecting cable to the current / voltage measuring module.

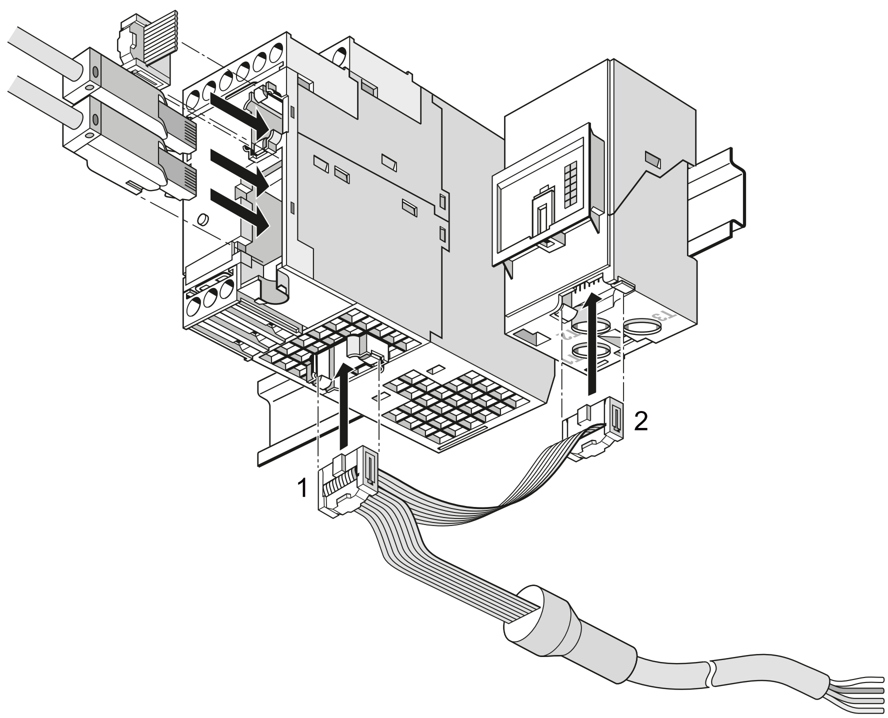


Figure 9-4 Connecting the Y connecting cable to the basic unit and to the current measuring module or to the current / voltage measuring module

9.5 Commissioning and service compartment identification

General safety information

Note

Operating Instructions

During commissioning and service work, also heed the relevant "Initialization Module" Operating Instructions!

You will find the operating instructions for SIMOCODE pro at Manuals/operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man).

Commissioning the initialization module

Sequence for initial startup of a new SIMOCODE pro basic unit and a new initialization module

Step	Description
1	Connect the SIMOCODE pro basic unit to the planned expansion modules and to the initialization module.
2	Switch on the power supply. The following LED states result: • The "DEVICE" LED lights up green • The "BUS" LED lights up or flashes green when the bus is connected • The "GEN.FAULT" LED flashes red At the same time, the "Fault - parameterization" fault message is output.
3	Parameterize SIMOCODE pro with a PC with the SIMOCODE ES (TIA Portal) software installed. For this, connect the PC/PG to the system interface with the PC cable (see the figure below) or to the basic unit via the communication bus.
4	Acknowledge the pending fault either locally on the device or via the SIMOCODE ES software by means of the "TEST/RESET button".

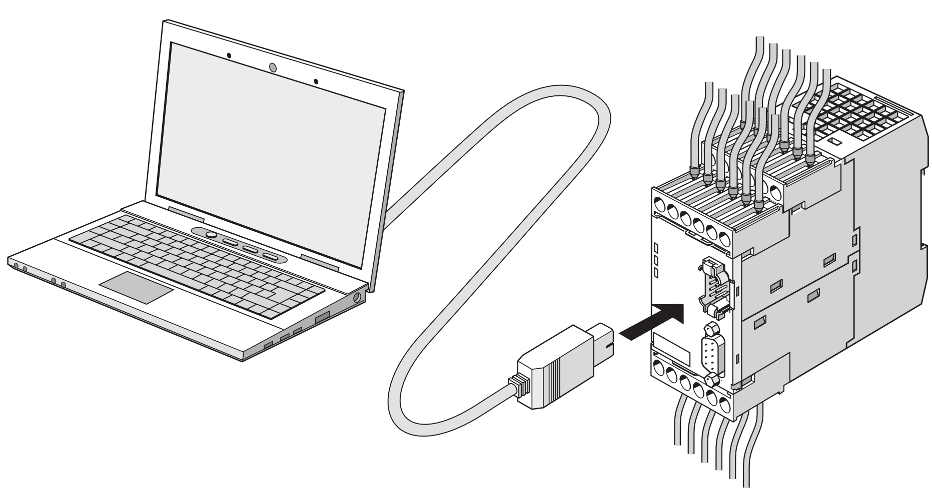


Figure 9-5 Connecting a PC to a SIMOCODE pro basic unit

9.6 Alarm, fault, and system events for compartment identification

Messages

Table 9-1 Alarm, fault, and system events

Message	Description	Troubleshooting
Initialization module write-protected	The initialization module is completely write-protected.	Deactivate write protection of the initialization module.
Initialization module write-protected, parameter changes not allowed	The initialization module is completely or partially write-protected. Reparameterization of SIMOCODE pro is denied because the initialization module is write-protected.	Deactivate write protection of the initialization module.
Initialization module identification data write-protected	The device addressing and the I&M data in the initialization module are write-protected. Parameterization will only be accepted by SIMOCODE if the new parameter set is identical to the data stored in the initialization module at that time.	• Select a parameterization with identical addressing and I&M data • Deactivate the partial write protection of the initialization module.
Initialization module read in	The parameters of the initialization module were read into SIMOCODE.	-
Initialization module programmed	The reparameterization was accepted in the initialization module.	-
Initialization module cleared	The initialization module has been cleared and is now back in the as-delivered condition.	-

9.7 Compartment identification dimension drawings

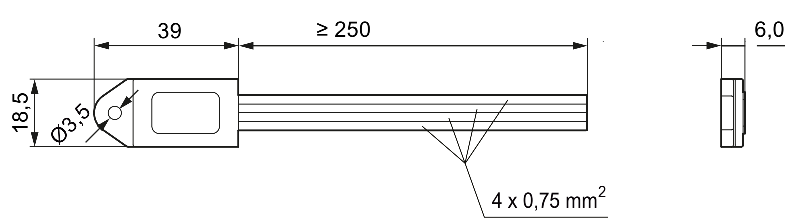


Figure 9-6 Dimension drawing initialization module

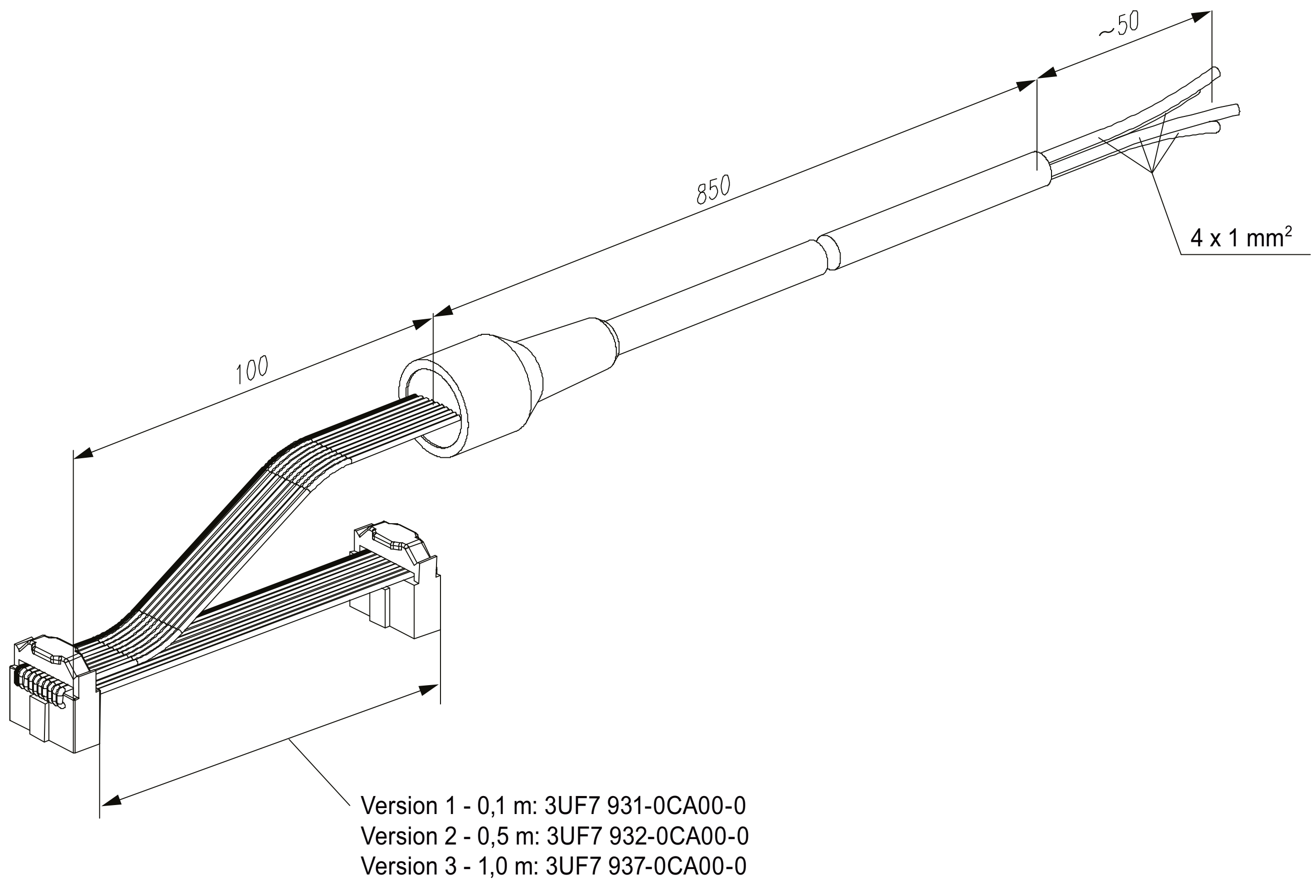


Figure 9-7 Dimension drawing Y connecting cable

9.8 Technical data compartment identification

Technical data initialization module

- Order number (MLFB): 3UF7 902-0AA00-0
- Ambient temperature: -25 ... +80 °C
- Rated insulation voltage: 300 V
- Rated operating voltage: 24 V.

Technical data Y connecting cable

- Order numbers (MLFB):
  - Version 1 - 0.1 m: 3UF7 931-0CA00-0
  - Version 2 - 0.5 m: 3UF7 932-0CA00-0
  - Version 3 - 1.0 m: 3UF7 937-0CA00-0.
- Ambient temperature: -25 ... +60 °C

- Rated insulation voltage: 300 V
- Rated operating voltage: 24 V.

Accessories

10

Accessories overview

The following figure shows selected accessories:

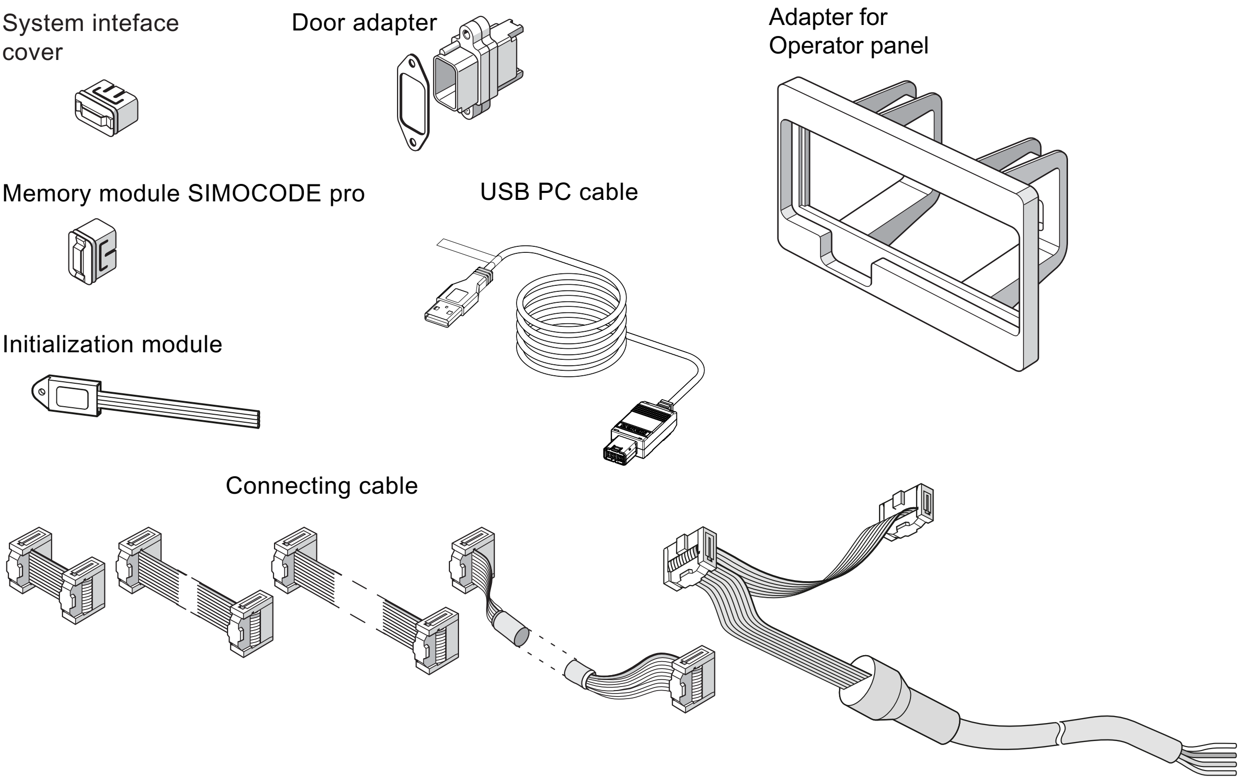


Figure 10-1 Accessories

USB PC cable

For device parameterization, for connecting a PC via its USB interface or serial interface to the system interface of a basic unit.

Note

PC cable variant

For SIMOCODE pro V PN / EIP, a serial PC cable 3UF7940-0AA00-0 as from product version *E02* or a USB PC cable USB 3UF7941-0AA00-0 can be used.

USB-to-serial adapter

For connecting an RS -232 PC cable to the USB interface of a PC.

Memory module

Enable all system parameter settings to be backed up and transferred to a new system without the need for additional resources or specialist expertise, for example, if the device is replaced (see also Chapter Replacing SIMOCODE pro components (Page 257)).

Note

Memory module type

- The SIMOCODE pro C and SIMOCODE pro V PB basic units up to product version *E08* only support the 3UF7900* memory module.
- The SIMOCODE pro S, SIMOCODE pro V MR and SIMOCODE pro V PB basic units support all memory modules as from product version *E09*.
- A 3UF7901* memory module is required for the SIMOCODE pro V PN and SIMOCODE pro V EIP basic units. The 3UF7900* memory module is not supported.

Initialization module

The initialization module enables all system parameter settings to be backed up and transferred to a new system without the need for additional resources or specialist expertise, for example, if the device is replaced. It can be installed permanently in the switchboard.

Note

Basic unit support

The SIMOCODE pro S and SIMOCODE pro V PB basic units (as from product version *E09*) support the initialization module.

Further information: See Chapter Compartment identification (Page 139).

Addressing plug

For "hardware" assignment of the PROFIBUS DP address without PC/PG on SIMOCODE pro via the system interface. Setting the PROFIBUS DP address with the addressing plug: See Chapter Setting the PROFIBUS DP address (Page 236).

Connecting cable

Different types and lengths of connecting cable are available. It is required to connect the basic unit to its current measuring module and, if applicable, to its expansion modules or the operator panel.

Note

The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit!

Door adapter

The door adapter is used to facilitate access to the SIMOCODE pro system interface, for example via the front panel, to ensure fast parameterization.

System interface cover

The system interface cover helps to protect and/or seal the system interfaces against the ingress of dirt. In normal operation, unused system interfaces must be closed.

Operator panel adapter

The operator panel adapter enables use of the 3UF720 operator panel of SIMOCODE pro in a front panel cutout, in which a 3UF52 operator panel of SIMOCODE-DP (IP54 degree of protection) has previously been used, e.g. after system replacement.

3UF50 compatibility mode 11

11.1 Application, Win-SIMOCODE-DP converter

Application of 3UF50 compatibility mode

3UF50 compatibility mode is used whenever a SIMOCODE-DP device is to be replaced with a SIMOCODE pro V PB device without modification of the configuration.

In 3UF50 compatibility mode, you can operate a SIMOCODE pro V PB basic unit with a 3UF50 configuration. In this case, from the point of view of the PLC (master class 1) communication with SIMOCODE pro is the same as communication with SIMOCODE-DP.

SIMOCODE-DP supports cyclic communication (basic types 1-3), diagnosis, as well as DPV1 data sets (DS 130, DS 131, DS 133).

Win SIMOCODE-DP converter

In order for the technical functions (parameterization) of SIMOCODE-DP to be integrated into the technical functions of SIMOCODE pro V PB, the device parameters must be adjusted accordingly. The "Win SIMOCODE-DP Converter" software supports you in this process. This software enables you to convert the parameter files (smc files) created with Win SIMOCODE-DP into SIMOCODE ES parameter files (sdp files).

Safety guidelines

Note

Communication with a DP master (class 2 master), e.g. with the Win-SIMOCODE-DP Professional software via PROFIBUS DP, is not covered by the 3UF50 compatibility mode.

Note

In the 3UF50 compatibility mode, the startup parameter block is always set, i.e. the transmission of the device parameters created using the SIMOCODE-DP GSD or the SIMOCODE-DP Object Manager cannot be integrated into SIMOCODE pro V PB.

Note

The 3UF50 compatibility mode supports SIMOCODE-DP projects in which SIMOCODE-DP is integrated via GSD SIEM8031.gs?, SIEM8069.gs? or via the SIMOCODE-DP Object Manager (OM).

11.2 Diagram of send and receive data

The following table shows the send and receive data in compatibility mode:

Table 11-1 "Receive" configuration

Receive								
	Basic type 1, SIMOCODE DP	Basic type 1, SIMOCODE pro V		Basic type 2, SIMOCODE DP	Basic type 2, SIMOCODE pro V		Basic type 3, SIMOCODE DP	Basic type 3, SIMOCODE pro V
0	Receive data	Cyclic receive bit 0 to 1.7	0	Receive data	Cyclic receive bit 0 to 1.7	0	Receive data	Cyclic receive bit 0 to 1.7
1			1			1		
2		Not supported	2		Not supported	2		Not supported
3			3			3		

Table 11-2 "Send" configuration

Send								
	Basic type 1, SIMOCODE DP	Basic type 1, SIMOCODE pro V		Basic type 2, SIMOCODE DP	Basic type 2, SIMOCODE pro V		Basic type 3, SIMOCODE DP	Basic type 3, SIMOCODE pro V
0	Send data	Cyclic send bit 0 to 1.7	0	Send data	Cyclic send bit 0 to 1.7	0	Send data	Cyclic send bit 0 to 1.7
1			1			1		
2	Motor current	Specified: max. current I_{max}	2	Motor current	Specified: max. current I_{max}	2		Acycl. Send Bit 0 to 1.7
3			3			3		
4	Number of starts	Specified: Number of starts (Byte 0)						
5								
6								
7	Counter 1 value	Specified: Counter 1 - Actual value						
8								
9	Counter 2 value	Specified: Counter 2 - Actual value						
10								
11	Sensor value	Specified: TM - Max. temperature						

Note

The send data bytes 2 - 11 are always permanently assigned in compatibility mode (see Table "'Send' configuration").

11.3 Diagram of diagnostics data

The following table shows the diagnostics data in the 3UF50 compatibility mode:

Table 11-3 Diagram of the diagnostics data in the 3UF50 compatibility mode

Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP	Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP	Equivalent in SIMOCODE pro V
		6	0x0B	Same as 3UF-50 diagnostics
		7	0x81	
		8	0x04	
6	0x0E	9	0x00	
7.0	Free	10.0	Free	
7.1	Event: DP block	10.1	Event: DP block	Event - Startup parameter block active
7.2	Event: Emergency start	10.2	Event: Emergency start	Status - Emergency start executed
7.3	Event: HW test OK	10.3	Event: HW test OK	• No fault - HW fault basic unit • No fault - Module fault • No fault - temporary components
7.4	Free	10.4	Free	—
7.5	Event: Ext. message 1	10.5	Event: Ext. message 1	Event - ext. fault 5
7.6	Event: Ext. message 2	10.6	Event: Ext. message 2	Event - ext. fault 6
7.7	Event: Ext. message 3	10.7	Event: Ext. message 3	—
8.0	Warning: Ext. warning	11.0	Warning: Ext. warning	Warning: Ext. fault 3
8.1	Warning: Unbalance > 40 %	11.1	Warning: Unbalance > 40 %	Warning - Unbalance
8.2	Event: Failure PLC-CPU	11.2	Event: Failure PLC-CPU	Status - PLC / PCS (intervened)
8.3	Warning: Sensor short circuit	11.3	Warning: Sensor short circuit	Warning - Thermistor short circuit
8.4	Event: Cooling down period active	11.4	Event: Cooling down period active	Status - Cooling down period active
8.5	Status: TPF	11.5	Status: TPF	Status - Test position (TPF)
8.6	Free	11.6	Free	—
8.7	Free	11.7	Free	—
9.0	Warning: Ground fault	12.0	Warning: Ground fault	• Warning internal ground fault or • Warning external ground fault
9.1	Warning: Overload	12.1	Warning: Overload	Warning - Overload

Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP	Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP	Equivalent in SIMOCODE pro V
9.2	Warning: Overload + unbalance	12.2	Warning: Overload + unbalance	Warning - Overload + unbalance
9.3	Warning: I1 response level overshot	12.3	Warning: I1 response level overshot	Warning - Warning level I >
9.4	Warning: I1 response level undershot	12.4	Warning: I1 response level undershot	Warning - Warning level I <
9.5	Warning: I2 response level overshot	12.5	Warning: I2 response level overshot	—
9.6	Warning: I2 response level undershot	12.6	Warning: I2 response level undershot	—
9.7	Warning: Thermistor	12.7	Warning: Thermistor	• Warning - Thermistor overload • Warning - Thermistor open circuit • Warning - TM warning T > • Warning - TM sensor fault • Warning - TM out of range
10.0	Trip: Ground fault	13.0	Trip: Ground fault	• Fault - internal ground fault or • Fault - ext. ground fault
10.1	Trip: Overload	13.1	Trip: Overload	Fault - overload
10.2	Trip: Overload + unbalance	13.2	Trip: Overload + unbalance	Fault - overload + phase failure
10.3	Trip: I1 response level overshot	13.3	Trip: I1 response level overshot	Fault - trip level I >
10.4	Trip: I1 response level undershot	13.4	Trip: I1 response level undershot	Fault - trip level I <
10.5	Trip: I2 response level overshot	13.5	Trip: I2 response level overshot	—
10.6	Trip: I2 response level undershot	13.6	Trip: I2 response level undershot	—

Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP	Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP	Equivalent in SIMOCODE pro V
10.7	Trip: Thermistor	13.7	Trip: Thermistor	• Fault - thermistor overload • Fault - thermistor short circuit • Fault - thermistor open circuit • Fault - TM trip T > • Fault - TM sensor fault • Fault - TM out of range
11.0	Trip: FB ON	14.0	Trip: FB ON	Fault - feedback (FB) ON
11.1	Trip: FB OFF	14.1	Trip: FB OFF	Fault - feedback (FB) OFF
11.2	Trip: Stalled rotor	14.2	Trip: Stalled rotor	Fault - stalled rotor
11.3	Trip: Stalled positioner	14.3	Trip: Stalled positioner	Fault - stalled positioner
11.4	Trip: Double 0	14.4	Trip: Double 0	Fault - double 0
11.5	Trip: Double 1	14.5	Trip: Double 1	Fault - double 1
11.6	Trip: End position	14.6	Trip: End position	Fault - end position
11.7	Trip: Antivalence	14.7	Trip: Antivalence	Fault - antivalence
12.0	Trip: ESB	15.0	Trip: ESB	Fault - ext. fault 4
12.1	Trip: OPO	15.1	Trip: OPO	Fault - Operational Protection Off (OPO)
12.2	Trip: UVO	15.2	Trip: UVO	Fault - power failure (UVO)
12.3	Trip: Ext. fault 1	15.3	Trip: Ext. fault 1	Fault - ext. fault 1
12.4	Trip: Ext. fault 2	15.4	Trip: Ext. fault 2	Fault - ext. fault 2
12.5	Trip: TPF fault	15.5	Trip: TPF fault	Fault - Test Position Feedback (TPF)
12.6	Trip: Runtime ON	15.6	Trip: Runtime ON	Fault - execution ON command
12.7	Trip: Runtime OFF	15.7	Trip: Runtime OFF	Fault - execution STOP command
13.0	Trip: Parameter fault 0	16.0	Trip: Parameter fault 0	Fault - parameterization
13.1	Trip: Parameter fault 1	16.1	Trip: Parameter fault 1	—
13.2	Trip: Parameter fault 2	16.2	Trip: Parameter fault 2	—
13.3	Trip: Parameter fault 3	16.3	Trip: Parameter fault 3	—
13.4	Trip: Parameter fault 4	16.4	Trip: Parameter fault 4	Fault - configuration error

Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DP standard SIMOCODE DP	Byte.Bit	Setup 3UF50 - Device-specific diagnostics according to DPV1 SIMOCODE DP	Equivalent in SIMOCODE pro V
13.5	Trip: Parameter fault 5	16.5	Trip: Parameter fault 5	
13.6	Trip: Parameter fault 6	16.6	Trip: Parameter fault 6	
13.7	Trip: Parameter fault 7	16.7	Trip: Parameter fault 7	Fault - hardware fault basic unit
14 - 15	Number of overload trips			Number of overload trips
16 - 17	I of the overload trip [% / IE)]			Last trip current
18 - 19	Operating hours [10 h]			Motor operating hours

Mounting, wiring, connecting 12

12.1 Mounting

12.1.1 Mounting basic units, expansion modules, and the decoupling module

You can attach these system components as follows:

- Snap-on mounting onto a 35 mm standard mounting rail, without tools
- Snap-on mounting of basic units (no tools required) onto current measuring modules of 45 mm and 55 mm in width (up to 100 A or 115 A (UM+))) with integrated standard mounting rail
- Screw fixing with fixing lugs (article number: 3RP1903 or 3ZY1311-0AA00 for SIMOCODE pro S) and screws on a flat surface. These fixing lugs are only suitable for basic units, expansion modules and the decoupling module!

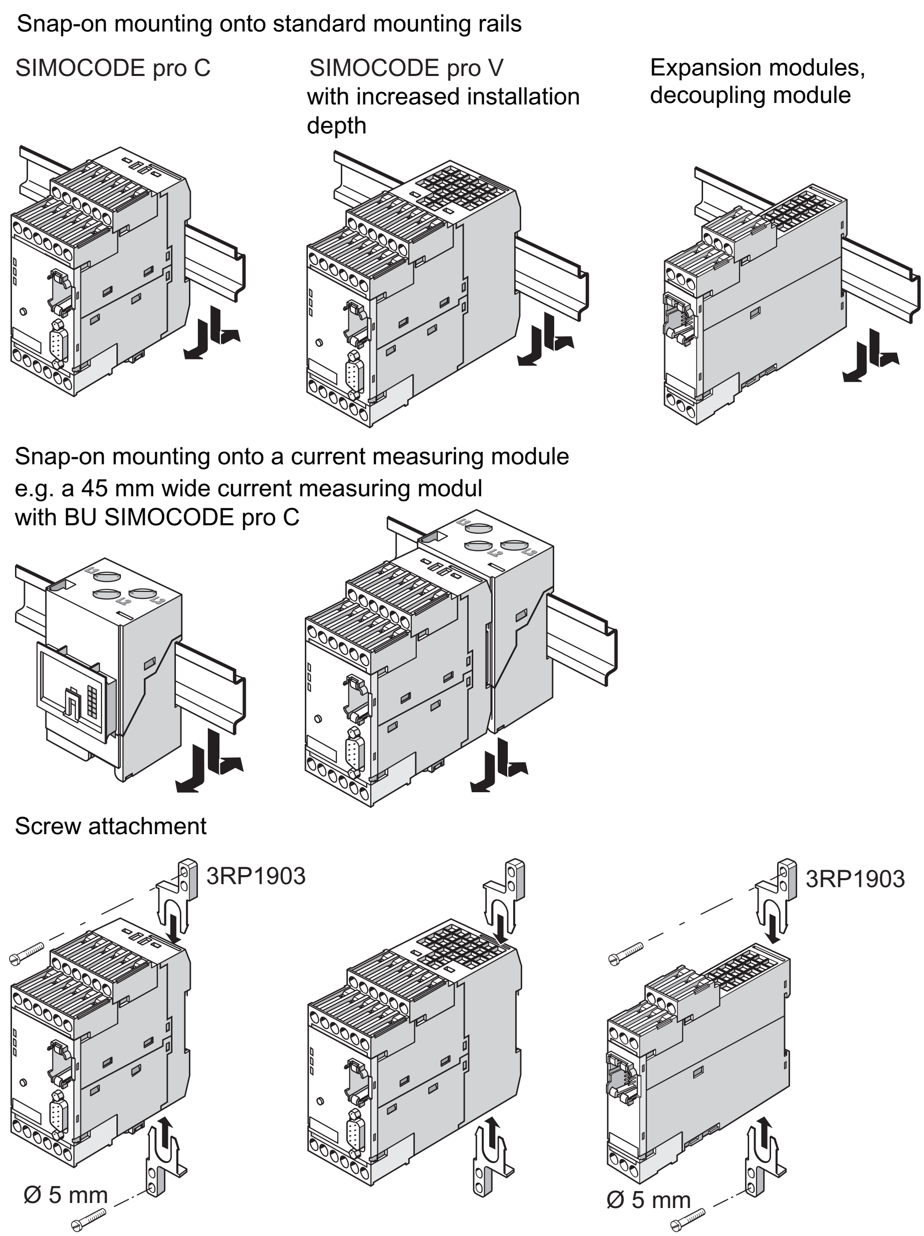


Figure 12-1 Mounting basic unit, expansion modules or the decoupling module, SIMOCODE pro C/V

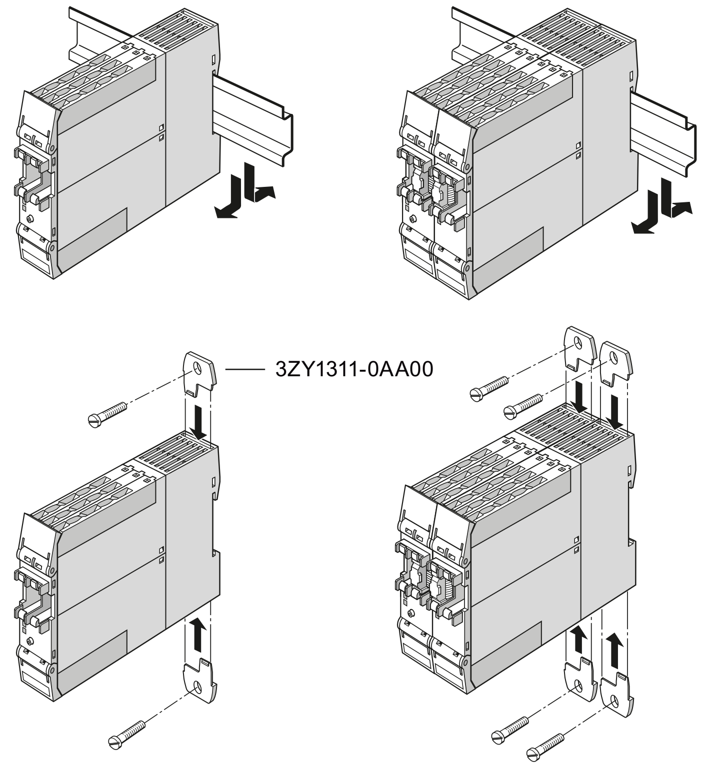


Figure 12-2 Mounting of basic unit and multifunction module, SIMOCODE pro S

12.1.2 Mounting the bus terminal

Sequence for mounting the bus terminal on the SIMOCODE pro S basic unit

Proceed as follows:

Table 12-1 Mounting the bus terminal on the SIMOCODE pro S basic unit

Step	Description
1	Screw the two PROFIBUS cables to the bus terminal as shown
2	Attach the bus terminal to the SIMOCODE pro S basic unit as shown.

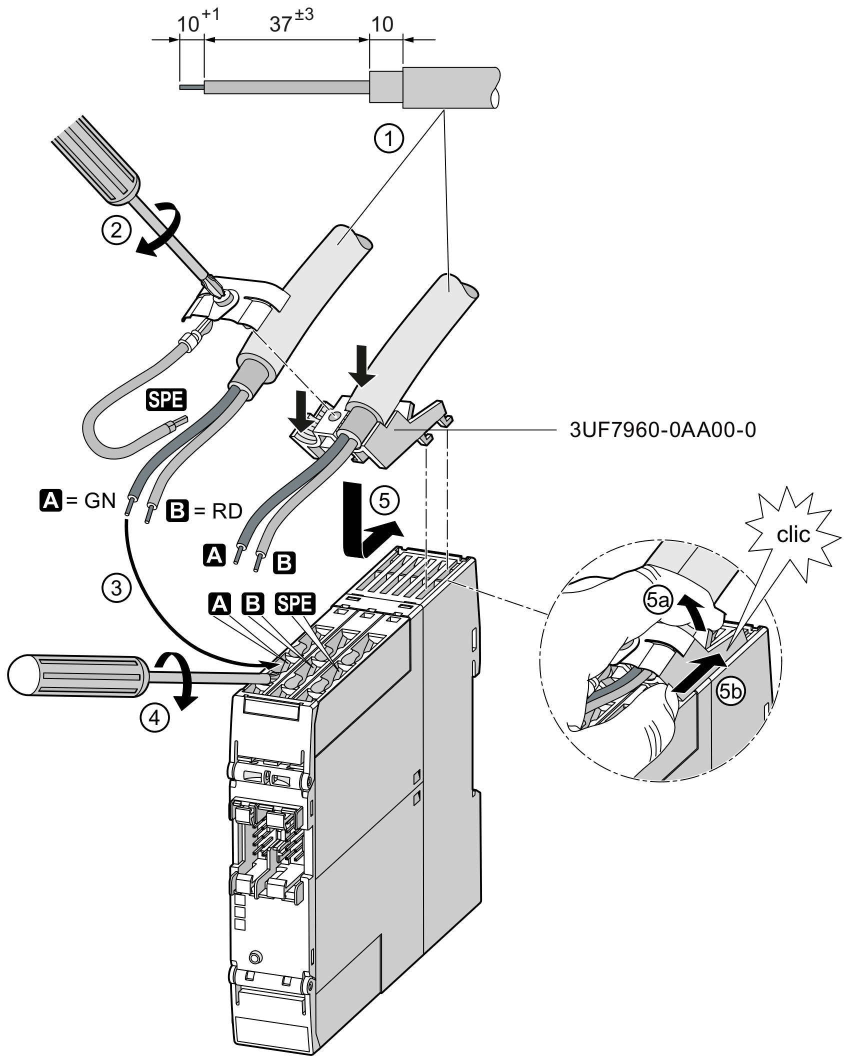


Figure 12-3 Mounting the bus terminal on the SIMOCODE pro S basic unit

12.1.3 Mounting of digital modules DM-F Local and DM-F PROFIsafe

See Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852), Chapter "Mounting and connection."

12.1.4 Mounting of current measuring modules

You can attach these system components as follows:

- Current measuring modules up to 100 A: Standard mounting rail mounting or screw attachment with mounting lugs (Order No: 3RV2928-0B) and screws for mounting on a level surface. These mounting lugs are suitable only for current measuring modules and current / voltage measuring modules! For current measuring modules up to 25 A you will require an additional 25 mm spacer.
- Current measuring modules up to 200 A: Rail-mounting or screw attachment
- Current measuring modules up to 630 A: Screw mounting.

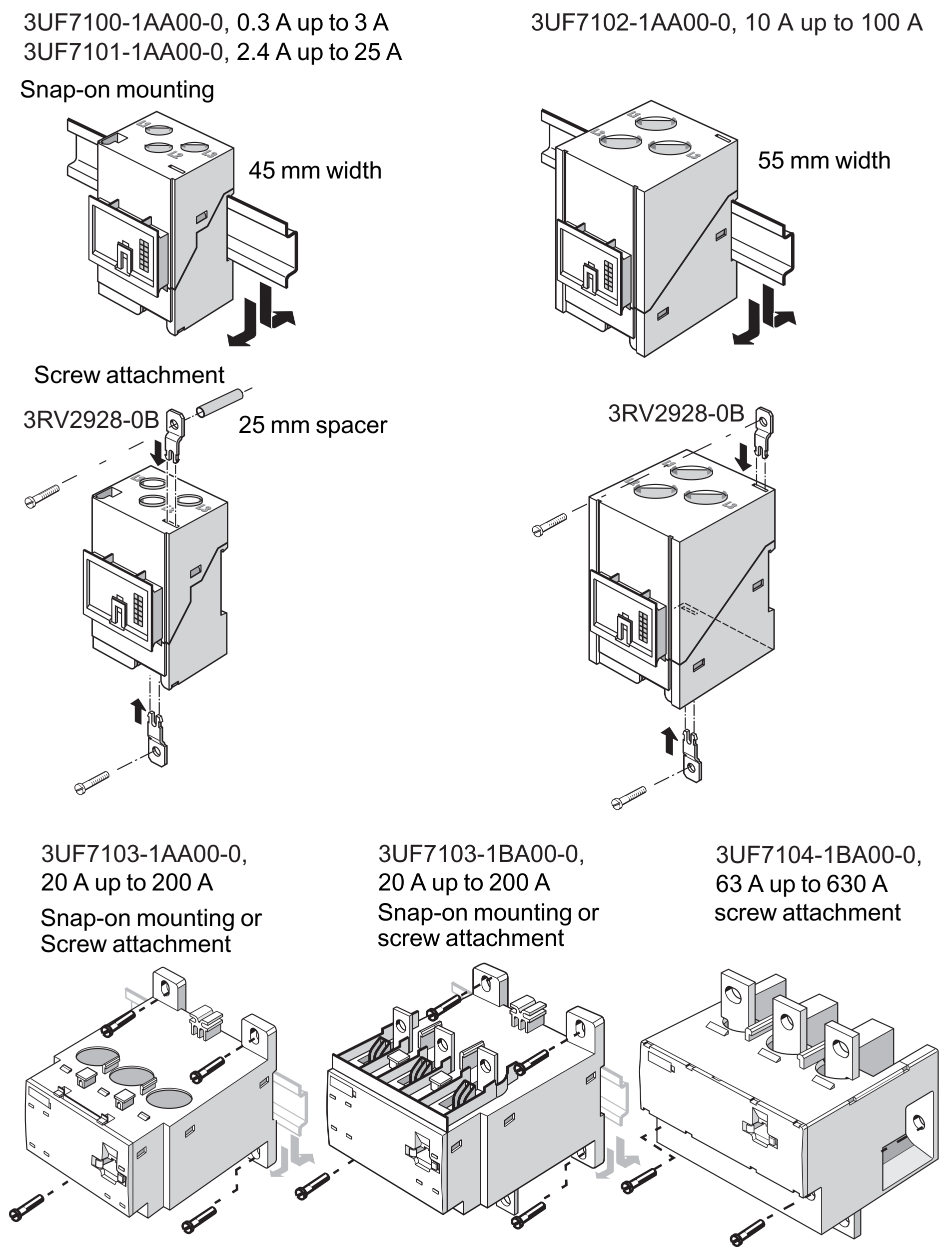


Figure 12-4 Mounting the current measuring modules

12.1.5 Mounting the current / voltage measuring modules

You can attach these system components as follows:

- Current / voltage measuring modules up to 115 A: Standard mounting rail mounting or screw attachment with mounting lugs (article number: 3RV2928-0B) and screws for mounting on a level surface. These mounting lugs are suitable only for current / voltage measuring modules (and current measuring modules)! For current / voltage measuring modules up to 25 A you will require an additional spacer, 25 mm in length.
- Current / voltage measuring modules up to 200 A: Standard mounting rail or screw attachment.
- Current / voltage measuring modules up to 630 A: Screw mounting

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Note

Current / voltage measuring modules with a current setting of up to 115 A can be connected to the basic unit mechanically and installed as a unit (behind one another).

Larger current / voltage measuring modules can only be mounted separately.

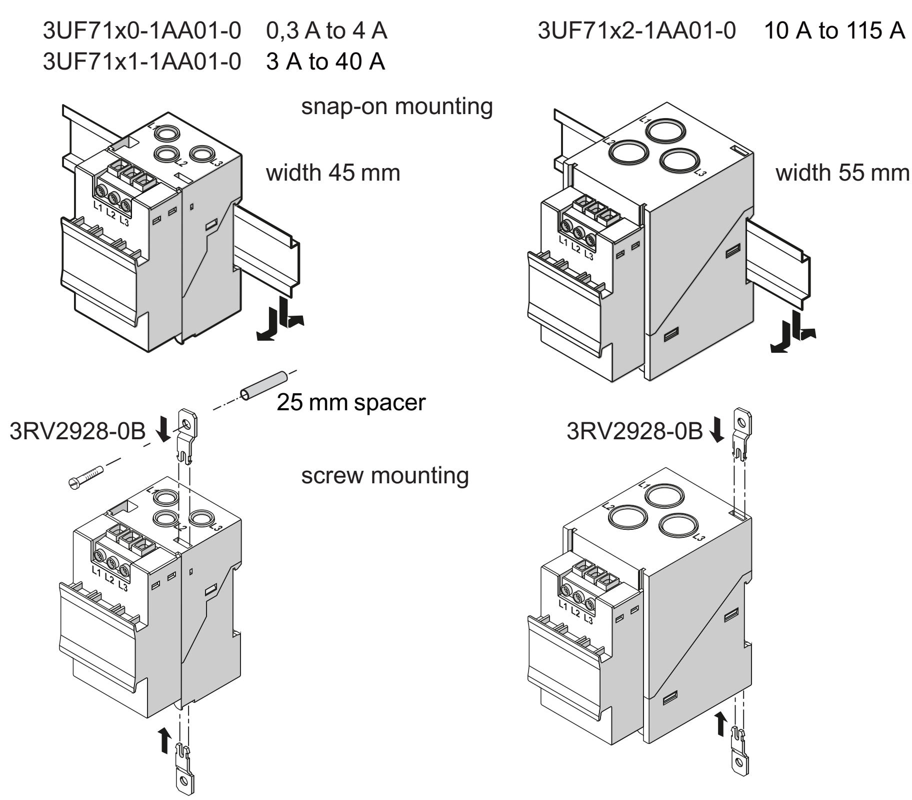


Figure 12-5 Mounting the current / voltage measuring modules UM+ with through-hole technology

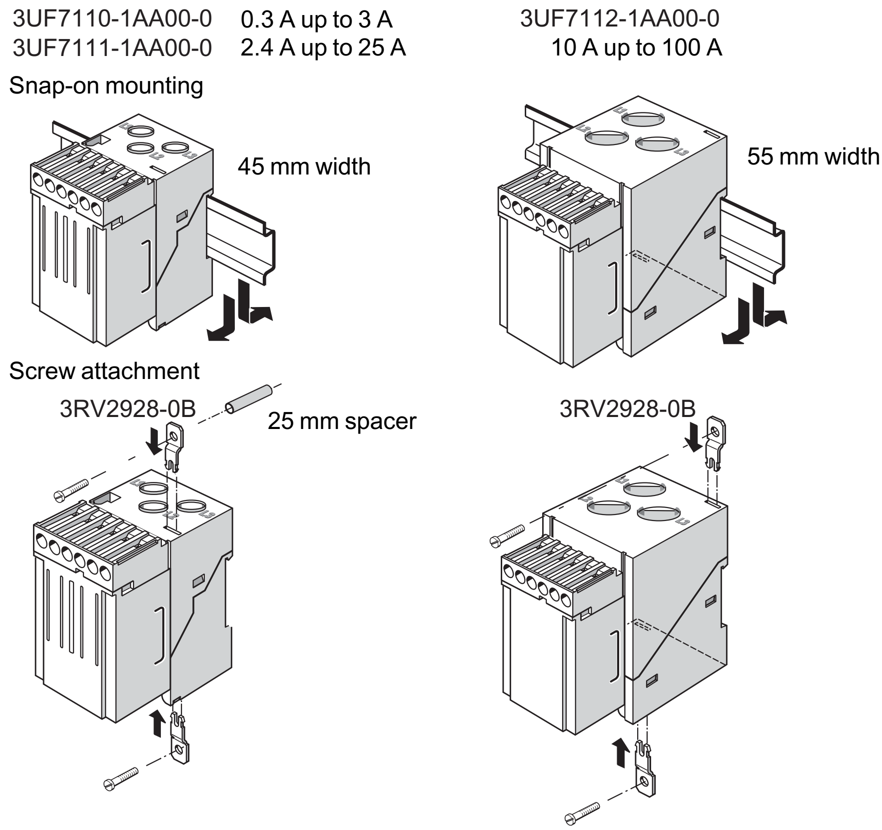


Figure 12-6 Mounting the current / voltage measuring modules UM with through-hole technology

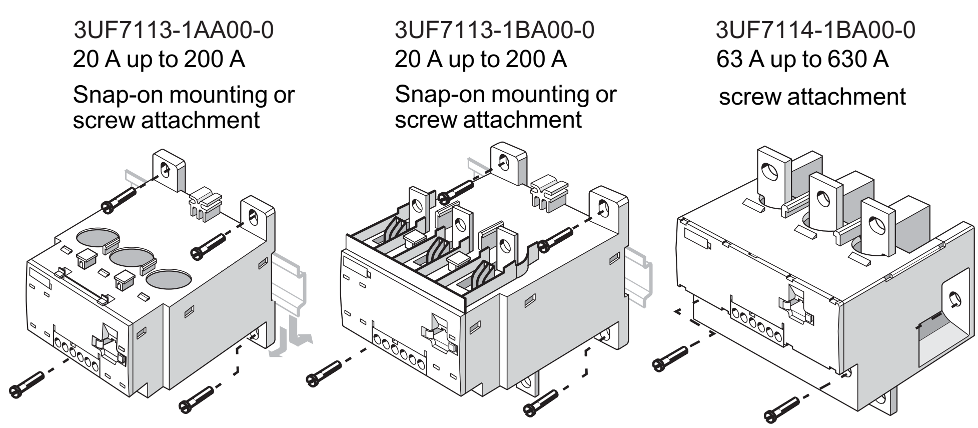


Figure 12-7 Mounting the current / voltage measuring modules UM with bus connection system

12.1.6 Mounting of the operator panel and operator panel with display

The operator panels are designed for installation in the front panels of motor control centers, for example, or in control cabinet doors.

To install, proceed as follows:

Table 12-2 Sequence for installing the operator panel / operator panel with display

Step	Description
1	Make a cutout, e.g. in the front panel or switchgear cabinet door. Dimensions (see figure "Mounting the operator panel" or figure "Mounting the operator panel with display").
2	Position the operator panel or the operator panel with display in the cutout.
3	Snap the four mounting brackets onto the operator panel.
4	Lock the operator panel in position by tightening the four screws on the securing brackets.

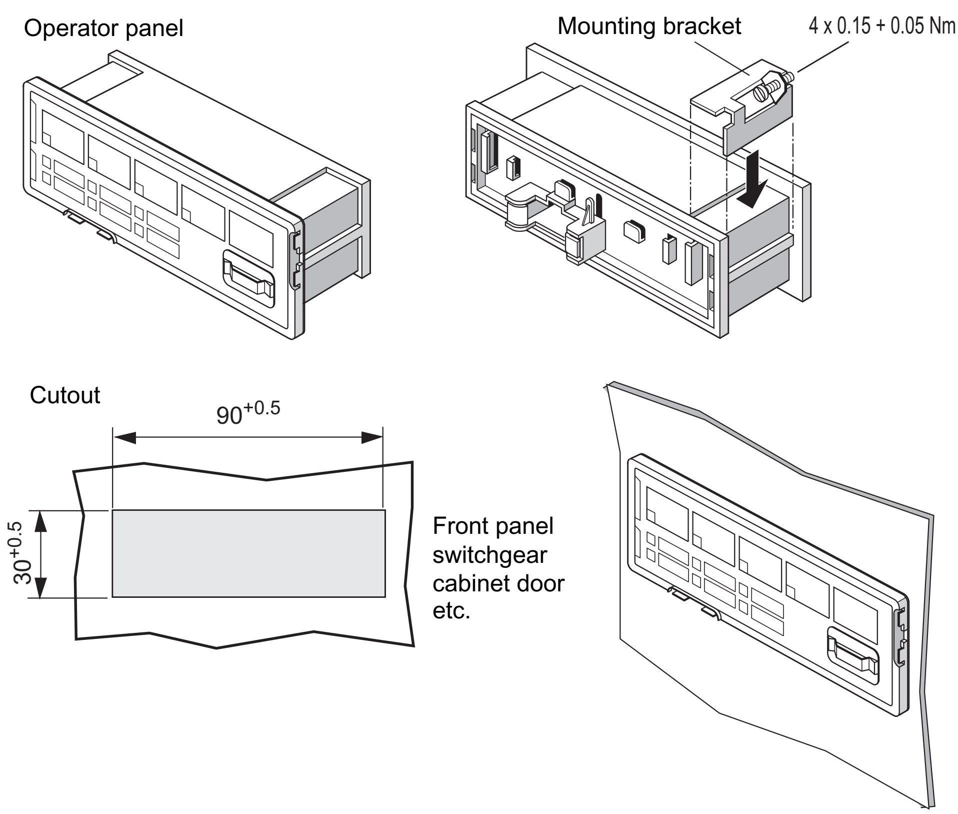


Figure 12-8 Mounting the operator panel

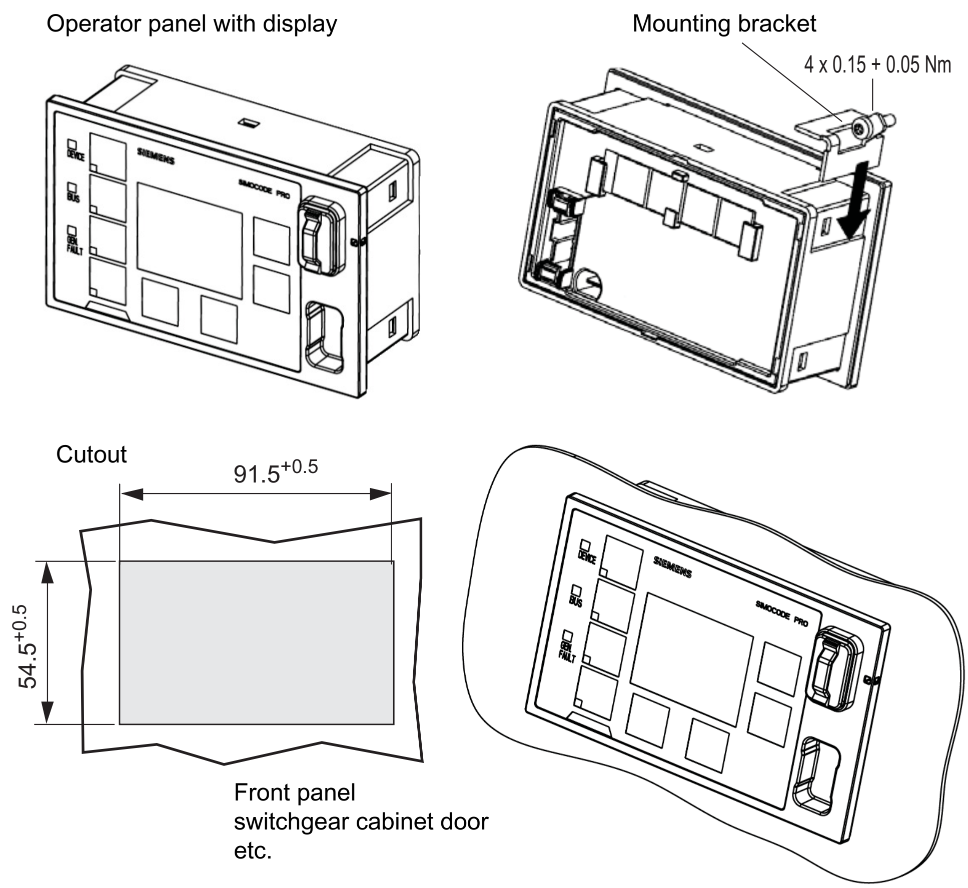


Figure 12-9 Mounting the operator panel with display

> **WARNING**
>
> **Tightening torque of the screws**
>
> To ensure that the panel will function correctly and is sealed to comply with IP54, the tightening torque of the screws provided must not be set too high when mounting and the seal must be properly fitted.

Note

Only one connecting cable is required for connecting the operator panel with display to SIMOCODE pro (see Chapter An overview of system components (Page 57)). Additional wiring for the power supply or ground is not required.

12.2 Wiring, connecting

12.2.1 Wiring basic units, expansion modules and the decoupling module

Removable terminals

Basic units, expansion modules and the decoupling module have removable terminals. You do not have to detach the wiring to exchange these devices!

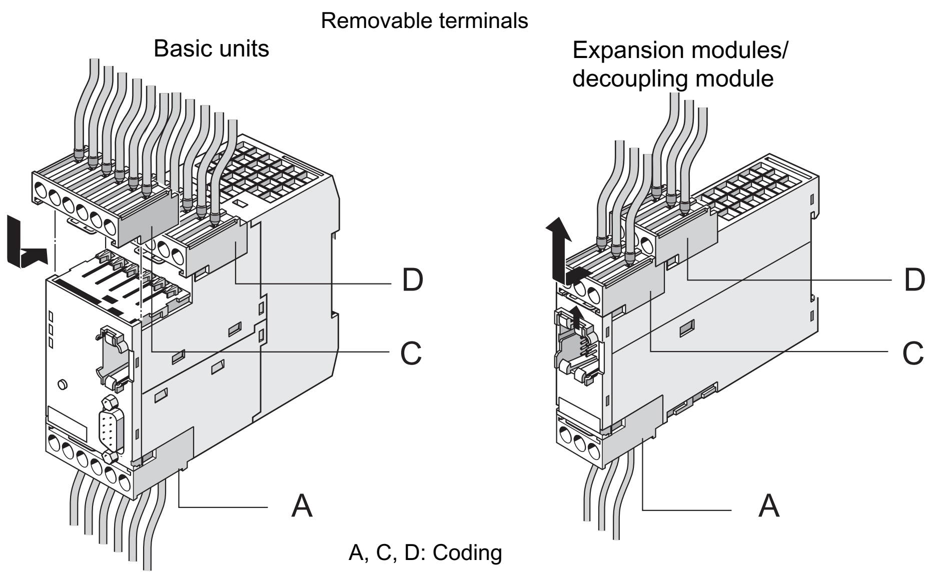


Figure 12-10 Removable terminals for basic units, expansion modules, or the decoupling module, SIMOCODE pro C/V

Note

The removable terminals are mechanically coded and will only fit in a certain position!

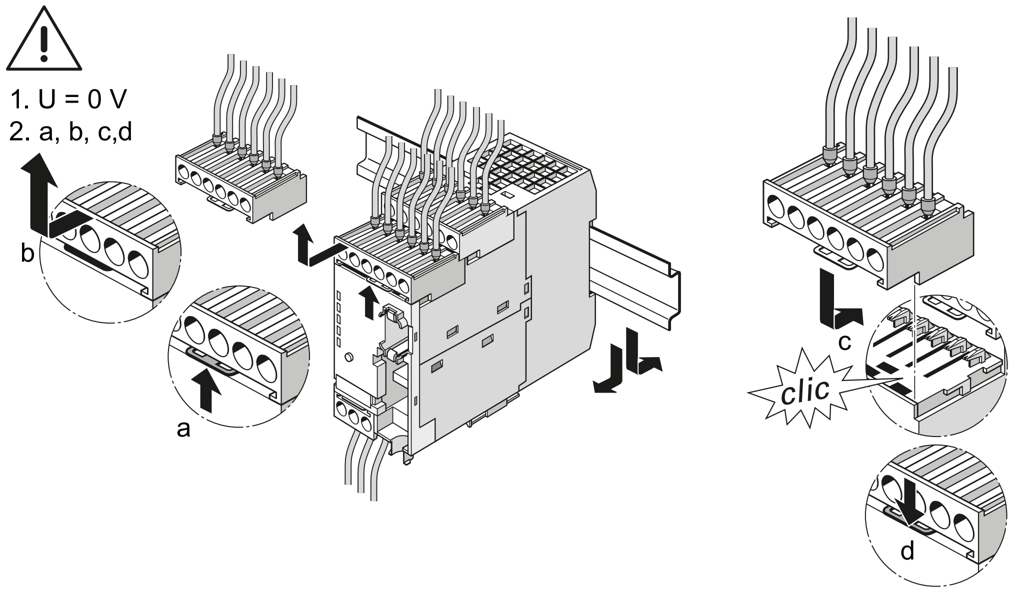


Figure 12-11 Removable terminals for SIMOCODE pro C and pro V basic units

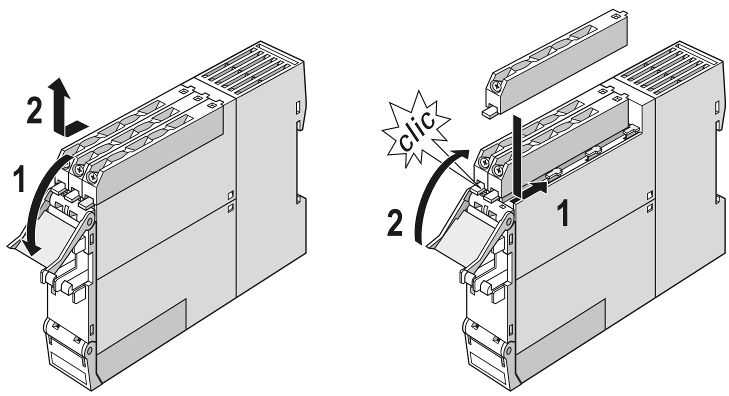


Figure 12-12 Removable terminals for basic unit and multifunction module, SIMOCODE pro S

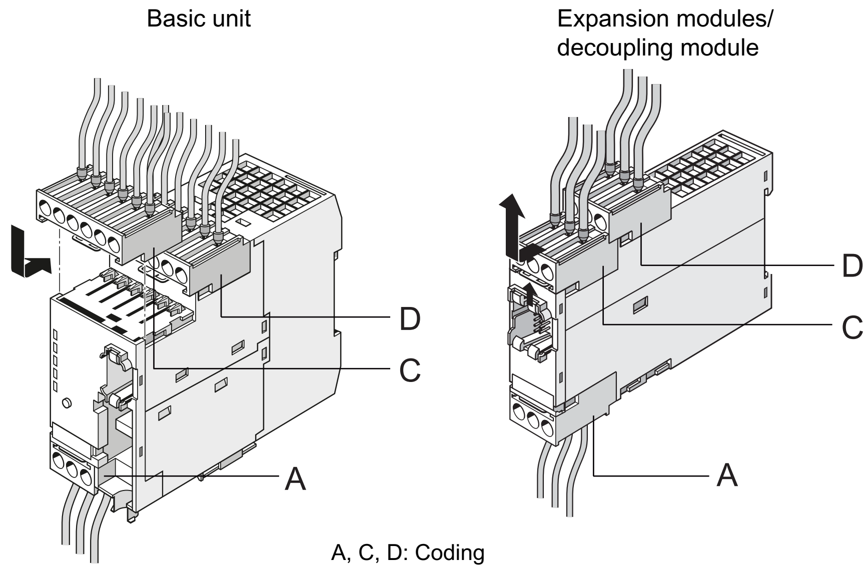


Figure 12-13 Removable terminals for SIMOCODE pro V PN / pro V EIP basic units, expansion modules and decoupling module

Cables

The conductor cross sections are the same for all devices. The following table shows conductor cross sections, stripped lengths, and tightening torques of the cables for the removable terminals:

Table 12-3 Conductor cross sections, stripped lengths, and tightening torques of the cables for the basic units SIMOCODE pro C and pro V

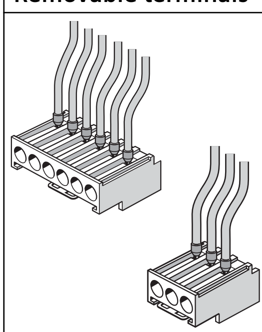
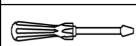
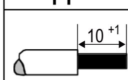
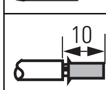
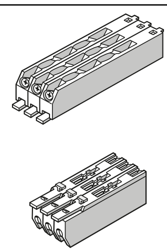
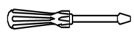
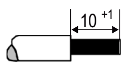
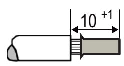
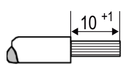
Removable terminals	**Screwdriver**		**Tightening torque**
		PZ2 / Ø 5 to 6 mm	TORQUE: 7 to 10.3 lb.in 0.8 to 1.2 Nm
	Stripped lengths		**Conductor cross section**
		Solid	2x 0.5 to 2.5 mm² / 1x 0.5 to 4 mm² 2x AWG 20 to 14 / 1x AWG 20 to 12
		Finely stranded with / without end sleeve	2x 0.5 to 1.5 mm² / 1x 0.5 to 2.5 mm² 2x AWG 20 to 16 / 1x AWG 20 to 14

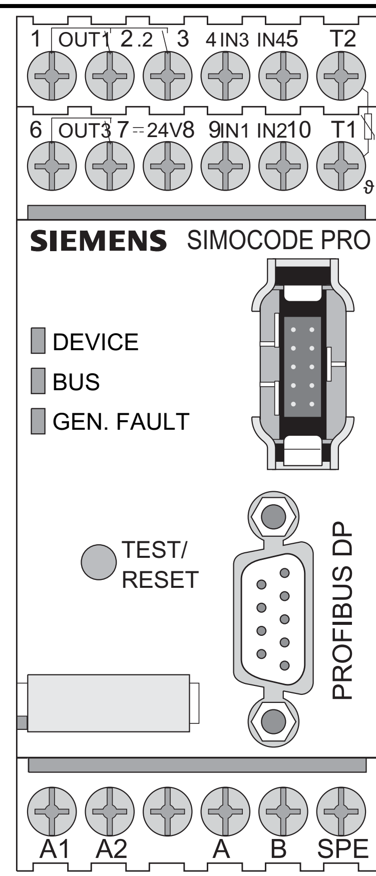
Table 12-4 Conductor cross sections, stripped lengths, and tightening torques of the cables for the basic unit SIMOCODE pro S

Removable terminals	Screwdriver		Tightening torque
		PZ1 / Ø 4.5 mm	TORQUE: 5.2 to 7.0 lb.in 0.6 to 0.8 Nm
	Stripped lengths		**Conductor cross section**
		Solid	2x 0.5 to 1.5 mm² / 1x 0.5 to 2.5 mm² 2x AWG 20 to 16 / 1x AWG 20 to 14
		Finely stranded with end sleeve	2x 0.5 to 1.0 mm² / 1x 0.5 to 2.5 mm²
		Finely stranded without end sleeve	-
	PROFIBUS		2x 0.34 mm² / 1x 0.34 mm²

Pin assignment of SIMOCODE pro C / pro V PB / pro V MR basic units

The following table show the assignment of the removable terminals of the SIMOCODE pro C/ pro V PB basic units:

Terminal	Assignment	
Upper terminals		
1	Common potential for relay outputs 1 and 2	
2	Relay output OUT1	
3	Relay output OUT2	
4	Digital input IN3	
5	Digital input IN4	
T2	Thermistor connection (binary PTC)	
6	Relay output OUT3	
7	Relay output OUT3	
8	24 V DC only for IN1 to IN4	
9	Digital input IN1	
10	Digital input IN2	
T1	Thermistor connection (binary PTC)	
Lower terminals		
A1	Supply voltage terminal 1	
A2	Supply voltage terminal 2	
A	Bus-type connection A	
B	Bus-type connection B	
SPE [1]	System shielding	



1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

A1 / A2: Supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

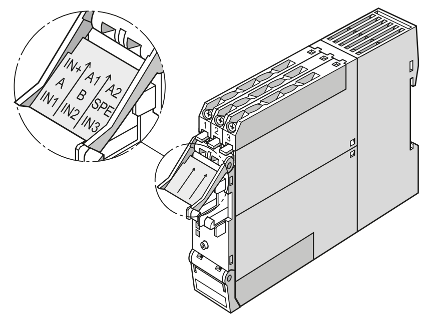
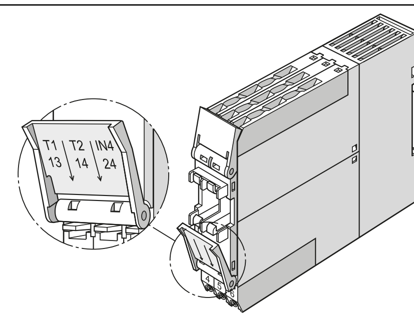
No additional measures are required for short-circuit protection.

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Assignment of the removable terminals, SIMOCODE pro S basic units

The following table shows the assignment of the removable terminals of the SIMOCODE pro S basic unit:

Terminal	Assignment	
Upper terminals		
IN+	24 V DC only for IN1 to IN4	
A1	Supply voltage terminal 1	
A2	Supply voltage terminal 2	
A	PROFIBUS DP terminal A	
B	PROFIBUS DP terminal B	
SPE [1)]	System shielding	
IN1	Digital input IN1	
IN2	Digital input IN2	
IN3	Digital input IN3	
Lower terminals		
T1	Thermistor connection 1 (binary PTC)	
T2	Thermistor connection 2 (binary PTC)	
IN4	Digital input IN4	
13	Common potential for relay outputs 1 and 2	
14	Relay output OUT1	
24	Relay output OUT2	

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

A1 / A2: Supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

No additional measures are required for short-circuit protection.

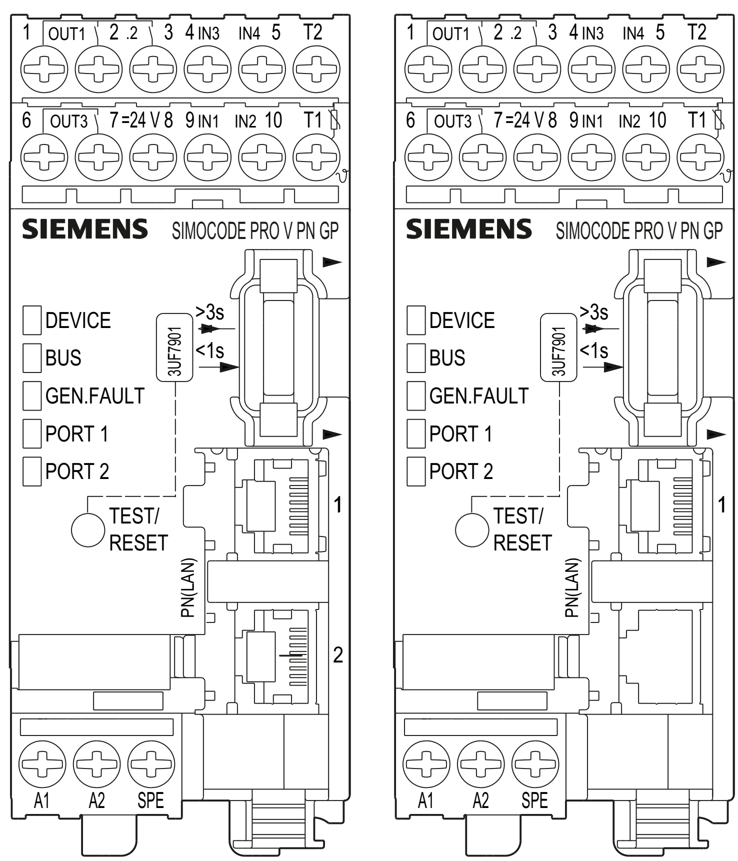
Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Pin assignment for SIMOCODE pro V PN GP basic unit

The following table shows the pin assignment of the removable terminals:

Terminal	Assignment
Upper terminals	
1	Common potential for relay outputs 1 and 2
2	Relay output OUT1
3	Relay output OUT2
4	Digital input IN3
5	Digital input IN4
T2	Thermistor connection (binary PTC)
6	Relay output OUT3
7	Relay output OUT3
8	24 V DC only for IN1 to IN4
9	Digital input IN1
10	Digital input IN2
T1	Thermistor connection (binary PTC)
Lower terminals	
A1	Supply voltage terminal 1
A2	Supply voltage terminal 2
PORT 1	PROFINET connection 1
PORT 2 [1)]	PROFINET connection 2
SPE [2))]	System shielding



1) Not available for SIMOCODE pro V PN GP 3UF7011-1AB00-2 and 3UF7011-1AU00-2 basic units

2)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

A1 / A2 supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

No additional measures are required for short-circuit protection.

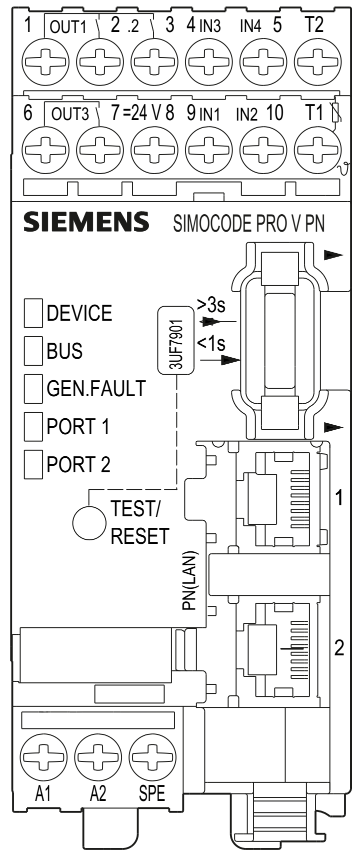
Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Pin assignment for SIMOCODE pro V PN / EIP basic units

The following table shows the pin assignment of the removable terminals:

Terminal	Assignment
Upper terminals	
1	Common potential for relay outputs 1 and 2
2	Relay output OUT1
3	Relay output OUT2
4	Digital input IN3
5	Digital input IN4
T2	Thermistor connection (binary PTC)
6	Relay output OUT3
7	Relay output OUT3
8	24 V DC only for IN1 to IN4
9	Digital input IN1
10	Digital input IN2
T1	Thermistor connection (binary PTC)
Lower terminals	
A1	Supply voltage terminal 1
A2	Supply voltage terminal 2
PORT 1	PROFINET / EIP connection 1
PORT 2	PROFINET / EIP connection 2
SPE [1]	System shielding



1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

A1 / A2: Supply voltage:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

IN1 / IN2 / IN3 / IN4 / 24 V=: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V=.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / T2: Thermistor input:

No additional measures are required for short-circuit protection.

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Power supply to the inputs of the basic unit

There are three possibilities for powering the inputs:

a): 24 V DC internal

b): 24 V DC external. Input 1 or 3 is the reference potential, i.e. three inputs are available.

c): 24 V DC external. **Only possible for a basic unit with 24 V DC supply voltage!**

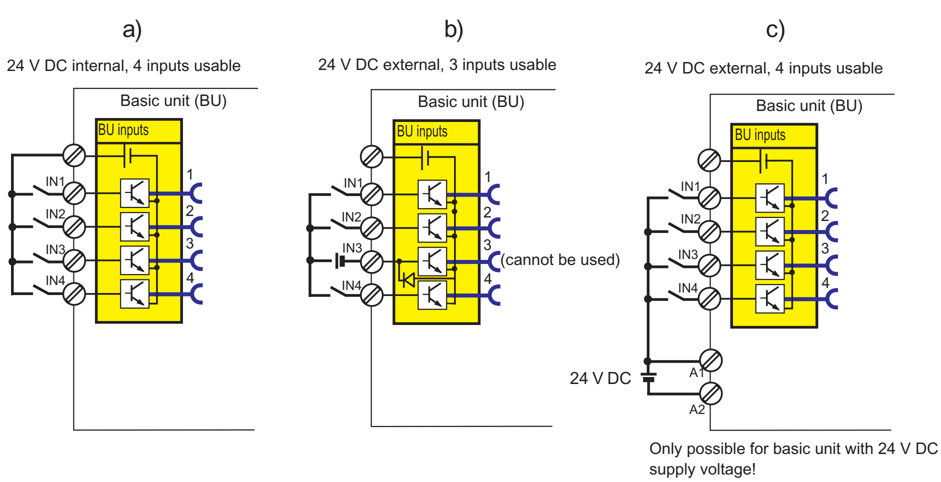


Figure 12-14 24 V DC to supply the inputs and SIMOCODE pro C / pro V PB / pro V MB RTU / pro S basic units

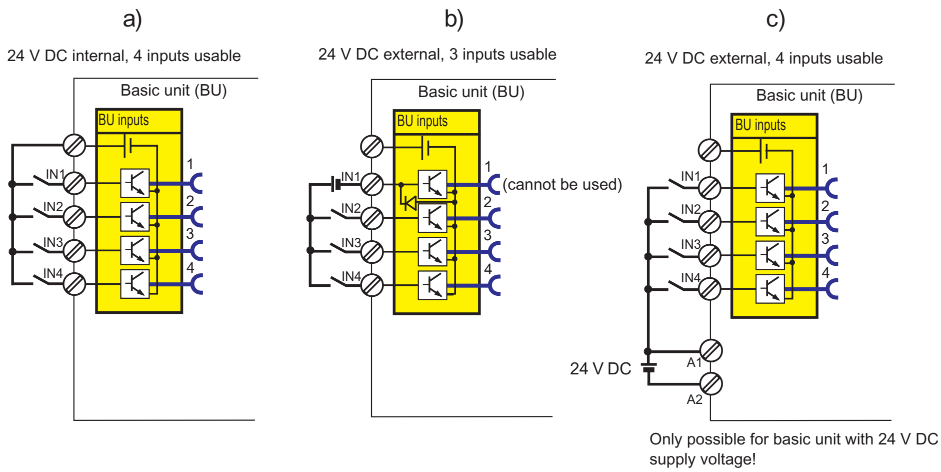


Figure 12-15 24 V DC to supply the inputs, SIMOCODE pro V PN / pro V EIP / pro V PN GP basic units

All inputs work reaction-free, i.e. the signal statuses on neighboring inputs do not influence each other.

Wiring sequence of the removable terminal of the SIMOCODE pro C/V basic units

Proceed as follows:

Step	Description
1	Connect the cables to the upper and lower terminals.
2	If you wish to use the A/B terminals for PROFIBUS DP, connect the PROFIBUS DP cable shield to the SPE / PE terminal.
3	Connect the equipment shield to the SPE [1] terminal.

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Note

The A / B terminals are an alternative to the 9-way SUB-D connection! Baud rates of up to 1.5 Mbit / s [1] are possible.

Note

1) Baud rates > 1.5 Mbit / s

At baud rates > 1.5 Mbit / s, the "Bus" fault is generated and the "Bus" LED lights up.

Wiring sequence of the PROFIBUS cable for SIMOCODE pro S basic units

Proceed as follows:

Step	Description
1	Insulate the PROFIBUS cable as shown below.
2	Screw the SPE cable to the bus terminal as shown below.
3	Connect the PROFIBUS cables A and B and the SPE cable to terminals A, B, and SPE [1)] as shown below.

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

CAUTION

SPE connection

Connect the SPE cable to the SPE terminal or alternatively to the bus connection terminal with a ring cable lug.

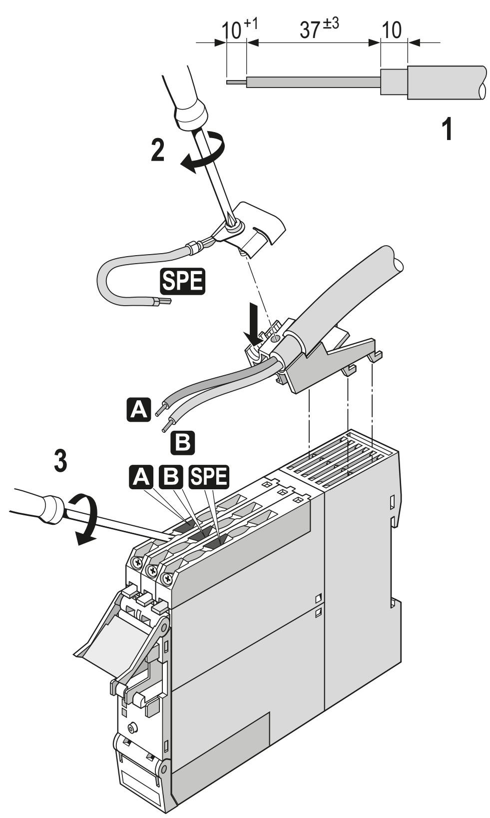


Figure 12-16 Wiring sequence of the PROFIBUS cable for SIMOCODE pro S basic units

Sequence for wiring the removable terminals for SIMOCODE pro V PN / pro V EIP / pro V PN GP basic units

Proceed as follows:

Step	Description
1	Connect the cables to the upper and lower terminals.
2	Connect the equipment shield to the SPE [1)] terminal.

DANGER

Hazardous voltage. Can cause death or serious injury

To ensure touch protection and degree of protection IP20 for SIMOCODE pro S, screw in all screws which are not used for conductor clamping and close the terminal covers.

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Connection examples SIMOCODE pro C / pro V PB / pro V MR / pro S basic unit

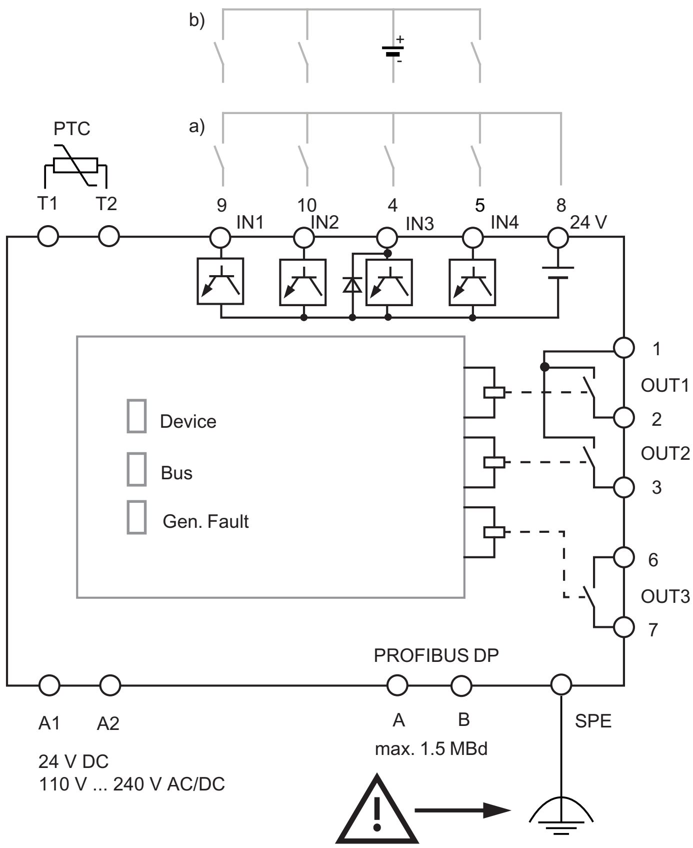


Figure 12-17 Connection example SIMOCODE pro C / pro V PB / pro V MR basic units

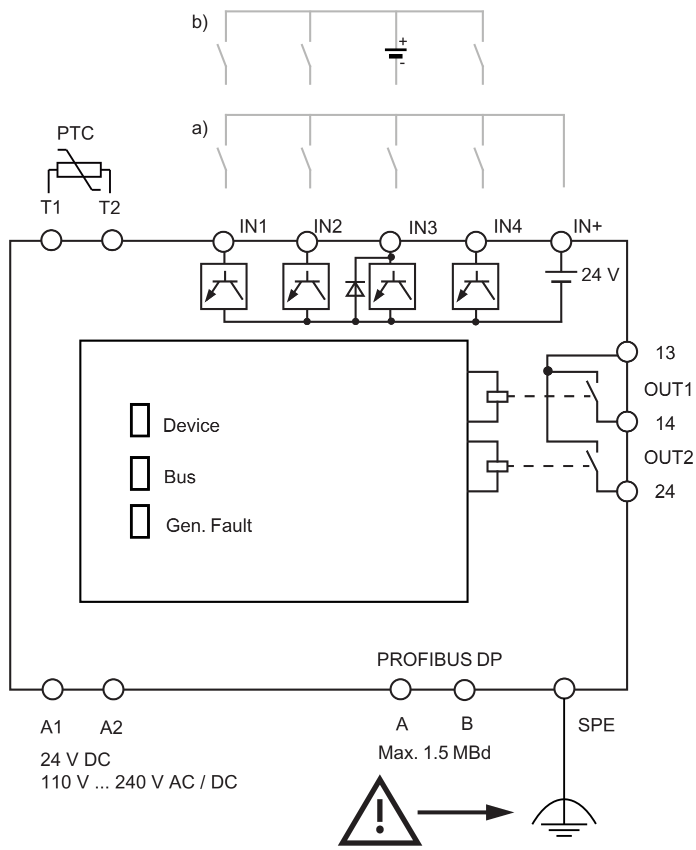


Figure 12-18 Connection example SIMOCODE pro S basic unit

Note

Only three inputs can be used

With an external 24 V DC supply, only three inputs can be used (see section "Power supply to the inputs of the basic unit" above).

Note

Baud rates PROFIBUS DP

Baud rates up to 1.5 Mbits are possible via bus terminals A/B.

Connection examples for SIMOCODE pro V PN / pro V EIP basic units

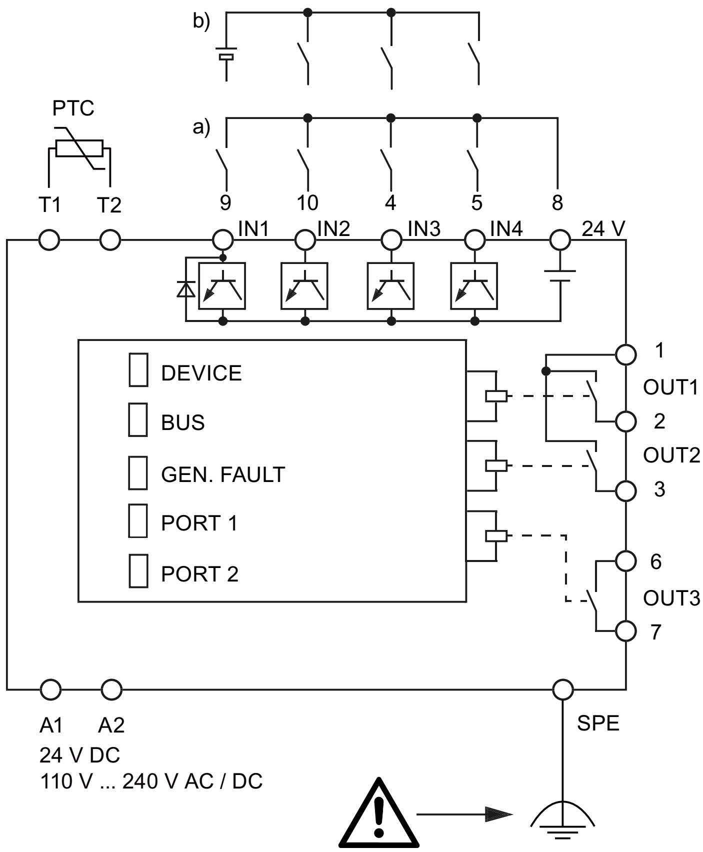
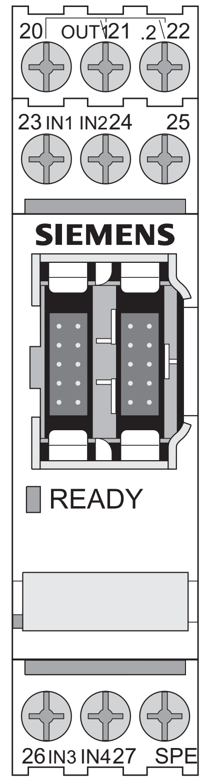


Figure 12-19 Connection examples for SIMOCODE pro V PN / pro V EIP basic units

Terminal assignment of the digital module

The following table shows the assignment of the removable terminals:

Terminal	Assignment
Upper terminals	
20	Common potential for relay outputs 1 and 2
21	Relay output OUT1
22	Relay output OUT2
23	Digital input IN1
24	Digital input IN2
25	N/M for IN1 to IN4
Lower terminals	
26	Digital input IN3
27	Digital input IN4
SPE [1)]	System shielding



1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

IN1 / IN2 / IN3 / IN4 / N/M: Digital inputs:

No additional measures are required for short-circuit protection when using the internal 24 V.

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Power supply to the digital module inputs

There are two possibilities for powering the inputs:

a) Digital module with 24 V DC input supply

b) Digital module with 110 to 240 V AC/DC input supply

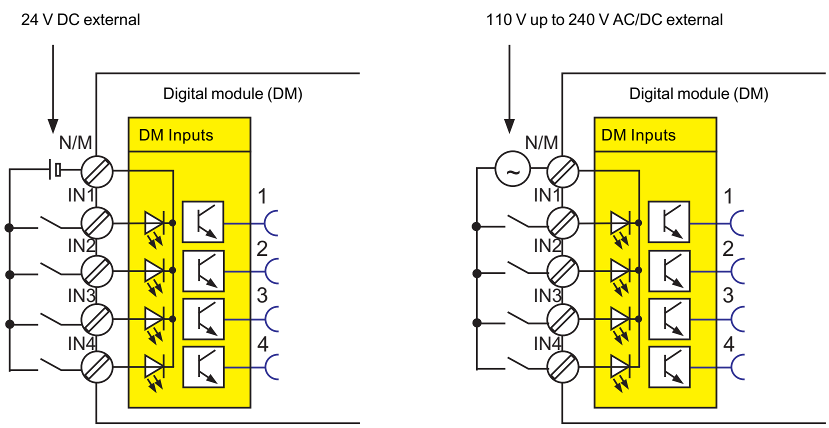


Figure 12-20 Power supply to the digital module inputs

Digital module connection example

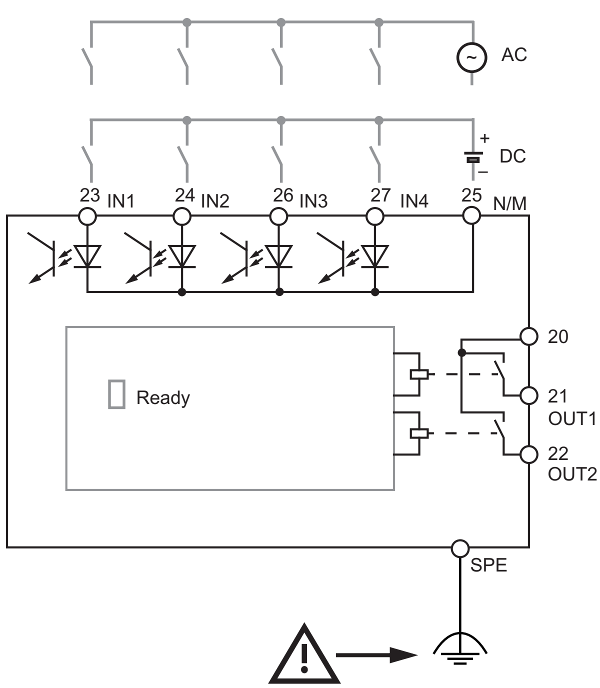
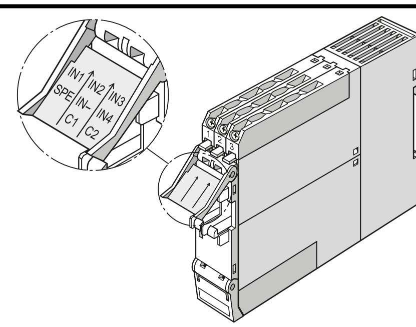
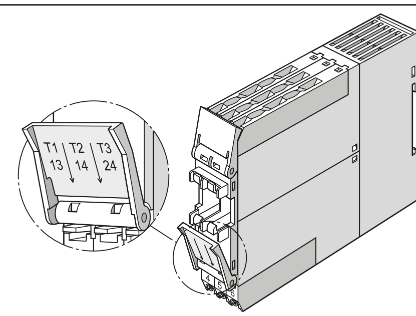


Figure 12-21 Digital module connection example

Terminal assignment of the multifunction module

Terminal	Assignment	
Upper terminals		
IN1	Digital input IN1	
IN2	Digital input IN2	
IN3	Digital input IN3	
SPE [1)]	System shielding	
IN-	Ground for IN1 to IN4	
IN4	Digital input IN4	
C1	Terminal 1, 3UL23 residual current transformer	
C2	Terminal 2, 3UL23 residual current transformer	
Lower terminals		
T1	Input T1, temperature sensor	
T2	Input T2, temperature sensor	
T3	Input T3, temperature sensor	
13	Common potential for relay outputs 1 and 2	
14	Relay output OUT1	
24	Relay output OUT2	

DANGER

Hazardous voltage. Can cause death or serious injury

To ensure touch protection and degree of protection IP20 for SIMOCODE pro S, screw in all screws which are not used for conductor clamping and close the terminal covers.

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

IN1 / IN2 / IN3 / IN4 / N/M: Digital inputs:

The technical data for protection when using an external power supply can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

T1 / 1T2 1T3: Temperature inputs:

No additional measures are required for short-circuit protection.

Out1 / Out2 / Out3: Relay outputs:

The technical data for protection can be found in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Connection example for multifunction module

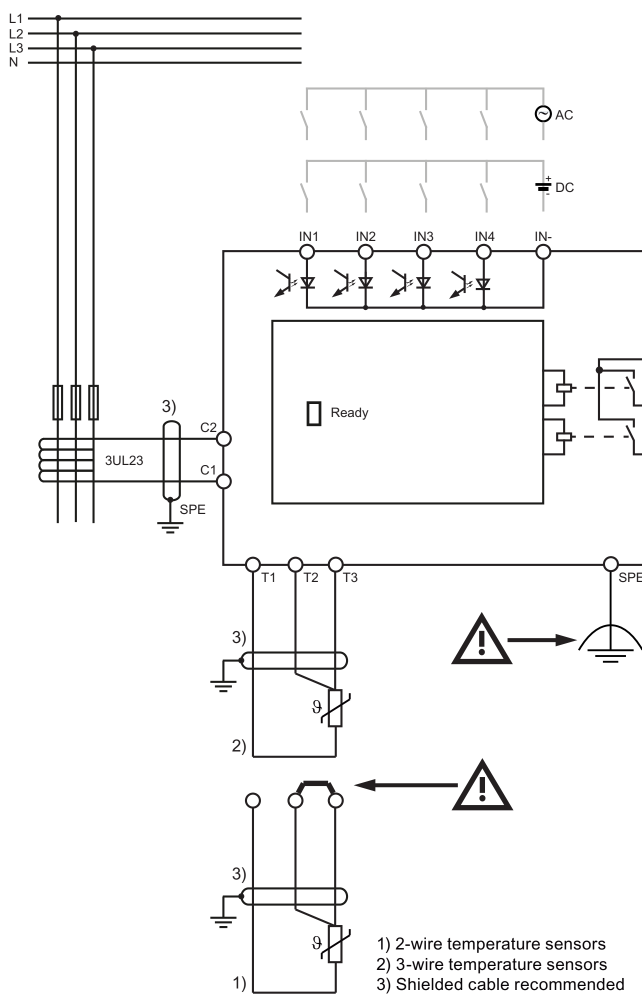


Figure 12-22 Connection example for multifunction module

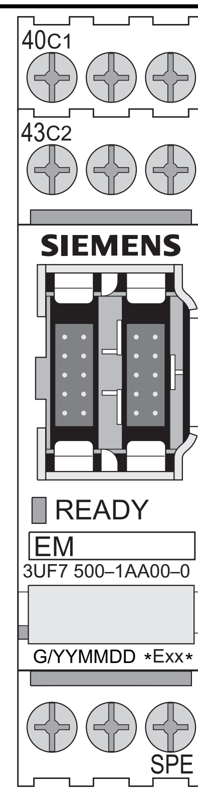
Safety information on installing the 3UL23 residual current transformer:

See Chapter 14.2.5 in the Manual 3UG4/3RR2 Monitoring Relay (https://support.industry.siemens.com/cs/ww/en/view/54397927).

NOTICE
Routing the connecting cables / using shielded cables
To avoid interference injection, which could result in incorrect measurements, route these connecting lines parallel and twisted, if possible, or use shielded cables.

Terminal assignment of the ground-fault module

The following table shows the assignment of the removable terminals:

Terminal	Assignment	
Upper terminals		
40	Input C1 residual current transformer	
43	Input C2 residual current transformer	
Lower terminals		
SPE [1)]	System shielding	

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

C1 / C2: Temperature inputs, residual current transformer:

No additional measures are required for short-circuit protection.

NOTICE
Types of ground-fault module
The 3UF7 500-1AA00-0 ground-fault module requires the 3UL22 residual current transformer.
The 3UF7 510-1AA00-0 ground-fault module requires the 3UL23 residual current transformer.

Ground-fault module connection example

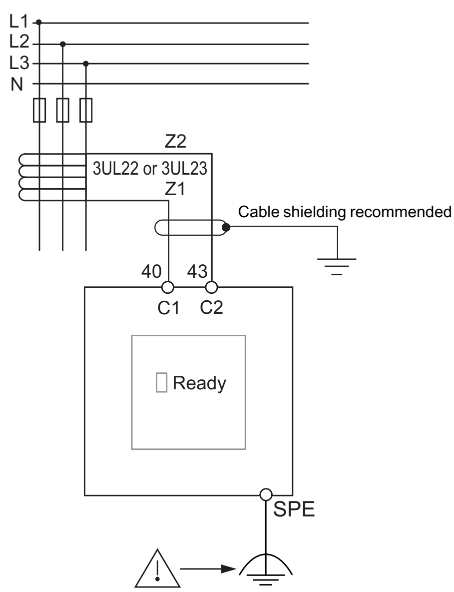


Figure 12-23 Ground-fault module connection example

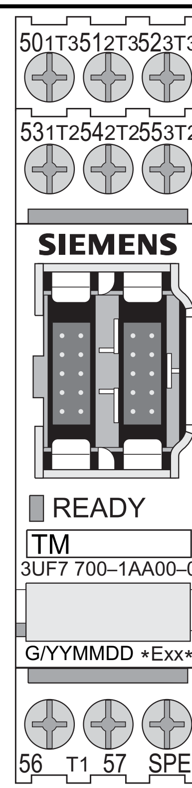
The output signal of the transformers 3UL22/3UL23 is connected to terminals C1 and C2 of the corresponding ground-fault module.

Information on installing the residual current transformer 3UL23: See Manual 3UG4/3RR2 Monitoring Relay (https://support.industry.siemens.com/cs/ww/en/view/54397927), Chapter 13.2.5.

NOTICE
Routing the connecting cables / using shielded cables
To avoid interference injection, which could result in incorrect measurements, route these connecting lines parallel and twisted, if possible, or use shielded cables.

Terminal assignment of the temperature module

The following table shows the assignment of the removable terminals:

Terminal	Assignment	
Upper terminals		
50	Input T3, temperature sensor 1	
51	Input T3, temperature sensor 2	
52	Input T3, temperature sensor 3	
53	Input T2, temperature sensor 1	
54	Input T2, temperature sensor 2	
55	Input T2, temperature sensor 3	
Lower terminals		
56	Input T1, temperature sensor 1 to 3	
57	Input T1, temperature sensor 1 to 3	
SPE [1)]	System shielding	

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

You can connect up to three 2-wire or 3-wire temperature sensors.

- 2-wire temperature sensors: Connect a jumper between the T2 terminals and T3 terminals.
- 3-wire temperature sensors: Assign terminals 56 and 57 twice when three sensors are used.

Notes on the protection of device connections

T1 / 1T2 / 2T2 / 3T2 / 1T3 / 2T3 / 3T3: Temperature inputs:

No additional measures are required for short-circuit protection.

Temperature module connection example

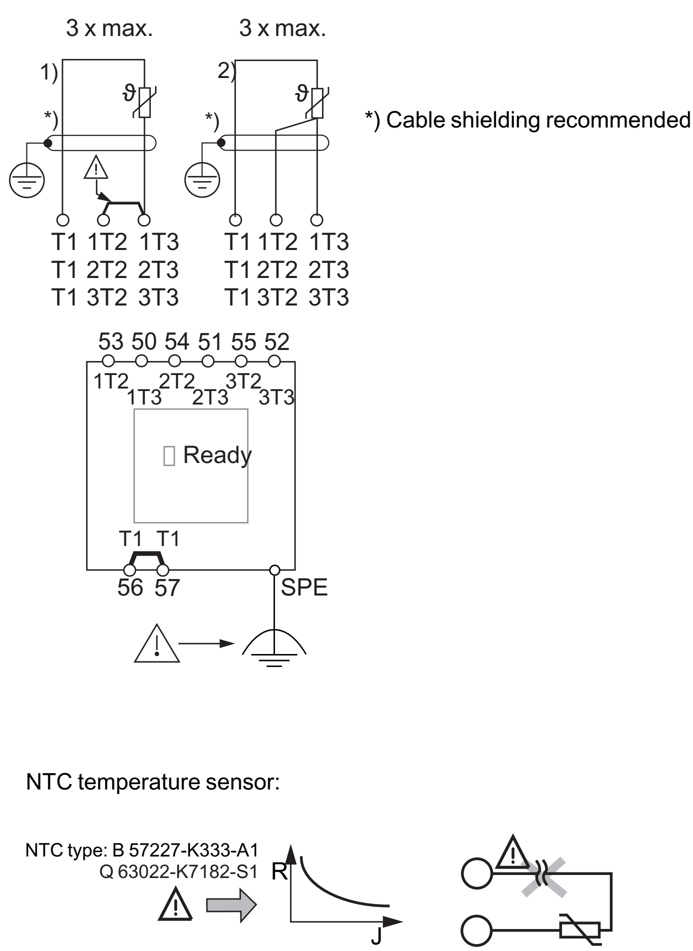
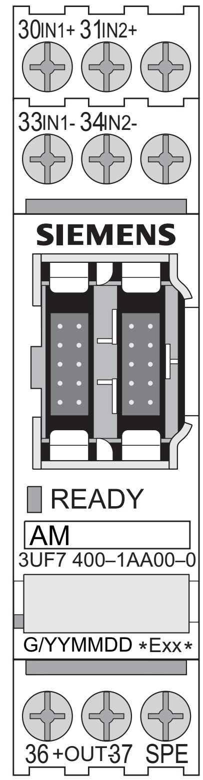


Figure 12-24 Temperature module connection example

Terminal assignment of the analog module

The following table shows the assignment of the removable terminals:

Terminal	Assignment	
Upper terminals		
30	Analog input IN1+	
31	Analog input IN2+	
33	Analog input IN1+	
34	Analog input IN2+	
Lower terminals		
36	Analog output OUT+	
37	Analog output OUT+	
SPE [1)]	System shielding	

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

IN1+ / IN1- / IN2+ / IN2-: Analog inputs:

No additional measures are required for short-circuit protection.

OUT+ / OUT-: Analog outputs:

No additional measures are required for short-circuit protection.

Analog module connection example

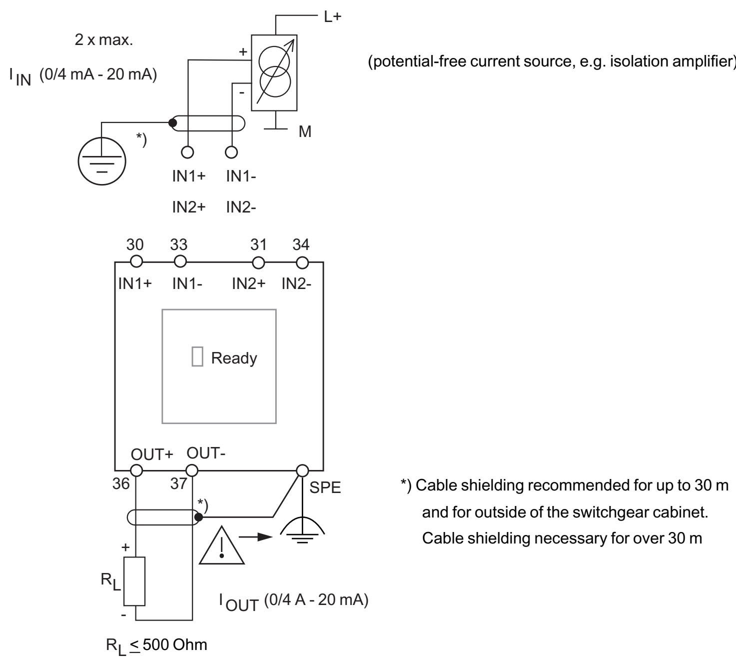
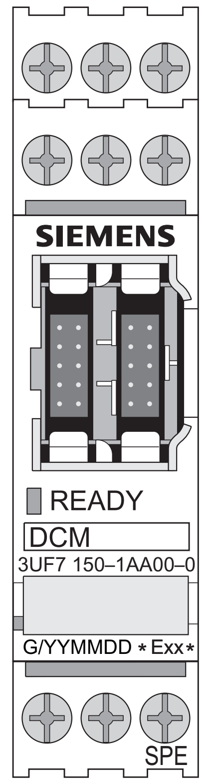


Figure 12-25 Analog module connection example

Terminal assignment of the decoupling module

The following table shows the assignment of the removable terminals:

Terminal	Assignment	
Upper terminals		
	—	
Lower terminals		
SPE [1)]	System shielding	

1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Decoupling module connection example

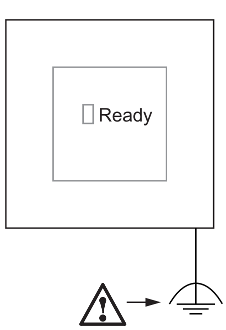


Figure 12-26 Decoupling module connection example

Wiring the removable terminals of the expansion modules and the decoupling module

Connect the equipment shield to the SPE terminal.

12.2.2 Wiring digital modules DM-F Local and DM-F PROFIsafe

Safety guidelines

See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852), Chapter "Mounting and connection."

⚠ WARNING
Loss of safety function is possible
For the 24 V DC power supply, always use an SELV or PELV power supply unit!

Note

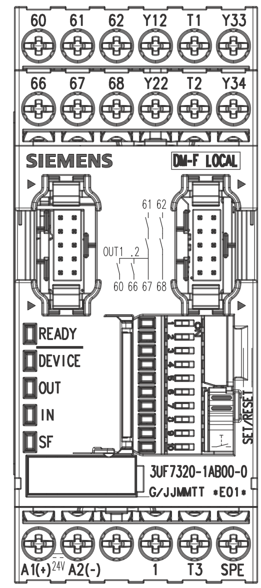
Surge suppressors are required for inductive loads.

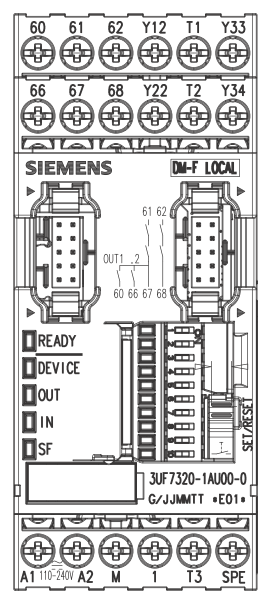
Terminal assignment for digital module DM-F Local

The following table shows the pin assignment of the removable terminals:

Table 12-5 Terminal assignment of the removable terminals of the digital module DM-F Local, 24 V DC version and 110 to 240 V UC version.

Terminal	Assignment
Upper terminals	
60, 66	Digital module, relay outputs 1 (60) and 2 (66)
61, 67	Relay enabling circuit 1, NO
62, 68	Relay enabling circuit 2, NO
Y12, Y22	Sensor input channel 1, channel 2
T1, T2	Supply for sensor inputs (24 V DC, pulsed)
Y33	Start button (start after rising and falling edge)
Y34	Feedback circuit
Lower terminals	
A1 (+)	Power supply connection 110 to 240 V AC/DC or +24 V DC
A2 (-)	N or -24 V
M	Ground (reference potential for sensor inputs, 3UF7320-1AU00-0 only)
1	Cascading input
T3	Supply for sensor inputs (24 V DC, static)
SPE [1]	System shielding





1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

A1 / A2: Supply voltage:

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Y12 / Y22 / Y33 / Y34: Sensor inputs:

Start, feedback circuit: No additional measures are required for short-circuit protection.

1: Cascading input:

No additional measures are required for short-circuit protection.

61 / 62 / 67 / 68: Enabling circuits

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

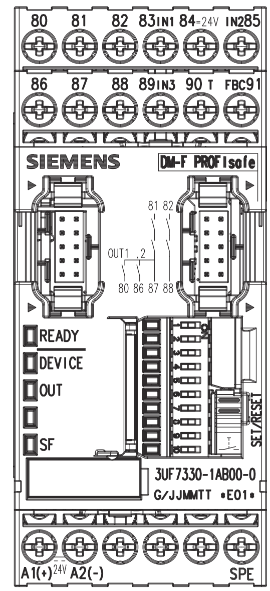
60 / 66: Relay outputs:

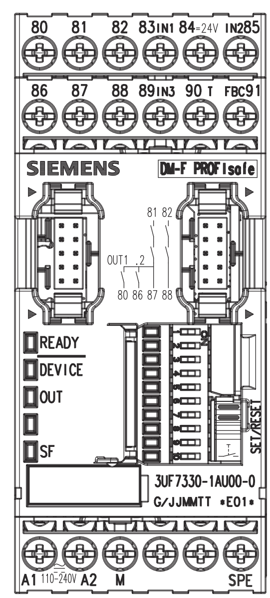
The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Terminal assignment for digital module DM-F PROFIsafe

Table 12-6 Terminal assignment of the removable terminals of the digital module DM-F PROFIsafe, 24 V DC version and 110 to 240 V UC version.

Terminal	Assignment
Upper terminals	
80, 86	Digital module, relay outputs 1 (80) and 2 (86)
81, 87	Relay enabling circuit 1, NO
82, 88	Relay enabling circuit 2, NO
83 (IN1) 85 (IN2) 89 (IN3)	Digital module, inputs 1, 2, 3
84	Power supply, diigital module, inputs 1 to 3, 24 V DC
90 (T)	Feedback circuit supply (FBC) 24 V DC
91 (FBC)	Feedback circuit
Lower terminals	
A1 (+)	Power supply connection 110 to 240 V AC/DC or +24 V DC
A2 (-)	N or -24 V
M	Ground (reference potential inputs, only 3UF7320-1AU00-0)
1	Cascading input
T3	Supply for sensor inputs (24 V DC, static)
SPE [1)]	System shielding





1)

Note

Connect SIMOCODE pro via terminal SPE with the maximum possible cross-section and with as short a cable as possible to the functional ground of the control cabinet, e.g. to the grounded mounting plate of the control cabinet.

Notes on the protection of device connections

A1 / A2: Supply voltage:

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

FBC: Feedback circuit:

No additional measures are required for short-circuit protection.

IN1 / IN2 / IN3: Digital inputs

No additional measures are required for short-circuit protection.

1: Cascading input:

No additional measures are required for short-circuit protection.

81 / 82 / 87 / 88: Enabling circuits

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

80 / 86: Relay outputs:

The technical data for protection can be found in the Siemens Industry Online Support: https://support.industry.siemens.com/cs/ww/en/ps/16337/td (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

Digital module DM-F Local connection example

DM-F Local with cross-circuit detection, 2 NCs, 2 channels, monitored start

WARNING

Fuse protection required!

Always install the prescribed fuse protection.

This ensures safe tripping in the event of a fault.

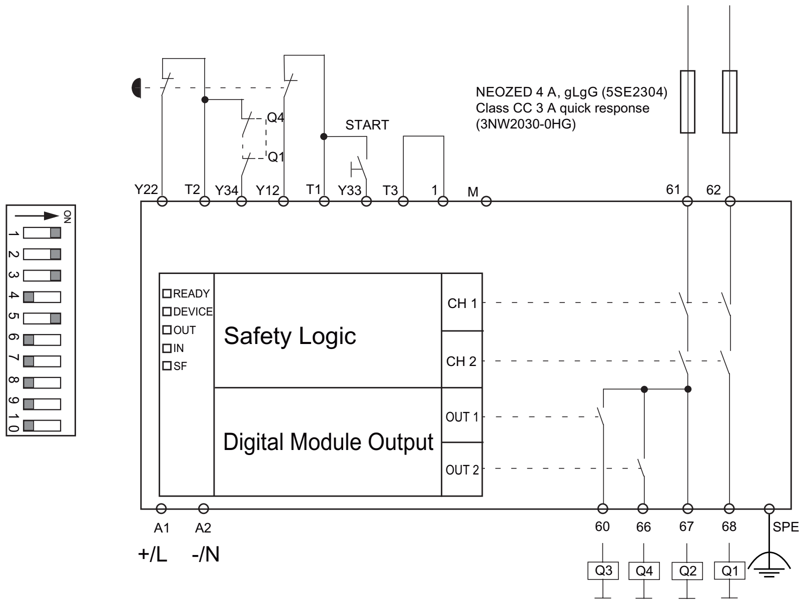


Figure 12-27 Connection example for "DM-F Local with cross-circuit detection, 2 NCs, 2 channels, monitored start"

For further connection examples: See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852).

Digital module DM-F PROFIsafe connection example

WARNING
Fuse protection required!
Always install the prescribed fuse protection.
This ensures safe tripping in the event of a fault.

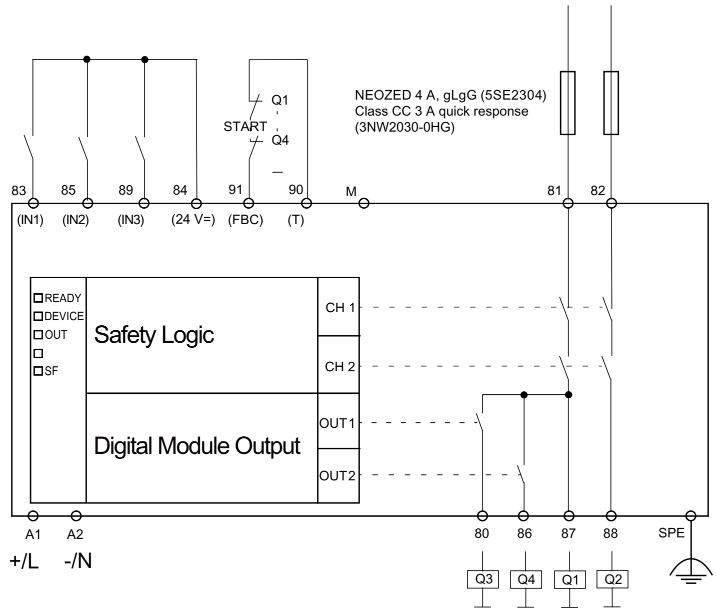


Figure 12-28 Block diagram of DM-F PROFIsafe

Connection examples fail-safe digital module DM-F

See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852).

12.2.3 Wiring of current measuring modules

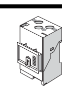
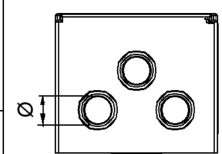
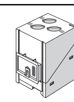
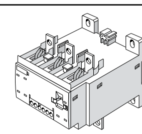
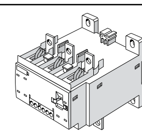
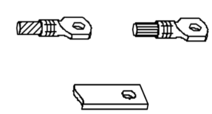
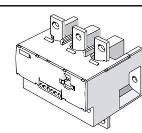
Selection

Select the appropriate current measuring module according to the motor current:

- Through-hole connection up to 200 A: The cables of the three phases are passed through the feed-through openings.
- Bus connection system from 20 A to 630 A, also for direct connection to Siemens contactors.

The following table shows the various current measuring modules:

Table 12-7 Current measuring modules

Current measuring module		Version
3UF7100-1AA00-0; 0.3 to 3 A Ø feed-through openings: 7.5 mm		Through-hole connection 
3UF7101-1AA00-0; 2.4 to 25 A Ø feed-through openings: 7.5 mm		
3UF7102-1AA00-0; 10 - 100 A Ø feed-through openings: 14 mm		
3UF7103-1AA00-0; 20 to- 200 A Ø feed-through openings: 25 mm		
3UF7103-1BA00-0; 20 to 200 A Conductor cross section: 16 to 95 mm², AWG 5 to 3/0		Bus connection system 
3UF7104-1BA00-0; 63 to 630 A Conductor cross section: 50 to 240 mm², AWG 1/0 to 500 kcmil		

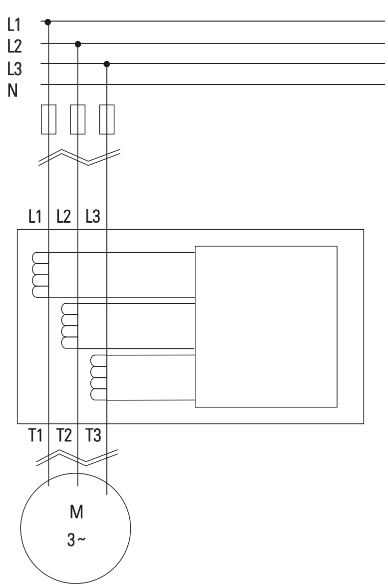


Figure 12-29 Main circuit connection

Note

When connecting or routing the cables of the individual phases of the main circuit, ensure correct assignment of the phases on the current measuring module and correct routing direction!

Please note the information in the Operating Instructions. You will also find the Operating Instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

12.2.4 Wiring of current / voltage measuring modules

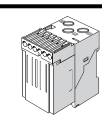
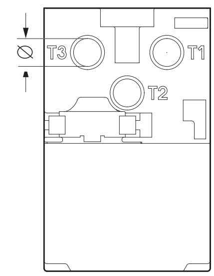
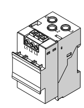
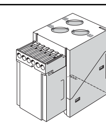
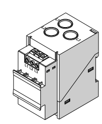
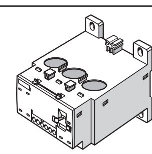
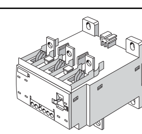
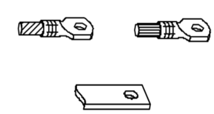
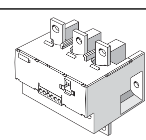
Selection

Select the appropriate current / voltage measuring module according to the motor current.

- Through-hole connection up to 200 A: The cables of the three phases are passed through the feed-through openings.
- Bus connection system from 20 A to 630 A, also for direct connection to Siemens contactors.

The following table shows the various current / voltage measuring modules:

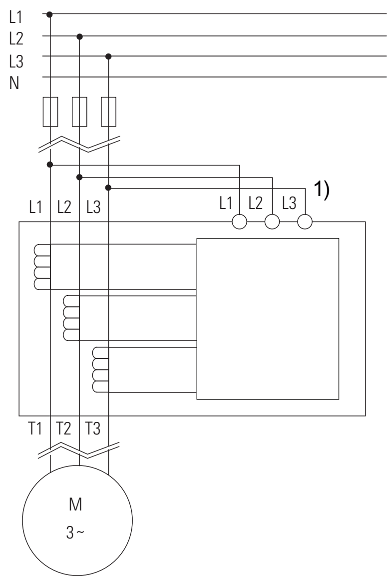
Table 12-8 Current / voltage measuring modules

1) Current / voltage measuring module UM **2) 2nd generation current / voltage measuring module UM+** **3) 2nd generation current / voltage measuring module UM+ for ATEX dry-running protection**		**Version**
1) 3UF7110-1AA00-0; 0.3 - 3 A 2) 3UF7110-1AA01-0; 0.3 - 4 A 3) 3UF7120-1AA01-0; 0.3 - 4 A Ø feed-through openings: 7.5 mm		Through-hole connection 
1) 3UF7111-1AA00-0; 2.4 - 25 A 2) 3UF7111-1AA01-0; 3 - 40 A 3) 3UF7121-1AA01-0; 3 - 40 A Ø feed-through openings: 7.5 mm		
1) 3UF7112-1AA00-0; 10 - 100 A 2) 3UF7112-1AA01-0; 10 - 115 A 3) 3UF7122-1AA01-0; 10 - 115 A Ø feed-through openings: 14 mm	 	
1) 3UF7113-1AA00-0; 20 - 200 A 2) 3UF7113-1AA01-0; 20 - 200 A 3) 3UF7123-1AA01-0; 20 - 200 A Ø feed-through openings: 25 mm		
1) 3UF7113-1BA00-0; 20 - 200 A 2) 3UF7113-1BA01-0; 20 - 200 A 3) 3UF7123-1BA01-0; 20 - 200 A Conductor cross section: 16 to 95 mm², AWG 5 to 3/0		Bus connection system 
1) 3UF7114-1BA00-0; 63 - 630 A 2) 3UF7114-1BA01-0; 63 - 630 A 3) 3UF7124-1BA01-0; 63 - 630 A Conductor cross section: 50 to 240 mm², AWG 1/0 to 500 kcmil		

Notes on the protection of device connections

L1 / L2 / L3: Voltage measurement:

Short-circuit proof wiring is recommended.



Safety guidelines

WARNING

1) Short-circuit proof wiring or line protection recommended

Note

Acquisition of the line supply voltage

A voltage tap between the circuit breaker or fuse and the contactor is recommended for acquisition of the line supply voltage.

Thus, when the motor is shut down, its operable state can be derived from the presence of the supply voltage.

Note

Measurement of voltage or power-related variables

Connect the main circuit L1, L2, L3 of a current / voltage measuring module to the clamps (L1, L2, L3) of the removable terminal with a 3-core cable. The supply cables may require additional cable protection, for example via short-circuit proof cable or fuses.

Note

When connecting or routing the cables of the individual phases of the main circuit, ensure correct assignment of the phases on the current / voltage measuring module and correct routing direction!

Please note the information in the Operating Instructions. You will also find the Operating Instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

Removable terminals

The following tables show conductor cross-sections, stripped lengths, tightening torques of conductors and pin assignments of the removable terminals of the current / voltage measuring modules:

Table 12-9 Conductor cross-sections, stripped lengths, tightening torques of conductors of the 2nd generation 45 mm and 55 mm current / voltage measuring modules

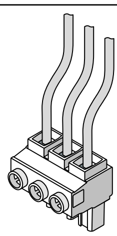
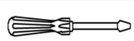
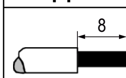
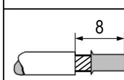
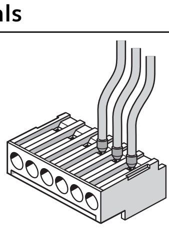
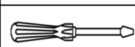
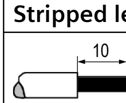
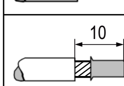
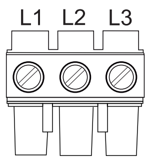
Removable terminals	**Screwdriver**		**Tightening torque**
		ISO 2380- A 0.6 x 3.5 (8WA2803)	TORQUE: 4.4 to 5.3 lb.in 0.5 to 0.6 Nm
	Stripped lengths		**Conductor cross section**
		Solid	1x 0.25 - 2.5 mm² / 1x AWG 24 to 14 2x 0.25 - 1 mm² / 2x AWG 24 to 18
		Finely stranded with end sleeve	

Table 12-10 Conductor cross-sections, stripped lengths, tightening torques of conductors of the 2nd generation 120 mm and 145 mm current / voltage measuring modules

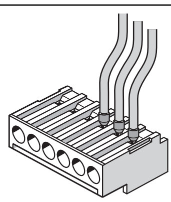
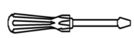
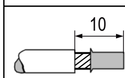
Removable terminals	**Screwdriver**		**Tightening torque**
		PZ 2 / Ø 5 ... 6 mm	TORQUE: 7 to 10.3 lb.in 0.8 ... 1.2 Nm
	Stripped lengths		**Conductor cross section**
		Solid	1x 0.5 - 4 mm² / 1x AWG 20 to 12 2x 0.5 - 2.5 mm² / 2x AWG 20 to 14
		Finely stranded with end sleeve	1x 0.5 - 2.5 mm² / 1x AWG 20 to 14 2x 0.5 - 1.5 mm² / 2x AWG 20 to 16

Pin assignments of the removable terminals of the 2nd generation current / voltage measuring modules

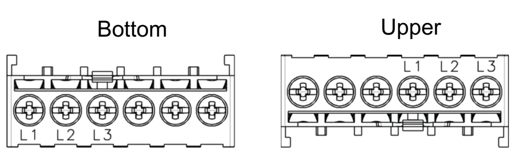


L1, L2, L3: Terminals for connecting the 3-wire cable of the main circuit

Table 12-11 Conductor cross-sections, stripped lengths, tightening torques of conductors of the 1st generation current / voltage measuring modules

Removable terminals	Screwdriver		Tightening torque
		PZ2 / Ø 5 to 6 mm	TORQUE: 7 to 10.3 lb.in 0.8 to 1.2 Nm
	Stripped lengths		**Conductor cross section**
		Solid	1x 0.5 - 4 mm² / 1x AWG 20 to 12 2x 0.5 - 2.5 mm² / 2x AWG 20 to 14
		Finely stranded with / without end sleeve	1x 0.5 - 2.5 mm² / 1x AWG 20 to 14 2x 0.5 - 1.5 mm² / 2x AWG 20 to 16

Pin assignments of the removable terminals of the 1st generation current / voltage measuring modules



L1, L2, L3: Terminals for connecting the 3-wire cable of the main circuit

12.2.5 Measuring current with an external current transformer (interposing transformer)

Functional principle

SIMOCODE pro can be operated with external current transformers. The secondary cables of the current transformer are looped through the three feed-through openings of the current measuring module, and short-circuited. The secondary current of the external current transformer is the primary current of the SIMOCODE pro current measuring module.

Note

If the main circuit is using rated current, the secondary current of the current transformer must be within the setting range of the current measuring module used!

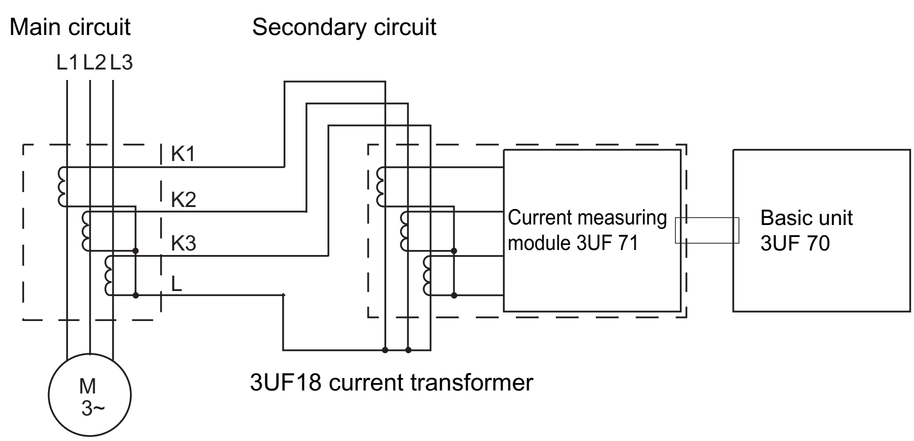


Figure 12-30 Measuring current with an external 3UF18 current transformer

Transformation ratio

The transformation ratio is calculated using the following formula:

$$\text{Transformation ratio} = \frac{\text{Primary current (external current transformer)}}{\underset{\text{(ext. current transformer)}}{\text{Secondary current}} \times \underset{\text{(current measuring module)}}{\text{number of loops n}}}$$

In the following examples, the displayed actual current flowing does not need to be converted, even when an interposing transformer is used, since SIMOCODE pro only outputs the proportional value, based upon the parameterized current setting I_s.

Requirements for an interposing current transformer

- Secondary current: 1 A
- Frequency: 50 Hz/60 Hz

- Transformer rating: Recommended ≥ 2.5 VA, depending on the secondary current and cable length
- Overcurrent factor: 5P10 or 10P10
- Accuracy class: 1

Example 1

- 3UF1868-3GA00 current transformer:
  - Primary current: 820 A at nominal load
  - Secondary current: 1 A
- SIMOCODE pro with 3UF7100-1AA00-0 current measuring module, current setting 0.3 A to 3 A. This means:
  - The secondary current of the current transformer is 1 A at rated load and is, therefore, within the 0.3 to 3 A setting range of the current measuring module used
  - The current setting I_s to be parameterized in SIMOCODE pro is 1 A.

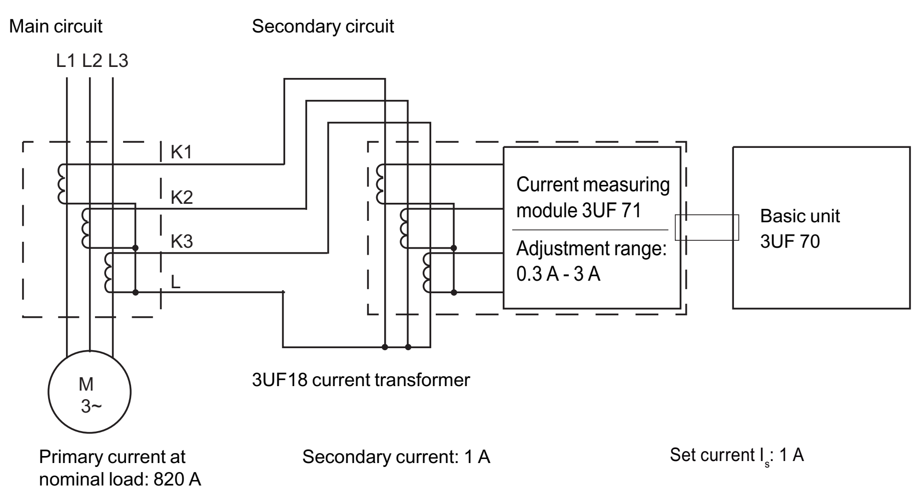


Figure 12-31 Example (1 of 2) for measuring current with an 3UF18 external current transformer

Example 2

- 3UF1868-3GA00 current transformer:
  - Primary current: 205 A at nominal load
  - Secondary current: 0.25 A
- SIMOCODE pro with 3UF7100-1AA00-0 current measuring module, current setting 0.3 to 3 A. This means:
  - The secondary current of the current transformer is 0.25 A at rated load and is, therefore, **not** within the 0.3 to 3 A setting range of the current measuring module used.
  - The secondary current must be boosted by multiple looping of the secondary cables through the feed-through openings of the current measuring module. Double-looping results in 2 x 0.25 A = 0.5 A.
  - The current setting I_s to be parameterized in SIMOCODE pro is 0.5 A.

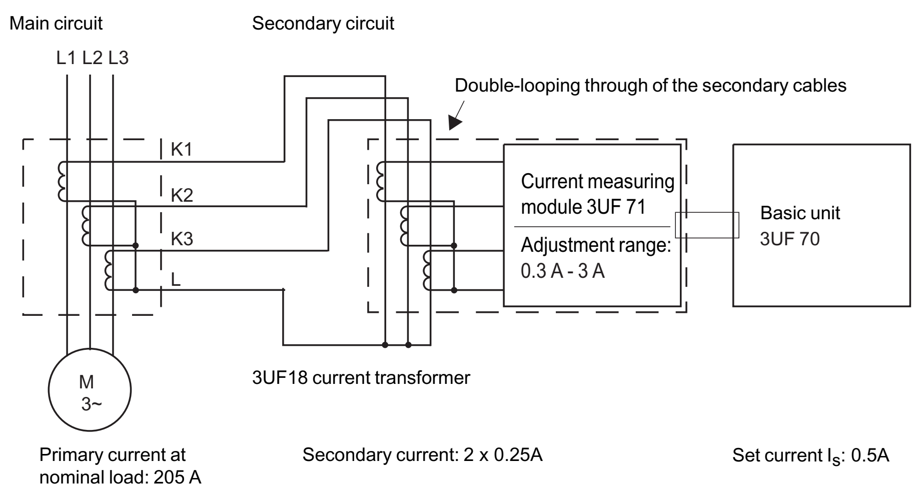


Figure 12-32 Example (2 of 2) for measuring current with an external 3UF18 current transformer

Note

If the SIMOCODE pro V PB basic unit as from version *E03* is used, the current setting does not have to be converted but is the same as the nominal primary current.

By additionally entering the transformation ratio of the current transformer (interposing transformer), conversion will be performed automatically in the device.

12.3 System interfaces

12.3.1 Information about the system interfaces

Information about the system interfaces

- SIMOCODE pro system components are connected to each other via the system interfaces. The system interfaces are provided on the front and bottom of the devices.
- Connecting cables of different lengths are available for connecting the system components.
- The PC cables, addressing plugs, and memory modules can be plugged directly into the system interface.
- The system is always configured according to the basic unit. Basic units have two system interfaces:
  - Bottom/left: For outgoing connecting cable to the current or current / voltage measuring module.
  - Front side: For outgoing connecting cables leading to an expansion module or operator panel, or for PC cables, memory modules or addressing plugs.
- Current measuring modules and current / voltage measuring modules have one system interface:
  - Bottom or front: For incoming connecting cable from the basic unit.
- Expansion modules have two interfaces on the front:
  - Left: For incoming connecting cables from the upstream expansion module or SIMOCODE pro S/SIMOCODE pro V basic unit.
  - Right: For outgoing connecting cables leading to an expansion module or operator panel, and for PC cables, memory modules or addressing plugs.
- Decoupling modules have 2 interfaces on the front:
  - Left: For incoming connecting cable from the upstream expansion module or basic unit.
  - Right: Exclusively for the outgoing connecting cable to the current / voltage measuring module.
- Operator panels have two system interfaces:
  - Front side: For PC cables, memory modules and addressing plugs.
  - Rear side: For incoming connecting cable from the upstream expansion module or basic unit.

⚠ WARNING
Hazardous voltage
Connect the system interfaces only when they are fully de-energized!

See also

Closing the system interfaces with the system interface cover (Page 225)

12.3.2 System interfaces on basic units, expansion modules, decoupling module, current measuring modules and current / voltage measuring modules

Examples of connection of system components to the system interface and system structure

Close system interfaces not in use with the system interface cover (see Closing the system interfaces with the system interface cover (Page 225).

⚠ WARNING
System interface on the operator panels (degree of protection IP54):
To ensure degree of protection IP 54 • press the cover into the socket as far as it will go when it is used for the first time! • When fastening the operator panel with the screws supplied, do not apply an excessive tightening torque.

The following figure shows an example for SIMOCODE pro C/V of connecting system components to the

system interfaces:

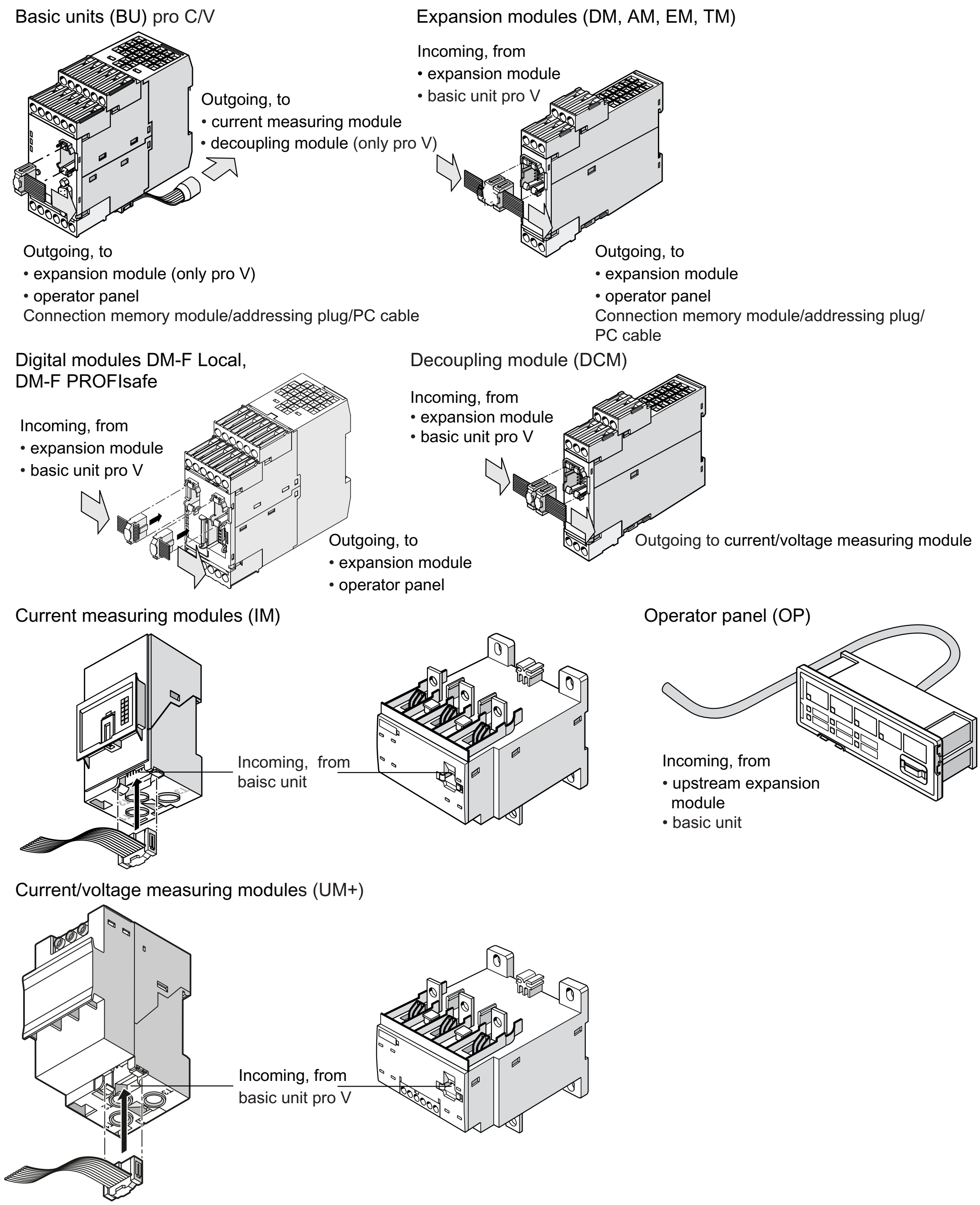


Figure 12-33 Example of system interfaces - SIMOCODE pro C/V with system component IM, UM+

The following figure shows an example for SIMOCODE pro S of connecting system components to the system interfaces:

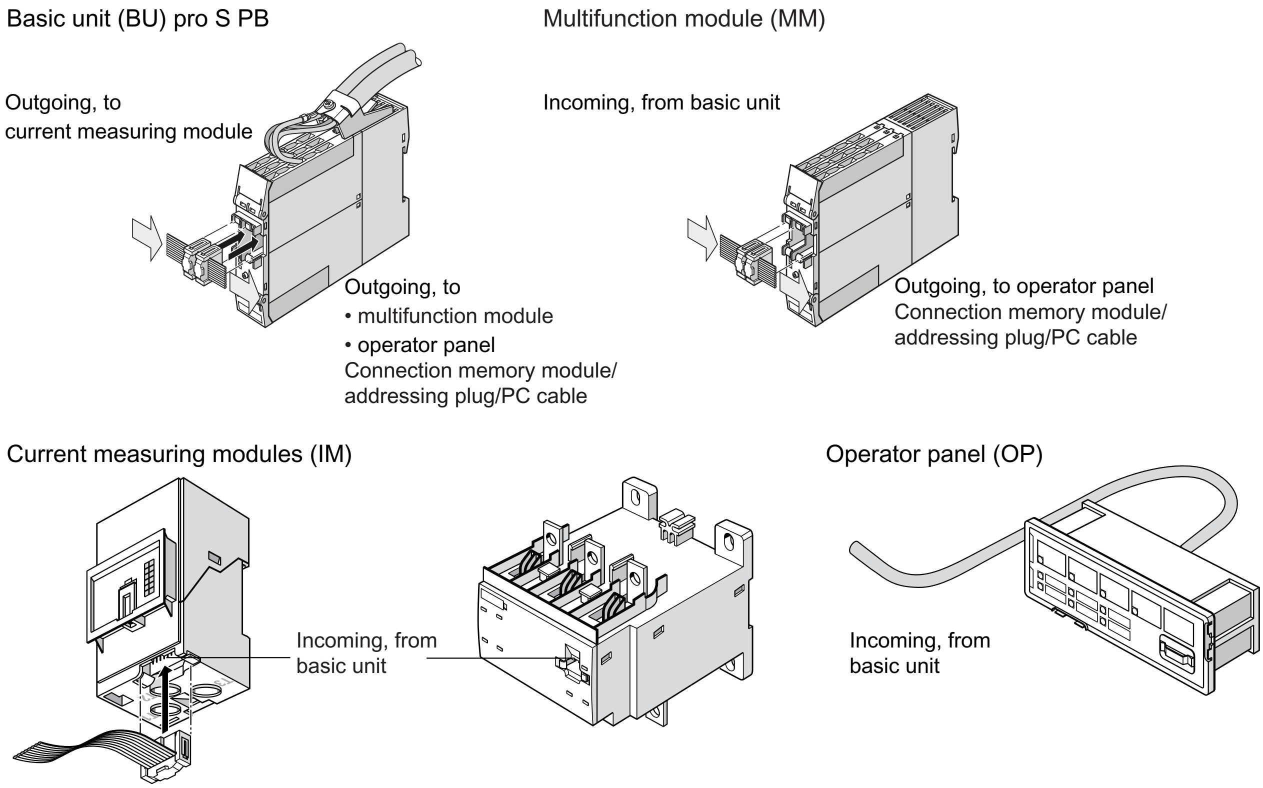


Figure 12-34 Example of system interface - SIMOCODE pro S

The following figure shows an example of a SIMOCODE pro V system installation:

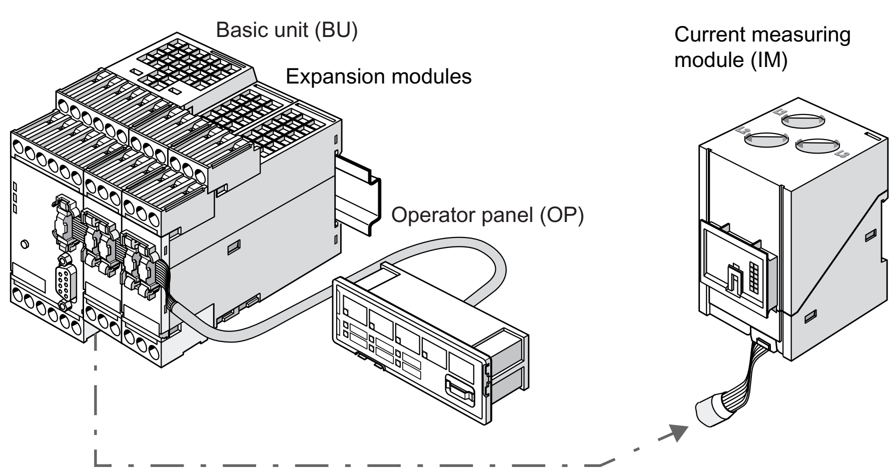


Figure 12-35 Example of SIMOCODE pro V installation

The following figure shows an example of a SIMOCODE pro S system installation:

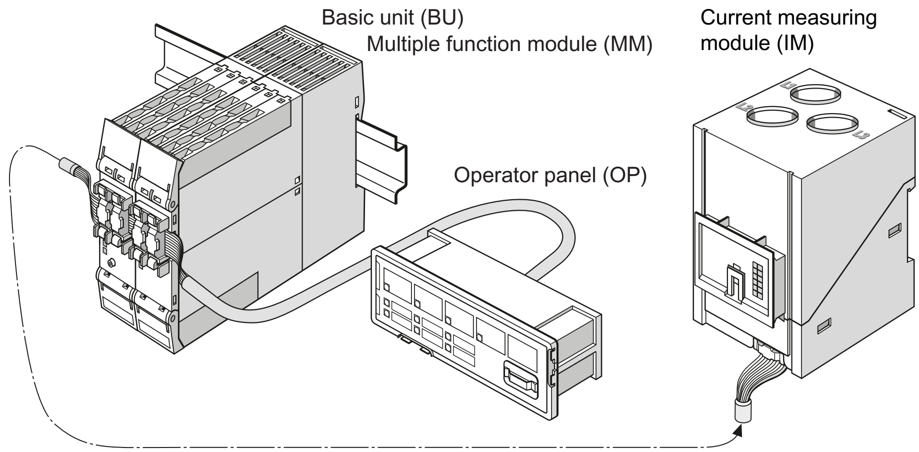


Figure 12-36 Example of SIMOCODE pro S installation

Sequence for connecting cables to the system interface

Proceed as follows:

Table 12-12 Connecting to the system interface

Step	Description
1	Place the plug in the plug shaft, keeping it is as straight as possible. Ensure the locking mechanisms of the connector slot audibly snap onto the connector enclosure.
2	System interfaces not in use can be closed using the system interface cover.

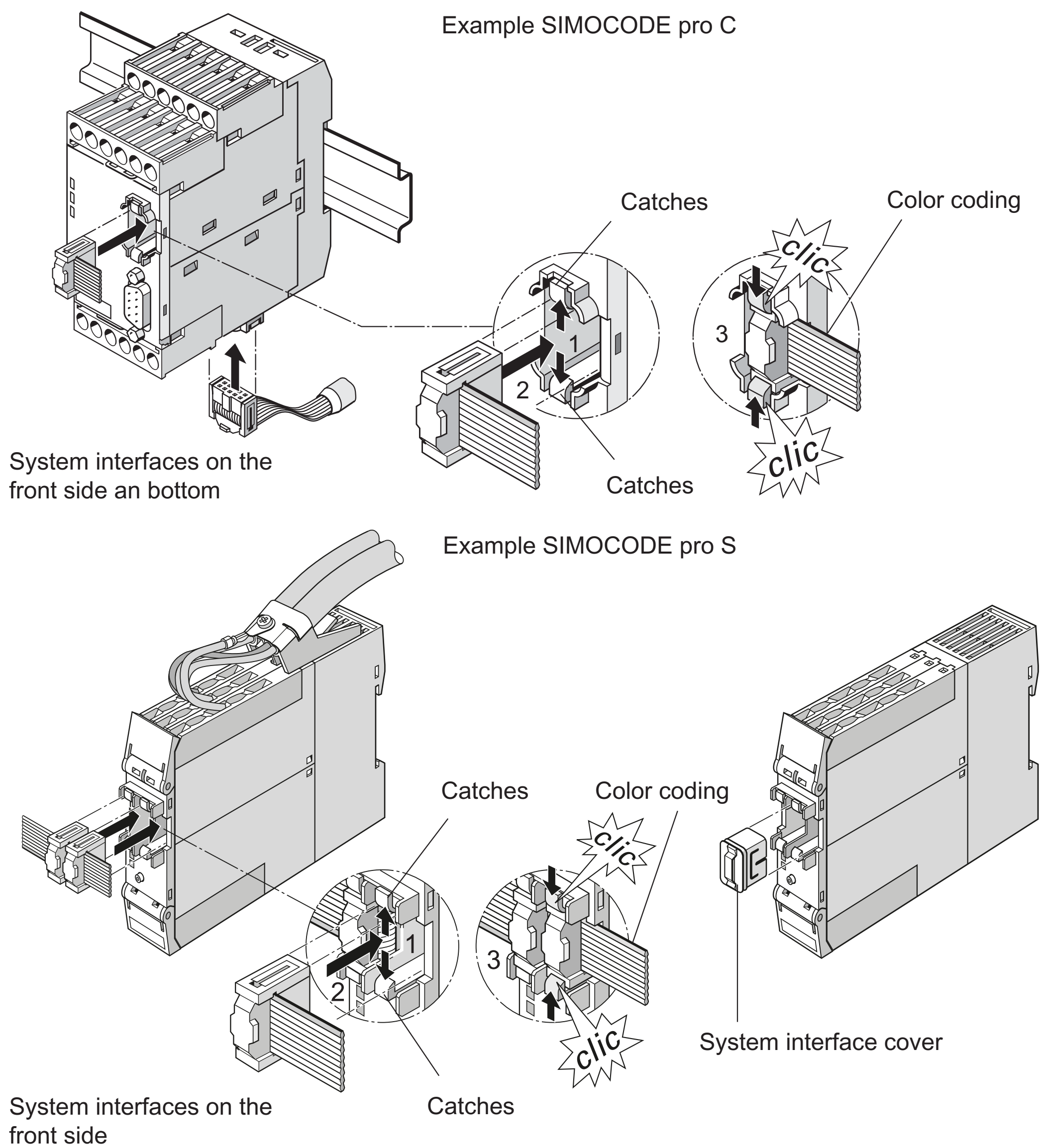


Figure 12-37 Sequence for connecting cables to the system interfaces

Safety guidelines

Note

Only a current / voltage measuring module may be connected to the right-hand system interface of the decoupling module. Memory modules, addressing plugs or PC cables will not be recognized there.

Note

Observe the color coding of the connecting cable (see diagram)!

12.3.3 System interfaces on the digital modules DM-F Local and DM-F PROFIsafe

See System Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852), Chapter "Mounting and connection."

12.3.4 System interfaces on the operator panel and the operator panel with display

Versions and safety notices

The operator panel has two system interfaces:

- Rear side system interface. This is not normally accessible on an integrated operator panel. The incoming cable from the basic unit or expansion module is always connected here.
- Front system interface. This is normally accessible on an integrated operator panel. Components are only connected directly when needed, and removed again after use. These can be:
  - Memory module
  - Addressing plug
  - PC cable for connecting a PC / PG
  - Cover (if the system interface is not in use).

WARNING

Hazardous voltage

Connect the system interfaces only when they are fully de-energized!

WARNING

System interface on the operator panels (degree of protection IP54):

To ensure degree of protection IP 54

- press the cover into the socket as far as it will go when it is used for the first time!
- When fastening the operator panel with the screws supplied, do not apply an excessive tightening torque.

Sequence for connecting cables to the system interface of the operator panel and the operator panel with display

Proceed as follows:

Table 12-13 Connecting system components to the system interface

Step	Description
1	Place the plug in the plug shaft, keeping it is as straight as possible. Ensure the locking mechanisms of the connector slot audibly snap onto the connector enclosure. The incoming connecting cable is connected on the rear.
2	System interfaces not in use can be closed using the system interface cover.

Note

Throughout connection, you can place the cover on one of the two "park positions" (see figure below).

Note

Observe the color coding of the connecting cable (see diagram)!

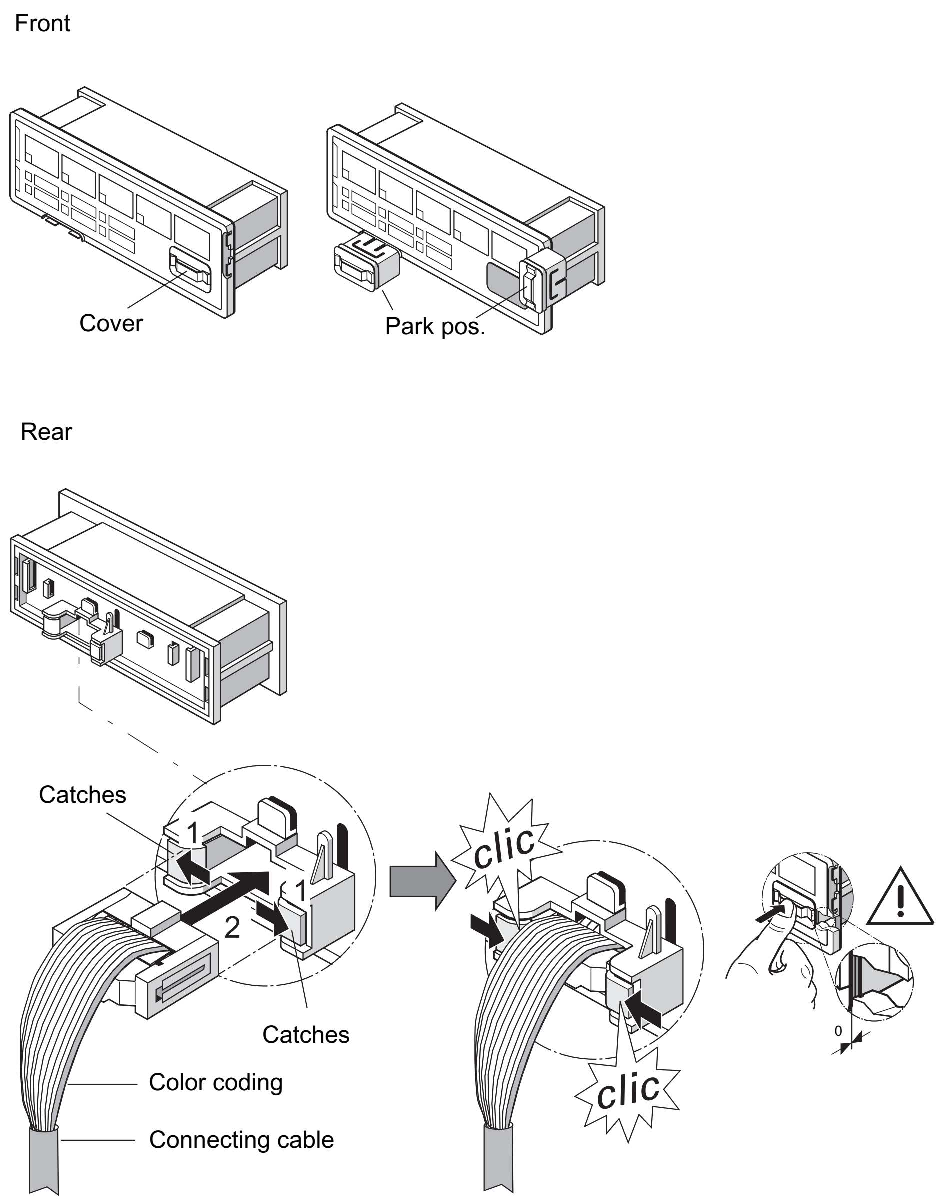


Figure 12-38 Sequence for connecting cables to the system interface of the operator panel

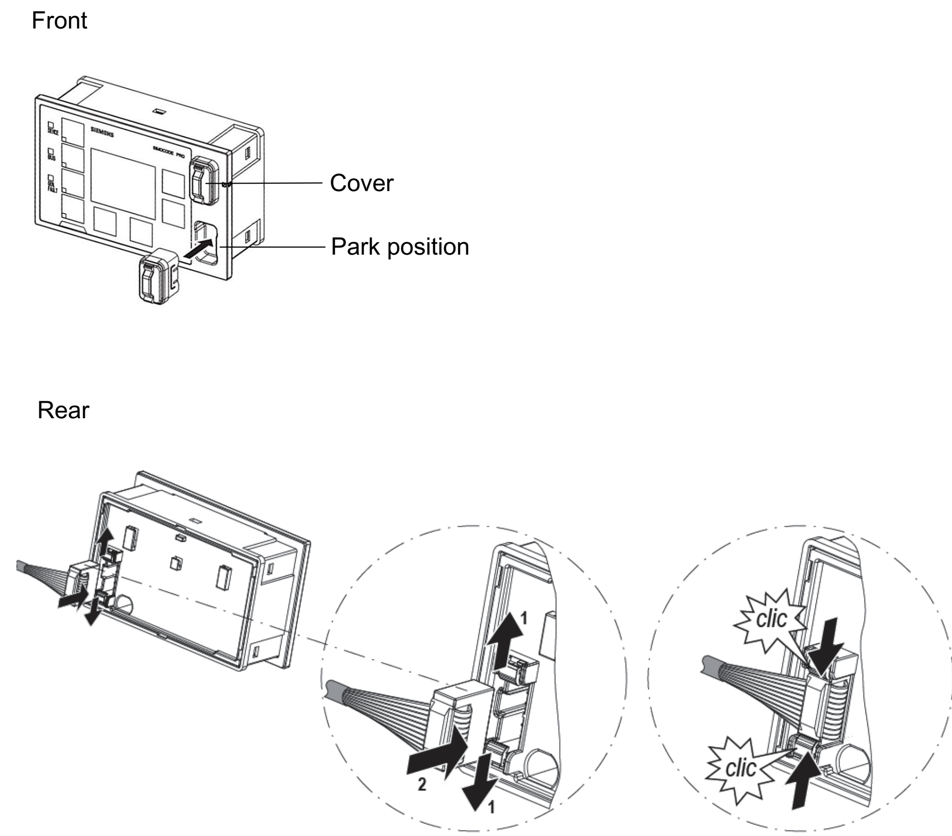


Figure 12-39 Sequence for connecting cables to the system interface of the operator panel with display

12.3.5 Closing the system interfaces with the system interface cover

Examples of closing the system interface with the system interface cover

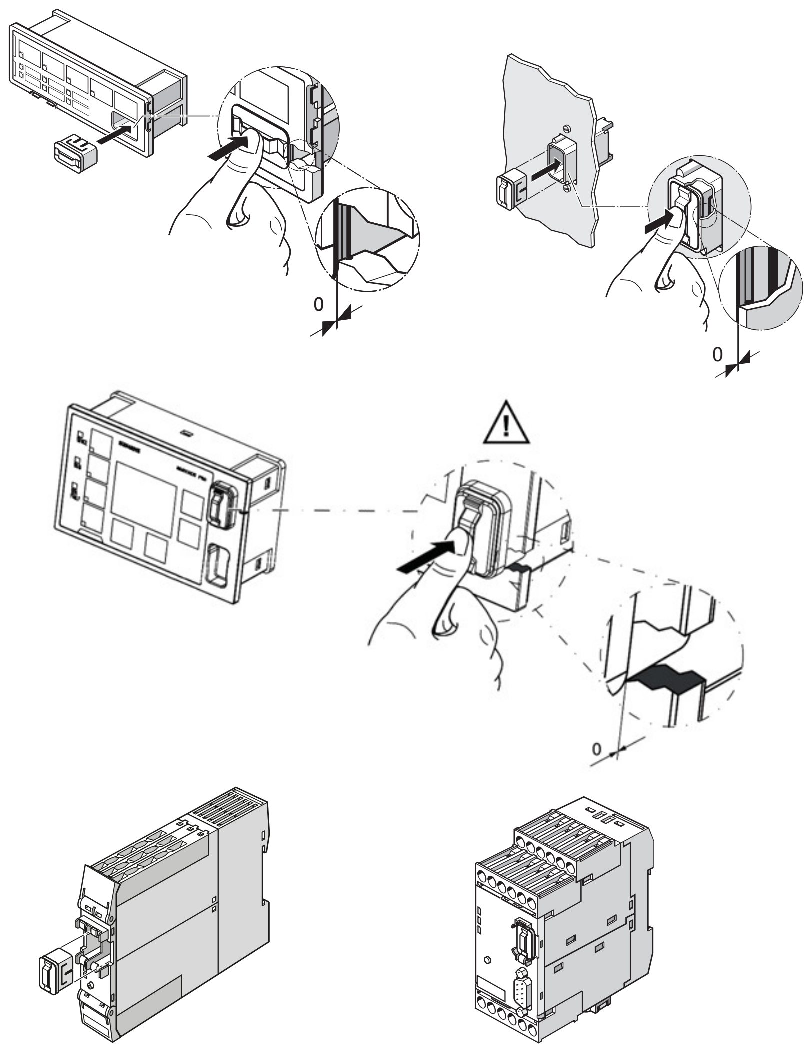


Figure 12-40 Examples of closing the system interface with the system interface cover

> **WARNING**
>
> **System interface on the operator panels (degree of protection IP54):**
>
> To ensure degree of protection IP 54
>
> - press the cover into the socket as far as it will go when it is used for the first time!
> - When fastening the operator panel with the screws supplied, do not apply an excessive tightening torque.

12.3.6 PROFIBUS DP to a 9-pole SUB-D socket

PROFIBUS DP connection

The PROFIBUS DP can be connected to the basic unit.

System	PROFIBUS DP via Sub-D	PROFIBUS DP via terminals A/B
SIMOCODE pro C	12 Mbaud	1.5 Mbaud
SIMOCODE pro S	-	1.5 Mbaud
SIMOCODE pro V	12 Mbaud	1.5 Mbaud

Note

The 9-way SUB-D connection is an alternative to the A / B terminals!

Sequence for connecting PROFIBUS DP to the SIMOCODE pro C and SIMOCODE pro V basic units

Proceed as follows:

Table 12-14 Sequence for connecting PROFIBUS DP to the basic unit

Step	Description
1	Connect the PROFIBUS DP cable with the 9-pole SUB-D plug to the PROFIBUS DP interface.

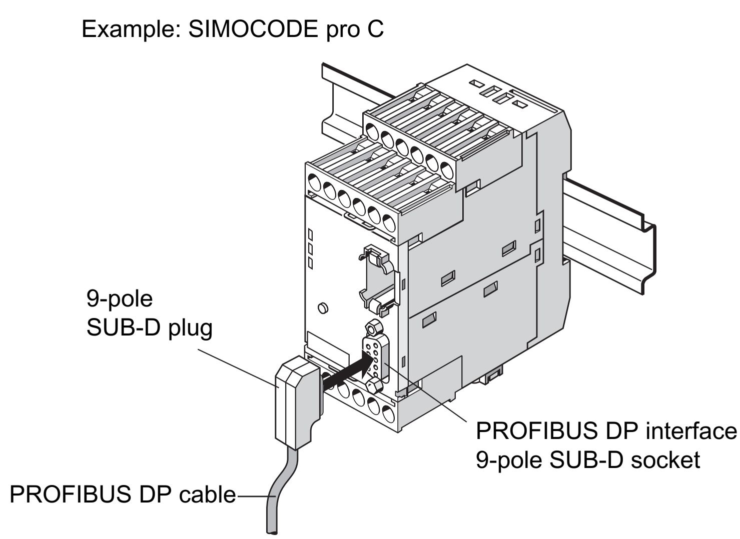


Figure 12-41 Connecting the PROFIBUS DP to the 9-way SUB-D socket

12.3.7 Ethernet cable to RJ45 socket (PROFINET and EtherNet/IP)

The ETHERNET cable is connected to the basic unit.

NOTICE
Ethernet connector
Connect using only Industrial Ethernet connectors, e.g. • Siemens IE FC RJ45 PLUG 180 2x2, RJ45 connector (10/100MBIT/S) with robust metal housing and Fast Connect connection method, for IE FC Cable 2x2 180° cable outlet, order number 6GK1901-1BB10-2AA0 or • Siemens IE FC RJ45 PLUG 90 2x2, RJ45 connector (10/100MBIT/S) with robust metal housing and Fast Connect connection method, for IE FC Cable 2x2 90° cable outlet, order number 6GK1901-1BB20-2AA0.

Sequence for connecting ETHERNET to the basic unit

Table 12-15 Connecting the ETHERNET cable to the basic unit pro V

Step	Description
1	Connect the Ethernet cable to the Ethernet interface 1 and/or Ethernet interface 2

The following connection options are available:

- with connector IE FC RJ45 Plug 180 on interface 1 and/or interface 2 (left)
- with connector IE FC RJ45 Plug 90 on interface 1 (right).

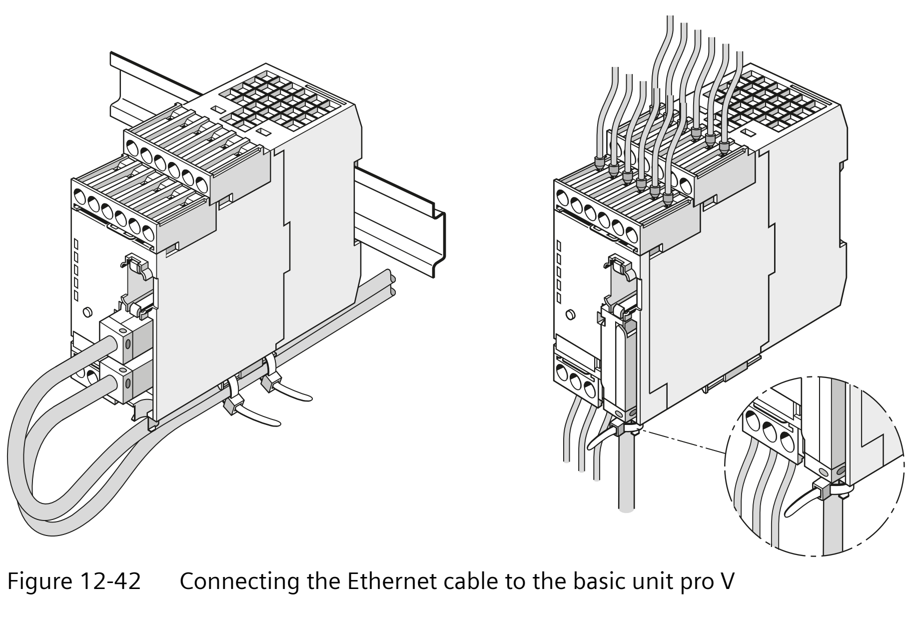


Figure 12-42 Connecting the Ethernet cable to the basic unit pro V

12.3.8 Modbus RTU connection to the SIMOCODE pro device

Connecting Modbus RTU to the SIMOCODE pro V Modbus basic unit

Modbus RTU can be connected to the SIMOCODE pro V basic unit both via the connecting terminals as well as via the sub-D connector. The maximum data transfer rate for both connection methods is 57,600 bps.

NOTICE
9-pin sub-D connection
The 9-way sub-D connection is an alternative to the A/B terminals!

Connecting Modbus RTU to the SIMOCODE pro V Modbus basic unit via the device terminals

Terminal assignment:

Terminal	Modbus signal
A	D0 or DA
B	D1 or DB
SPE	Cable shielding

Connecting Modbus RTU to the SIMOCODE pro V Modbus basic unit via the sub-D connector

The pin assignments of the 9-pin sub-D socket for SIMOCODE pro correspond to the assignments defined for PROFIBUS DP. The sub-D connector has the following assignments:

Pin	Modbus signal
8	D0 or DA
3	D1 or DB
5	GND

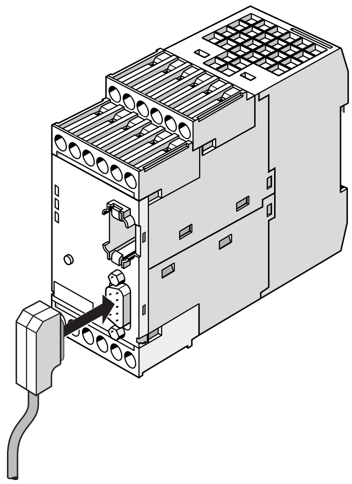


Figure 12-43 Connecting the 9-pin sub-D connector to the SIMOCODE pro V Modbus RTU basic unit

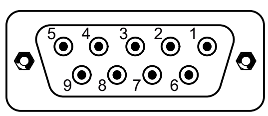


Figure 12-44 PIN assignments 9-pin sub-D socket

SIMATIC Industrial Communication 6ES7972* RS485 connectors can be used to connect Modbus RTU to the sub-D interface thanks to the identical pin assignments to PROFIBUS DP (see RS485 bus connector (https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/9300041?tree=CatalogTree) in the Industry Mall).

NOTICE
Using the PROFIBUS DP connector When the PROFIBUS DP connector is used, the bus terminator does not conform to the Modbus specification. Possible functional constraints resulting from the use of the PROFIBUS DP bus terminator with a MODBUS TCP are the user's responsibility.

You can find recommendations for a suitable layout of the serial communication bus in the document MODBUS over Serial Line - Specification and Implementation Guide - V1.02 (http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf) on the Internet.

12.4 Configuration guidelines

12.4.1 Configuration guidelines on PROFIBUS DP

Definition

The key data contained in this chapter is valid for Siemens products and cables.

PROFIBUS User Organization (PNO) installation guidelines

In the case of electric PROFIBUS networks, note also the PROFIBUS DP / FMS installation guidelines defined by the PROFIBUS user organization. These contain important information about cable routing and the commissioning of PROFIBUS networks.

Publisher:

PROFIBUS-Nutzerorganisation e. V.

Haid-und-Neu-Strasse 7

76131 Karlsruhe / Germany

Phone: ++49 721 965 85 90

Fax: ++49 721 965 85 89

Internet: PROFIBUS user organization (http://www.profibus.com)

Guideline: Order no. 2.111

See also Manual "SIMATIC NET PROFIBUS Networks (https://support.automation.siemens.com/WW/view/en/1971286)."

Application of bus termination modules

The 3UF1900-1K.00 bus termination module is primarily intended for use in MCC motor feeders. It provides correct bus termination, even when MCC plug-in units have been removed. The bus termination module can also be utilized when a standard SUB-D plug cannot be used for the last device on a bus line.

The 3UF1900-1KA00 bus termination module can be connected to either a 220 / 230 V, 380 / 400 V, 115 / 120 V or 24 V AC supply. The 3UF1900-1KB00 type can be used for a 24 V DC supply.

Note

Use of SIMOCODE pro S basic units

In particular, when using SIMOCODE pro S basic units, use the bus termination module for connecting a PROFIBUS segments.

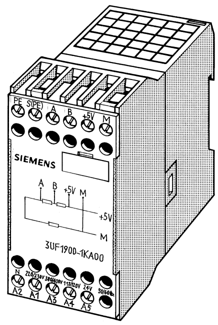


Figure 12-45 Bus termination module

12.4.2 Configuration guidelines on PROFINET

PROFINET installation guidelines

Please also note the PROFINET installation guidelines of the PROFIBUS user organization. These contain important information about planning, installing, and commissioning PROFINET networks.

Publisher:

PROFIBUS-Nutzerorganisation e. V.

Haid-und-Neu-Strasse 7

76131 Karlsruhe / Germany

Phone: +49 (721) 965-8590

Fax: +49 (721) 965-8589

Internet: PI - PROFIBUS & PROFINET International Home (http://www.profibus.com)

PROFINET installation guidelines:

- PROFINET planning
  Version: 1.04
  Order No.: 8.061
  Language: German
- PROFINET installation
  Version: 1.0
  Order No.: 8.071
  Language: German

- PROFINET commissioning
  Version: 1.01
  Order No.: 8.081
  Language: German
- PROFINET commissioning
  Checklist version: 1.01
  Order No.: 8.091
  Language: German

For an overview of the structure and configuration of Industrial Ethernet networks with SIMATIC NET: See also "Industrial Ethernet Networking Manual" system manual (https://support.automation.siemens.com/WW/view/en/27069465)

Commissioning, service, troubleshooting 13

13.1 General information about commissioning and service

Safety guidelines

WARNING

Hazardous voltage!

Can cause electric shock and burns.

Before starting work, disconnect the system and the device from the power supply.

Note

Please also observe the following SIMOCODE pro Operating Instructions (supplied with the devices):

Table 13-1 SIMOCODE pro operating instructions

Device	Article No. Operating instructions
Basic unit	3ZX1012-0UF70-3BA1
SIMOCODE pro S basic unit	3ZX1012-0UF70-2BA1
Operator panel	3ZX1012-0UF72-1AA1
Operator panel adapter	3ZX1012-0UF78-2BA1
Operator panel with display	3ZX3012-0UF72-2AA1
Digital module	3ZX1012-0UF73-1AA1
DM-F Local fail-safe digital module	3ZX1012-0UF73-1BA1
DM-F PROFIsafe fail-safe digital module	3ZX1012-0UF73-3BA1
Expansion modules	3ZX1012-0UF75-1BA1
Multifunction module	3ZX1012-0UF76-1AA1
Current measuring module	3ZX1012-0UF71-1AA1
Current / voltage measuring module	3ZX1012-0UF71-1BA1
Door adapter	3ZX1012-0UF78-1AA1
Decoupling module	3ZX1012-0UF71-5BA1
Initialization module	3ZX1012-0UF70-2AA1
You will also find the Operating Instructions for SIMOCODE pro at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)	

Prerequisites

The following prerequisites must be fulfilled for commissioning and servicing:

- SIMOCODE pro is already installed and wired
- The motor is switched off.

Parameterization methods

You can parameterize SIMOCODE pro as follows:

- With the memory module in which the parameters have already been saved from a basic unit. The memory module is plugged into the system interface. If the memory module is connected to the system interface and the supply voltage returns to the basic unit, the basic unit will be automatically parameterized by the memory module. The parameters can also be downloaded to the basic unit from the memory module by pressing the TEST / RESET button briefly.
- With the SIMOCODE ES software via serial or USB interface: The PC / PG is connected to the system interface with a PC cable.
- With an automation system and/or SIMOCODE ES software via PROFIBUS DP. For this purpose, the PROFIBUS DP cable is connected to the PROFIBUS DP interface of the basic unit.
- With the initialization module in which the parameters have already been saved from a basic unit. The initialization module is permanently installed in the switchboard in a Motor Control Center (MCC). If a withdrawable unit with a SIMOCODE pro S or SIMOCODE pro V basic unit into the MCC and the power supply returns to the basic unit, it will automatically be parameterized by the initialization module.

Commissioning options

There are two commissioning options:

1. Standard case: SIMOCODE pro has not yet been parameterized and has the factory setting
2. SIMOCODE pro has already been parameterized:
   - The parameters have already been loaded into the basic unit.
   - The parameters from a previous application still exist. Check whether the parameters (e.g. the set current) are correct for the new application. Change these accordingly, if necessary.

13.2 Commissioning

13.2.1 Commissioning with PROFIBUS

13.2.1.1 PROFIBUS commissioning steps

Please observe the information in Chapter General information about commissioning and service (Page 233).

To commission SIMOCODE pro, proceed as follows:

Table 13-2 Commissioning the basic unit

Step	Description
1	Switch on the power supply. In a fault-free state, the following LEDS should light up or flash green: • "Device" (lights up) • "Bus" if PROFIBUS DP is connected (lights up or flashes). Proceed to Step 2. Otherwise, carry out diagnostics according to the LED display. For more information, see Chapter Diagnostics via LED display on the basic unit and on the operator panel (PROFIBUS) (Page 238). Try to rectify the fault.
2	If you wish to make SIMOCODE pro available on the PROFIBUS DP, set the PROFIBUS DP address. For more information, see Chapter Setting the PROFIBUS DP address (Page 236).
3	Parameterize SIMOCODE pro or check the existing parameterization, e.g. with a PC on which SIMOCODE ES (TIA Portal) software is installed. For this, connect the PC / PG to the system interface with the PC cable (see the figure below). **Notice** With SIMOCODE pro C use the system interface on the front and with SIMOCODE pro S use the right-hand system interface.
4	Start SIMOCODE ES.

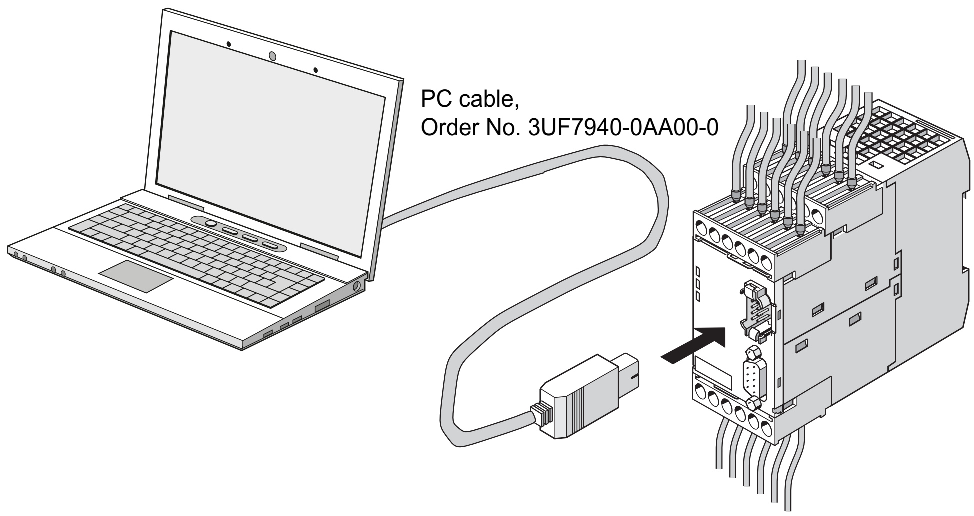


Figure 13-1 Connecting a PC to the basic unit

13.2.1.2 Setting the PROFIBUS DP address

Setting the PROFIBUS DP address via the addressing plug

Note

This setting cannot be made if the TEST / RESET button has been blocked.

Proceed as follows:

Table 13-3 Setting the PROFIBUS DP address via the addressing plug

Step	Description
1	Set the desired valid address on the DIP switch. The switches are numbered. For example, address 21: Put the "16"+"4"+"1" switches in the "ON" position.
2	Plug the addressing plug into the system interface. The "Device" LED lights up yellow.
3	Briefly press the TEST / RESET button. The address you set is now stored. The "Device" LED flashes yellow for approx. 3 seconds.
4	Remove the addressing plug from the system interface.

Setting the PROFIBUS DP address via SIMOCODE ES (TIA Portal)

Proceed as follows:

Table 13-4 Setting the PROFIBUS DP address via SIMOCODE ES (TIA Portal)

Step	Description
1	Switch on the power supply of the basic unit.
2	Connect the USB interface of the PC/PG and the system interface of the basic unit to the Sirius USB PC cable. It may be necessary to install a device driver for the parameterization cable when using the USB PC cable for the first time.
3	Observe the status LED on the basic unit. The "Device" LED should light up green. SIMOCODE pro can be started up.
4a	Setting the address of a device configured in SIMOCODE ES (TIA Portal) (as started in steps 2 and 3): Under "Parameters → Fieldbus interface", set the "Station address" to the required address and then download the parameterization to the device.
4b	Setting the address of a SIMOCODE device without integration in the current project: In the project navigator, open "Online access" via "Online & Diagnostics". Here, the device currently connected to the serial interface can be accessed using "COM<x> [SIRIUS PtP] → Update accessible devices". If the serial interface COM<x> should indicate a protocol other than SIRIUS PtP, you can change this via the context menu (right mouse button) → Properties. There, under "Parameters → Fieldbus interface", set the "Station address" to the required address and then download the change into the device again.
5	After the parameters have been transferred to the basic unit, the message confirming successful downloading appears under "Info → General" in the status window.

Setting the PROFIsafe address on DM-F PROFIsafe

See Chapter "Safety-related tripping" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

13.2.1.3 Diagnostics via LED display on the basic unit and on the operator panel (PROFIBUS)

The basic units and the operating panel have three LEDs for displaying specific device states:

Table 13-5 Diagnostics via LED display on the basic unit and on the operator panel

LED	Status	Display	Description	Corrective measures for faults
Device	Device status	Green	Device ON	-
		Green – flickering	Internal fault	Send the basic unit in for repair
		Yellow	Memory module or addressing plug recognized, TEST/RESET buttons control the memory module or addressing plug	-
		Yellow – flashing	Memory module / addressing plug read in; factory settings restored (duration: 3 s)	–
		Yellow – flickering	Memory module programmed (duration: 3 s)	-
		Red	Incorrect parameterization (also GEN. FAULT on)	Parameterize again, then switch the control voltage off and on again
			Basic unit defective (also GEN. FAULT on)	Replace the basic unit!
		Red – flashing	Memory module, addressing plug or expansion modules defective (also GEN. FAULT on - flashing)	Reprogram/replace the memory module, replace the expansion modules
		Off	Supply voltage too low	Check whether the supply voltage is connected/switched on
Bus	Bus status	Off	Bus not connected or bus fault	Connect the bus or check the bus parameters
		Green – flashing	Baud rate recognized / communication with PC / programming device	-
		Green	Communication with PLC/PCS	-
GEN. FAULT	Fault status	Red	Fault pending; reset has been saved	Rectify fault, e.g., overload
		Red – flashing	Fault pending; reset has not been saved	Clear the error and press Reset; Configuration error: Parameterize again and reset, or switch the control voltage off and on again
		Off	No fault	-

13.2.1.4 Diagnostics via LED display on the modules DM-F Local or DM-F PROFIsafe

See Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852).

13.2.2 Commissioning with PROFINET

13.2.2.1 PROFINET commissioning steps

Please observe the information in Chapter General information about commissioning and service (Page 233).

To commission SIMOCODE pro, proceed as follows:

Table 13-6 Commissioning the basic unit

Step	Description
1	Switch on the power supply. In a fault-free state, the following LEDS should light up green: • "Device" (lights up) • "PORT 1 / PORT 2" when the PROFINET cable is connected (lighted or flashing). Continue with step 2. Otherwise, carry out diagnostics according to the LED display. For more information, see Chapter Diagnostics via LED display on the basic unit and on the operator panel (PROFINET) (Page 243). Try to rectify the fault.
2	If you want to make SIMOCODE pro available to PROFINET, you must set the IP parameters and the PROFINET device names. For more information, see Chapter Setting IP parameters and PROFINET device name (Page 240).
3	Parameterize SIMOCODE pro or check the existing parameterization, e.g. with a PC on which SIMOCODE ES (TIA Portal) software is installed. For this, connect the PC / PG to the system interface with the PC cable (see the figure below).
4	Start SIMOCODE ES.

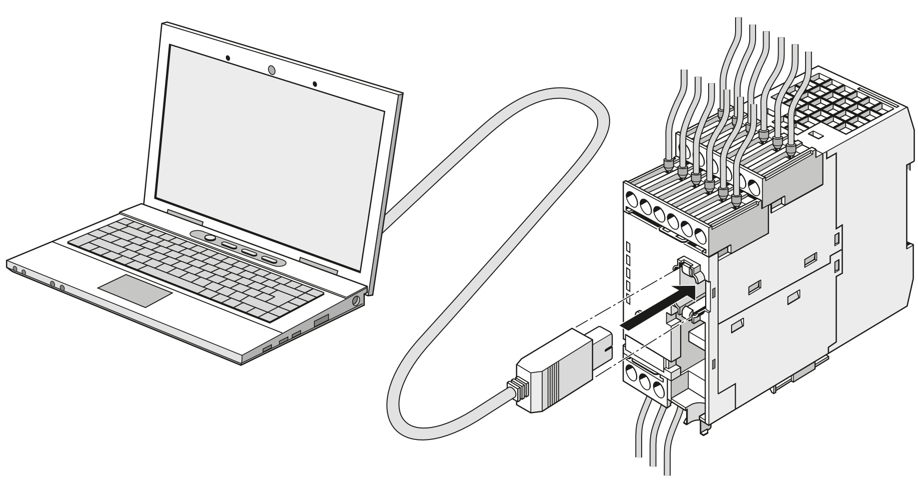


Figure 13-2 Connecting a PC to the basic unit

13.2.2.2 Setting IP parameters and PROFINET device name

Setting IP parameters and PROFINET device name on a plant-specific basis

The setting of IP parameters and the PROFINET device name is a mandatory step for communication via PROFINET.

These parameters can be set in different ways, depending on the needs of the plant configuration.

A detailed description of these possible approaches can be found in the Chapter "Configuration of further properties of SIMOCODE pro V PN as IO Device" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Setting IP parameters and PROFINET device name with SIMOCODE ES (TIA Portal) via PC cable

Proceed as follows:

Table 13-7 Setting IP parameters and PROFINET device name with SIMOCODE ES (TIA Portal) via PC cable

Step	Description
1	Plug the PC cable into the system interface.
2	Start SIMOCODE ES (TIA Portal).

<table>
<tr><th>Step</th><th colspan="2">Description</th></tr>
<tr><td>3</td><td>1st option: Create new project
• In the Project view, create a new project via "Project → New"
• Add a new device by double-clicking the button "Add new device" in the project navigator and select the application in the device wizard. The selected application corresponds to the description in the manual SIMOCODE pro - Application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959).
• Check the device configuration and adapt it to the actual configuration, if applicable
• Select the communication settings under "Parameters → PROFINET parameters" and set the IP parameters and the device name
• Under "Parameters → Motor protection", set the current setting and, if applicable, other parameters
• Adapt other parameters in the parameter editor if necessary
• Save the project and transfer the device parameters to the device</td><td rowspan="6">2nd option: Do not create a new project
• In the portal view, click on the button "Online & Diagnostics"
• Click "Accessible devices". The "Accessible devices" window opens
• Click the "Start search" button
• Select a station</td></tr>
<tr><td>4</td><td>Select the type of the PG/PC interface (SIRIUS PtP in this case)</td></tr>
<tr><td>5</td><td>Select the PG/PC interface via which the USB PC cable is connected to the computer.</td></tr>
<tr><td>6</td><td>Click on the "Start search" button and load the parameterization into the device.
After successfully transferring the parameters into the device (see message in inspector window), the device is ready to operate.</td></tr>
<tr><td>7</td><td>Select a suitable station. You can show the following devices/stations:
• devices with the same addresses
• all compatible stations
• accessible stations</td></tr>
<tr><td>8</td><td>Click the "Connect..." button.</td></tr>
<tr><td>9</td><td colspan="2">Open the "PROFINET parameters" dialog box in the parameter editor</td></tr>
<tr><td>10</td><td colspan="2">Activate/deactivate "Overwrite IP parameters in device" and set the IP address, subnet mask, and router as appropriate.
The IP parameters are configured with SIMOCODE ES and transferred to the device. In this case, the "Overwrite IP parameters in device" checkbox must be selected. Choose the IP parameters to match the configuration in the automation system. If the IP parameters are assigned by the IO controller in the automation system, no setting is necessary here and the "Overwrite IP parameters in device" checkbox must not be selected [1)]</td></tr>
<tr><td>11</td><td colspan="2">Enter the IP address.</td></tr>
<tr><td>12</td><td colspan="2">Activate the checkbox "Use router" if you want to use a router</td></tr>
<tr><td>13</td><td colspan="2">Enter the IP address (gateway) of the router</td></tr>
<tr><td>14</td><td colspan="2">Select the device name to match the configuration in the automation system</td></tr>
<tr><td>15</td><td colspan="2">Activate the "Overwrite device name in device" checkbox if you want to transfer the device name to the device.</td></tr>
</table>

Step	Description
16	If necessary, select the "Web server activated" checkbox
17	If necessary, select the "OPC-UA server activated" checkbox
18	Select the "Activate NTP synchronization" checkbox if you want to synchronize the unbuffered real-time clock of SIMO-CODE pro V PN using the NTP procedure.
19	Enter the NTP server address when the "Activate NTP synchronization" checkbox is selected.
20	Enter a value for the time shift: -1440 min to +1440 min (default value: 0 min)
21	Enter a value for the cyclic update interval when the "Activate NTP synchronization" checkbox is selected: 10 to 86400 s (default value: 10 s)
22	Load the data to the basic unit via "Online → Load to device" or click the corresponding button in the menu bar

1)

Note

Initial transfer of device name

The initial transfer of the device name must take place via the SIMOCODE pro system interface, since the device cannot be reached via PROFINET as address settings are missing.

Setting the PROFIsafe address on DM-F PROFIsafe

See Chapter "Safety-related tripping" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

13.2.2.3 Setting the time manually after switch-on or recovery of the supply voltage

Setting the time with SIMOCODE ES (TIA Portal)

If the internal realtime clock of the devices is not automatically synchronized via NTP, you can make the setting manually with SIMOCODE ES.

To do so, follow these steps:

Set the time manually after switch-on or recovery of the supply voltage

Step	Description
1	Go online, e.g. via "Online & Diagnostics" → Accessible devices
2	• In the project navigator, double-click "Commissioning". • Click on "Command" • Choose "Set time (=PC time in UTC)

13.2.2.4 Diagnostics via LED display on the basic unit and on the operator panel (PROFINET)

The basic unit and the operating panel have LEDs for displaying specific device states:

Table 13-8 Diagnostics via LED display

LED	Status	Display	Description	Corrective measures for faults
Device	Device status	Green	Device ON	_
		Green – flickering	Internal fault	Send the basic unit in for repair
		Yellow	Memory module recognized, TEST/RESET buttons control the memory module	_
		Yellow – flashing	Memory module read in; factory settings configured (duration: 3 s)	_
		Yellow – flickering	Memory module programmed (duration: 3 s)	_
		Red	Device defective (also GEN. FAULT on)	Replace the basic unit!
		Red – flashing	Memory module or expansion modules defective (also GEN. FAULT on - flashing)	Reprogram/replace the memory module, replace the expansion modules
		Off	Supply voltage too low	Check whether the supply voltage is connected/switched on
		Green - flashing	PE energy saving mode active	_
Bus	Bus status	Off	No communication with the IO Controller of the PLC/PCS via PROFINET	Connect the bus or check PROFINET parameters (IP parameters, device name)
		Green	Communication with the IO Controller of the PLC/PCS via PROFINET is active	_
GEN. FAULT	Fault status	Red	Fault pending; reset has been saved	Rectify fault, e.g., overload
		Red – flashing	Fault pending; reset has not been saved	Clear the error and reset. Configuration error: Parameterize again and reset, or switch the control voltage off and on again
		Off	No fault	_
PORT1 (only on basic unit)	Bus status	Green	Ethernet connection available	_
		Off	No Ethernet connection available	Check the Ethernet connection and the wiring
		Flashing	Station flash test for device location active	_
PORT2 (only on basic unit)	Bus status	Green	Ethernet connection available	_
		Off	No Ethernet connection available	Check the Ethernet connection and the wiring
		Flashing	Station flash test for device location active	_

13.2.3 Commissioning with Modbus

13.2.3.1 Commissioning with Modbus RTU

Commissioning sequence of the SIMOCODE pro V Modbus basic unit

Table 13-9 Commissioning sequence of the SIMOCODE pro V Modbus basic unit

Step	Description
1	Switch on the power supply. In a fault-free state, the "Device" LED should light up green.
2	Connect the PC / PG to the system interface with the PC cable (see the figure below)
3	Parameterize SIMOCODE pro or check the existing parameterization with a PC on which SIMOCODE ES (TIA Portal) is installed
4	If automatic baud rate detection is activated, the "Bus" LED flashes green as soon as the setting selected by the controller is found. When the controller exchanges data with the device, the "Bus" LED lights up green.

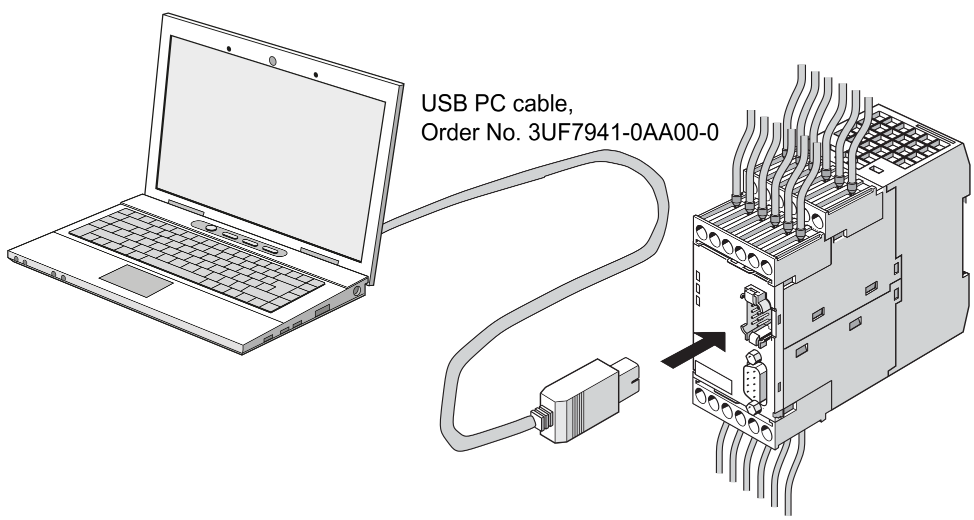


Figure 13-3 Connecting a PC to the SIMOCODE pro V Modbus RTU basic unit

Software for configuring and commissioning

SIMOCODE ES V14 + SP1 (or a later version) is required for full configuring and commissioning. Here, you can choose between:

- SIMOCODE ES Basic: text-oriented configuration of SIMOCODE
- SIMOCODE ES Standard: configuration of SIMOCODE using graphically interconnectable function blocks.

Note

The SIMOCODE ES Premium software does not have more functionality than SIMOCODE ES Standard for SIMOCODE pro Modbus devices, but it can nevertheless be used for commissioning.

The functional principle of SIMOCODE ES software is described in the online help. A "Getting Started" is available on the internet in a multimedia format to help you become more familiar with the software in the initial fundamental steps: Guided Tour (https://www.industry.siemens.com/topics/global/en/tia-portal/tia-portal-framework/tabcardpages/Pages/guided-tour.aspx)

Device addressing

As supplied, the default setting for the device address 126. This must be reassigned when commissioning the devices.

Setting the Modbus RTU address via addressing plug

Proceed as follows:

Table 13-10 Setting the Modbus RTU address via addressing plug

Step	Description
1	Set the desired valid address on the DIP switch. The switches are numbered. Addresses from 1 to 247 can be assigned. For example, address 21: Put the "16"+"4"+"1" switches in the "ON" position. 1)
2	Plug the addressing plug into the system interface. The "Device" LED lights up yellow.
3	Briefly press the "TEST/RESET" button. The address you set is now stored. The "Device" LED flashes yellow for approx. 3 seconds.
4	Remove the addressing plug from the system interface.

1)

Note

Labeling for the address "128"

Labeling for the address "128" is not available on the addressing plug, that is, the unlabeled switch corresponds to the address "128".

Setting the Modbus RTU address with SIMOCODE ES (TIA Portal)

Proceed as follows:

Table 13-11 Setting the Modbus RTU address with SIMOCODE ES (TIA Portal)

Step	Description
1	Plug the PC cable into the system interface.
2	Start SIMOCODE ES
3	Select "Online → Go online" or click the "Go online" button

Communication parameters

The following Modbus communication parameters can be set in the SIMOCODE ES (TIA Portal) software under "Parameters → Modbus":

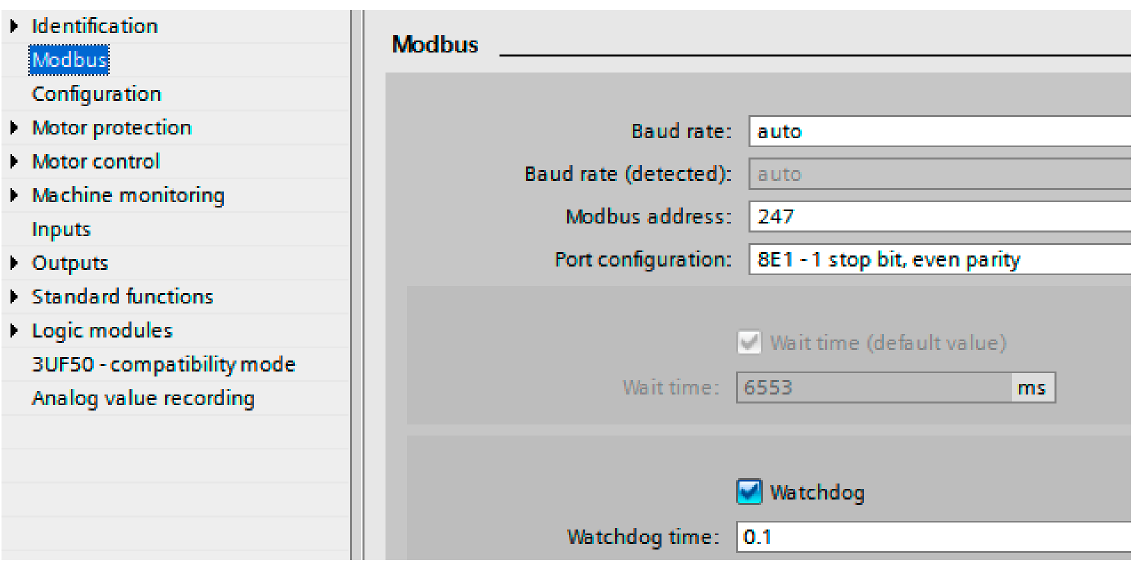


Figure 13-4 Modbus settings

- Baud rate: The baud rate of SIMOCODE pro V Modbus can be set in the range from 0.3 - 57.6 kbps. The parameter setting "auto" activates automatic baud rate detection with which the device autonomously determines the setting selected by the controller. Automatic baud rate search encompasses baud rates in the range from 4.8 ... 57.6 kbps.

Note

Automatic baud rate detection

Use of this function is only possible when the "Watchdog" function is activated.

Idle time:
Messages begin and end with a transmission break of at least 3.5 characters. The shortest idle time depends on the baud rate. The following table shows the default values:

Bits per second (bps)	Shortest idle time (ms)
300	128
600	64
1200	32
2400	16
4800	8
9600	4
19200	2
57600	2

- Baud rate (detected): Information about the detected baud rate, if automatic baud rate detection (baud rate = auto) is set.
- Modbus address: Setting the Modbus address for the SIMOCODE device. The address can be set in the range from 1 - 247. As supplied, the address for SIMOCODE pro V devices is set to the default value of 126
- Port configuration: The number of stop bits and the selected parity of the Modbus interface can be set here. The following settings are possible:
  - 8E1 - 1 stop bit, even parity
  - 8O1 - 1 stop bit, odd parity
  - 8N2 - 2 stop bits, no parity
  - 8N1 - 1 stop bit, no parity

- Wait time / wait time (default value): The time duration of the pause between a received request and the reply from SIMOCODE pro can be set with the "Wait time" and "Wait time (default value)" parameters. If the default value of the Modbus specification is to be used, selection of the "Wait time (default value)" parameter is recommended. The "Wait time" parameter is available for free setting. The setting is made in ms. The smallest settable value corresponds to the default value of the Modbus specification. If longer wait times are required, these can be defined using the "Wait time" parameter.
- Watchdog / Watchdog time: Monitoring of the bus communication can be activated with these parameters. This is necessary when automatic baud rate detection is selected, or if the SIMOCODE device were to experience a fault if the bus communication fails. If the watchdog is activated, SIMOCODE monitors whether a valid read or write access to the device occurs within the set watchdog time. If this is not the case, SIMOCODE begins a new search for a valid baud rate if automatic rate detection is set. In addition, a "Fault - bus" is generated if the "Watchdog → Bus monitoring" parameter is also activated.

Bus and controller monitoring on Modbus

With the SIMOCODE pro V Modbus basic unit, both the bus communication and the controller function can be monitored. The functions "Bus monitoring" and "PLC / PCS monitoring" are available for this purpose.

The functionality differs slightly from that described for SIMOCODE pro PROFIBUS.

- Bus monitoring: With this type of monitoring, the "Fault - bus" fault is generated if
  - "Bus monitoring" is active
  - In the "Remote" operating mode (mode selector S1 = 1 and S2 = 1), cyclic data access to Modbus registers between the PLC and SIMOCODE pro is interrupted for longer than the set bus monitoring time, e.g. as the result of an interruption of the Modbus connection.
  - The "Status - bus o. k." can always be evaluated. If SIMOCODE pro is cyclically exchanging data with the PLC, "Status - Bus o. k." is set to "1".
- PLC / PCS monitoring: With this type of monitoring, the "Fault - PLC/PCS" message is generated if
  - "PLC/PCS monitoring" is active
  - The input "PLC/PCS monitoring - input" switches to logic zero when in the "Remote" operating mode (mode selector S1=1 and S2=1). "PLC/PCS monitoring - input" is connected preferably with the bit "Cyclic receive - bit 0.7".
  - The status "PLC/PCS in Run" can always be evaluated. If SIMOCODE pro is in cyclic data exchange with the PLC, and the input "PLC/PCS monitoring" is set, "PLC/PCS in Run" is set to "1".

You can find the further description of the "Watchdog" function block (PLC/PCS monitoring) in Chapter "Watchdog" (PLC/PCS monitoring) in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

13.2.4 Commissioning with EtherNet/IP

13.2.4.1 EtherNet/IP commissioning steps

Please observe the information in Chapter General information about commissioning and service (Page 233).

To commission SIMOCODE pro, proceed as follows:

Table 13-12 Commissioning the basic unit

Step	Description
1	Switch on the power supply. In a fault-free state, the following LEDS should light up green: • "Device" (lights up) • "PORT 1 / PORT 2" when the Ethernet cable is connected (lighted or flashing). Continue with step 2. Otherwise, carry out diagnostics according to the LED display. For more information, see Chapter Diagnostics via LED display on the basic unit and on the operator panel with EtherNet/IP (Page 252). Try to rectify the fault.
2	If you want to make SIMOCODE pro available to EtherNet/IP, you must set the IP parameters and the device name. For more information, see Chapter Setting IP parameters and EIP device name (Page 249).
3	Parameterize SIMOCODE pro or check the existing parameterization, e.g. with a PC on which SIMOCODE ES software is installed. For this, connect the PC / PG to the system interface with the PC cable (see the figure below).
4	Start SIMOCODE ES.

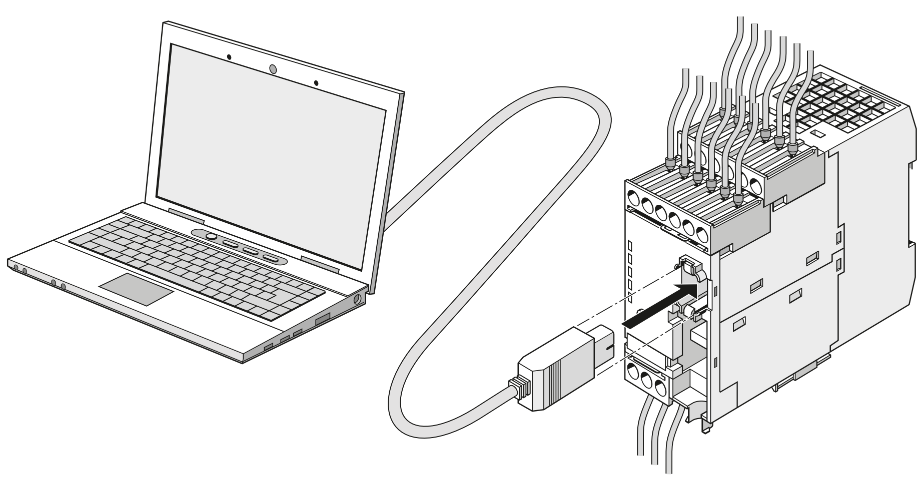


Figure 13-5 Connecting a PC to the basic unit

13.2.4.2 Setting IP parameters and EIP device name

Setting IP parameters and device name on a plant-specific basis

For communication via EtherNet/IP it is mandatory to set the IP parameters and the device name.

These parameters can be set in different ways, depending on the needs of the plant configuration.

Setting IP parameters and EtherNet/IP device name with SIMOCODE ES via PC cable

Proceed as follows:

Table 13-13 Setting IP parameters and EtherNet/IP device name with SIMOCODE ES via PC cable

<table>
<tr><th>Step</th><th colspan="2">Description</th></tr>
<tr><td>1</td><td colspan="2">Plug the PC cable into the system interface</td></tr>
<tr><td>2</td><td colspan="2">Start SIMOCODE ES (TIA Portal)</td></tr>
<tr><td>3</td><td>1st option: Create new project
• In the Project view, create a new project via "Project → New"
• Add a new device by double-clicking the button "Add new device" in the project navigator and select the application in the device wizard. The selected application corresponds to the description in the manual SIMOCODE pro - Application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959).
• Check the device configuration and adapt it to the actual configuration, if applicable
• Select the communication settings under "Parameters → Ethernet parameters" and set the IP parameters and the device name
• Under "Parameters → Motor protection", set the current setting and, if applicable, other parameters
• Adapt other parameters in the parameter editor if necessary
• Save the project and transfer the device parameters to the device</td><td rowspan="6">2nd option: Do not create a new project
• In the portal view, click on the button "Online & Diagnostics"
• Click "Accessible devices". The "Accessible devices" window opens
• Click the "Start search" button
• Select a station</td></tr>
<tr><td>4</td><td>Select the type of the PG/PC interface (SIRIUS PtP in this case)</td></tr>
<tr><td>5</td><td>Select the PG/PC interface via which the USB PC cable is connected to the computer.</td></tr>
<tr><td>6</td><td>Click on the "Start search" button and load the parameterization into the device.
After successfully transferring the parameters into the device (see message in inspector window), the device is ready to operate.</td></tr>
<tr><td>7</td><td>Select a suitable station. You can show the following devices/stations:
• devices with the same addresses
• all compatible stations
• accessible stations</td></tr>
<tr><td>8</td><td>Click the "Connect..." button.</td></tr>
<tr><td>9</td><td colspan="2">Open the "Ethernet parameters" dialog box in the parameter editor</td></tr>
</table>

Step	Description
10	Select "Use BOOTP/DHCP" if the IP parameters are obtained from a DHCP server and assigned to the IO Device. If the DHCP mode is selected, SIMOCODE pro immediately receives an IP address if the DHCP server is available in the same network. Otherwise the device searches for an IP address. If SIMOCODE pro finds no IP address when setting up an online connection or during a loading operation, because no DHCP server is available in the network, SIMOCODE ES assigns the device a temporary IP address. If the DHCP mode is selected, SIMOCODE pro accepts this temporary address as if it came from a DHCP server. There are two options for deactivating a temporary IP address again: • Restart the device by means of "Commissioning → Command → Restart/Cold start" • Switch the device off and on again. After the restart, the device runs in the DHCP mode and looks for an IP address again.
11	Activate/deactivate "Overwrite IP parameters in device" and set the IP address, subnet mask, and router as appropriate. The IP parameters are configured with SIMOCODE ES and transferred to the device. In this case, the "Overwrite IP parameters in device" checkbox must be selected. Choose the IP parameters to match the configuration in the automation system. If the IP parameters are assigned by the IO controller in the automation system, no setting is necessary here and the "Overwrite IP parameters in device" checkbox must not be selected [1)]
12	Enter the IP address.
13	Activate the checkbox "Use router" if you want to use a router
14	Enter the IP address (gateway) of the router
15	Select the EtherNet/IP device name to match the configuration in the automation system.
16	Activate the "Overwrite device name in device" checkbox if you want to transfer the device name to the device.
17	If necessary, select the "Web server activated" checkbox
18	Select the "Activate NTP synchronization" checkbox if you want to synchronize the unbuffered real-time clock of SIMOCODE pro V EIP using the NTP procedure.
19	Enter the NTP server address when the "Activate NTP synchronization" checkbox is selected.
20	Enter a value for the time shift: -1440 min to +1440 min (default value: 0 min)
21	Enter a value for the cyclic update interval when the "Activate NTP synchronization" checkbox is selected: 10 to 86400 s (default value: 10 s)
22	Load the data to the basic unit via "Online → Load to device" or click the corresponding button in the menu bar

1)

Note

Initial transfer of device name

The initial transfer of the device name must occur via the SIMOCODE pro system interface, since the device is not yet accessible via EtherNet/IP due to the missing address settings.

13.2.4.3 Set the time manually after switch-on or recovery of the supply voltage

Setting the timer with SIMOCODE ES

If the internal realtime clock of the devices is not automatically synchronized via NTP, you can make the setting manually with SIMOCODE ES.

To do so, follow these steps:

Set the time manually after switch-on or recovery of the supply voltage

Step	Description
1	Start SIMOCODE ES
2	Establish an online connection.
3	Set the device-internal real time clock via "Commissioning → Command → Set time (= PC time in UTC)"

13.2.4.4 Diagnostics via LED display on the basic unit and on the operator panel with EtherNet/IP

The basic unit and the operating panel have LEDs for displaying specific device states:

Table 13-14 Diagnostics via LED display

LED	Status	Display	Description	Corrective measures for faults
Device	Device status	Green	Device ON	_
		Green flickering	Internal fault	Send back the basic unit!
		Yellow	Memory module recognized, TEST/RESET buttons control the memory module	_
		Yellow flashing	Memory module read in; factory settings configured (duration: 3 s)	_
		Yellow flickering	Memory module programmed (duration: 3 s)	_
		Red	Device defective (also GEN. FAULT on)	Replace the basic unit!
		Red – flashing	Memory module or expansion modules defective (also GEN. FAULT on - flashing)	Reprogram/replace the memory module, replace the expansion modules
		Off	Supply voltage too low	Check whether the supply voltage is connected/switched on
		Green flashing	PE energy saving mode active	_
Bus	Bus status	Off	No communication with a controller active	Connect the bus or check Ethernet parameters (IP parameters, device name)
		Green flashing	Communication with a controller active (e.g. Rockwell Automation controller)	_
GEN. FAULT	Fault status	Red	Fault pending; reset has been saved	Rectify fault, e.g., overload
		Flashing red	Fault pending; reset has not been saved	_
		Off	No fault	_
PORT1 (only on basic unit)	Bus status	Green	Ethernet connection available	_
		Off	No Ethernet connection available	Check the Ethernet connection and the wiring
		Flashing	Station flash test for device location active	_
PORT2 (only on basic unit)	Bus status	Green	Ethernet connection available	_
		Off	No Ethernet connection available	Check the Ethernet connection and the wiring
		Flashing	Station flash test for device location active	_

13.3 Service

13.3.1 Preventive maintenance

Preventive maintenance - general information

Preventive maintenance is an important step towards avoiding faults and unforeseen costs. Industrial plants require regular professional maintenance, for example, to avoid production losses due to plant downtimes. Preventive maintenance ensures that all components are always kept in perfect working order.

Reading out statistical data

SIMOCODE pro makes statistical data available that can, for example, be read out with SIMOCODE ES (TIA Portal) under **Commissioning → Service Data / Statistical Data**. For example, based on "Motor operating hours" and "Number of starts," you can decide whether motor and / or motor contactors should be replaced.

Figure 13-6 Reading out statistical data

13.3.2 Backing up and saving parameters

Always save the parameters in the memory module or in a SIMOCODE ES file. This particularly applies if you replace a basic unit, or if you wish to transfer data from one basic unit to another.

Saving parameters from the basic unit into the memory module

Note

This function will not be available if the TEST / RESET button has been disabled.

Proceed as follows:

Table 13-15 Saving the parameters into the memory module

Step	Description
1.	Plug the memory module into the system interface. The "Device" LED lights up yellow for approx. 10 seconds. During this time, press the "TEST / RESET" button for approx. 3 seconds. The parameters will be saved in the memory module. After successful data transfer, the "Device" LED flickers yellow for approx. 3 seconds.
2.	If necessary, unplug the memory module from the system interface.

Saving parameters from the memory module into the basic unit

Note

This function will not be available if the TEST / RESET button has been disabled.

Proceed as follows:

Table 13-16 Saving parameters from the memory module into the basic unit

Step	Description
1.	Plug the memory module into the system interface. The "Device" LED lights up yellow for approx. 10 seconds. During this time, briefly press the "TEST / RESET" button. The parameters will be transferred to the basic unit. After successful data transfer, the "Device" LED flashes yellow for approx. 3 seconds.
2.	If necessary, unplug the memory module from the system interface.

Note

If the memory module is plugged in, the parameters will be transferred from the memory module to the basic unit when the supply voltage is switched on.

Saving parameters from the basic unit to a SIMOCODE ES file

Proceed as follows:

Table 13-17 Saving parameters to a SIMOCODE ES file

Step	Description
1.	Plug the PC cable into the system interface.
2.	Start SIMOCODE ES.
3.	Create a new project via "Create new project".
4.	Switch to the project view.
5.	Go online, e.g. via "Online & Diagnostics" in the project navigator
6.	Open the "Online access" menu in the project navigator and select the suitable interface by double-clicking it.
7.	Double-click on "Update accessible devices".
8.	Select "Online → Upload device as new station (hardware and software) ...".
9.	Save the project.

Note

This function will not be available if the TEST / RESET button has been disabled.

Saving parameters from a SIMOCODE ES file into the basic unit

Proceed as follows:

Table 13-18 Saving parameters from a SIMOCODE ES file into the basic unit

Step	Description
1.	Plug the PC cable into the system interface.
2.	Start SIMOCODE ES.
3.	Open a project.
4.	Select Online → Extended online connection.
5.	Select the type of the PG/PC interface (SIRIUS PtP or PN/IE).
6.	Select the PG/PC interface.
7.	Click the "Start search" button. A search is made for compatible stations.
8.	Select a station.
9.	Load the parameters to the device via "Online → Load to device".

13.3.3 Replacing SIMOCODE pro components

Safety guidelines

WARNING

Replacing current measuring modules and current/voltage measuring modules

The main power for the feeder and the supply voltage for the basic unit must be switched off before replacing current measuring modules and current/voltage measuring modules.

Note

Please observe the information contained in the Operating Instructions!

You will also find the Operating Instructions for SIMOCODE pro at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man)

Note

It is not necessary to detach the wiring from the removable terminals to replace the components!

Replacing the basic unit

Proceed as follows:

Table 13-19 Replacing the basic unit

Step	Description
1.	Save the parameters. For information on this, see Chapter Backing up and saving parameters (Page 255).
2.	Switch off the main power for the unit feeder and the power supply for the basic unit.
3.	Withdraw the PC cable if necessary, then remove the cover or the connecting cable from the system interface.
4.	Withdraw the removable terminals. You do not need to detach the wiring.
5.	Dismantle the basic unit.
6.	Withdraw the removable terminals from the new basic unit.
7.	Mount the new basic unit.
8.	Connect the wired, removable terminals.
9.	Connect the cables to the system interfaces.
10.	Switch on the supply voltage for the basic unit.
11.	Save the parameters into the basic unit. For information on this, see Chapter Backing up and saving parameters (Page 255).
12.	Switch on the main power for the unit feeder.

Replacing an expansion module or a decoupling module

Proceed as follows:

Table 13-20 Replacing an expansion module or a decoupling module

Step	Description
1.	Switch off the main power for the feeder and switch off the power supply for the basic unit and the DM-F.
2.	Withdraw the PC cable if necessary, then remove the cover or the connecting cable from the system interface.
3.	Withdraw the removable terminals. You do not need to detach the wiring.
4.	Remove the expansion module or decoupling module.
5.	Withdraw the removable terminals from the new expansion module or decoupling module.
6.	Install the new expansion module or decoupling module.
7.	Connect the wired, removable terminals.
8.	Connect the cables to the system interfaces.
9.	Switch on the supply voltage for the basic unit.
10.	Switch on the main power for the unit feeder.

Replacing a DM-F

Proceed as follows:

Table 13-21 Replacing a DM-F

Step	Description
1	First, switch off the main power for the feeder and then the supply voltage for the basic unit and the DM-F.
2	Withdraw the PC cable if necessary, then remove the cover or the connecting cable from the system interface.
3	Withdraw the removable terminals. You do not need to detach the wiring.
4	Dismantle the DM-F.
5	Withdraw the removable terminals from the new DM-F.
6	Mount the new DM-F.
7	Connect the wired, removable terminals.
8	Connect the cables to the system interfaces.
9	DM-F PROFIsafe only: Set the DIP switches for the PROFIsafe address according to the configuration in the F-controller (see Chapter "Configuring the DM-F PROFIsafe and integrating it into the fail-safe automation system" in the manual Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852)).
10	Switch on the power supply for the DM-F and the basic unit.
11	DM-F Local only Configure the DM-F Local accordingly (see Chapter "Configuring the DM-F Local" in manual Manual Fail-safe Digital Modules SIMOCODE pro (https://support.automation.siemens.com/WW/view/en/50564852)).
12	Switch on the main power for the unit feeder.

Replacing the current measuring module and the current/voltage measuring module

WARNING

Replacing current measuring modules and current/voltage measuring modules

The main power for the feeder and the supply voltage for the basic unit must be switched off before replacing current measuring modules and current/voltage measuring modules.

Proceed as follows:

Table 13-22 Replacing the current measuring module and the current/voltage measuring module

Step	Description
1	Switch off the main power for the unit feeder and the power supply for the basic unit.
2	Pull out the connecting cable from the system interface.
3	Remove the removable terminal from the module as illustrated below (current / voltage measuring modules only)
4	Disconnect the three cables of the three phases of the main circuit.
5	Replace the module (see Chapter Mounting of current measuring modules (Page 167) and Chapter Mounting the current / voltage measuring modules (Page 168)).
6	Connect the three cables of the main circuit, leading them through the feed-hole openings.
7	Plug the removable terminals onto the module (current / voltage measuring modules only).
8	Connect the cable to the system interface.
9	Switch on the supply voltage for the basic unit.
10	Switch on the main power for the unit feeder.

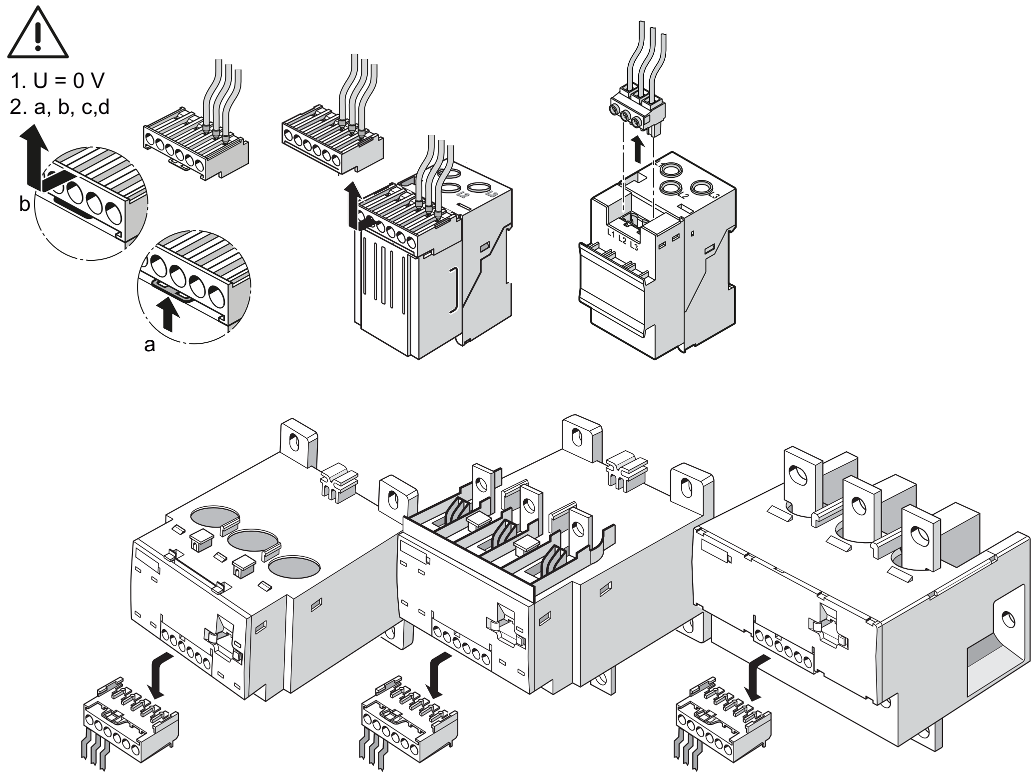


Figure 13-7 Replacing current/voltage measuring modules

Replacing a 1st generation current/voltage measuring module (UM) with a 2nd generation current/voltage measuring module (UM+)

> **WARNING**
>
> **Replacing current measuring modules and current/voltage measuring modules**
>
> The main power for the feeder and the supply voltage for the basic unit must be switched off before replacing current measuring modules and current/voltage measuring modules.

The following table shows which 2nd generation current/voltage measuring module replaces a 1st generation current/voltage measuring module:

1st generation current/voltage measuring module		2nd generation current/voltage measuring module
3UF7110-1AA00-0, I_s = 0.3 to 3 A	→	3UF7110-1AA01-0, I_s = 0.3 to 4 A
3UF7111-1AA00-0, I_s = 2.4 to 3 A	→	3UF7110-1AA01-0, I_s = 0.3 to 4 A
3UF7111-1AA00-0, I_s = 3.0 to 25 A	→	3UF7111-1AA01-0, I_s = 3 to 40 A
3UF7112-1AA00-0, I_s = 10 to 100 A	→	3UF7112-1AA01-0, I_s = 10 to 115 A
3UF7113-1AA01-0, I_s = 20 to 200 A	→	3UF7113-1AA00-0, I_s = 20 to 200 A
3UF7113-1BA01-0, I_s = 20 to 200 A	→	3UF7113-1BA00-0, I_s = 20 to 200 A
3UF7114-1BA01-0, I_s = 20 to 200 A	→	3UF7114-1BA00-0, I_s = 20 to 200 A

Note

Conversion to a 2nd generation current/voltage measuring module

Depending on the previous parameterization of the SIMOCODE basic unit, the Device LED and the General Fault LED may flash red when downloading a parameterization with a 2nd generation current / voltage measuring module.

This behavior can be corrected with a reset. The device LED changes to green; the Gen. Fault LED goes out.

After a reset, the basic unit is in the UM+ mode. The device LED changes to green; the Gen. Fault LED goes out.

13.3.4 Exchanging a 3UF52 operator panel for a 3UF720 operator panel

To exchange a 3UF52 operator panel for the smaller 3UF720 operator panel, proceed as follows:

Table 13-23 Exchanging a 3UF52 operator panel for a 3UF720 operator panel

Step	Description
1	Unscrew the four mounting bracket screws and remove the 3UF52 operator panel from the front panel or switchgear cabinet door.
2	Ensure that the dimensions of the cutout in the front panel or cabinet door measure 91.5 + 0.5 mm (width) and 54.5 + 0.5 mm (height) (see figure).
3	Slide the seal provided onto the operator panel adapter (see figure).
4	Position the operator panel adapter in the cutout.
5	Position the operator panel in the adapter.
6	Snap the four mounting brackets onto the operator panel.
7	Lock the operator panel in position by tightening the four mounting bracket screws (see figure and safety information!).

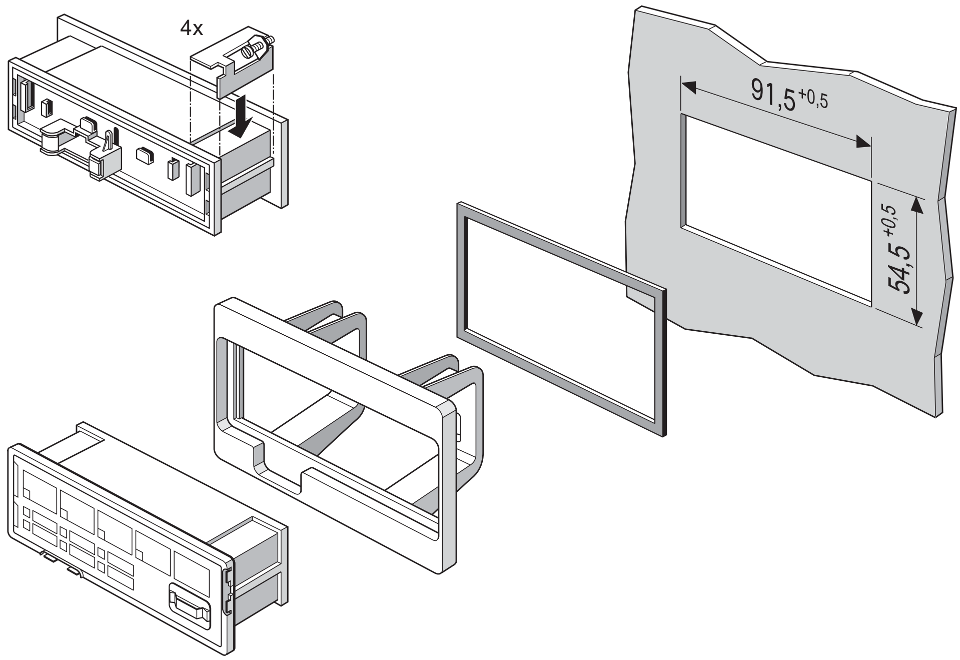


Figure 13-8 Mounting the operator panel adapter (1)

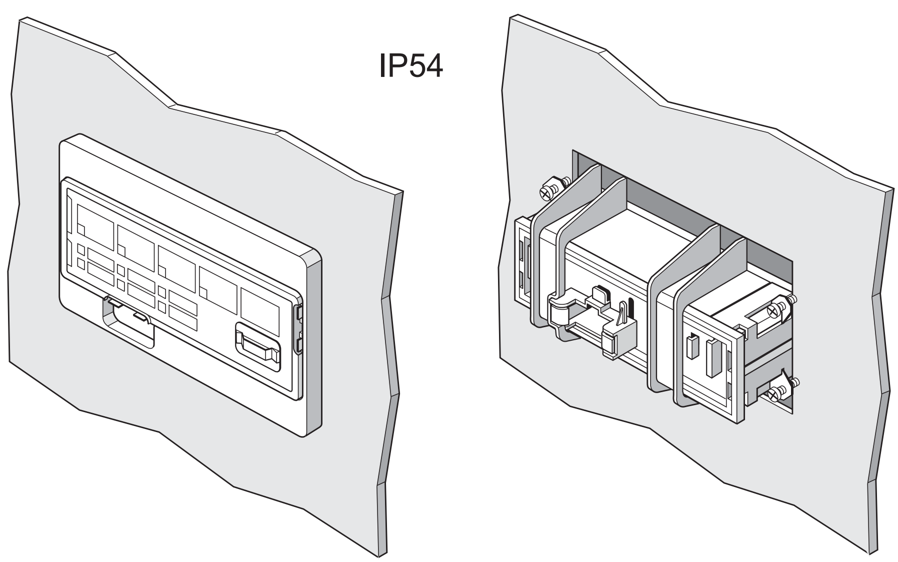


Figure 13-9 Mounting the operator panel adapter (2)

WARNING

Tightening torque of the screws

To ensure that the panel will function correctly and is sealed to comply with IP54, the tightening torque of the screws provided must not be set too high when mounting and the seal must be properly fitted.

Note

A SIMOCODE pro 3UF7 system operator panel is not compatible with SIMOCODE DP 3UF5, and vice versa.

13.3.5 Restoring factory settings

With the factory settings, all parameters are reset to the factory values.

Restoring the factory settings with the TEST / RESET button on the basic unit

Proceed as follows (also deletes any previous password setting!):

Table 13-24 Restoring the factory settings with the TEST / RESET button

Step	Description
1	Switch off the supply voltage for the basic unit.
2	Press the TEST / RESET button on the basic unit and keep it pressed.
3	Switch on the supply voltage for the basic unit. The "Device" LED lights up yellow.
4	Release the TEST / RESET button after approx. two seconds.
5	Press the TEST / RESET button again after approx. two seconds.
6	Release the TEST / RESET button after approx. two seconds.
7	Press the TEST / RESET button again after approx. two seconds.
8	The factory setting is restored.

Note

If any of the steps stated above are not carried out correctly, the basic unit will revert to normal operation.

Note

This function is always active, irrespective of the "TEST / RESET keys disabled" parameter.

Restoring the factory settings with the software SIMOCODE ES (TIA Portal)

Prerequisite: SIMOCODE pro is connected to the PC / PG via PROFIBUS DP or via the system interface and SIMOCODE ES is started.

Proceed as follows (resets to factory settings, excluding the password):

Table 13-25 Restoring the factory settings with the software SIMOCODE ES (TIA Portal)

Step	Description
1	Go online, e.g. via "Online → Connect online".
2	In the Project navigation view, select "Online accesses → COM [Sirius PtP] → Update accessible stations → SIMOCODE → Commissioning → Command".
3	Click on the "Factory settings" button. The factory setting is restored.
4	"Factory settings OK" is displayed in the inspector window.

13.3.6 Firmware update of device components

You can use this function to update the firmware of the following SIMOCODE pro basic units. You can download the firmware versions on the Support page:

- Firmware update for SIMOCODE pro V PB basic units from product version *E15* (https://support.industry.siemens.com/cs/ww/en/view/109767656)
- Firmware update for SIMOCODE pro V MR basic units from product version *E03* (https://support.industry.siemens.com/cs/ww/en/view/109771740)
- Firmware update for SIMOCODE pro V PN basic units from product version *E08* (https://support.industry.siemens.com/cs/de/en/view/109749989)
- Firmware update for SIMOCODE pro V EIP basic units (https://support.industry.siemens.com/cs/de/en/view/109756912)

Note

The parameterization of the device is retained after the firmware has been updated.

NOTICE

Connection to the device

The connection by USB PC cable or Ethernet must not be interrupted during the update procedure.

Requirements:

- The basic unit must be connected to SIMOCODE ES via online connection, USB PC cable (PtP) or Ethernet.
- The supply voltage must be present at the basic unit at the start of and during the firmware update.
- A firmware update is only possible if
  - The motor is in the "off" state and there is no motor current
  - The control station is in "Local manual" status
  - The device is not protected by a password

Firmware update

You can perform the firmware update as follows:

- for the SIMOCODE pro V PB and pro V MR basic units, via the SIRIUS PC USB cable (SIRIUS PtP) with the assistance of the SIMOCODE ES (TIA Portal) software, all versions Basic / Standard / Premium V15 or higher or Professional V16 or higher.
- for the SIMOCODE pro V PN and pro V EIP basic units: via Ethernet with the assistance of the SIMOCODE ES (TIA Portal) software, all versions Basic / Standard / Premium V13 or higher or Professional V16 or higher.

WARNING
Risk of impermissible system states.
The installation of the firmware update switches the basic unit into "station failure" state. This state can affect the operation of an online process or a machine.
Unexpected operation of a process or a machine can lead to fatal or severe injuries and/or to property damage.
Before installing the firmware update, ensure that the basic unit is not involved in an active process.

Update procedure:

1. Select the module in the device configuration
2. Select the "Online & diagnostics" command from the shortcut menu
3. Select the "Firmware update" group from the "Functions" folder.
4. Click the "Browse" button to select the path to the firmware update files.
5. Select the firmware file from the folder into which you previously unpacked the download file. The table in the "Firmware update" area lists those modules under "Suitable for modules with" for which an update is possible with the selected firmware file.
6. Click the "Run update" button. If the module can interpret the selected file, the file is downloaded to the module

Updating the firmware

The "Run firmware after update" check box is always selected. When the loading process is complete, the module works with the new firmware.

Note

Avoid interrupting the firmware update

If you interrupt a firmware update, the device is not ready for use. In this case, the "BUS" and "GEN FAULT" LED indicators flash alternately and the "DEVICE" LED lights up red.

Note the following behavior during the firmware update:

The "BUS" and "GEN FAULT" LED indicators flash alternately and the "DEVICE" LED lights up red.

Checking the behavior following the firmware update

After the firmware update, check the firmware version of the basic unit that has had the firmware updated.

13.3.7 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

13.4 Troubleshooting

13.4.1 Error buffer

SIMOCODE pro has an error buffer in which the 21 most recent errors / faults and "Power - On" events are recorded with a time stamp. Time stamps are based upon the operating hours of the device (resolution 1 s), i.e. the length of time for which the device is supplied with control supply voltage.

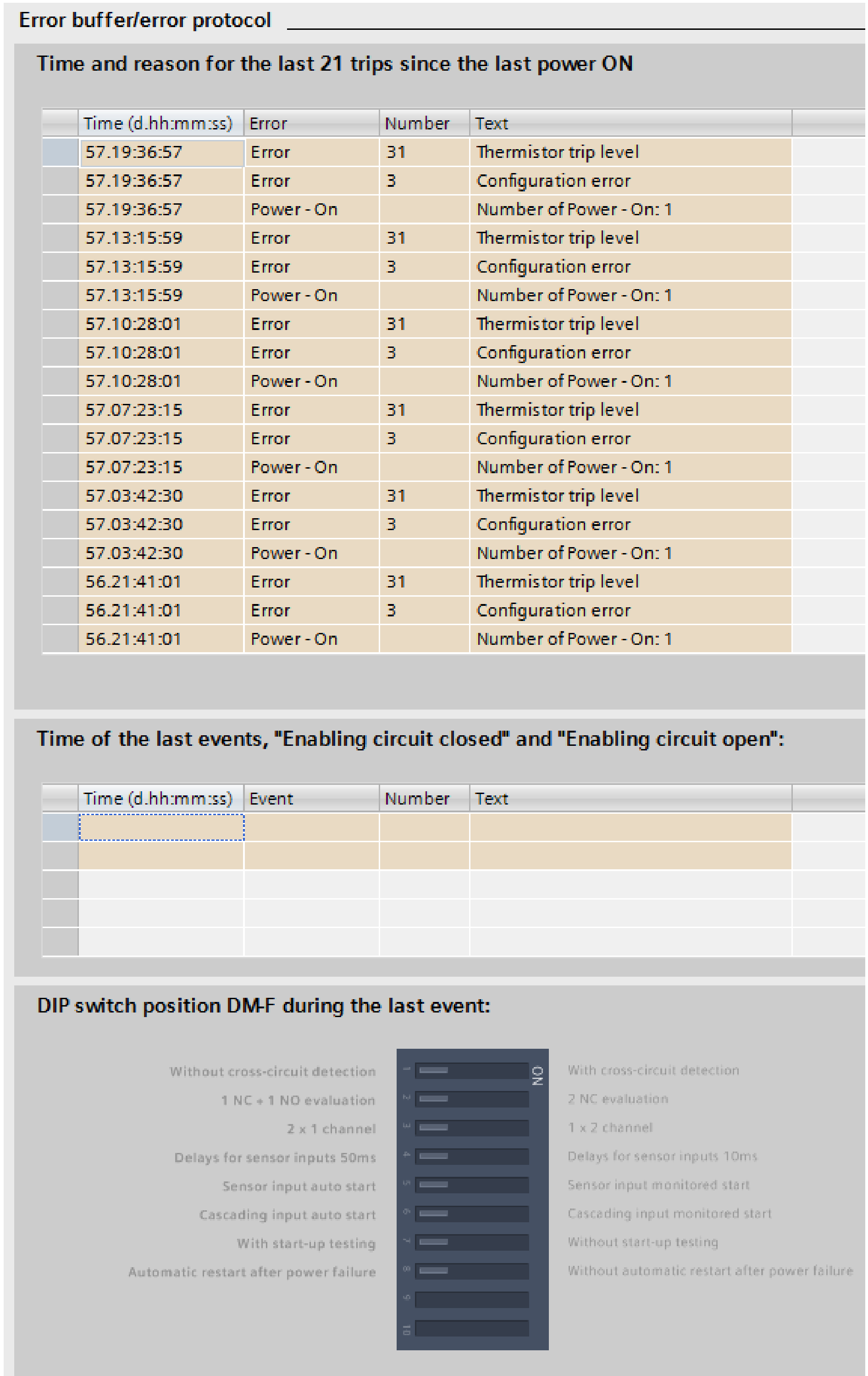
The "Error/Fault" and "Power - On" events are logged. Each of these events is given a time stamp.

- Error/Fault: The last 21 errors are stored in a ring buffer; the incoming error (rising edge) is always logged. An outgoing error (falling edge) will not be logged.
- Power on: If the most recent entry is "Power - On," this is not logged multiple times. Instead, the error number is used as a power-on counter. Thus, the error buffer cannot be deleted by frequent on/off operations.

Entry 1 is the most recent entry and entry 21 the oldest.

This data is displayed via the "SIMOCODE ES (TIA Portal)".

Example:



Error buffer/error protocol

Time and reason for the last 21 trips since the last power ON

Time (d.hh:mm:ss)	Error	Number	Text
57.19:36:57	Error	31	Thermistor trip level
57.19:36:57	Error	3	Configuration error
57.19:36:57	Power - On		Number of Power - On: 1
57.13:15:59	Error	31	Thermistor trip level
57.13:15:59	Error	3	Configuration error
57.13:15:59	Power - On		Number of Power - On: 1
57.10:28:01	Error	31	Thermistor trip level
57.10:28:01	Error	3	Configuration error
57.10:28:01	Power - On		Number of Power - On: 1
57.07:23:15	Error	31	Thermistor trip level
57.07:23:15	Error	3	Configuration error
57.07:23:15	Power - On		Number of Power - On: 1
57.03:42:30	Error	31	Thermistor trip level
57.03:42:30	Error	3	Configuration error
57.03:42:30	Power - On		Number of Power - On: 1
56.21:41:01	Error	31	Thermistor trip level
56.21:41:01	Error	3	Configuration error
56.21:41:01	Power - On		Number of Power - On: 1

Time of the last events, "Enabling circuit closed" and "Enabling circuit open":

Time (d.hh:mm:ss)	Event	Number	Text

DIP switch position DM-F during the last event:

Figure 13-10 Example of event logging using the SIMOCODE ES (TIA Portal)

Example:

The most recent "power-on" event was logged at a device operating time of 17 days, 21 hours and 31 minutes. Therefore, at the moment of "Power - On", the device was operating (supplied with voltage) for 17d 21h 31min. The "Number of starts >" fault was logged at a device operating time of 18 days, 22 hours, 17 minutes, i.e. 24h 46min after the most recent "Power - On."

When **using a DM-F**, the events "Enabling circuit closed" and "Enabling circuit open" are logged for the DM-F Local and/or the DM-F PROFIsafe in a separate window:

- Time
- Event: "Enabling circuit closed" or "Enabling circuit open"
  - Number:
    Line 1 200 or 202
    Line 2 201 or 203
  - Text:
    Line 1 "DM-F Local enabling circuit 0 -> 1" or "DM-F PROFIsafe enabling circuit 0 -> 1"
    Line 2 "DM-F Local enabling circuit 1 -> 0" or "DM-F PROFIsafe enabling circuit 1 -> 0."

The current DIP switch position of the "DM-F Local" and/or the "DM-F PROFIsafe" is displayed under "DIP switch position DM-F during the last event".

See also Chapter "Data record 72 - Error buffer" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

13.4.2 Event memory

In addition to the error buffer, various events can be stored in the event buffer

Note

This event memory is supported by the SIMOCODE pro V basic unit as from firmware version V3.0.

The following events are stored:

- last event "DM-F enabling circuit closed"
- last event "DM-F enabling circuit open"
- Initialization module read in
- Initialization module written.

See also Chapter "Data record 73 - Event buffer" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

13.4.3 Alarms, faults, and system events - error handling

Table 13-26 Alarm, fault, and system events

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. 1)
Analog module 1/2 open circuit	An open circuit has occurred in the analog value measuring circuit.	Check the measured value sensor and the measuring circuit.	Reset		64
Startup parameter block active	The startup parameter block prevents transfer of SIMOCODE pro parameters that can be transferred from the IO controller during startup. The block may not be set if SIMOCODE pro is integrated in STEP7 via the SIMOCODE pro object manager (OM). 2)				
Antivalence	Only for positioner control function: The change-over contacts of the limit switch do not issue an antivalent signal.	Limit switch defective, open circuit limit switch		Tripped	
Configuration error	The configured unit configuration does not match the actual configuration.	• Check whether all the configured components are available • Check the actual configuration with "Configuration".	Clear the fault; reset	Tripped	3
Execution STOP command	The motor feeder could not be turned off after a STOP command was issued.	• The contactor contact is welded • Parameter execution time is too short • The "open" end position has not been reached during the parameterized runtime (only for the "Positioner" and "Solenoid valve" control functions).	Clear the fault; reset	Tripped	9
Execution ON command	The motor feeder could not be turned on after an ON command is issued.	• Main circuit is interrupted (fuse, circuit breaker) • The motor contactor or contactor control is defective • Parameter execution time is too short.	Reset	Tripped	8
Trip level cos phi <	The power factor cos phi has undershot the trip level. Possible cause: The motor is being operated without a load.	Please check the application that is being driven by the motor.		Tripped	44
Trip level I < undershot	The maximum current has undershot the trip level.	Please check the application that is being driven by the motor.		Tripped	41

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. 1)
Trip level I > overshot	The maximum current has overshot the trip level.	Please check the application that is being driven by the motor.		Tripped	40
Trip level P < undershot	The active power of the motor has undershot the trip level.	Please check the application that is being driven by the motor.		Tripped	43
Trip level P > overshot	The active power of the motor has overshot the trip level.	Please check the application that is being driven by the motor.		Tripped	42
Trip level U < undershot	The voltage in the motor feeder has undershot the trip level. Possible causes: • Undervoltage in the network • Fuse has tripped	Check the motor feeder.		Tripped	45
Trip level 0/4 - 20 mA < undershot	The measured value at the analog input has undershot the trip level.	Check the measuring station.		Tripped	47
Trip level 0/4 - 20 mA > overshot	The measured value at the analog input has overshot the trip level.	Check the measuring station.		Tripped	46
Operational Protection Off (OPO)	An "Operational Protection Off (OPO)" signal is pending. A switched-on motor feeder has been switched off. The feeder cannot be switched on while the OPO signal is active.		Reset	Tripped; for positioners QE1 or QE2 switched on until end position is reached - depending upon configuration	19
Motor operating hours >	The configured limit value for motor operating hours monitoring has been exceeded.	Please adopt the maintenance measures intended for the feeder.			
Stalled rotor	The maximum motor current has exceeded the threshold for stalled rotor protection. Possible cause: The motor is blocked.	Please check the application that is being driven by the motor.	Reset	Tripped	48
Stalled positioner	The torque switch has activated before or without the respective limit switch.	• The positioner may be blocked. • Acknowledge the fault by releasing with the "OPEN/ CLOSED" counter command. • Please check the positioner application and the limit switches.	Counter command "OPEN / CLOSED!"	Tripped	12

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. [1]
DM-F feedback circuit	The DM-F Local or DM-F PROFIsafe has detected a fault in the feedback circuit (the feedback circuit must be closed as the enabling circuit is switched on); the "SF" (general fault) LED on the front of the DM-F Local or DM-F PROFIsafe is flashing red.	• Check the wiring of the feedback circuit • Check the contact blocks in the feedback circuit.	Rectify the fault such that the feedback circuit is closed.	Tripped	
DM-F safety-related tripping	The DM-F has tripped the enabling circuit for safety reasons.	The motor cannot be switched on again until the enabling circuits of the DM-F are closed again.	Acknowledge with "Reset", if auto-reset is not active.	Tripped	66
DM-F test requirement	The enabling circuits of the DM-F Local or DM-F PROFIsafe have not been opened and closed again within the configured time period.	The function of the enabling circuit relay contacts can only be tested when they are switched. Perform a function test.	Please apply the maintenance measures prescribed for this scenario.		
DM-F wiring	DM-F module wiring fault (short-circuit to ground in the sensor circuit/feedback circuit); the "SF" (general fault) LED on the front of the DM-F Local is illuminated red.	• Check the wiring of the sensor circuits / feedback circuit • Rectify the fault.	Reset	Tripped	67
DM-FL actual and set configuration different	The actual configuration of the DM-F Local does not correspond to the parameterized set configuration.	Check whether the effective configuration of the DM-F Local corresponds to the parameterized set configuration. Correct the effective configuration by changing the DIP switch settings or adjusting the set configuration by means of parameterization if required.			
DM-FL simultaneity	The DM-F Local has detected a discrepancy error in the two-channel sensor circuit.	Check the switching elements in the sensor circuit.	Rectify the fault by opening or closing the sensor inputs.	Tripped	
DM-FL configuration mode	The DM-F Local is in "configuration mode"; the "DEVICE" LED on the front of the DM-F Local is illuminated yellow.	Complete the configuration (see manual "Fail-safe Digital Modules SIMOCODE pro Safety", Chapter 7.4) [3].			

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. [1)]
DM-FL cross circuit	Cross circuit in sensor circuit of DM-F Local; the "SF" (general fault) LED on the front of the DM-F Local is illuminated red.	• Check the wiring of both sensor circuits for cross circuiting • Rectify the fault.	Reset	Tripped	68
DM-FL waiting for start-up test	The DM-F LOCAL is in the "Waiting for start-up test" status.	Perform the startup test by actuating the sensor in the sensor circuit.			
DM-FP Prm error	The parameter settings of the PROFIsafe profile are incorrect or the set PROFIsafe address is not identical to the configured address.	Check the communication / PROFIsafe parameters of SIMOCODE pro that were set on the IO controller.			
Double 0	Both torque switches have activated simultaneously. The motor feeder has been turned off.	• Open circuit torque switch. • Torque switch is defective.		Tripped	13
Double 1	Both limit switches have activated simultaneously.	Limit switch defective		Tripped	14
End position	Except positioner 5 control function: The state of the limit switches has changed without a command (positioner has left the end position without a command).		Counter command "OPEN / CLOSED!"	Tripped	15
External ground fault	External ground-fault monitoring has responded. An impermissibly high residual current is flowing.	Please check the motor connection cable for damage.	Reset	Tripped	29
External fault 1, 2, 3, 4, 5 or 6	A signal is pending at the input (socket) of the "External fault 1, 2, 3, 4, 5 or 6" standard function.	Check the motor feeder.		Tripped	56, 57, 58, 59, 60, 61
Required function is not supported	At least one parameterized function is not supported by the version of the basic unit.	Activate only the functions that are supported by the version of the basic unit.			
Hardware fault [6)]	The SIMOCODE pro basic unit hardware is defective.	Replace the basic unit. See Chapter Replacing SIMOCODE pro components (Page 257).	Clear the fault.	Tripped	0
Initialization module write-protected	The initialization module is completely write-protected.	Deactivate write protection of the initialization module			
Initialization module write-protected, parameter changes not allowed	The initialization module is completely or partially write-protected. Reparameterization of SIMOCODE pro is denied because the initialization module is write-protected.	Deactivate write protection of the initialization module			

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. [1)]
Initialization module - identification data write-protected	Reparameterization has been rejected because the initialization module is write-protected.	• Select a parameterization with identical addressing and I&M data • Deactivate the partial write protection of the initialization module			
Initialization module read in	The parameters of the initialization module were read into SIMOCODE.				
Initialization module programmed	The reparameterization was accepted in the initialization module.				
Initialization module cleared	The initialization module has been cleared and is now back in the as-delivered condition.				
Internal ground fault	Internal ground-fault monitoring has responded. An impermissibly high residual current is flowing.	Please check the motor connection cable for damage.	Reset	Tripped	28
No start permitted	The permissible number of starts in the monitoring timeframe has been attained. The next start should not be carried out until the interlocking time has expired.		Reset	Tripped	
Module fault	At least 1 SIMOCODE pro module is not ready for use.	• Connecting cable defective or incorrectly connected • Module defective. Replace the module. See Chapter Replacing SIMOCODE pro components (Page 257).	Clear the fault; reset	Tripped	1
Module supply voltage is not present	Supply voltage on the DM-F Local is too low or not present.	• The terminals are not wired properly • Module defective. Replace the module. See Chapter Replacing SIMOCODE pro components (Page 257).	Clear the fault; reset	Tripped	
Power failure (UVO)	The power failure lasted longer than the set power failure time.		Clear the fault; reset	Tripped	18
Just one start possible	The start after the next one should not be carried out until the interlocking time has expired.				
Parameter is incorrect ("General fault" category)	The parameter data is incorrect.	The designation of the incorrect parameter can be found via the number (byte No.) in Chapter "Tables" in the manual "Parameterizing SIMOCODE pro" [4)].	Clear the fault; reset	Tripped	4

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. [1]
Parameter is incorrect ("Event" category)	The parameter data transferred to the unit is incorrect. Errors in the parameter data can occur, for example, if the device has not been parameterized with SIMOCODE ES (TIA Portal).	Check the parameter data (data records 130 - 135) that has been transmitted to the device for correct content. See Chapter "Data formats and data records" in the manual "SIMOCODE pro - Communication" [5].			
Parameter changes not allowed in the current operating state	You attempted to change at least one parameter that cannot be changed in the current operating state.	Many parameters can only be changed if the motor feeder is switched off and not in "Remote" mode. The following parameters can always be changed: See Chapter "Data formats and data records" in the manual "SIMOCODE pro - Communication" [5].			
Wrong password	SIMOCODE pro parameters are protected by a password. An attempt has been made to change the parameters without entering the password.	Please use the correct password for changing the parameters. If you do not know the password, new parameters can only be entered after the factory settings have been restored. For a description of how to restore the factory settings, see Chapter Restoring factory settings (Page 263).			
Phase unbalance	The limit value for phase unbalance has been exceeded. Phase unbalance can cause an overload. Possible causes: • Phase failure • Fault in the motor windings.	Check the motor feeder and the motor.	Reset	Tripped	25
Feedback (FB) OFF	The current flow in the motor feeder has been interrupted without the motor feeder being turned off.	• The main circuit has been interrupted (fuse, circuit breaker, main switch). • The motor contactor or contactor control is defective	Reset	Tripped	11
Feedback (FB) ON	Current is flowing in the motor feeder without the motor feeder being switched on	• Contactor contacts have been manually activated • Contactor has not been switched on via SIMOCODE	Clear the fault; reset	Tripped	10
Test Position Feedback (TPF)	Current is flowing in the motor feeder although the motor feeder is in the test position (TPF).	The main circuit is not interrupted in test operation.	Reset	Tripped	17
Memory module read in	The parameters of the memory module were read into SIMOCODE.				
Memory module cleared	The memory module was cleared and is now back in as-delivered state.				

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. [1)]
Memory module programmed	The reparameterization was accepted in the memory module.				
Memory module write-protected	The memory module is completely write-protected.	Deactivate write protection of the memory module.			
Status - cooling down period active	The motor feeder has been switched off due to overload.	The motor can only be switched on again after the cooling down period has expired.			
Status - DM-F enabling circuit	Shows the status of the enabling circuit: • closed or • tripped				
Status - emergency start executed	The thermal memory has been cleared with the function "Emergency start".	The motor can be switched on again immediately after an overload trip.			
Status - test position (TPF)	The motor feeder is in the test position (TPF). The main circuit has been interrupted and the feeder can be "cold started".				17
Stop time >	The configured limit value for motor stop time monitoring has been exceeded.	Please adopt the maintenance measures intended for the feeder. If possible, switch on the feeder.			
Fault - bus	Bus communication has been or is being interrupted.	Check the bus connection (plugs, cables, etc.).	Reset, auto-reset	Tripped	5
Fault - PLC/PCS	The PLC that controls the feeder was or is in STOP mode.	Check the operating state of the PLC.	Reset, auto-reset	Tripped	6
Fault antivalence	The limit switches are not reporting any antivalent signals.	• Limit switch open circuit • Please check the positioner application and the limit switches.	Counter command "OPEN/ CLOSED"	Tripped	16
Fault - EM open circuit	A short circuit has occurred in the wiring to the 3UL23 residual current transformer.	Check the wiring to the 3UL23 residual current transformer	Reset	Tripped	38
Fault - EM short-circuit	A short-circuit has occurred in the wiring to the 3UL23 residual current transformer.	Check the wiring to the 3UL23 residual current transformer	Reset		39
Fault end position	Positioner/solenoid valve has left the end position without a command being issued. The motor feeder has been turned off.	Acknowledge the fault by releasing with the counter command "OPEN/ CLOSED".	Reset; counter command	Tripped	15
Fault - temporary components (e.g. memory module)	One of the following components is defective: • Memory module • PC cable.	Replace the defective components. See Chapter Replacing SIMOCODE pro components (Page 257).	Clear the fault; reset	Tripped	2

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. [1)]
Temperature module 1/2 - trip level exceeded	The temperature trip level has been overshot.	Check the temperature measuring station.	Tripped		35
Temperature module 1/2 - warning level exceeded	The temperature warning level has been exceeded.	Check the temperature measuring station.			
Temperature module 1/2 out of range	Temperature sensor is delivering impermissible values.	Check the temperature sensor.	Reset	Tripped	37
Temperature module 1/2 sensor fault	Either a short circuit or an open circuit has occurred in the temperature sensor circuit.	Check the temperature sensor and the sensor cable.	Clear the fault; reset	Tripped	36
Test trip	The motor feeder has been checked and switched off by a test trip.		Reset	Tripped	65
Thermistor trip level	Thermistor protection response. The temperature of the motor is too high.	Please check the motor and the application that is being driven by the motor. The motor cannot be switched on again until the temperature has reached the reset point of the thermistor.	Reset, auto-reset	Tripped	31
Thermistor open circuit	An open circuit has occurred in the thermistor sensor cable.	Check the thermistor sensor cable and the thermistor.	Clear the fault; reset	Tripped	33
Thermistor short circuit	A short circuit has occurred in the thermistor sensor cable.	Check the thermistor sensor cable and the thermistor.	Clear the fault; reset	Tripped	32
Dry-running – pump	Dry-running of the pump was prevented by switching off the pump motor. Possible causes: • The permissible limit value of the minimum flow rate Q_{min} of the pump was undershot or • The set limit value of the active power P_{min} of the pump motor is not correct.	Make sure that the minimum flow rate specified for the pump is not undershot and that the monitored limit value of the active power P_{min} has been set correctly.			

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. 1)
Dry-running protection – error	An error was detected in the measured value acquisition of the active power of the pump motor or the teach-in process was interrupted with a timeout. The pump motor was switched off. Possible causes: • Timeout during teach-in process • Unbalance in voltage or current of at least 30% • Fault in current/voltage measuring module	1. Repeat the teach-in process. 2. Check the power supply. 3. Check the current/voltage measuring module; replace the defective component.			
Overload	The motor feeder has been overloaded.	Please check the motor and the aplication that is being driven by the motor. The motor can be switched on again after the cooling down period has expired or after an emergency start.	Reset, auto-reset	Tripped	26
Overload and unbalance	There is a load unbalance on the motor feeder phases. Possible causes: • Phase failure • Fault in the motor windings.	Check the motor feeder and the motor. The motor can be switched on again after the cooling down period has expired or after an emergency start.	Reset, auto-reset	Tripped	27
Prewarning overload (I > 115 %)	The motor feeder is in overload operation. If this condition continues to persist, the motor feeder will trip within a short period of time due to overload.	Please check the motor and the aplication that is being driven by the motor.			
Warning level cos phi <	The power factor cos phi has undershot the warning level. Possible cause: The motor is being operated without a load.	Please check the application that is being driven by the motor.			
Warning level I< undershot	The maximum current has undershot the warning level.	Please check the application that is being driven by the motor.			
Warning level I> overshot	The maximum current has overshot the warning level.	Please check the application that is being driven by the motor.			
Warning level P< undershot	The active power of the motor has undershot the warning level.	Please check the application that is being driven by the motor.			
Warning level P> overshot	The active power of the motor has overshot the warning level.	Please check the application that is being driven by the motor.			
Warning level U< undershot	The voltage in the motor feeder has undershot the warning level. Possible causes: • Undervoltage in the network • Fuse has tripped.	Check the motor feeder.			

Event (alphabetical)	Description	Troubleshooting	Acknowledgment / fault rectification	Contactor control	Error No. [1)]
Warning level 0/4 - 20 mA < undershot	The measured value at the analog input has undershot the warning level.	Check the measuring station.			
Warning level 0/4 - 20 mA > overshot	The measured value at the analog input has overshot the warning level.	Check the measuring station.			
Permissible number of starts exceeded	The permissible number of starts in the monitoring timeframe has already been exceeded. The next start should not be carried out until the interlocking time has expired.		Reset	Tripped	52

1) See also "Error number" in Chapter "Data record 72 - Error buffer" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Note

2) Parameter block

On devices in the as-delivered condition or after the factory settings have been restored, the parameter block is not active!

3) SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852)

4) Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)

5) SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960)

6) If SIMOCODE pro restarts the basic unit after a hardware fault into the normal operating mode (device LED lights up green) by means of a power cycle, no hardware replacement is necessary.

Safety and commissioning information for Ex areas 14

14.1 Motor protection functions (overload protection, thermistor protection)

14.1.1 Module integration

The motor protection functions (overload protection, thermistor protection) are implemented in the following modules:

- 3UF70 basic units
- 3UF71 current / voltage measuring modules
- 3UF73 digital modules
- 3UF76 multifunction modules.

14.1.2 Information and standards

Information and standards

Motor protection functions (overload protection, thermistor protection)

The overload protection and the thermistor motor protection of the SIMOCODE pro system comply with the requirements for overload protection of explosion-proof motors of the following types of protection:

- **Ex d "flameproof enclosure" according to DIN EN 60079-1**
- **Ex e "increased safety" according to DIN EN 60079-7**
- **Ex p "pressurization" according to DIN EN 60079-2**
- **Ex t "dust ignition protection by enclosure" according to DIN EN 60079-31**

Increased danger in hazardous areas means it is necessary to carefully observe the following notes and standards:

- **IEC 60079-14 / EN 60079-14 / DIN VDE 0165-1** Electrical equipment for locations with explosive gas atmosphere - Electrical installations in hazardous areas (except mines)
- **IEC 60079-17 / EN 60079-17 / DIN VDE 0165-10-1** Electrical equipment for locations with explosive gas atmosphere - Testing and maintenance of electrical installations in hazardous areas (except mines)
- **DIN EN 50495** Safety devices required for the safe functioning of equipment with respect to explosion risks

- **VDE 0118** Erection of electrical installations in mines
- **National implementation of Directive 1999/92/EC**

All 3UF7 devices are approved under Equipment Group I, Category "M2" (mining) and Equipment Group II, Category 2 in the area "G and D" (areas in which explosive gas, vapor, mist and air mixtures as well as flammable dust are present):

Marking:

- BVS 06 ATEX F 001 *) / ITS21UKEX0464
- II (2) G [Ex eb Gb][Ex db Gb][Ex pxb Gb]
- II (2) D [Ex tb Db][Ex pxb Db]
- I (M2) [Ex db Mb]

*)

Note

This safety and commissioning information is also valid for devices with certificate numbers BVS 04 ATEX F 003.

The devices are suitable for protecting motors in potentially explosive areas in accordance with the above standards.

> **⚠ WARNING**
>
> **Use in hazardous locations**
>
> The components of SIMOCODE pro are **not** suitable for installation in hazardous areas.
>
> The device is only allowed to be installed in a control cabinet with the minimum degree of protection of IP 4x.
>
> If you have any questions, ask your explosion protection specialist.

> **⚠ WARNING**
>
> **Qualified personnel required**
>
> All work involved in connecting, commissioning and maintenance must be carried out by **qualified, responsible** personnel.
>
> Failure to follow proper procedures may result in **personal injury and damage to property**.

14.1.3 Installation and commissioning – motor protection functions (overload protection, thermistor protection)

14.1.3.1 Operating Instructions

NOTICE
SIMOCODE pro Operating Instructions
Please observe the SIMOCODE pro Operating Instructions (enclosed with the devices).
You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information about commissioning and service (Page 233) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support.

14.1.3.2 Setting the rated motor current

Notes/example

Set the 3UF7 to the rated motor current (according to the type plate or design test certificate of the motor).

NOTICE
Trip class / tripping characteristic
Pay attention to the trip class or the tripping characteristic of the 3UF7.
Choose the trip class so that the motor is thermally protected even with a blocked rotor.
The motor, cables, and contactor must be dimensioned for the selected trip class.

NOTICE
Setting the "response" of the overload protection
Set the response of the overload protection to "Trip"!

Example of a tripping characteristic with 3UF710* current/voltage measuring modules and 3UF711*-1AA00-0 1st generation current/voltage measuring modules

Motor 500 V, 50 / 60 Hz, 110 kW, 156 A, temperature class T3, time T_E = 11 s, I_A / I_s = 5.5:

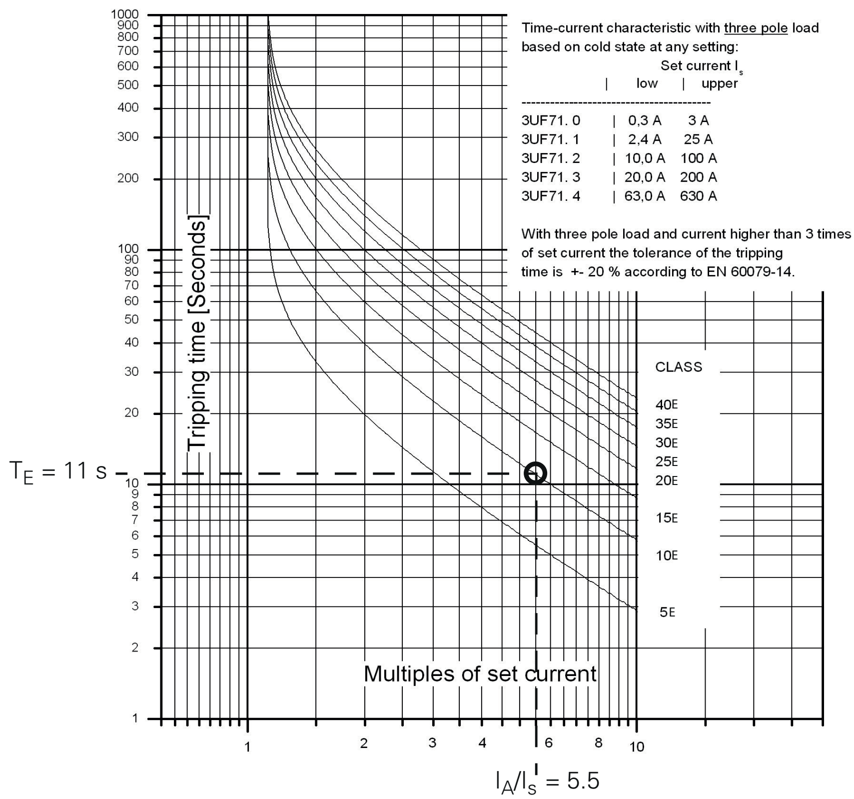


Figure 14-1 Tripping conditions of the Ex e motor, selected: CLASS 10E when using a 3UF710* current measuring module

The latest tripping characteristics for SIMOCODE pro can be found in the Industry Online Support (Tripping characteristics 3UF7 (https://support.industry.siemens.com/cs/search?search=3UF7&type=Characteristic&lc=en-WW)).

NOTICE
Tripping characteristic The type of tripping characteristic is dependent on the configured measuring module. If a 3UF711*-1AA00-0 1st generation current / voltage measuring module is configured in a parameter assignment, although a 3UF711*-1AA01-0 2nd generation current / voltage measuring module is used, then the tripping characteristic remains that of the 1st generation current / voltage measuring module. If only the hardware of the measuring module is replaced, this does not result in any change to the tripping behavior.

14.1.3.3 SIMOCODE pro with thermistor input

On the 3UF70, you can use temperature sensor type A with a characteristic according to IEC 60947-8 (DIN VDE 0660, part 303) and DIN VDE V 0898-1-401.

Depending on the number of sensors, the following tripping and restart temperatures apply.

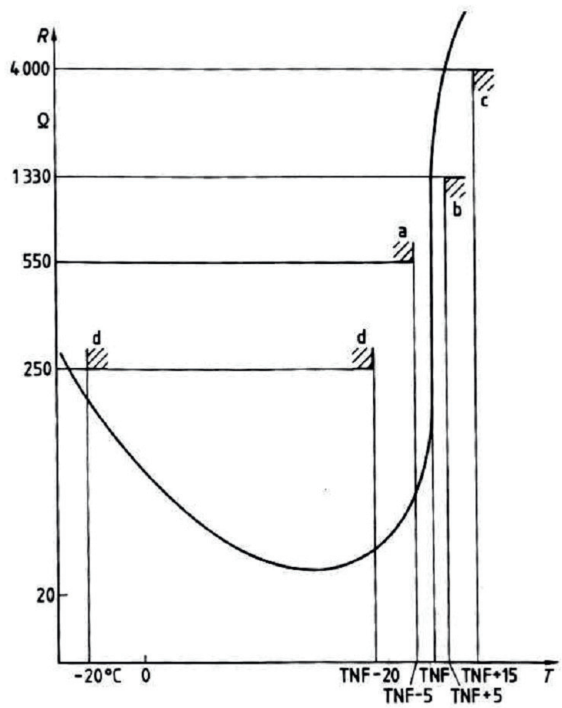


Figure 14-2 Typical characteristic curve of a type A sensor (logarithmic scale)

Depending on the number of sensors, the following tripping and restart temperatures will result based on the TNF (rated response temperature of the sensor):

Table 14-1 Tripping and restart temperatures

	Tripping temperature	Restart temperature
3 sensors	TNF +4 K	TNF -7 K
6 sensors	TNF -5 K	TNF -20 K

The temperatures listed are limit values.

CAUTION

Response setting

Set the response for the activated thermistor to "Trip"!

14.1.3.4 Sensor circuit wiring

NOTICE

Installing the measuring circuit cables

Lay the measuring circuit cables as separate control cables. It is not permissible to use the cores of the motor supply cable or other main supply cables.

Shielded control cables should be used if extremely inductive or capacitive interference is expected as a result of power cables routed in parallel.

Maximum cable lengths of the sensor circuit cables:

Table 14-2 Maximum cable length of the sensor circuit cables

Cable cross section	Cable lengths (single) at the thermistor input	
	Without short-circuit detection	With short-circuit detection1)
2.5 mm^2	2800 m	250 m
1.5 mm^2	1500 m	150 m
0.5 mm^2	500 m	50 m
1) A short circuit in the sensor circuit will be detected up to these maximum cable lengths.		

NOTICE

Evaluation of the short-circuit detection of the sensor cable

Evaluating the short-circuit detection of the sensor cable is recommended.

If the short-circuit detection of the sensor cable is not evaluated, when commissioning or after modifications / maintenance work (assembly, disassembly) of the system, the sensor resistor must be measured using a suitable measuring instrument.

14.1.3.5 Short-circuit protection for type of coordination 2 according to IEC 60947-4-1

Short-circuit protection must be carried out by separately arranged overcurrent protection devices.

NOTICE

Fuse protection of the contactor for type of coordination 2

When combining with other contactors, observe the respective maximum fuse protection of the contactor for type of coordination 2.

14.1.3.6 Cable protection

NOTICE
Cable cross sections
Avoid impermissibly high cable surface temperatures by correctly dimensioning the cross sections!
Choose a sufficient cable cross section, especially for heavy-starting motors CLASS 20E to CLASS 40E (see Chapter Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module (Page 331))

14.1.3.7 Test

Testing - general information

SIMOCODE pro offers users a convenient method of checking the complete motor protection chain (incl. actuators and sensors such as contactors, circuit breakers, thermistors). This can be used, for example, for testing according to IEC 60079-17 or VDE 0118 The test encompasses a full function test. For this purpose, all three test phases are to be carried out (hardware test, current feedback, motor protection tripping, see below). The test can be carried out using the "TEST / RESET" buttons provided, or automatically via the bus. Tripping currents do not need to be injected in order to carry out testing.

Test phases

- Phase 1: Hardware test / lamp test (0 to 2 s):
  The hardware (e.g. the thermistor electronics) is tested, all LEDs and displays are activated, including the lamp control. Contactor controls remain unchanged.
- Phase 2: Hardware test results (2 s to 5 s):
  If there is a fault, the "HW fault basic unit" fault is triggered.
  If there is no fault:
  - the "GEN. FAULT" LED flashes if no main current is flowing
  - the "GEN. FAULT" LED flickers; if main current is flowing in all three phases (exception: with a "1-phase load" in one phase).
- Phase 3: Relay test (> 5 s):
  If testing is carried out with tripping, the contactor controls are deactivated.

The contactor control can only be shut down by means of the "Test 1" function block and in the "Local 1-3" operating mode, using the "TEST / RESET" button on the basic device / operator panel.

The following table shows the test phases performed when the "TEST / RESET" button is pressed for the required length of time:

Table 14-3 States of the status LEDs / contactor controls during testing

Test phase	**Status**	**Without main current**		**With main current**	
		OK	**Fault** *)	**OK**	**Fault**
Hardware test / lamp test					
< 2 s	"DEVICE" LED	● orange	● green	● orange	● green
	"GEN.FAULT" LED	●	●	●	●
	Contactor control	Unchanged	Unchanged	Unchanged	Unchanged
	Show QL *)	●	●	●	●
Results of the hardware test / lamp test					
2 to 5 s	"DEVICE" LED	● green	● red	● green	● red
	"GEN.FAULT" LED	◐	●	⊗	●
	Contactor control	Unchanged	Deactivated	Unchanged	Deactivated
Relay test					
> 5 s	"DEVICE" LED	● green	● red	● green	● red
	"GEN.FAULT" LED	●	●	●	●
	Contactor control	Deactivated	Deactivated	Deactivated	Deactivated

● LED lighted / switched on
◐ LED flashing
⊗ LED flickering
○ LED off
*) "Fault" only displayed after 2 s

14.1.3.8 Further safety guidelines

> **WARNING**
>
> **Safety information for DM-F Local and DM-F PROFIsafe fail-safe digital modules**
>
> Pay attention to the safety notes in the Manual Fail-safe Digital Modules SIMOCODE pro (http://support.automation.siemens.com/WW/view/en/50564852).

> **CAUTION**
>
> **Using relay outputs for the protection function**
>
> For the protection function, only the relay outputs of the 3UF70 basic unit, of a monostable digital module 3UF730, of a multifunction module 3UF76, or of a fail-safe expansion module 3UF732/3UF733 may be used, and only if connected to the corresponding contactor controls "QE" of the control function!

WARNING

The 3UF7 is not suitable for installation in hazardous areas.

The device is only allowed to be installed in a control cabinet with the minimum degree of protection of IP 4x.

If installed in hazardous areas, there must be no ignition hazard from the 3UF7. Appropriate measures must be taken (e.g. encapsulation).

WARNING

Electrical isolation required

For SIMOCODE pro devices with a 24 V DC control supply, galvanic isolation must be ensured with a battery or a safety isolating transformer according to DIN EN 61558-2-6.

Note

The 3UF7 is not suitable for load-side operation on frequency converters.

14.1.3.9 Ambient conditions

Permissible ambient temperature range:

- Storage / transport: -40 °C to +80 °C
- Operation: -25 °C to +60 °C; OPD: 0 °C to +60 °C.

14.1.3.10 Safety values

In a system with SIMOCODE pro basic units and current measuring modules, the functionality of the SIMOCODE pro motor protection and control device is suitable for use in safety functions up to safety integrity level SIL1.

This applies to the "low demand mode of operation" with a three-year test cycle for safety functions as well as for the "high demand mode of operation".

- $SFF_{SIMOCODE} \geq 60\ \%$
- $PFH_{Max,\ SIMOCODE} \leq 3 * 10^{-6}$ 1/h
- $PFD_{3a} \leq 3*10^{-2}$
- HFT = 0 (single-channel system)
- T_{UL} = 20 years

The failure rate was specified for a maximum ambient temperature of 60 °C.

The requirements demanded of SIL 1 are fulfilled with a reserve of 70% for sensors and actuators.

14.1.4 Maintenance and repairs

These devices are maintenance-free.

WARNING

Repairs

Repairs to the device may only be carried out by the manufacturer.

14.1.5 Warranty

Note

To meet the conditions of the warranty, you must observe the safety and commissioning instructions from the operating instructions.

You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information about commissioning and service (Page 233) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support.

14.1.6 Further information

You will find further information on the Internet:

- Internet (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Product Information System (ProdIS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Service and support (https://support.industry.siemens.com/My/ww/en/requests)
- ATEX (https://www.siemens.com/sirius/atex)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

14.2 Dry-running protection for centrifugal pumps by active power monitoring

14.2.1 Module integration

The function "dry-running protection for centrifugal pumps by means of active power monitoring" is implemented in the following modules:

- Basic units with PTB 18 ATEX 5003 X / ITS21UKEX0455X:
  - 3UF7010-1A.00-0 from *E16*
  - 3UF7011-1A.00-0 from *E13*
  - 3UF7013-1A.00-0 from *E04*
- 3UF712 current/voltage measuring modules

You must to use a combination of both modules to realize this function.

14.2.2 Information and standards

Information and standards

Dry-running protection for centrifugal pumps by active power monitoring – type of ignition protection b

Monitoring systems against dry running are one of the elements required to ensure the safe operation of centrifugal pumps in hazardous areas.

SIMOCODE pro is a safety, controlling or regulating device intended to work autonomously. SIMOCODE pro corresponds to the requirement level for a b1 ignition protection system for centrifugal pumps that are suitable for pumping flammable media and are installed in hazardous areas.

WARNING

Use in hazardous locations

The components of SIMOCODE pro are **not** suitable for installation in hazardous areas.

The device is only allowed to be installed in a control cabinet with the minimum degree of protection of IP 4x.

If you have any questions, ask your explosion protection specialist.

NOTICE
Overall ignition protection concept
According to the overall ignition protection concept for the centrifugal pump, further independent monitoring devices may be necessary, depending on the requirement level, to avoid ignition sources in the event of expected and/or rare malfunctions. Failure of this "dry-running protection for centrifugal pumps by active power monitoring" device for control of ignition sources is regarded as a rare malfunction.

WARNING
Qualified personnel required
All work involved in connecting, commissioning and maintenance must be carried out by **qualified, responsible** personnel.
Failure to follow proper procedures may result in **personal injury and damage to property**.

With SIMOCODE pro the dry-running protection for centrifugal pumps (non-electrical device) works by active power monitoring and shutdown of the motor if a minimum flow rate is undershot. This corresponds to the following type of ignition protection: **Control of ignition sources b, ignition protection system b1, e.g. according to DIN EN 80079-37**

SIMOCODE pro is registered for dry-running protection for centrifugal pumps by active power monitoring according to both ATEX and IEC Ex.

Increased danger in hazardous areas means it is necessary to carefully observe the following notes and standards:

- **IEC 60079-14 / EN 60079-14 / DIN VDE 0165-1** Electrical apparatus for explosive gas atmospheres - Electrical installations in hazardous areas (other than mines)
- **IEC 60079-17 / EN 60079-17 / DIN VDE 0165-10-1** Electrical apparatus for explosive gas atmospheres - Explosive atmospheres. Electrical installations inspection and maintenance (other than mines)
- **DIN EN 50495** Safety devices required for the safe functioning of equipment with respect to explosion risks
- **VDE 0118** Erection of electrical installations in mines
- **DIN EN ISO 80079-36** Explosive atmospheres - Part 36: Non-electric equipment for use in explosive atmospheres - Basic method and requirements
- **DIN EN ISO 80079-37** Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"
- **DIN EN 1127-1** Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology

- **DIN EN 13237** Potentially explosive atmospheres – Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres
- **DIN EN 15198** Methodology for the risk assessment of non-electrical equipment and components for intended use in potentially explosive atmospheres
- **National implementation of Directive 1999/92/EC**

Marking on the nameplate of the SIMOCODE pro device with meaning with regard to the possible applications of the centrifugal pumps to be protected in hazardous areas:

- PTB 18 ATEX 5003 X / ITS21UKEX0455X
- IECEx PTB 18.0004 X
- I (1G/M2) [Ex h Ga/Mb]
- II (1/2) G [Ex h Ga/Gb]
- II (1G/2D) [Ex h Ga/Db]

Explanation of marking:

Notes regarding the term "device":

- The electrical device to be marked (SIMOCODE pro) is installed in the non-hazardous area.
- The marking refers to the requirements for the non-electrical device (centrifugal pump) to be protected, which is installed in the hazardous area or in which a hazardous area may be present.
- The protection function of the SIMOCODE pro device is achieved by monitoring/avoiding ignition sources on the device to be protected (centrifugal pump) by preventing dry running.

All valid device combinations (see Module integration (Page 289)) are permitted:

- For explosion protection outside of the equipment (centrifugal pump)
  - Under Equipment Group I, Equipment category M2 (mining) for mines endangered by firedamp
  - Under Equipment Group II, Equipment category 2G (potentially explosive gas atmospheres, zone 1)
  - Under Equipment Group II, Equipment category 2D (potentially explosive dust atmospheres, zone 21)
- For explosion protection within the equipment (centrifugal pump). In this case, approval relates to both stated Equipment Groups and Equipment category 1G (potentially explosive gas atmospheres, zone 0).

Explanation of approval for explosion protection within the equipment (centrifugal pump):

In practice, very rarely zone 0 (gas/vapor/mist) will be present inside the pump, but possibly zone 2, sometimes also zone 1. These use cases are covered by the approval for zone 0. For requirements according to zone 2 and zone 1, SIMOCODE pro can be used as the sole safety device to protect against dry running - depending on the overall protection concept of the operator. For requirements according to zone 0, SIMOCODE pro can be used as a building block in addition to other independent safety devices - here too, depending on the overall protection concept of the operator.

The devices/modules are also marked with the following warning:

"WARNING – this enclosure contains equipment forming part of an ignition protection system in accordance with ISO 80079-37."

NOTICE

Monitoring equipment required

Take steps to ensure that the system cannot operate without any additional monitoring equipment required by the overall ignition protection concept.

NOTICE

Points to observe

To ensure that SIMOCODE pro is used as intended for dry-running protection for centrifugal pumps by active power monitoring in hazardous areas, observe the stipulations from this manual as well as the stipulations from the manuals provided by the manufacturers of the centrifugal pump and the motor.

The devices are suitable for dry-running protection of centrifugal pumps by active power monitoring in hazardous areas in accordance with the above standards.

Tests other than those legally stipulated (Ordinance on Industrial Safety and Health) are not required.

14.2.3 Installation and commissioning – dry-running protection for centrifugal pumps by means of active power monitoring

14.2.3.1 Operating Instructions

NOTICE

SIMOCODE pro Operating Instructions

Please observe the SIMOCODE pro Operating Instructions (enclosed with the devices).

You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information about commissioning and service (Page 233) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support.

NOTICE
Operating instructions from the manufacturer of the centrifugal pump and the manufacturer of the motor used to drive the pump
Observe the operating instructions from the manufacturer of the centrifugal pump that is to be protected against dry running as well as those from the manufacturer of the motor used to drive the pump

14.2.3.2 General information on installation and commissioning

WARNING
Qualified personnel required
All work involved in connecting, commissioning and maintenance must be carried out by **qualified, responsible** personnel.
Failure to follow proper procedures results in **personal injury and damage to property**.

NOTICE
Information provided by the pump manufacturer
Observe all information provided by the pump manufacturer concerning installation / mounting / preconditions for commissioning.

NOTICE
Setting the motor's rated current
Set the motor's rated current I_E (see nameplate) correctly in SIMOCODE pro.
The automatic zero point measurement at $I < 0.1*I_E$ can lead to unintended shutdowns if I_E is set too high.

14.2.3.3 Special conditions for commissioning and operation

NOTICE
Commissioning and operation of the centrifugal pumps to be protected
You must commission and operate the centrifugal pumps that are to be protected in accordance with the pump manufacturer's stipulations.

NOTICE

Suitability of the device for control of ignition sources

The device for control of ignition sources is suitable for centrifugal pumps with progressive flow characteristics with sufficient distance between the active powers P_{MIN} at the minimum flow rate Q_{MIN} and P_{OPT} at the operating point Q_{OPT} with P_{MIN} / P_{OPT} < 0.80.

CAUTION

Setting the required switching levels

Set the dry-running protection by active power monitoring to the required switching level and check that it is working correctly.

The equipment may not be used as a device for control of ignition sources for monitoring the liquid filling of a centrifugal pump installed in a potentially explosive atmosphere until the combination pump/motor/shutdown has been successfully tested.

NOTICE

Checking the set parameter values

Check the parameter values that have been set with respect to their suitability for the protection function in terms of avoiding dry running when required (following any changes in the pump or system characteristics, e.g. as a result of changing the operating medium or of intervention in the plant configuration). Correct the parameter values where necessary.

To determine the active power from which the trip level is derived, you must either use the same 3UF7 system, with which the shutdown function is realized, or an identical system with the same functionality. External measuring equipment is not permitted for determining the active power.

NOTICE

Monitoring limit values

Make sure that the pump is shut down when the limit values for monitoring are reached.

CAUTION

No automatic restart

Take steps to ensure that the drive motor cannot automatically restart.

Acknowledge any fault manually once it has been remedied.

NOTICE

Periodic function tests

Test the device for control of ignition sources in accordance with the operating instructions on a periodic basis to make sure it is working correctly (see sections Test (Page 297) and Periodic tests (Page 300)).

14.2.3.4 Setting the parameters

Example

Set the following parameters in SIMOCODE pro:

- Trip level: P_{TRIP} threshold value for active power monitoring to prevent dry running: P_{TRIP} < (lower limit): 0 - 750000 W (default setting: 0)
- Delay time for preventing incorrect tripping caused by short undershooting of the P_{TRIP} threshold value during operation: $t_{V,TRIP}$: 0 - 10 s (default setting: 0.5 s, incrementally: 0.1 s)
- Start-up bridging time for preventing incorrect tripping caused by short undershooting of the P_{TRIP} threshold value during start-up of the centrifugal pump (depending on the procedure used to open the pressure-side shut-off valve): t_{BRIDGE} : 0 - 60 s (default setting: 0 s, incrementally: 0.5 s). During the start-up bridging time, the dry-running protection function is suppressed. If the trip level is still undershot after expiry of t_{BRIDGE} , then the delay time $t_{V,TRIP}$ starts to run from this instant.

Parameters can be entered directly in SIMOCODE ES.

To determine the trip level, you must perform an active power measurement with a corresponding 3UF7 system beforehand (either with the same system, which is also used for monitoring, or with an identical system with the same functionality). You will find the parameters in the project for the respective SIMOCODE pro device in the parameter editor under "Dry-running protection". You must upload the parameters manually to the device.

However, we recommend a "teach-in" to determine and enter the parameters. This must be carried out with the medium being pumped. You can initially carry out the teach-in with water during the cold commissioning of the production plant. However, it is essential that you repeat the procedure with operating medium under operational conditions.

SIMOCODE ES engineering software will support you when carrying out the teach-in by providing a dry-running wizard.

To start the wizard, go to the online view and open the commissioning editor for the respective SIMOCODE device in the project. You will find the wizard there under "Dry running wizard".

Note

Teach-in procedure

The teach-in procedure as well as that for direct entry of the parameters is described in the chapter "Dry-running protection for centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

Note

Log file

For verification purposes, we recommend generating a log file (see Chapter "Dry-running protection of centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)) after setting the parameters (whether done as a teach-in or by means of direct entry using SIMOCODE ES).

Note

Activating the dry-running protection function

This function is deactivated in the as-delivered state.

The function is activated following a successful run-through with the wizard. The response of the dry-running protection at P_{TRIP} < (lower threshold) is set to "Trip".

Note

Default setting for response

The response of the dry-running protection at P_{TRIP} < (lower threshold) is preset to "Trip".

Note

Setting the warning level

You have the option of configuring an additional warning level for undershooting of active power using the "Active power monitoring" function (see Chapter "Active power monitoring" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)). This becomes effective before the trip level P_{TRIP} is undershot.

However, this warning level is of no relevance with respect to approval for use in hazardous areas.

NOTICE

Manufacturer's instructions on the centrifugal pump

Observe the manufacturer's instructions for the centrifugal pump, which must be protected against dry running, in particular the characteristic curve which supplies the information on the minimum flow rate and possible information for the procedure during startup and shutdown of the pump / motor.

14.2.3.5 Line protection

NOTICE

Cable / conductor cross sections

Avoid impermissible maximum cable surface temperatures by correctly dimensioning the cross sections!

Choose a sufficient cable cross section, especially for heavy-starting motors CLASS 20E to CLASS 40E (see Chapter Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module (Page 331))

14.2.3.6 Test

General system tests

SIMOCODE pro offers you a method of checking the dry-running protection chain (incl. actuators such as contactors, circuit breakers). Use this, for example, to carry out the test according to IEC 60079-17 or VDE 0118.

The test encompasses a full function test. For this purpose, all 3 test phases are to be carried out (hardware test, current feedback, motor protection tripping, see below). The test can be carried out using the "TEST / RESET" buttons provided, or automatically via the bus. It is not necessary to load the test variable (active power) to check if the measured values are correct.

Note

Must be carried out periodically

You must repeat the general system tests at least every 3 years (cf. IEC 60079-17, Section 4.4.2).

Test phases of the general system test

The hardware is tested, all LEDs and displays are activated, including the lamp control. Contactor controls remain unchanged.

- Phase 1: Hardware test / lamp test (0 s to 2 s)
- Phase 2: Hardware test results (2 s to 5 s): If there is a fault, the "HW fault basic unit" fault is triggered. If there is no fault:
  - The "GEN. FAULT" LED flashes if no main current is flowing
  - The "GEN. FAULT" LED flickers if main current is flowing in all 3 phases (exception: with a "1-phase load" in one phase).
- Phase 3: Relay test (> 5 s): If testing is carried out with tripping, the contactor controls are deactivated. The contactor control can only be shut down by means of the "Test 1" function block and in the "Local 1-3" operating mode, using the "TEST / RESET" button on the basic unit / operator panel.

The following table shows the test phases performed when the "TEST / RESET" button is pressed for the required length of time:

Test phase	Status	Without main current		With main current	
		OK	Fault *)	OK	Fault
		Hardware test / lamp test			
< 2 s	"DEVICE" LED	○ orange	○ green	○ orange	○ green
	"GEN.FAULT" LED	○	○	○	○
	Contactor control	Unchanged	Unchanged	Unchanged	Unchanged
	Show QL *)	○	○	○	○
		Results of the hardware test / lamp test			
2 - 5 s	"DEVICE" LED	○ green	○ red	○ green	○ red
	"GEN.FAULT" LED	◐	○	⊗	○
	Contactor control	Unchanged	Deactivated	Unchanged	Deactivated

Test phase	Status	Without main current		With main current	
		OK	Fault *)	OK	Fault
Relay test					
> 5 s	"DEVICE" LED	green	red	green	red
	"GEN.FAULT" LED				
	Contactor control	Deactivated	Deactivated	Deactivated	Deactivated
LED lights up / activated					
LED flashing					
LED flickering					
LED off					
*) "Fault" only displayed after 2 s					

System test with operating medium

A system test with operating medium is an integral part of any commissioning procedure (e.g. after changes to parameter settings) and of the "General system test". It might also be required at shorter intervals if demanded by statutory regulations.

Note

Automation

If you wish to reduce the amount of manual intervention, you can store appropriate sequences in your process control system for (partially) automated running of the system test with operating medium.

- Checking a potential drift:
  - Set the same operating conditions (medium, flow rate, temperature, pressures, etc.) as for the previous test.
  - Measure the active power (at least two measured values, e.g. P_{OPT} and P_{MIN}).
  - Compare the measured values with those from the previous test.
  - Eliminate any causes of deviation.

- Checking the effectiveness of shutdown:
  - If not yet done: First enter the relevant values for plant configuration for the trip level of the active power monitoring P_{TRIP} and for the delay time for ongoing operation $t_{V,TRIP}$.
  - If necessary, carry out a teach-in to determine the trip level (see Chapter "Dry-running protection for centrifugal pumps" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958)).
  - Set the start-up bridging time t_{BRIDGE} to 0 s.
  - Start the centrifugal pump filled with operating medium; the pressure-side shut-off valve must be closed. The "dry-running protection" function must shut down the pump immediately.
  - Set a sufficiently large value for the start-up bridging time t_{BRIDGE} – coordinated with the procedure used when starting up the centrifugal pump.
  - Start the centrifugal pump filled with operating medium.
  - Begin by setting a sufficiently high flow rate for ongoing operation.
  - Reduce the pump's flow rate incrementally until the active power value detected by SIMOCODE pro falls below the trip level. The time span during which the flow-rate remains at a certain value for the active power at each step must be longer than the delay time $t_{V,TRIP}$ that has been set. After undershooting the trip level P_{TRIP}, the pump must shut down once the delay time $t_{V,TRIP}$ has expired. The system's response (shutdown and delay time) must correspond to the preset parameter values.

14.2.3.7 Further safety information

> **WARNING**
>
> **Safety information for DM-F Local and DM-F PROFIsafe fail-safe digital modules**
>
> Pay attention to the safety notes in the Manual Fail-safe Digital Modules SIMOCODE pro (http://support.automation.siemens.com/WW/view/en/50564852).

> **CAUTION**
>
> **Using relay outputs for the protection function**
>
> For the protection function, only the relay outputs of the 3UF70 basic unit, of a monostable digital module 3UF730, of a multifunction module 3UF76, or of a fail-safe expansion module 3UF732/3UF733 may be used, and only if connected to the corresponding contactor controls "QE" of the control function!

> **WARNING**
>
> **Electrical isolation required**
>
> For SIMOCODE pro devices with a 24 V DC control supply, you must ensure galvanic isolation with a battery or a safety isolating transformer according to DIN EN 61558-2-6.

Note

SIMOCODE pro is not suitable for load-side operation on frequency converters.

14.2.3.8 Environmental conditions

Permissible ambient temperature range:

- Storage / transport: -40 °C to +80 °C
- Operation: -25 °C to +60 °C; OPD: 0 °C to +60 °C.

14.2.3.9 Safety values

In a system with SIMOCODE pro basic units and current measuring modules, the functionality of the SIMOCODE pro motor protection and control device is suitable for use in safety functions up to safety integrity level SIL1.

This applies to the "low demand mode of operation" with a three-year test cycle for safety functions as well as for the "high demand mode of operation".

- $SFF_{SIMOCODE} \geq 60$ %
- $PFH_{Max, SIMOCODE} \leq 3 * 10^{-6}$ 1/h
- $PFD_{3a} \leq 3*10^{-2}$
- HFT = 0 (single-channel system)
- T_{UL} = 20 years

The failure rate was specified for a maximum ambient temperature of 60 °C.

The requirements demanded of SIL 1 are fulfilled with a reserve of 70% for sensors and actuators.

14.2.4 Periodic tests

You must regularly test the functional safety of the device for control of ignition sources using the "Dry-running protection for centrifugal pumps by means of active power monitoring" function. The procedure corresponds to that for commissioning and is described in section Test (Page 297).

Note

Calibration of active power measurement

Active power measurement is calibrated just once prior to shipment of the equipment.

It is not necessary to repeat calibration during the equipment's lifetime when used in hazardous areas for dry-running protection for centrifugal pumps by means of active power monitoring.

14.2.5 Maintenance and repair

These devices are maintenance-free.

WARNING

Repairs

Repairs to the device may only be carried out by the manufacturer.

14.2.6 Warranty

Note

To meet the conditions of the warranty, you must observe the safety and commissioning information from the operating instructions.

You can find the Operating Instructions for SIMOCODE pro listed in Chapter General information on installation and commissioning (Page 293) or at Operating Instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man) in the Industry Online Support.

14.2.7 More information

You will find further information on the Internet:

- Internet (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Product Information System (ProdIS) (https://support.industry.siemens.com/My/ww/en/requests)
- Service and Support (https://support.industry.siemens.com/cs/ww/en/ps)
- ATEX (https://www.siemens.com/sirius/atex)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

Technical specifications 15

15.1 Common technical data

Common technical data	
Standards	EN 60204-1, EN 1760-1, ISO 13849-1, IEC 61508, IEC/EN 60947-4-1, IEC/EN 60947-5-1, ISO EN 80079-36, ISO EN 80079-37
Test verification documents	See Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)
Certificate of suitability	
IECEx	Yes; IECEx PTB 18.0004 X
According to ATEX Product Directive 2014/34/EU	BVS 06 ATEX F 001, PTB 18 ATEX 5003 X
According to Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016 No.1107)	ITS21UKEX0464, ITS21UKEX0455X
Permiss. ambient temperature	
In operation	-25 ... +60 °C 1)
For storage and transport	-40 ... +80 °C 2)
at installation altitude above MSL	
≤ 2000 m	
≤ 3000 m	Max. +50 °C (no protective separation)
≤ 4000 m	Max. +40 °C (no protective separation)
Degree of protection (according to IEC 60529)	
All components (except current measuring modules with bus connection, operator panel and door adapter)	IP20 5)
Current measuring modules with bus connection	IP00
Operator panel (front) and door adapter (front) with cover	IP54
Vibration resistance acc. to IEC 60068-2-6	
• General • SIMOCODE pro S basic unit and SIMOCODE pro S multifunction module assembled on a current measuring module • SIMOCODE pro V basic unit assembled on a current / voltage measuring module	• 1-6 Hz / 15 mm; 6-500 Hz / 2 g • 1-6 Hz / 15 mm; 6-500 Hz / 1 g • 1-6 Hz / 15 mm; 6-500 Hz / 1 g
Shock resistance (sine pulse) acc. to IEC 60068-2-27	

Common technical data	
• General • SIMOCODE pro S basic unit and SIMOCODE pro S multifunction module assembled on a current measuring module • SIMOCODE pro V basic unit assembled on a current / voltage measuring module	• 15 g / 11 ms • 15 g / 11 ms • 15 g / 11 ms
Mounting position	• Any (except operator panel, operator panel with display and door adapter) • Operator panel, operator panel with display and door adapter: Vertical
Frequencies	50/60 Hz ± 5 %
EMC stability according to IEC 60947-1 • IEC 60947-1, IEC 60947-5-1, SN 27095, NE21 • DM-F: IEC 61326-3-1	Corresponds to degree of severity 3
Conducted interference, burst according to IEC C 61000-4-4	2 kV (power ports) **Surge suppressor is required for inductive loads.** 1 kV (signal ports)
Conducted interference, high-frequency according to IEC 61000-4-6	10 V
Conducted interference, surge according to IEC 61000-4-5	2 kV (line to earth) 1 kV (line to line)
Electrostatic discharge, ESD according to IEC 61000-4-2 [4)]	8 kV (air discharge) 6 kV (contact discharge) [3)]
Radiated interference immission according to IEC 61000-4-3	10 V/m
SIMOCODE pro is a Class A product. This product can cause radio interference if used in a domestic environment. In this case the user must implement suitable countermeasures. Conducted and radiated interference emission	DIN EN 55011/DIN EN 55022 (CISPR11/CISPR22) (corresponds to Degree of Severity A)
Protective separation according to IEC 60947-1	All SIMOCODE pro circuits are isolated from each other according to IEC 60947-1, i.e. dimensioned with double creepage distance and air clearance. **Notice** Observe the notes of the test report, No. A0258 "Protective separation".
3UF793 connecting cable:	
Rated voltage	300 V
Rated operating voltage	24 V

1) for operator panel with display 3UF721 0 - 60 °C

2) for operator panel with display 3UF721 20 - 70 °C

3) for operator panel with display 3UF721 4kV

4) 3UF7020: Operator input during operation only on the front

5) ⚠ **Danger**

Hazardous voltage. Will cause death or serious injury.

To ensure touch protection and degree of protection IP20 for SIMOCODE pro S, screw in all screws that are not used for conductor clamping and close the terminal covers.

15.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

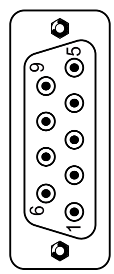
If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

See also

Wiring, connecting (Page 172)

15.3 Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units

Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs
Cabinet mounting basic unit SIMOCODE pro S (3UF7020)	Minimum distance to be maintained • from cabinet rear wall for series mounting at side: 0 mm • from grounded parts at side: 2 mm
Display	
Red / green / yellow "DEVICE" LED	• Red: "Function test negative, device disabled" • Green: "Ready for operation" • Yellow: "Memory module or addressing plug detected" • OFF: "No control supply voltage"
Green "BUS" LED	• Continuous light: "Communication with PLC/PCS" • Flashing: "Baud rate recognized/communication with PC/PG" • Flickering: "Communication interrupted"
Red "GEN. FAULT" LED	Continuous light/flashing: "Feeder fault," e.g. overload tripping
"TEST/RESET" button	• Resets the device after tripping • Function test (system self-test) • Operation of memory module or addressing plug

Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units	
System interfaces	
Front, right-hand side (pro S)	For connecting an operator panel or expansion modules. The memory module, addressing plug or a PC cable can also be connected to the system interface for parameterization purposes.
Bottom, front (pro C, pro V)	Connection of a current measuring module or a current/voltage measuring module
Front, left-hand side (pro S)	Connection of a current measuring module
PROFIBUS DP interface	
Interface (physical)	RS485
Connection technology [1)]	9-way sub D socket (12 Mbit) Pin assignment acc. to DIN EN 61158-2 Terminals (1.5 Mbit) Connection of a PROFIBUS DP cable via terminal connection or a 9-pole sub D socket.  Pin assignment: 1: n. c.: Reserved 2: n. c.: Reserved 3: BUS B: Data line B 4: RTS: Transmission request 5: P-: Ground 6: P+: Supply voltage 7: n. c.: Reserved 8: BUS A: Data line A 9: n. c.: Reserved -: SHIELD: Shield over connector housing Load rating 5 V DC on PROFIBUS DP: Max. 100 mA Support for the transfer rates defined by the PROFIBUS DP standard: 9.6 Kbit / s, 19.2 Kbit / s, 45.45 Kbit / s, 93.75 Kbit / s, 187.5 Kbit / s, 500 Kbit / s, 1500 Kbit / s, 3000 Kbit / s, 6000 Kbit / s, 12000 Kbit / s. **Note** The 5 V power supply is only sufficient to power the bus termination module, not any other loads. Supported data transfer rates for Modbus RTU: 300 baud, 600 baud, 1,200 baud, 2,400 baud, 4,800 baud, 9,600 baud, 19,200 baud (default), 57,600 baud

Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units		
Rated control supply voltage U_s (according to DIN EN 61131-2) ⚠ **Warning** For the 24 V DC power supply, always use an SELV or PELV power supply unit!	110 V to 240 V AC/DC, 50/60 Hz	24 V DC
Operating range	0.85 x Us to 1.1 x Us	0.8 x Us to 1.2 x Us
Power consumption		
SIMOCODE pro C (3UF7000) / pro S (3UF7020). Measurement conditions: Room temperature, combination of basic unit, current acquisition module and operator panel, each with 2 LEDs switched on and active inputs and outputs, active thermistor, and 1.5 MBd bus transmission rate	SIMOCODE pro C basic unit:	
	5.3 VA / 2.9 W	2.3 W
	SIMOCODE pro S basic unit:	
	4.7 VA / 2.5 W	2.1 W
SIMO- CODE pro V PB (3UF7010) / pro V MR (3UF7012): Measurement conditions: Room temperature, combination of basic unit, current/voltage acquisition modules and operator panel with display, each with 2 LEDs switched on and active inputs and outputs, active thermistor, and 1.5 MBd bus transmission rate	SIMOCODE pro V PB basic unit:	
	8.3 VA / 3.6 W	2.6 W
	SIMOCODE pro V MR basic unit:	
	8.3 VA / 3.6 W	2.6 W
Rated insulation voltage U_i	300 V (at pollution degree 3)	
Rated impulse withstand voltage U_{imp}	4 kV	
Power failure backup time (longer power failures lead to shutdown of the relay outputs (monostable))	SIMOCODE pro C 24 V DC 110 V to 240 V AC/DC	Typ. 50 ms
	SIMOCODE pro S	Typ. 50 ms
	SIMOCODE pro V - 24 V DC	Typ. 50 ms
	SIMOCODE pro V - 110 V - 240 V AC/DC	Typ. 200 ms
Relay outputs		
Number	Monostable relay outputs: 3 (SIMOCODE pro C, pro V) 2 (SIMOCODE pro S)	
Function	Isolated NO contacts (NO contact response parameterizable via internal signal conditioning), 2 relay outputs connected to common potential, one separate relay output, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information.)	
Stipulated short-circuit protection for auxiliary contacts (relay outputs)	• 6 A fuse inserts, operational class gG; 10 A quick-response (IEC 60947-5-1) • Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1) • Miniature circuit breaker 6 A, C characteristic (Ik < 500 A)	
Rated uninterrupted current	5 A 6 A at max. +50 °C	

Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units	
Rated switching capacity	• AC-15: 6 A / 24 V AC; 6 A / 120 V AC; 3 A / 230 V AC • DC-13: 2 A / 24 V DC; 0.55 A / 60 V DC; 0.25 A / 125 V DC
Inputs (binary)	4 inputs connected to common potential that are supplied via the device electronics (24 V DC) for measuring process signals (e.g. local control station, key-operated switch, limit switch, etc.), freely-assignable to control functions.
24 V DC	
Cable lengths (single)	300 m
Input characteristic	Type 1 according to EN 61131-2
Thermistor motor protection (PTC binary)	
Total cold resistance	≤ 1.5 kOhm
Response value	3.4 kOhm to 3.8 kOhm
Return value	1.5 kOhm to 1.65 kOhm
Sensor short-circuit response value	< 9 ohm
Cable lengths (single), conductor cross sections:	250 m: 2.5 mm² 150 m: 1.5 mm² 50 m: 0.5 mm²
Dry-running protection for centrifugal pumps by active power monitoring (for 3UF7010-1A.00-0 basic unit)	
Trip level – active power	0 - 750000 W (default setting: 0)
Delay time during pump operation	0 s ... 10 s
Start-up bridging time when starting pump	0 s ... 60 s
Connection of SIMOCODE pro C / pro V basic units	
• Tightening torque	TORQUE: 7 lb.in to 10.3 lb.in 0.8 Nm to 1.2 Nm
• Connection cross sections	
- Solid	2 x0.5 mm² ... 2.5 mm²; 1 x 0.5 mm² ... 4 mm² 2 x AWG 20 to 14 / 1 x AWG 20 to 12
- Finely stranded with end sleeve	2 x 0.5 mm² ... 1.5 mm²; 1 x 0.5 mm² ... 2.5 mm² 2 x AWG 20 to 16 / 1 x AWG 20 to 14
- PROFIBUS cable	2 x 0.34 mm² AWG 22
Connection of SIMOCODE pro S basic unit	
• Tightening torque	TORQUE: 5.2 lb.in to 7.0 lb.in 0.6 Nm to 0.8 Nm
• Connection cross sections	
- Solid	2 x 0.5 mm² ... 1.5 mm²; 1 x 0.5 mm² ... 2.5 mm² 2 x AWG 20 to 16 / 1 x AWG 20 to 14

Technical specifications of the SIMOCODE pro C / pro S / pro V PB / pro V MR basic units	
- Finely stranded with end sleeve	2 x 0.5 mm² ... 1.0 mm²; 1 x 0.5 mm² ... 2.5 mm²
- PROFIBUS cable	2 x 0.34 mm² / 1 x 0.34 mm² AWG 22

1)

Note

Bus termination module

The bus termination module is powered by a voltage of max. 5 V.

The current drawn for the bus termination module is limited.

15.4 Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units

Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs
Mounting position	Any
Display	
Red/green/yellow "DEVICE" LED	• Red: "Function test negative, device disabled" • Green: "Ready for operation" • Yellow: "Memory module detected" • OFF: "No control supply voltage"
Green "BUS" LED	• Continuous light: "Communication with PLC/PCS" • Flashing: "Baud rate recognized/communication with PC/PG"
Red "GEN. FAULT" LED	Continuous light/flashing: "Feeder fault", e.g. overload tripping
Green "PORT1" LED	• Continuous light: Ethernet connection available • Flashing: Station flash test
Green "PORT2" LED	• Continuous light: Ethernet connection available • Flashing: Station flash test
"TEST/RESET" button	• Resets the device after tripping • Function test (system self-test) • Operation of memory module
System interfaces	
Front	For connecting an operator panel or expansion modules. The memory module or a PC cable can also be connected to the system interface for parameterization purposes.
Bottom	Connection of a current measuring module or a current/voltage measuring module
ETHERNET interface	

Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units		
Connection system	2 x RJ45 (LAN)	
Transmission rate	Max. 100 Mbit/s	
Number of interfaces according to PROFINET	2 1 (SIMOCODE pro V PN GP 3UF7011-1A.00-2 basic units)	
PROFINET conformity class	B	
Protocols supported	PROFINET IO, PROFIsafe, LLDP, SNMP, Address Resolution Protocol (ARP), HTTP, HTTPS, OPC UA Server, NTP	
Autonegation	Yes	
Autosensing	Yes	
MRP/MRRP redundancy procedure	Yes No (SIMOCODE pro V PN GP 3UF7011-1A.00-2 basic units)	
PROFINET IO system redundancy	Yes	
PROFIenergy measured values	Yes	
PROFIenergy shutdown	Yes	
Rated control supply voltage Us (according to DIN EN 61131-2) ⚠ **Warning** For the 24 V DC power supply, always use an SELV or PELV power supply unit!	110 V to 240 V AC/DC, 50/60 Hz	24 V DC
Operating range	0.85 x Us to 1.1 x Us (startup) 0.85 x Us to 1.1 x Us (operation)	0.85 x Us to 1.2 x Us (startup) 0.80 x Us to 1.2 x Us (operation)
Power consumption		
SIMOCODE pro V PN (3UF7011) and SIMOCODE pro V EIP (3UF7013): Measurement conditions: Room temperature, combination of basic unit, current/voltage acquisition module and operator panel with display, each with 2 LEDs switched on and active inputs and outputs, active thermistor, and 100 MBd bus transmission rate	SIMOCODE pro V PN basic unit:	
	8.3 VA / 4.8 W	3.9 W
	SIMOCODE pro V EIP basic unit:	
	8.3 VA / 4.8 W	3.9 W
Rated insulation voltage U_i	300 V (at pollution degree 3)	
Rated impulse withstand voltage U_{imp}	4 kV	
Power failure backup time (longer power failures lead to shutdown of the relay outputs (monostable))	• 24 V DC • 110 V to 240 V AC/DC	Typ. 20 ms
Relay outputs		
Number	3 monostable relay outputs	
Function	Isolated NO contacts (NO contact response parameterizable via internal signal conditioning), 2 relay outputs connected to common potential, one separate relay output, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information.)	
Stipulated short-circuit protection for auxiliary contacts (relay outputs)	• 6 A fuse inserts, operational class gG; 10 A quick-response (IEC 60947-5-1) • Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1) • Miniature circuit breaker 6 A, C characteristic (Ik < 500 A)	

Technical specifications of the SIMOCODE pro V PN / pro V PN GP / pro V EIP basic units	
Rated uninterrupted current	• 5 A • 6 A at max. +50 °C
Rated switching capacity	• AC-15: 6 A / 24 V AC; 6 A / 120 V AC; 3 A / 230 V AC • DC-13: 2 A/24 V DC; 0.55 A / 60 V DC; 0.25 A / 125 V DC
Contact rating of the auxiliary contacts according to UL	B300/R300
Electrical durability (operating cycles)	Typical: 100 000
Mechanical durability (operating cycles)	Typical: 10 000 000
Inputs (binary)	4 inputs connected to common potential that are supplied via the device electronics (24 V DC) for measuring process signals (e.g. local control station, key-operated switch, limit switch, etc.), freely-assignable to control functions.
24 V DC Cable lengths (single) Input characteristic	 300 m Type 1 according to EN 61131-2
Thermistor motor protection (PTC binary)	
Total cold resistance	≤ 1.5 kOhm
Response value	3.4 kOhm to 3.8 kOhm
Return value	1.5 kOhm to 1.65 kOhm
Sensor short-circuit response value	< 9 ohm
Cable lengths (single), conductor cross sections:	250 m: 2.5 mm² 150 m: 1.5 mm² 50 m: 0.5 mm²
Dry-running protection for centrifugal pumps by active power monitoring (for 3UF7011-1A.00-0 and 3UF7013-1A.00-0 basic units)	
Trip level – active power	0 - 750000 W (default setting: 0)
Delay time during pump operation	0 s ... 10 s
Start-up bridging time when starting pump	0 s ... 60 s
Connection	
Tightening torque	TORQUE: 7 lb.in - 10.3 lb.in; 0.8 Nm - 1.2 Nm
Connection cross sections	
• Solid	2 x 0.5 mm² - 2.5 mm²; 1 x 0.5 mm² - 4 mm²; 2 x AWG 20 to 14 / 1 x AWG 20 to 12
• Finely stranded with end sleeve	2 x 0.5 mm² - 1.5 mm²; 1 x 0.5 mm² - 2.5 mm²; 2 x AWG 20 to 16 / 1 x AWG 20 to 14

15.5 Technical data of the current measuring modules and the current / voltage measuring modules

Technical data of the 2nd generation current / voltage measuring modules		
Mounting		
Current setting I_s = 0.3 A - 4 A; 3 A - 40 A; 10 A - 115 A (3UF71..-1AA0.-0)	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs	
Current setting I_s = 20 A to 200 A (3UF71.3-1.A01-0)	Snap-on mounting onto 35-mm standard mounting rails, screw attachment onto the mounting plate or direct mounting onto the contactor	
Current setting I_s = 63 A to 630 A (3UF71.4-1BA01-0)	Screw attachment to the mounting plate or direct mounting onto the contactor	
System interface for main circuit	For connection to a basic unit	
Current setting I_s	3UF7110-1AA01-0: 0.3 A - 4 A	3UF7113-1AA01-0: 20 A to 200 A
	3UF7111-1AA01-0: 3 A - 40 A	3UF7113-1BA01-0: 20 A to 200 A
	3UF7112-1AA01-0: 10 A - 115 A	3UF7114-1BA01-0: 63 A to 630 A
Rated insulation voltage U_i (at pollution degree 3)	690 V	
Rated operating voltage U_e	690 V	
Rated impulse withstand voltage U_{imp}	6 kV	
Rated frequency	50/60 Hz	
Type of current	Three-phase	
Short circuit	Additional short-circuit protection is required in the main circuit [1)]	
Typical voltage measuring range		
Line-to-line voltage / voltage between lines (e.g.: U_{L1L2})	110 V - 690 V	
Phase voltage (e.g.: U_{L1})	65 V to 400 V	
Operating range	$0.12 \times I_u \leq Is \leq 10 \times I_o$	
Accuracy [7)] at 25°C, 50/60 Hz for the following voltage ranges and limited current ranges		
of the voltage measurement	± 1.5%	
Valid for voltage range: • Line-to-line voltage U_L in the range 0.85 x 110 V - 1.1 x 690 V • Phase voltage U_L in the range 0.85 x 65 V - 1.1 x 400 V		
of the current measurement	± 1.5%	
Valid for limited current range:	3UF7110-1AA01-0: 0.25 A - 8 A	3UF7113-1AA01-0: 15 A - 400 A
	3UF7111-1AA01-0: 2.25 A - 80 A	3UF7113-1BA01-0: 15 A - 400 A
	3UF7112-1AA01-0: 7.5 A - 230 A	3UF7114-1BA01-0: 47 A - 1260 A
Temperature drift of current measurement	3UF7110-1AA01-0: 0.02% / K	3UF7113-1AA01-0: 0.01% / K
	3UF7111-1AA01-0: 0.01% / K	3UF7113-1BA01-0: 0.01% / K
	3UF7112-1AA01-0: 0.01% / K	3UF7114-1BA01-0: 0.01% / K
of the cos phi measurement (cos phi ≥ 0.5)	± 1.5% [8)]	

Technical data of the 2nd generation current / voltage measuring modules		
of the apparent power measurement (cos phi ≥ 0.5)	± 3%	
of the active power measurement (cos phi ≥ 0.5)	± 5%	
of the energy measurement (cos phi ≥ 0.5)	± 5%	
of the frequency measurement (cos phi ≥ 0.5)	± 1.5%	
of the ground-fault detection acc. to IEC 60947-1, Annex T		
• in the range 30% - 120% I_s • in the range 15% - 30% I_s	• ± 10% (Class CI-A) • ± 25% (Class CI-B)	
Accuracy at 25°C, 50/60 Hz for extended current ranges 2 x I_o < Is < 8x I_o		
Temperature drift of current measurement		
• 3UF7110-1AA01-0		0.02% / K
• 3UF7111-1AA01-0, 3UF7112-1AA01-0, 3UF7113-1AA01-0, 3UF7113-1BA01-0, 3UF7114-1BA01-0		0.01% / K
Current measuring accuracy		± 3% (typically)
Accuracy of the cos phi measurement (cos phi ≥ 0.5)		± 5% (typically)
Accuracy of the apparent power measurement (cos phi ≥ 0.5)		± 5% (typically)
Accuracy of the active power measurement (cos phi ≥ 0.5)		± 10% (typically)
Accuracy of the energy measurement (cos phi ≥ 0.5)		± 10% (typically)
Note on voltage measurement		
Caution Note that the supply cables for voltage measurement may require additional cable protection.		
Feed-through opening	Diameter	Design of cable insulation
Current setting 0.3 A - 4 A; 3 A - 40 A	7.5 mm	6 kV according to IEC 60947-1
Current setting 10 A - 115 A:	14.0 mm	6 kV according to IEC 60947-1
Current setting 20 A to 200 A:	25.0 mm	6 kV according to IEC 60947-1
Bus connection		
Current setting I_s	20 A to 200 A	63 A to 630 A
Connection screw	M8x25	M10x30
Tightening torque	10 Nm to 14 Nm	14 Nm to 24 Nm
Solid with cable lug	16 mm² - 95 mm [2) 3)]	50 mm² - 240 mm [2) 4)]
Stranded with cable lug	25 mm² - 120 mm [2) 3)]	70 mm² - 240 mm [2) 4)]
AWG cable	4 kcmil - 250 kcmil	1/0 kcmil to 500 kcmil
Connection for voltage measurement		
	45 mm / 55 mm modules	**120 mm / 145 mm modules**
• Tightening torque	TORQUE: 4.4 lb.in - 5.3 lb.in 0.5 Nm to 0.6 Nm	TORQUE: 7 lb.in - 10.3 lb.in 0.8 Nm to 1.2 Nm
• Connection cross sections		

Technical data of the 2nd generation current / voltage measuring modules		
- Solid	1 x 0.25 mm² - 2.5 mm² / 1 x AWG 24 to 14 2 x 0.25 mm² - 1 mm² / 2 x AWG 24 to 18	1 x 0.5 mm² - 4 mm² / 1 x AWG 20 to 12 2 x 0.5 mm² - 2.5 mm² / 2 x AWG 20 to 14
- Finely stranded with end sleeve		1 x 0.5 mm² - 2.5 mm² / 1 x AWG 20 to 14 2 x 0.5 mm² - 1.5 mm² / 2 x AWG 20 to 16

1) You will find more information at SIMOCODE pro (https://www.siemens.com/simocode).

2) Screw connection is possible with an appropriate 3RT19 box terminal.

3) When connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 95 mm², the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

4) When connecting cable lugs complying with DIN 46234 to cables with a cross section larger than 240 mm² and when connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 185 mm², the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

Technical data of the current measuring modules or the 1st generation current / voltage measuring modules		
Mounting		
Current setting I_s = 0.3 A to 3 A; 2.4 A to 25 A; 10 A to 100 A (3UF7100*, 3UF7101*, 3UF7102*, 3UF7110.0-0, 3UF7111.0-0, 3UF7112.0-0)	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs	
Current setting I_s = 20 A to 200 A (3UF7103*, 3UF7113.0-0)	Snap-on mounting onto 35-mm standard mounting rails, screw attachment onto the mounting plate or direct mounting onto the contactor	
Current setting I_s = 63 A to 630 A (3UF7104*, 3UF7114.0-0)	Screw attachment to the mounting plate or direct mounting onto the contactor	
System interface for main circuit	For connection to a basic unit or decoupling module	
Current setting I_s	3UF7100*0-0, 3UF7110*0-0: 0.3 A - ´3 A 3UF7101*0-0, 3UF7111*0-0: 2.4 A - 25 A 3UF7102*0-0, 3UF7112*0-0: 10 A - 100 A	3UF7103*0-0, 3UF7113*0-0: 20 A to 200 A 3UF7104*0-0, 3UF7114*0-0: 63 A to 630 A
Rated insulation voltage U_i (at pollution degree 3)	690 V [1)]	
Rated operating voltage U_e	690 V	
Rated impulse withstand voltage U_{imp}	6 kV [2)]	
Rated frequency	50/60 Hz	
Type of current	Three-phase	
Short circuit	Additional short-circuit protection is required in the main circuit [3)]	
Operating range	$0.1 \times I_u \leq I_s \leq 10 \times I_o$	
Accuracy of current measuring (ranging from 1 x minimum current setting I_u to 8 x maximum current setting I_o)	± 3% (typically)	
Typical voltage measuring range		

Technical data of the current measuring modules or the 1st generation current / voltage measuring modules		
Line-to-line voltage / voltage between lines (e.g.: U_{L1L2})	110 V - 690 V (depending on the setting, either the line-to-line voltage/phase-to-ground voltage or the phase voltage is displayed)	
Phase voltage (e.g.: U_{L1})	65 V to 400 V	
Voltage measuring accuracy in the range from 230 V to 400 V	± 3% (typically)	
Accuracy of cos phi measurement (in the nominal load range cos phi = 0.4 to 0.8)	± 5% (typically)	
Accuracy of apparent power measurement (in the nominal load range)	± 5% (typically)	
Notes on voltage measurement		
Current / voltage measuring modules must be used with a decoupling module in certain types of power system. See the table in Chapter Decoupling module (DCM) for 1st generation current/voltage measuring modules (e.g. 3UF711.1AA00-0) (Page 126).	**Caution** Note that the supply cables for voltage measurement may require additional cable protection.	
Feed-through opening	Diameter	Design of cable insulation
Current setting 0.3 A to 3 A; 2.4 A to 25 A	7.5 mm	6 kV according to IEC 60947-1
Current setting 10 A to 100 A:	14.0 mm	6 kV according to IEC 60947-1
Current setting 20 A to 200 A:	25.0 mm	UM: 6 kV, IM: 8 kV according to IEC 60947-1
Bus connection		
Current setting I_s	20 A to 200 A	63 A to 630 A
Connection screw	M8x25	M10x30
Tightening torque	10 Nm to 14 Nm	14 Nm to 24 Nm
Solid with cable lug	16 mm² - 95 mm [2) 4) 5)]	50 mm² - 240 mm [2) 4) 6)]
Stranded with cable lug	25 mm² - 120 mm [2) 4) 5)]	70 mm² - 240 mm [2) 4) 6)]
AWG cable	6 kcmil to 300 kcmil	1/0 kcmil to 500 kcmil
Connection for voltage measurement		
• Tightening torque	TORQUE: 7 lb.in - 10.3 lb.in 0.8 Nm to 1.2 Nm	
• Connection cross sections		
- Solid	1 x 0.5 mm² - 4 mm² / 1 x AWG 20 to 12 2 x 0.5 mm² - 2.5 mm² / 2 x AWG 20 to 14	

Technical data of the current measuring modules or the 1st generation current / voltage measuring modules	
- Finely stranded with end sleeve	1 x 0.5 mm² - 2.5 mm² / 1 x AWG 20 to 14 2 x 0.5 mm² - 1.5 mm² / 2 x AWG 20 to 16

1) for 3UF7103 or 3UF7104 to 1000 V

2) for 3UF7103 or 3UF7104 to 8 kV

3) You will find more information at SIMOCODE pro (https://www.siemens.com/simocode) and in Chapter Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module (Page 331)

4) Screw connection is possible with an appropriate 3RT19 box terminal.

5) When connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 95 mm², the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

6) When connecting cable lugs complying with DIN 46234 to cables with a cross section larger than 240 mm² and when connecting cable lugs complying with DIN 46235 to cables with a cross section larger than 185 mm², the 3RT19 56-4EA1 terminal cover is required to maintain phase separation.

7) Valid for float values

8) A current range of 0.4 - 8 A is necessary for the 3UF7110-1AA01-0 version

15.6 Technical data of the decoupling module

Technical data of the decoupling module	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs.
Display	
• Green "READY" LED	
System interfaces	The left interface is for connection to a basic unit or an expansion module, the right interface is exclusively for connection to a current / voltage measuring module.
Connection cross sections	
• Tightening torque	TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm
• Connection cross sections	
- Solid	2 x 0.5 mm² to 2.5 mm² / 1 x 0.5 mm² to 4 mm² 2 x AWG 20 to 14 / 1 x AWG 20 to 12
- Finely stranded with end sleeve	2 x 0.5 mm² to 1.5 mm² / 1 x 0.5 mm² to 2.5 mm² 2 x AWG 20 to 16 / 1 x AWG 20 to 14

15.7 Technical data of the expansion modules

15.7.1 Technical data of the digital modules

Technical data of the digital modules	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs
Display	
• Green "READY" LED	• Continuous light: "Ready for operation" • Flashing: "No connection to basic unit"
System interfaces	For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel
Control circuit	
Rated insulation voltage U_i	300 V (at pollution degree 3)
Rated impulse withstand voltage U_{imp}	4 kV
Relay outputs	
• Number	2 monostable or bistable relay outputs (depending on the type)
• Function	Isolated NO contacts (NC contact response parameterizable via internal signal conditioning), relay outputs all with connection to common potential, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information).
• Stipulated short-circuit protection for auxiliary contacts (relay outputs)	• Fuse links, operating class gL/gG 6 A, quick-response 10 A (IEC 60947-5-1) • Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1) • Miniature circuit breaker 6 A, C characteristic (I_k < 500 A)
• Rated uninterrupted current	• 5 A • 6 A at max. +50 °C
• Rated switching capacity	
AC-15	6 A / 24 V AC; 6 A / 120 V AC; 3 A / 230 V AC
DC-13	2 A / 24 V DC; 0.55 A / 60 V DC; 0.25 A / 125 V DC
Inputs (binary)	4 externally supplied, isolated inputs (24 V DC or 110 V to 240 V AC / DC, depending on the type), connected to common potential for measuring process signals (e.g. local control station, key-operated switches, limit switches, ...), freely-assignable to control functions.
• 24 V DC: Cable lengths (single) Input characteristic	 300 m Type 2 according to EN 61131-2

Technical data of the digital modules	
• 110 V to 240 V AC/DC: Cable lengths (single) Input characteristic	 200 m (cable capacitance 300 nF / km) —
Connection	Removable terminal block with screw connection
• Tightening torque	TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm - 1.2 Nm
• Connection cross sections	
- Solid	2 x 0.5 mm^2 to 2.5 mm^2 / 1 x 0.5 mm^2 to 4 mm^2 2 AWG 20 to 14 / 1 x AWG 20 to 12
- Finely stranded with end sleeve	2 x 0.5 mm^2 - 1.5 mm^2 / 1 x 0.5 mm^2 - 2.5 mm^2 2 x AWG 20 to 16 / 1 x AWG 20 to 14

15.7.2 Technical data, digital modules DM-F Local and DM-F PROFIsafe

Technical data of the DM-F Local and DM-F PROFIsafe digital modules	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs
Enclosure width	45 mm
System interfaces	For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel
Rated control supply voltage U_s (according to DIN EN 61131-2)	• 24 V DC • 110 V to 240 V AC/DC, 50/60 Hz
Operating range	• 24 V DC: 0.8 to 1.2 x U_s • 110 V to 240 V AC/DC: 0.85 to 1.1 x U_s
Power consumption	DM-F LOCAL: • 24 V DC: 3 W • 110 V to 240 V AC/DC: 9.5 VA/4.5 W DM-F PROFIsafe: • 24 V DC: 4 W • 110 V to 240 V AC/DC: 11.0 VA/5.5 W
Protective separation according to IEC 60947-1	Between relay enabling circuits / relay outputs and electronics
Rated insulation voltage U_i	300 V (at pollution degree 3)
Rated impulse withstand voltage U_{imp}	4 kV
Mains buffering time	• 24 V DC: typically 20 ms at 0.8 x Us • 110 V to 240 V AC/DC: typically 20 ms at 0.85 x Us, typically 200 ms at 230 V
Relay outputs	2 monostable relay outputs
• Number	• Common potential connection is internally disconnected in a fail-safe manner by a relay enabling circuit
• Function	• Normally open contact, freely assignable to the control functions

Technical data of the DM-F Local and DM-F PROFIsafe digital modules	
Electrical service life of relay outputs	0.1 million switching cycles (AC-15, 230 V/3 A)
Relay enabling circuits	
• Number	2 common switching-type, fail-safe relay enabling circuits
• Function	Fail-safe normally open contacts
• Stipulated short-circuit protection for relay enabling circuits / relay outputs	Fuse links operating class gL/gG 4 A (IEC 60947-5-1), separate for each relay enabling circuit
• Rated uninterrupted current of relay enabling circuits	5 A
• Rated switching capacity of relay enabling circuits	AC-15: 3 A / AC 24 V; 3 A / AC 120 V; 1.5 A / AC 230 V DC-13: 4 A / DC 24 V; 0.55 A / DC 60 V; 0.22 A / DC 125 V; 0.11 A / DC 250 V
• Electrical service life of relay enabling circuits	0.1 million switching cycles (AC-15, 240 V/ 2 A)
• Switching rate of the relay enabling circuits	2000/h
Connection	Removable terminals with screw connection
• Tightening torque	TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm - 1.2 Nm
• Connection cross sections	
- Solid	2x 0.5 mm² to 2.5 mm² / 1x 0.5 mm² to 4 mm² 2x AWG 20 to 14 / 1x AWG 20 to 12
- Finely stranded with end sleeve	2x 0.5 mm² to 1.5 mm² / 1x 0.5 mm2 to 2.5 mm² 2x AWG 20 to 16 / 1x AWG 20 to 14

15.7.3 Technical data of the DM-F Local digital module

Technical data of the DM-F Local digital module			
LEDs on DM-F LOCAL		**Color**	**Meaning**
"READY"		OFF	System interface not connected / supply voltage too low / device defective
		Green	Device ON/system interface OK
		Flashing green	Device ON / system interface not active or not OK
"DEVICE"		OFF	Supply voltage too low
		Green	Device ON
		Flashing green	Self-test
		Yellow	Configuration mode
		Flashing yellow	Configuration error
		Red	Device defective or faulty
"OUT"		OFF	Safety-related output not active
		Green	Safety-related output active
		Flashing green	Feedback circuit not closed although start condition satisfied

Technical data of the DM-F Local digital module		
"IN"	OFF	Input not active
	Green	Input active
	Flashing green	Fault detected (e.g., cross circuit at input, sensor simultaneity not fulfilled)
"GF"	OFF	No general fault
	Red	Group fault (wiring error, cross-circuit, configuration error)
	Flashing red	Group fault (feedback circuit fault, simultaneity condition not satisfied)
"1"	OFF	Cross-circuit detection Off
	Yellow	Cross-circuit detection On
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
"2"	OFF	NC contact/NO contact
	Yellow	NC contact/NC contact
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
"3"	OFF	2 x 1-channel
	Yellow	1 x 2-channel
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
"4"	OFF	Debounce time Y12, Y22, Y34 ~ 50 ms
	Yellow	Debounce time Y12, Y22, Y34 ~ 10 ms
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
"5"	OFF	Sensor circuit, automatic start
	Yellow	Sensor circuit, monitored start
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
"6"	OFF	Cascading input 1, automatic start
	Yellow	Cascading input 1, monitored start
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
"7"	OFF	With startup testing
	Yellow	Without startup testing
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
"8"	OFF	Automatic starting after power failure
	Yellow	No automatic starting after power failure
	Flashing yellow	Configuration mode waiting for confirmation
	Flickering yellow	Configuration error
DIP switch	for setting safety functions	
"SET / RESET" button	• Application of parameters set via DIP switch • Resetting of faults (also possible via "TEST/RESET" button on basic unit)	

Technical data of the DM-F Local digital module	
Inputs with safety relay function	2 sensor inputs 24 V DC (Y12, Y22) • Supply via terminal T1 and T2 with cross-circuit detection or external supply (static +24 V DC) without cross-circuit detection • Functions parameterizable via DIP switch
	1 start signal input 24 V DC (Y33) • For monitored reconnection of the relay enabling circuits after a safety-related trip • Supply via terminal T1 with/without T3 (static +24 V DC) without cross-circuit detection
	1 cascading input 24 V DC (1) • For use in connection with a higher-level safety relay • Supply via terminal T3 (static +24 V DC)
	1 feedback circuit input 24 V DC (Y34) • For contactor monitoring of the motor and incoming supply contactors via series-connected auxiliary switch normally-closed contacts • Supply via terminal T2 with/without T3 (static +24 V DC) without cross-circuit detection
Cable length (single)	1500 m
Input characteristic	Type 2 according to EN 61131-2

15.7.4 Technical data of the DM-F-PROFIsafe digital module

Technical data of the DM-F PROFIsafe digital module		
LED display DM-F PROFI-safe	**Color**	**Meaning**
"READY"	OFF	System interface not connected / supply voltage too low / device defective
	Green	Device ON/system interface OK
	Flashing green	Device ON / system interface not active or not OK
"DEVICE"	OFF	Supply voltage too low
	Green	Device ON
	Red	Device defective or faulty
"OUT"	OFF	Safety-related output not active
	Green	Safety-related output active
	Flashing green	Feedback circuit not closed although start condition satisfied
"GF"	OFF	No general fault
	Red	Group fault (PROFIsafe not active, incorrect PROFIsafe address, wiring error, device defective)
"1"	Yellow	PROFIsafe address 1
"2"	Yellow	PROFIsafe address 2
"3"	Yellow	PROFIsafe address 4
"4"	Yellow	PROFIsafe address 8
"5"	Yellow	PROFIsafe address 16
"6"	Yellow	PROFIsafe address 32

Technical data of the DM-F PROFIsafe digital module			
"7"		Yellow	PROFIsafe address 64
"8"		Yellow	PROFIsafe address 128
"9"		Yellow	PROFIsafe address 256
"10"		Yellow	PROFIsafe address 512
DIP switch	for setting the PROFIsafe address		
"SET / RESET" button	• Displays the set PROFIsafe address • Application of the set PROFIsafe address (restart of the module) • Resetting of faults (also possible via "TEST/RESET" button on basic unit)		
Inputs binary	• 3 inputs (83, 85, 89) 24 V DC • Supply via terminal 84 or external supply (static +24 V) • Common connected, electrically isolated inputs for acquiring process signals (e.g., local control station, keyswitch, limit switch, etc.), freely assignable to control functions		
Input with safety relay function	• 1 feedback circuit input (91/FBC) 24 V DC • For contactor monitoring of the motor and incoming supply contactors via series-connected auxiliary switch contacts • Supply via terminal 90/T		
Cable length (single)	300 m		
Input characteristic	Type 2 according to EN 61131-2		

15.7.5 Safety-related technical data of the digital modules DM-F Local and DM-F PROFIsafe

See "Technical Data" in the Manual "SIMOCODE pro Safety" fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

15.7.6 Technical data of the analog module

Technical data of the analog module	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs
Display	
• Green "READY" LED	• Continuous light: "Ready for operation" • Flashing: "No connection to basic unit"
System interfaces	For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel.
Control circuit	
Connection type:	2-wire connection
Inputs:	
• Channels	2 (passive)

Technical data of the analog module	
• Parameterizable measuring ranges	0/4 mA to 20 mA
• Cable shielding	Recommended for up to 30 m and outside the cabinet; shielding mandatory for cables of 30 m or longer
• Max. input current (destruction limit)	40 mA
• Accuracy	±1 %
• Input resistance	50 ohms
• Conversion time	150 ms
• Resolution	12 bits
• Open-circuit detection	For measuring range 4 mA to 20 mA
• Isolation of the inputs from the device electronics	No
Outputs:	
• Channels	1
• Parameterizable output range	0/4 mA to 20 mA
• Cable shielding	Recommended for up to 30 m and outside the cabinet; shielding mandatory for cables of 30 m or longer
• Max. output voltage	30 V DC
• Accuracy	±1 %
• Max. output load	500 ohms
• Conversion time	25 ms
• Resolution	12 bits
• Short-circuit proof	Yes
• Isolation of the outputs from the device electronics	No
Connection:	
• Tightening torque	TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm
• Connection cross sections	
- Solid	2x 0.5 mm² to 2.5 mm² / 1x 0.5 mm² to 4 mm² 2x AWG 20 to 14 / 1x AWG 20 to 12
- Finely stranded with end sleeve	2x 0.5 mm² to 1.5 mm² / 1x 0.5 mm² to 2.5 mm² 2x AWG 20 to 16 / 1x AWG 20 to 14

15.7.7 Technical data of the ground-fault module 3UF7500-1AA00-0

Technical data of the ground-fault module 3UF7500-1AA00-0	
Mounting	Snap-mounted onto 35 mm standard mounting rail or screw-mounted using additional push-in lugs
Display	
• Green "READY" LED	• Continuous light: "Ready for operation" • Flashing: "No connection to basic unit"
System interface	For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel.
Control circuit	
Connectable 3UL22 residual current transformer with rated fault currents I_N	0.3 / 0.5 / 1 A
• $I_{ground\ fault} \leq 50\ \%\ I_N$	No tripping
• $I_{ground\ fault} \geq 100\ \%\ I_N$	Tripping
Response delay (conversion time)	300 ms to 500 ms, additional delay possible
Connection	
• Tightening torque	TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm
• Connection cross sections	
- Connection cross sections, solid:	2x 0.5 mm² to 2.5 mm² / 1x 0.5 mm² to 4 mm² 2x AWG 20 to 14 / 1x AWG 20 to 12
- Connection cross sections, finely stranded with ferrule:	2x 0.5 mm² to 1.5 mm² / 1x 0.5 mm² to 2.5 mm² 2x AWG 20 to 16 / 1x AWG 20 to 14

15.7.8 Technical data of the ground-fault module 3UF7510-1AA00-0

Technical data of the ground-fault module 3UF7510-1AA00-0					
Mounting	Snap-mounted onto 35 mm standard mounting rail or screw-mounted using additional push-in lugs				
Display					
• Green "READY" LED	• Continuous light: "Ready for operation" • Flashing: "No connection to basic unit"				
System interface	For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel.				
Control circuit					
Cable to the residual current transformer **Notice** • We recommend using twisted cables. • Cables of lengths > 10 m must additionally be shielded and grounded.					
Conductor cross section	0.5 mm²	1.0 mm²	1.5 mm²	2.5 mm²	4.0 mm²
AWG	20 kcmil	18 kcmil	16 kcmil	14 / 12 kcmil	10 kcmil

Technical data of the ground-fault module 3UF7510-1AA00-0					
Max. cable length	70 m	140 m	210 m	300 m	550 m
Connectable residual current transformer 3UL23 1) - feed-through diameter	35 mm to 210 mm				
Type of current to be monitored	AC and pulsating DC (type A)				
Measurable line frequency	16 Hz to 400 Hz				
Response value current (settable)	0.03 A to 40 A				
Measuring accuracy (relative) ground-fault module	±5 %				
Measuring accuracy (relative) transformer 3UL23	±2.5 %				
Reaction time (maximal)	100 ms				

Connection	
Tightening torque	TORQUE: 7 LB.IN to 10.3 LB.IN 0.8 Nm to 1.2 Nm
Connection cross sections	
• Solid	2x 0.5 mm² to 2.5 mm² / 1x 0.5 mm² to 4 mm² 2x AWG 20 to 14 / 1x AWG 20 to 12
• Finely stranded with end sleeve	2x 0.5 mm² to 1.5 mm² / 1x 0.5 mm² to 2.5 mm² 2x AWG 20 to 16 / 1x AWG 20 to 14

1) Technical data residual current transformer 3UL23: See Manual 3UG4/3RR2 Monitoring Relay (https://support.industry.siemens.com/cs/ww/en/view/54397927).

15.7.9 Technical data of the temperature module

Technical data of the temperature module	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs
Display	
• Green "READY" LED	• Continuous light: "Ready for operation" • Flashing: "No connection to basic unit"
System interface	For connecting to a basic unit, an additional expansion module, a current measuring module or a current / voltage measuring module or the operator panel.
Sensor circuit	
Conversion time	500 ms
Type of connection	2-wire or 3-wire connection
Typical sensor current:	

Technical data of the temperature module	
• PT100	1 mA (typical)
• PT1000 / KTY83 / KTY84 / NTC	0.2 mA (typical)
Open circuit detection / short-circuit detection / measuring range:	
• PT100 / PT1000	Open circuit, short-circuit; measuring range: -50 °C to +500 °C
• KTY83-110	Open circuit, short-circuit; measuring range: -50 °C to +175 °C
• KTY84	Open circuit, short-circuit; measuring range: -40 °C to +300 °C
• NTC	Short-circuit; measuring range: +80 °C to +160 °C
Measuring accuracy at an ambient temperature of 20 °C (T20)	< ±2 K, ±1 digit
Deviation due to ambient temperature (as % of measured value)	0.05 per K deviation from T20
Isolation of the inputs from the device electronics	No
Connection	
Tightening torque	TORQUE: 7 LB.IN - 10.3 LB.IN 0.8 Nm - 1.2 Nm
Connection cross sections	
• Solid:	2x 0.5 mm^2 to 2.5 mm^2 / 1x 0.5 mm^2 to 4 mm^2 2x AWG 20 to 14 / 1x AWG 20 to 12
• Finely stranded with end sleeve:	2x 0.5 mm^2 to 1.5 mm^2 / 1x 0.5 mm^2 to 2.5 mm^2 2x AWG 20 to 16 / 1x AWG 20 to 14

15.8 Technical data of the multifunction module

Technical data of the multifunction module	
Mounting	Snap-mounted onto 35-mm standard mounting rail or screw-mounted using additional push-in lugs
Cabinet mounting	Minimum distance to be maintained • from cabinet rear wall for series mounting at side: 0 mm • from grounded parts at side: 2 mm
Display	
Green "READY" LED	• Continuous light: "Ready for operation" • Flashing: "No connection to basic unit"
System interfaces	For connection to a SIMOCODE pro S basic unit or an operator panel
Digital module function	
Control circuit	
Rated insulation voltage U_i	300 V (at pollution degree 3)
Rated impulse withstand voltage U_{imp}	4 kV
Inputs (binary)	4 externally supplied, isolated inputs (24 V DC or 110 V to 240 V AC / DC, depending on the type), connected to common potential for measuring process signals (e.g. local control station, key-operated switches, limit switches, ...), freely-assignable to control functions.

Technical data of the multifunction module	
• 24 V DC: Cable lengths (single) Input characteristic	 300 m Type 2 according to EN 61131-2
• 110 V to 240 V AC/DC: Cable lengths (single) Input characteristic	 200 m (cable capacitance 300 nF / km) —
Relay outputs	
• Number	2 monostable relay outputs (depending on the type)
• Function	Isolated NO contacts (NC contact response parameterizable via internal signal conditioning), relay outputs all with connection to common potential, freely-assignable to control functions (e.g. line, star or delta contactor or operating state status information).
• Stipulated short-circuit protection for auxiliary contacts (relay outputs)	• Fuse links, operating class gL/gG 6 A, quick-response 10 A (IEC 60947-5-1) • Miniature circuit breaker 1.6 A, C characteristic (IEC 60947-5-1) • Miniature circuit breaker 6 A, C characteristic (I_k < 500 A)
• Rated uninterrupted current	• 5 A • 6 A at max. +50 °C
• Rated switching capacity	
AC-15	6 A / 24 V AC; 6 A / 120 V AC; 3 A / 230 V AC
DC-13	2 A / 24 V DC; 0.55 A / 60 V DC; 0.25 A / 125 V DC
Ground-fault module function	
Connectable 3UL23 residual current transformer - feed-through diameter	35 mm to 210 mm
Type of current to be monitored	AC and pulsating DC (type A)
Measurable line frequency	16 Hz to 400 Hz
Response value current (settable)	0.03 A to 40 A
Measuring accuracy (relative) ground-fault module	±5 %
Measuring accuracy (relative) transformer 3UL23	±2.5 %
Reaction time (maximal)	100 ms
Temperature module function	
Sensor circuit	
Versions of the cable shielding for the sensor circuit	• Up to 30 m, cable shielding recommended • From 30 m, cable shielding necessary
Versions of the cable shielding for the sensor circuit	
Conversion time	500 ms

Technical data of the multifunction module	
Type of connection	2-wire or 3-wire connection
Typical sensor circuit • PT100 • PT1000 / KTY83 / KTY84 / NTC	 1 mA (typical) 0.2 mA (typical)
Measuring range open circuit detection / short-circuit detection	
• PT100 / PT1000	-50 °C ... +500 °C (open circuit, short circuit)
• KTY83-110	-50 °C to +175 °C (open circuit, short circuit)
• KTY84	-40 °C to +300 °C (open circuit, short circuit)
• NTC	+80 °C to +160 °C (short circuit)
Measuring accuracy at an ambient temperature of 20 °C (T20)	< ±2 K, ±1 digit
Deviation due to ambient temperature (as % of measured value)	0.05 per K deviation from T20
Isolation of the inputs from the device electronics	No
Connection	
• Tightening torque	TORQUE: 5.2 LB.IN to 7.0 LB.IN 0.6 Nm to 0.8 Nm
• Connection cross sections	
- Solid	2 x0.5 mm² to 1.5 mm²; 1 x 0.5 mm² to 2.5 mm² 2 x AWG 20 to 16 / 1 x AWG 20 to 14
- Finely stranded with end sleeve	2 x 0.5 mm² ... 1.0 mm²; 1 x 0.5 mm² ... 2.5 mm²

15.9 Technical data of the operator panels

15.9.1 Technical data of the operator panel

Technical data of the operator panel	
Mounting	Installation in a cabinet door or in a front panel, with IP54 system interface cover.
LED displays	
• Red / green / yellow "DEVICE" LED	• Red blocked: "Function test negative, device disabled" • Green: "Ready for operation" • Flashing green: "No connection to basic unit" • Yellow: "Memory module or addressing plug detected" • OFF: "No control supply voltage"

Technical data of the operator panel	
• Green "BUS" LED	• Continuous light: "Communication with PLC/PCS" • Flashing: "Baud rate recognized/communication with PC/PG"
• Red "GEN. FAULT" LED	• Continuous light / • Flashing: "Feeder fault," e.g. overload tripping
• 3 yellow LEDs / 4 green LEDs	For freely assigning any status signals
Buttons	
• Test / Reset	• Resets the device after tripping • Function test (system self-test) • Operation of memory module or addressing plug
• Control buttons	• For controlling the motor feeder, freely assignable
System interfaces	
• Front	For connecting a memory module, an addressing plug, or a PC cable for parameterization purposes
• Rear face	For connecting a cable to the basic unit or the expansion module

15.9.2 Technical data of the operator panel with display

Technical data of the operator panel with display	
Mounting	Installation in a cabinet door or in a front panel, with IP54 system interface cover.
LED displays	
• Red / green / yellow "DEVICE" LED	• Red blocked: "Function test negative, device disabled" • Green: "Ready for operation" • Flashing green: "No connection to basic unit" • Yellow: "Memory module or addressing plug detected" • OFF: "No control supply voltage"
• Green "BUS" LED	• Continuous light: "Communication with PLC/PCS" • Flashing: "Baud rate recognized/communication with PC/PG"
• Red "GEN. FAULT" LED	• Continuous light/flashing: "Feeder fault," e.g. overload tripping
• 4 green LEDs	For freely assigning any status signals (preferably for feedback on the switching state, e.g. ON, OFF, CCW, CW)
Display	Graphic display of current measured values, operating and diagnostics data or status information.
Buttons	
• Control buttons	• Control of the motor feeder, freely assignable
• Arrow keys	• Navigation in the display menu
• Softkeys	• Various functions, depending upon the menu, e.g. test, reset, operation of memory module and addressing plug
System interfaces	

Technical data of the operator panel with display	
• Front	For connecting a memory module, an addressing plug, or a PC cable for parameterization purposes
• Rear face	Connection to the basic unit or to an expansion module

Note

Product version of the operator panel with display

- For use with the SIMOCODE pro V PN/pro V EIP basic units, an operator panel with display version *E07* or higher is required
- For use with the SIMOCODE pro V MB basic unit, an operator panel with display version *E09* or higher is required.

Note

Usage restrictions concerning the operator panel with display

- SIMOCODE pro V PB basic unit: The operator panel with display can only be used with SIMOCODE pro V PB basic unit from version *E03*.
- SIMOCODE pro V PN, pro V EIP basic unit: An operator panel with display from version *E07* is required for use with these basic units.
- In combination with the SIMOCODE pro PN basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- In combination with the SIMOCODE pro MR basic unit, version *E09* or higher is required when using the operator panel with the 3UF7210-1AA00-0 display.
- When using the "Dry-running protection" function, the following operator panels with display are necessary:
  – 3UF7210-1AA00-0: ≥ E12
  – 3UF7210-1AA01-0: ≥ E03
  – 3UF7210-1BA00-0: ≥ E04
  – 3UF7210-1BA01-0: ≥ E03

15.10 Technical data of the compartment identification

Technical data of the initialization module

Technical data of the initialization module	
Order No. (MLFB)	3UF7 902-0AA00-0
Ambient temperature	-25 to +80 °C
Rated voltage	300 V
Rated operating voltage	24 V

Technical data of the Y connecting cable

Technical data of the Y connecting cable	
Order No. (MLFB)	3UF7 931-0CA00-0, 3UF7 932-0CA00-0, 3UF7 937-0CA00-0
Lengths of system cable / open end of cable	
3UF7 931-0CA00-0	0.1 m / 1.0 m
3UF7 932-0CA00-0	0.5 m / 1.0 m
3UF7 937-0CA00-0	1.0 m / 1.0 m

15.11 Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V for 1st generation current / voltage measuring module

Short-circuit protection with fuses for motor feeders for short-circuit currents up to 100 kA and 690 V

You will find selection tables for fuseless and fused motor feeders in the following manuals:

- Configuration Manual Load Feeders – Configuring the SIRIUS Modular System (https://support.automation.siemens.com/WW/view/en/39714188)
- Configuration Manual Configuring SIRIUS Innovations UL - Selection Data for Fuseless and Fused Load Feeders (https://support.automation.siemens.com/WW/view/en/53433538)

The manufacturer's declarations can be found in the Industry Online Support:

Declarations, manufacturer (https://support.industry.siemens.com/cs/ww/en/view/109741638)

15.12 Typical reaction times

15.12.1 Typical reaction times of the SIMOCODE pro C/V device series

Table 15-1 Typical reaction times of SIMOCODE pro C device series

Component	Time inputs	Time processing	Time outputs
Basic unit:	Set delay time	30 ms	10 ms
Thermistor:	400 ms		-
PROFIBUS:	30 ms		30 ms
Current measurement:	200 ms		-
Internal ground fault:	300 ms ... 600 ms + set delay		-

Table 15-2 Typical reaction times of SIMOCODE pro V device series [1)]

Component	Time: Inputs		Time: Processing	Time: Outputs
Basic unit:	Set delay time		5 ms	10 ms
Thermistor:	400 ms			-
PROFIBUS, PROFINET:	5 ms			5 ms
	when using UM	when using UM+ [2), 4)]		
Current measurement:	300 ms	200 ms		-
Voltage measurement:	300 ms	200 ms		-
Active power / cos phi:	1000 ms	200 ms		-
Internal ground fault:	300 ms ... 600 ms [3)]	200 ms ... 600 ms [3)]		-
Ground-fault module / external ground fault	100 ms [3)]			-
Digital modules:				
• 24 V DC version	15 ms + delay time			25 ms
• 110 V - 240 V AC/DC version	50 ms + delay time			25 ms
Analog module	150 ms			25 ms
Temperature module	500 ms			-
DM-F Local	≤ 75 ms + delay time			30 ms
DM-F PROFIsafe	15 ms + delay time			30 ms

1) Based upon a typical hardware set-up: Basic unit + current measuring module + 2 expansion modules

Reaction time = inputs conversion time + internal processing time + outputs conversion time

Example:

You wish to switch a relay output of the basic unit via PROFIBUS when the "remote" bit is set:

- SIMOCODE pro C: Reaction time = 30 ms + 30 ms + 10 ms = 70 ms
- SIMOCODE pro V: Reaction time = 5 ms + 5 ms + 10 ms = 20 ms.

For the data from and to the PLC, you must also add the times for bus execution time, IM/CP cycles, and PLC-CPU cycle.

You will find the corresponding information in the device descriptions.

2) 2nd generation current / voltage measuring modules

3) + set delay

4) Existing values are valid in compatibility mode

15.12.2 Typical response times of SIMOCODE pro S device series

Table 15-3 Typical reaction times of the SIMOCODE pro device series

Component/control function	Time inputs	Time: Processing	Time: Outputs
Basic unit: Thermistor: PROFIBUS:	Set delay time 400 ms 30 ms	30 ms	10 ms - 30 ms
Current measurement Internal ground fault	300 ms 300 ms ... 600 ms + set delay		- -
Multifunction module • 24 V-DC version • 110 V - 240 V AC/DC version	 30 ms + delay time 65 ms + delay time		 40 ms 40 ms
Ground-fault module function	100 ms + set delay		-
Temperature module function	500 ms		-
Star-delta starter - typical switchover time from star to delta	100 to 150 ms [1)]		-

1) QE2 and QE3 must be parameterized to the outputs of the basic unit.

Example:

You wish to switch a relay output of the basic unit via PROFIBUS when the "remote" bit is set:

Reaction time = 30 ms + 30 ms + 10 ms = 70 ms

In the case of the data from and to the PLC, you must also add the times for bus runtime, IM/CP cycles, and PLC-CPU cycle.

You will find the corresponding information in the device descriptions.

15.12.3 Typical reaction times of the Modbus RTU device series

Component	Time: Inputs	Time: Processing	Time: Outputs
Basic unit: Thermistor: Modbus RTU:	Set delay time 400 ms 5 ms	5 ms	10 ms - 5 ms
Current measurement: Voltage measurement: Active power / cos phi: Internal ground fault:	300 ms 300 ms 1000 ms 300 ms ... 600 ms + set delay		- - - -
Ground-fault module / external ground fault	100 ms + set delay		-
Digital modules: • 24 V DC version • 110 V - 240 V AC/DC version	 15 ms + delay time 50 ms + delay time		 25 ms 25 ms
Analog module	150 ms		25 ms
Temperature module	500 ms		-
DM-F Local	≤ 75 ms + delay time		30 ms
DM-F PROFIsafe	15 ms + delay time		30 ms

1) Based upon a typical hardware set-up: Basic unit + current measuring module + 2 expansion modules

Reaction time = inputs conversion time + internal processing time + outputs conversion time

Example:

You wish to switch a relay output of the basic unit via PROFIBUS when the "remote" bit is set:

Reaction time = 5 ms + 5 ms + 10 ms = 20 ms.

For the data from and to the PLC, you must also add the times for bus execution time, IM/CP cycles, and PLC-CPU cycle.

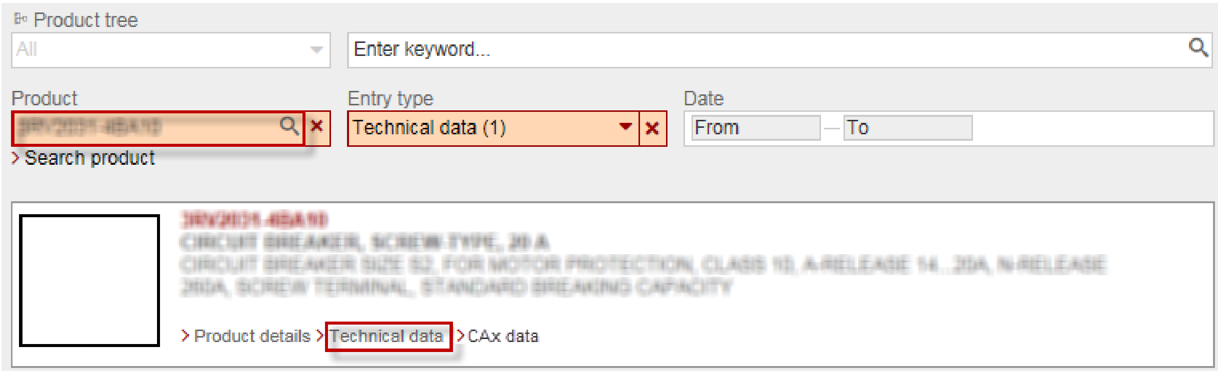
You will find the corresponding information in the device descriptions.

15.13 Technical data in Siemens Industry Online Support

Technical data sheet

You can also find the technical data of the product at Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "Technical data" link.

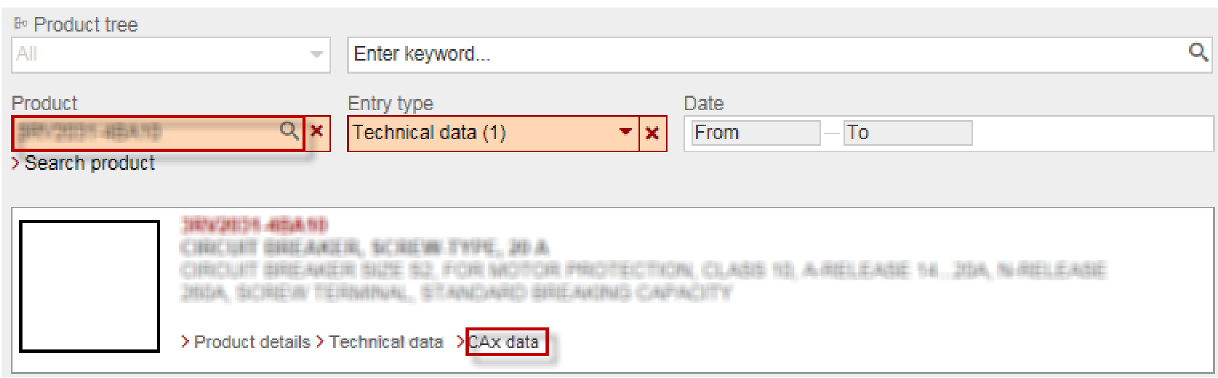

Product tree
All
Enter keyword...
Product
Entry type
Date
Technical data (1)
From
To
Search product
Product details
Technical data
CAx data

16 CAx data, dimension drawings

16.1 CAx data

You can find the CAx data in the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "CAx data link.



List of abbreviations

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Table 17-1 Guide to the abbreviations

Abbreviation	Term
AM	Analog module
AS	Alarm switch
ATEX	"Atmosphère explosible" according to ATEX Directive 2014/34/EU
AWG	American Wire Gauge
Acycl.	Acyclic
OP	Operator panel
OPD	Operator Panel with Display for SIMOCODE pro
BP	Basic Performance
OPO	Operational Protection Off
CPU	Central Processing Unit
DCM	Decoupling module
DHCP	Dynamic Host Configuration Protocol
DIP	Dual In-Line Package
DM	Digital module
DM-F	Fail-safe digital module (DM-FL or DM-FP)
DM-FL	Digital Module Failsafe Local
DM-FP	Digital Module Failsafe PROFIsafe
TO	Torque open
TC	Torque closed
DP	Distributed peripherals
DRP	Dry-running protection
DS	Data record
DTM	Device Type Manager
EEx	European Norm EXplosion-proof: Specifies the protection classes for categorizing motors for use in hazardous areas.
EIP	EtherNet/IP
ex	Explosion-proof
EM	Ground-fault module
EMF	Electromotive force
EMC	Electromagnetic compatibility
F-CPU	Fail-safe CPU (controller)
FMS	Fieldbus Message Specification
BU	Basic unit
BU0	SIMOCODE pro S basic unit
BU1	SIMOCODE pro C basic unit
BU2	1st generation SIMOCODE pro V PB (PROFIBUS) basic unit (for UM)
BU2+	2nd generation SIMOCODE pro V PB (PROFIBUS) basic unit (for UM+)

Abbreviation	Term
BU2_MR	1st generation SIMOCODE pro V Modbus RTU basic unit (for UM)
BU2_MR+	2nd generation SIMOCODE pro V Modbus RTU basic unit (for UM+)
BU3	SIMOCODE pro V PN (PROFINET) basic unit
BU3 GP	SIMOCODE pro V PN GP (PROFINET General Performance) basic unit
GP	General Performance
GSD	Device master data
HFT	Hardware failure tolerance
HP	High Performance
AUXS	Auxiliary switch
I&M	Identification and Maintenance
InM	Initialization module
IT	Isolation-Terre (isolation ground)
IM	Current measuring module
MM	Multifunction module
MR	Modbus RTU
NTC	Negative temperature coefficient (resistance dependent on temperature)
OB	Organization block
OM	Object Manager for PROFIBUS DP slaves for integration into STEP 7
OSSD	Part of the electro-sensitive protective equipment (ESPE) that is connected to the machine control system and that switches to the OFF state if the sensor part is tripped during operation for the intended purpose.
PB	PROFIBUS
PCS	Process Control System
PDM	Process Device Manager
PELV	Protective Extra Low Voltage
PFD	Probability of failure of demand: Probability of dangerous failure of a safety function on demand
PFD_{avg}	Average probability of failure of demand: Average probability of dangerous failure of a safety function on demand
PFHD	Probability of dangerous failure per hour: Average probability of hazardous failure occurring each hour
PG	Programming device
PL	Performance Level
PCS	Process Control System
PN	PROFINET
PROFIBUS	Process fieldbus
PTC	Positive temperature coefficient (resistance dependent on temperature)
PZ	Pozidriv
FB	Feedback
FO	Feedback open
TPF	Test position feedback
FC	Feedback closed
SELV	Safety Extra Low Voltage
GF, CF	Group fault or control function
SIL	Safety Integrity Level

Abbreviation	Term
SFB	System function block
SFC	System function
SFF	Safe failure fraction
PLC	Programmable logic controller
Th	Thermistor
TM	Temperature module
DRP	Dry-running protection
T_{OFDT}	Total one fault delay time (maximum response time when error is present)
T_{WCDT}	Total worst case delay time (maximum response time in error-free state)
UKCA	UK Conformity Assessed: British product designation, required for certain products that are placed on the market in Great Britain (England, Wales and Scotland)
UKEX	UK Type Examination certificate for products in potentially explosive atmospheres, issued by a British notified body - British equivalent for ATEX, of the regulation governing equipment and protective systems for intended for use in potentially explosive atmospheres from 2016 ("The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016" (SI 2016:1107))
UM	1st generation current / voltage measuring module (identified in SIMOCODE ES (TIA Portal) as IUM)
UM+	2nd generation current / voltage measuring module (identified in SIMOCODE ES (TIA Portal) as IUM V2)
T_{UL}	Useful lifetime
UM+_TL	2nd generation current / voltage measuring module for dry-running protection (identified in SIMOCODE ES (TIA Portal) as IUM V2 DRP)
UVO	Undervoltage off
LC	Local control
Cycl.	Cyclic

Glossary

0/4 to 20 mA monitoring

SIMOCODE pro supports two-phase monitoring of the analog signals of a transducer (standardized 0/4 - 20 mA output signal). The analog signals are fed to the "0/4 to 20 mA monitoring" function block via the analog module.

Addressing plug

The addressing plug is necessary to enable the hardware-based allocation of the PROFIBUS DP address to a basic unit without a PC / PG.

Analog module (AM)

The analog module provides a way of optionally extending the basic unit with analog inputs and outputs (0/4 - 20 mA). This makes it possible to measure and monitor any process variables that can be mapped onto a 0/4 to 20 mA signal. The automation system has free access to the measured process variables.

Application data unit (ADU)

Modbus application data unit.

ATEX

French abbreviation for "atmosphère explosible" (explosive atmosphere).

Synonym for the ATEX Directive 2014/34/EU.

Basic unit (BU)

The basic units are the fundamental components of the SIMOCODE pro system. Basic units are always necessary when using SIMOCODE pro.

Versions:

- SIMOCODE pro C basic unit**:** Basic component of the SIMOCODE pro C device series for PROFIBUS DP. It contains the essential motor control and motor protection functions.
- Basic unit pro S: Basic component of the SIMOCODE pro S device series for PROFIBUS DP. It is used in combination with a current measuring module and an optional operator panel.
- SIMOCODE pro V PN GP basic unit: Basic component for PROFINET. It is used in combination with a current measuring module and an optional operator panel.
- SIMOCODE pro V PB basic unit: Basic component of the SIMOCODE pro V device series for PROFIBUS DP. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.

- SIMOCODE pro V basic unit Modbus RTU: Basic component of the SIMOCODE pro V Modbus RTU device series for Modbus RTU. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.
- SIMOCODE pro V PN basic unit: Basic component of the SIMOCODE pro V PN device series for PROFINET. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.
- SIMOCODE pro V EtherNet/IP basic unit: Basic component of the SIMOCODE pro V EtherNet/IP device series. It contains all functions and requirements regarding motor protection, motor control, diagnostics, and monitoring.

Baud rate

The baud rate is the speed at which data is transferred and indicates the number of transmitted bits per second (baud rate = bit rate). For example, with PROFIBUS DP, baud rates between 9.6 kbaud and 12 Mbaud are possible.

Bus

A common transmission path with which all stations are connected. It has two defined ends. With PROFIBUS, the bus is a two-wire cable (copper cable) or a fiber optic cable.

Bus segment

PROFIBUS DP consists of at least one bus segment. A bus segment has at least two stations, one of which must be a DP master. A maximum of 32 stations can be connected to a bus segment.

Cascading input

Safe, 1-channel input of a safety relay, e.g. DM-F LOCAL and DM-F PROFIsafe. Internally, this input is evaluated like a sensor signal. If no voltage is present, the safety relay trips the enabling circuits (outputs) in a safety-related way.

Class

Unit for the trip class. Indicates the maximum tripping time in which SIMOCODE must trip at a current that is 7.2 times the value of the current setting I_s in a cold state (motor protection according to IEC 60947). If Class 10E is set for SIMOCODE pro, for example, it is ensured that the (cold) motor will switch off after 10 seconds if a current occurs that is 7.2 times the current setting. The trip class can be set to eight different settings ranging from Class 5E to Class 40E.

Class 1 master

Active station on PROFIBUS DP. It is characteristically used for cyclic data exchange with other stations. Typical Class 1 masters include PLCs with a PROFIBUS DP connection.

Class 2 master

Optional station on PROFIBUS DP. Typical class 2 masters include:

- PC/PG with SIMOCODE ES (TIA Portal)
- PDM (PCS7)
- PC with "SIMARIS manager" software (power management).

Connecting cable

Connecting cables are necessary for connecting the individual basic units with their current measuring modules and, if required, with their expansion modules or operator panels. They are available in various versions and lengths (ribbon cable 0.025 m, 0.1 m, 0.15 m, 0.3 m, 0.5 m; round cable 0.5 m, 1.0 m, 2.5 m).

Notice

Maximum length of connecting cables:

The total length of all cables must not exceed 3 m on either of the system interfaces of the basic unit!

Contactor

Electromagnetically operated low-voltage switch with only one position of rest; it cannot be manually operated. Contactors can energize, carry, and deenergize currents in a circuit under normal operating conditions, including operational overload. The contact system consists of main and auxiliary contacts (NC, NO). Depending on the size of the contactor, the main contacts can switch several hundred amps while the auxiliary contacts are only rated for control currents of a few amps.

Control functions

Control functions (e.g. direct-on-line starters, reversing starters) are used for controlling load feeders. They are characterized by the following important features:

- Monitoring the switch-on / switch-off process (no current flows in the main circuit without the ON command)
- Monitoring the OFF state (no current flows in the main circuit without the ON command)
- Monitoring the ON status
- Tripping if a fault occurs.

Control stations

Control stations are places from which control commands are issued to the motor. The "Control Stations" function block is used for administration, switching and prioritization of these different control stations. SIMOCODE pro allows parallel administration of up to four different control stations. Dependent on the control function, up to 5 different control commands can be transmitted from every control station to SIMOCODE pro.

- Local control, in the direct vicinity of the motor. Control commands via pushbuttons.
- PLC/PCS, switching commands are issued by the automation system (remote).
- PC, control commands are issued via an operator control and monitoring station or via PROFIBUS DPV1 with SIMOCODE ES (TIA Portal).
- Operator panel / operator panel with display, control commands are issued via the buttons of the operator panel / operator panel with display in the switchgear cabinet door.

Cooling down period

The cooling down period is the amount of time that must elapse before an overload trip can be reset. This is usually 5 minutes. Supply voltage failures of SIMOCODE pro during this time extend the specified time correspondingly.

Cos phi monitoring

Cos phi monitoring monitors the load condition of inductive loads. The main field of application is for asynchronous motors in 1-phase or 3-phase networks with loads that fluctuate significantly. The power factor (cos phi) is measured by evaluating the phase displacement between the voltage and current in a phase.

Current measuring module (IM)

Current measuring modules are used together with the basic units. The current measuring module must be selected according to the current setting to be monitored (rated operating current of the motor). The current measuring modules cover current ranges between 0.3 A and 630 A, with intermediate transformers up to 820 A.

Current limit monitoring

Current limit monitoring is used for process monitoring. This enables incipient anomalies in the system to be detected in good time. If a current limit is exceeded but still below the overload limit, it can, for example, indicate a dirty filter on a pump, or an increasingly sluggish motor bearing. If the current limit is undershot, it can be the first sign of a worn-out drive motor belt.

Current/voltage measuring module (UM, UM+)

The SIMOCODE pro V device series allows use of a current/voltage measuring module instead of a current measuring module. In addition to measuring the motor current, current/voltage measuring modules also enable:

- Monitoring of voltages up to 690 V
- Calculation and monitoring of power and power factor (cos phi)
- Monitoring of the phase sequence.

Special current/voltage measuring modules (DRP) are available for dry-running protection for centrifugal pumps by means of active power monitoring.

Cyclic redundancy check (CRC)

Cyclic redundancy check for checking Modbus RTU transmission errors

Decoupling module

A module for connection between a current/voltage measuring module and the basic unit at the system interface when voltage and power measurements are implemented in non-grounded networks.

Device master data (GSD file)

Information on the input and output range, as well as the consistency of the cyclically transmitted data is defined in the device data file (GSD file), tested with the configuration telegram from the device and, if appropriate, declared to be valid. The GSD file is used for integrating the device into SIMATIC S7 or any DP standard master system (automation system).

Device name

Before an IO device can be addressed by an IO controller, it must have a device name because the IP address is permanently assigned to the device name. In the case of PROFINET, this method was chosen because names are easier to handle than complex IP addresses.

Assignment of a device name for a specific IO device is comparable to setting the PROFIBUS address on a DP slave.

An IO device does not have a device name when it is delivered. It can only be addressed by an IO controller once a device name has been assigned to it, e.g. for transmission of the configuration data (including the IP address) during startup or for exchanging useful data in cyclic operation.

Digital module (DM)

Digital modules offer the option of further increasing the types and number of binary inputs and outputs on SIMOCODE pro V as required. Up to two digital modules can be connected to one SIMOCODE pro V basic unit. All types can be combined with each other. SIMOCODE pro V can thus be extended to a maximum of twelve binary inputs and seven binary outputs.

DIP switch

Small switch used to make certain basic settings. The abbreviation stands for Dual In-line Package, a device package with two parallel rows of electrical connection pins.

DM-F Local and DM-F PROFIsafe digital modules

The DM-F Local and DM-F PROFIsafe fail-safe digital modules are used as safety relays in EMERGENCY STOP devices in accordance with EN 418 and in safety circuits in accordance with EN 60204 (11.98):

DM-F Local digital module:

For applications that require local safety-related tripping with EMERGENCY OFF buttons.

DM-F PROFIsafe digital module:

For applications that require decentralized safety-related tripping with EMERGENCY OFF buttons. A fail-safe SIMATIC controller applies the logical connection between the EMERGENCY OFF button and DM-F PROFIsafe digital module.

See manual "Fail-safe Digital Modules SIMOCODE pro Safety".

Door adapter

The door adaptor is necessary for making the system interface of a basic unit available at an easily accessible location (e.g. front panel), thus enabling fast parameterization.

DP master

A master that works with the DP protocol according to the EN 50170 standard, Volume 2, PROFIBUS. Cyclic send data is exchanged between the DP master and the DP slave once in every DP cycle. The DP master sends the cyclic receive data to SIMOCODE pro. In response, SIMOCODE pro sends the cyclic send data to the DP master.

DP slave/DP standard slave

A slave that is operated on PROFIBUS with the PROFIBUS DP protocol and works according to the EN 50170 standard, Volume 2, PROFIBUS.

Dynamic Host Configuration Protocol

The Dynamic Host Configuration Protocol (DHCP) is an information technology communication protocol. It enables assignment of the network configuration to clients by a server. DHCP was defined in RFC 2131 and was assigned the UPD ports 67 and 68 by the Internet Assigned Numbers Authority.

Emergency start

Emergency start deletes the thermal memory from SIMOCODE pro each time it is activated. This allows the motor to be immediately restarted after an overload trip. This function can be used to:

- Enable an immediate restart/reset after an overload trip
- Influence the thermal memory (motor model) during operation, if required.

Since the emergency start is edge-triggered, this function cannot permanently affect the thermal motor model.

EMERGENCY STOP

Shutdown in case of an emergency according to EN 418 (ISO 13850).

An action in an emergency that is intended to stop a process or motion that would result in a hazard.

EMERGENCY STOP command device

Contact block ("EMERGENCY STOP" mushroom pushbutton according to EN EN 418 (ISO 13850), cable-operated switch with positive opening contacts according to EN 60204-1) that causes the process, machine or plant to be stopped when actuated in hazardous situations. This must have positive-opening contacts, be easy to reach and be tamper-proof.

EMERGENCY STOP device

Protective device that is operated in response to an emergency according to EN 418 (ISO 13850), EN 60204-1.

Enabling circuit

An enabling circuit is used to generate a safety-related output signal. From an external viewpoint, enabling circuits act as NO contacts (however, in terms of functionality, safety-related opening is always the most important aspect). A single enabling circuit, that is internally redundantly configured in the safety relay (two-channel) can be used for Category 3/4 according to EN 954-1 (ISO 13849-1).

EtherNet/IP

EtherNet/IP (EtherNet Industrial Protocol, often simply called EIP) is a real-time Ethernet that is used mainly in automation engineering. EtherNet/IP was developed by Allen-Bradley (belongs to Rockwell Automation) and was later handed over to the Open DeviceNet Vendor Association (ODVA) as an open standard. In 1998, a working group of ControlNet International designed a process for basing the already-published application protocol, Common Industrial Protocol, on Ethernet. Based on this process, EtherNet/IP was published as an open industrial standard in March 2000. ControlNet International (CI), the Open DeviceNet Vendor Association (ODVA) and the Industrial Ethernet Association (IEA) were involved.

Besides PROFINET and Modbus/TCP, EtherNet/IP is an Ethernet-based fieldbus that is currently widely spread.

Expansion modules

Expansion modules are intended as optional additions for the basic units. The following expansion modules are available:

- Digital module (DM)
- Analog module (AM)
- Ground-fault module (EM, EM+)
- Temperature module (TM)
- Multifunction module (MM).

All expansion modules are equipped with 2 system interfaces (incoming/outgoing) and removable terminals.

F_WD_Time

Monitoring time in the fail-safe PROFIsafe option. A valid, current safety message frame must be received from the F-CPU within this monitoring time. Otherwise, the PROFIsafe option goes to the safe state.

Factory settings

The factory settings are used to reset all parameters of a device to the default settings to which they were set at the factory. The factory settings can be restored using either the "TEST / RESET" button on the basic unit or via SIMOCODE ES (TIA Portal).

Feedback circuit

A feedback circuit is used to monitor controlled actuators (e.g., relays or contactors with positively driven contacts). The evaluation unit can only be activated if the feedback circuit is closed.

Note:

The NC contacts of the relays to be monitored are connected in series and integrated into the feedback circuit of the safety relay. If a contact in the enabling current path is welded, the safety relay can no longer be activated because the feedback circuit remains in the open position.

Field/field level

The field or field level of an automation system contains the individual sensors and actuators, as opposed to the control level, which is located above it in the hierarchy.

Fieldbus

Industrial communication system that connects a large number of field devices such as probes (sensors), actuators and drives to a control device.

Function block

Defined group of functions that can be freely parameterized by the user and connected to other function blocks to create a complete feeder-specific logic system. This means conventional wired control circuits containing auxiliary relays, time relays, etc. can be completely replaced.

Function code (FC)

Identification of a function

Ground-fault module (EM, EM+)

The ground-fault module and the multifunction module enable implementation of a powerful external ground fault monitoring system in conjunction with the 3UL22 (3UF7 500-1AA00-0) and 3UL23 (3UF7 510-1AA00-0) residual current transformers. In addition to the internal ground-fault monitoring function which is supported by both device series, SIMOCODE pro can be extended by an additional and more precise external ground-fault monitoring system.

Ground-fault monitoring

SIMOCODE pro acquires and monitors all three phase currents. By evaluating the summation current of the three current values, the motor feeder can be monitored for a possible residual current or ground fault. There is a difference between internal and external ground-fault monitoring:

Internal ground-fault monitoring:

Internal ground-fault monitoring via current measuring modules or current/voltage measuring modules is only possible for motors with a 3-phase connection in power systems that are either grounded solidly or with low impedance. The basic unit uses the total current to detect a possible residual current / ground-fault current.

External ground-fault monitoring:

The external ground-fault monitoring using residual current transformer and ground-fault module is normally used for power systems that are grounded with high impedance, or in cases, in which precise detection of the ground-fault current is necessary, for example, for condition monitoring. The ground-fault module (EM) or the multifunction module (MM) evaluates rated fault currents using an externally connected summation current transformer (e.g. 3UL23).

GSD file

The properties of a PROFINET device are described in a GSD (General Station Description) file that contains all the necessary information for configuration. You can use a GSD file to integrate a PROFINET device in exactly the same way as a PROFIBUS device into an automation system (SIMATIC S7 environment or any DP standard master system).

In the case of PROFINET IO, the GSD file is in XML format. The structure of the GSD file conforms to ISO 15734, the worldwide standard for device descriptions.

I&M data

Identification and maintenance data.

Information stored in a module that helps you to check the plant configuration, to locate hardware modifications in a plant, or to remedy faults in a plant. I&M data can be used to identify modules uniquely on the network.

I/O

The term I/O devices is used in automation engineering to refer to peripheral devices, for example, devices that are connected to centralized controls.

Independent operation

SIMOCODE pro protects and controls the motor feeder, independently of the automation system. Even if the automation system (PLC) fails, or if communication is disrupted, the motor feeder remains fully protected and controllable. SIMOCODE pro can be used without being connected to the communication bus. This can easily be connected later, if required.

Initialization module

Memory module permanently installed in the switchboard or the motor control center in which the device parameters of intelligent switching devices are stored.

The initialization module is used in motor control centers with a withdrawable design in which all functions concerning the motor feeder are fitted in an exchangeable withdrawable module.

The initialization module can be permanently installed in the switchboard and enables backup of all parameters of a system and completely automatic transmission to a new system, e.g. device replacement.

IP address

To enable a PROFINET device to be addressed as a node on Industrial Ethernet, this device also requires an IP address that is unique within the network. The IP address is made up of 4 decimal numbers with a range of values from 0 through 255. The decimal numbers are separated by a decimal point.

The IP address is made up of

- The address of the (sub)net and
- The address of the node (generally called the host or network node)

IT system

The IT system (FR Isolé Terre) is a specific type of ground connection for increased fail-safe protection in case of insulation faults.

Local Human Machine Interface (HMI) for SIRIUS devices

Human Machine Interface for a SIRIUS device or for several SIRIUS devices

Logic modules

Logical operations, time relay functions and counter functions are implemented using logic modules.

Low voltage

All voltage levels used for the distribution of electricity that are within a range whose upper limit in AC systems is generally 1000 V.

MAC address

Each PROFINET device is assigned a globally unique device identification at the factory. This 6-byte-long device identifier is the MAC address.

The MAC address is divided up as follows:

- 3 bytes for the manufacturer ID and
- 3 bytes device identifier (consecutive number).

The MAC address can generally be read from the front on the device, e.g.: 08-00-06-6B-80-C0.

Master

PROFIBUS DP is based on a master-slave architecture. Telegrams are sent by the master to the addressed station (slave) and responded to by the slave.

Media redundancy

SIMOCODE pro V PN supports media redundancy according to the Media Redundancy Protocol (MRP). This function is configured using the configuration tool of the automation system, e.g. HW Config with STEP 7.

Memory module

The memory module is plugged into the system interface and is used for fast reading in or out of the entire SIMOCODE pro parameterization, e.g. if a unit is exchanged.

Note

The SIMOCODE pro C and SIMOCODE pro V PB basic units up to product version *E08* only support the 3UF7900-0AA00-0 memory module. The basic units SIMOCODE pro S and SIMOCODE pro V (PB as from product version *E09*) also support the memory module 3UF7910-0AA00-0.

Modbus address table

Data with similar properties are combined in one of four address tables: Discrete inputs, coils, input register, holding register

Modbus RTU

Modbus RTU (Remote Terminal Unit) is a standard protocol for network communication and uses the electrical RS485 connection for serial data transmission between Modbus devices in the network.

Modbus RTU uses a master/slave network in which the entire communication is triggered by only one master device while the slaves can only respond to the request of the master. The master sends a request to a slave address and only this slave address responds to the command (exception: broadcast frames to slave address 0 which are not acknowledged by the slaves).

Monitoring functions

The following monitoring functions

- Ground-fault monitoring
- Current limit monitoring
- Voltage monitoring
- Cos phi monitoring
- Active power monitoring
- 0/4 to 20 mA monitoring
- Operation monitoring
- Temperature monitoring (analog)

Operate "in the background" in the same way as motor protection and motor control. They can be active or not, according to the control function selected.

Monitoring the number of starts

Monitoring the number of starts can protect system parts (motors and switching devices such as soft starters and converters) from too many start processes within a parameterizable time frame and thus prevent damage. This is particularly useful for commissioning or manual control.

Motor protection

The basic unit has several protection mechanisms for current-dependent motor protection:

- Overload protection
- Unbalance protection
- Stalled rotor protection
- Thermistor protection.

Motor stop time monitoring

SIMOCODE pro can monitor the stop times of a motor to avoid plant downtimes due to failed motors caused by either running too long (wearing out) or being stopped for too long.

Multifunction module

Universal module of the SIMOCODE pro S device series with the following functions:

- Digital module function with four digital inputs and two monostable relay outputs
- Ground fault module function with the possibility of implementing powerful external ground-fault monitoring in conjunction with the 3UL23 residual-current transformer
- Temperature module function with one input for connecting an analog PT100, PT1000, KTY83, KTY84 or NTC temperature sensor.

Network Time Protocol

Implementation of a TCP/IP protocol for time synchronization in networks. The NTP procedure uses hierarchical time synchronization, that is, an external clock (e.g. SICLOCK TM or a PC in the network) is used for synchronization.

Octet

Sequence of bytes. Octet n: string of n bytes.

Offset

A reference within an address table.

OPC Unified Architecture (UA)

OPC Unified Architecture (UA) is the next generation technology of the OPC Foundation for secure and reliable data transfer and defines access to industrial communication networks.

OPC UA client

An OPC UA client is a user program that accesses process data via the OPC UA interface. Access to the process data is made possible by the OPC UA server.

OPC UA server

The OPC server provides the OPC client with a wide range of functions with which it can communicate via industrial networks. SIMOCODE pro V PN provides extensive process data via OPC UA.

Operating hours monitoring

The motor operating hours monitoring function enables the operating hours (service life) of a motor to be recorded so that motor maintenance prompts can be generated in good time as applicable.

Operation monitoring

SIMOCODE pro can monitor the operating hours and stop times of a motor and restrict the number of startups in a defined time frame in order to avoid plant downtimes due to failed motors caused by running or being stopped for too long.

Operational Protection Off (OPO)

The "Operational Protection Off (OPO)" function block puts the positioner into a safe position and switches the motor off.

Operator panel with display (OPD)

The operator panel with display can be used as an alternative to the standard operator panel (OP). It displays the current measured values, operating and diagnostic data, status information for the motor feeder at the switchgear cabinet and the device-internal error log. It also contains all the status LEDs that are present on the basic unit and facilitates access to the system interface from outside the cabinet. Its keys can be used to control the motor and to navigate the display menu.

Operator panel (OP)

The operator panel controls the motor feeder from the switchgear cabinet. It contains all the status LEDs that are on the basic units, the "TEST/RESET" button and the external system interface.

Organization block

Organization blocks form the interface between the CPU operating system and the user program. The order in which the user program is processed is specified in the organization blocks.

Overload protection

SIMOCODE pro protects three-phase or AC motors in accordance with IEC 60947-4-1 requirements. The trip class can be set to eight different settings ranging from CLASS 5E to CLASS 40E.

Pause time

The pause time is the specified time for the cooling down response of the motor when tripped under normal operating conditions (not in the case of an overload trip). After this interval, the thermal memory in SIMOCODE pro is erased and a new cold start is possible. This means that many startups can be performed in a short space of time.

PC cable

The PC cable is used to connect the serial interface of the PC to the system interface of a basic unit for device parameterization.

Note

PC cable variant

For SIMOCODE pro V PN, a serial PC cable 3UF7940-0AA00-0 as from product version *E02* or a USB PC cable 3UF7941-0AA00-0 can be used.

PELV

Protective Extra-Low Voltage. Protective measure against electric shock (formerly referred to as "protective extra low voltage with safe isolation").

In contrast to an SELV circuit, live parts and exposed conductive parts of the equipment may be grounded and connected to the protective conductor. Safe isolation means that the primary circuit of the transformer must be separated from the secondary circuit by double or reinforced insulation. PELV is used whenever operational reasons dictate that live conductors of the low voltage or bodies of the equipment must be grounded. This is the case, for instance, if equipotential bonding is necessary to prevent sparking in containers or hazardous areas. However, owing to the chassis ground, dangerous leakage currents can flow through the body regardless of the low voltage if a fault occurs in the higher-level power system.

Use of power supply units according to IEC 60536, protection class III (SELV or PELV):

See Chapters "Safety-related tripping", "Fail-safe digital modules (DM-F)", and "DM-F Local and DM-F PROFIsafe digital modules".

Performance Level (PL)

Defined by standard EN ISO 13849-1 as "a discrete level specifying the ability of safety-related control parts to execute a safety function under anticipated conditions." Five performance levels are specified (a to e) with defined ranges of the probability of a dangerous failure per hour. PL "e" corresponds to SIL 3 and is specified as the highest level.

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Pozidriv (PZ)

Type of fixing screws and cross-tip screwdrivers.

Process Automation (PA)

Automation of continuous production processes. For instance, it controls production processes in the chemical industry or in water supply systems.

PROFIBUS

Process Fieldbus, a European process and fieldbus standard defined in the PROFIBUS standard (EN 50170, Volume 2, PROFIBUS). It specifies the functional, electrical and mechanical characteristics of a bit-serial fieldbus system.

PROFIBUS is a bus system that networks PROFIBUS-compatible automation systems and field devices at the cell and field level. PROFIBUS is available with the DP (= Distributed Peripherals), FMS (= Fieldbus Message Specification), PA (= Process Automation), or TF (= Technological Functions) protocol.

PROFIBUS User Organization (PNO) installation guidelines

The PROFIBUS DP / FMS installation guidelines published by the PROFIBUS User Organization must be complied with when installing PROFIBUS networks. These contain important information about cable routing and the commissioning of PROFIBUS networks.

PROFIBUS DP

PROFIBUS bus system with the DP (distributed I/Os - decentralized peripherals) protocol. The main task of PROFIBUS DP is to manage the fast, cyclic data exchange between the central DP devices and the I/O devices.

PROFIBUS DP interface

SIMOCODE pro has an integrated PROFIBUS DP interface (SUB-D socket or terminal connection on the basic units).

PROFIBUS DPV1

Extension of the DP protocol. It enables acyclic data exchange of parameter, diagnostic, receive and test data.

PROFIenergy

Profile for power management in production plants.

PROFIenergy uses the PROFINET communication protocol. It controls the power consumption of automation equipment in production via a PROFINET network.

PROFINET

PROFINET (Process Field Network) is the open Industrial Ethernet Standard from Profibus & Profinet International (PI) for automation.

Within the context of Totally Integrated Automation (TIA), PROFINET is the systematic development of the following systems:

- PROFIBUS DP, the established fieldbus
- Industrial Ethernet, the communications bus for the cell level.

Experiences from both systems have been and are being integrated in PROFINET.

PROFINET IO controller

Device via which the connected IO devices are addressed. This means the IO controller exchanges input and output signals with assigned field devices. The IO controller is often the controller on which the automation program runs.

PROFINET IO device

Distributed field device assigned to one of the IO controllers.

PROFINET IO Supervisor

PG/PC for commissioning and diagnostics.

PROFIsafe

The PROFIBUS safety profile specifies communication between fail-safe I/O devices and fail-safe controllers. It is based on the standards for safety-related applications as well as on the experience of PLC users and manufacturers who are members of PROFIBUS International (PI). The PROFIBUS safety profile has TÜV and BIA (Institute for Occupational Safety and Health of the German Social Accident Insurance) certification. The newest version of the PROFIsafe specification is the Profile for Safety Technology V1.11 specification, published in 07/2001.

Programmable logic controller (PLC)

Controller whose functionality is stored in the control equipment as a software program. The PLC comprises a CPU, memory, input/output modules, and an internal bus system. The I/O and the programming language are oriented toward control engineering needs.

Programming device

A compact and transportable PC, suitable for industrial purposes. Its distinguishing feature is the special hardware and software for SIMATIC programmable logic controllers.

Protection functions

The protection functions

- Overload protection
- Unbalance protection
- Stalled rotor protection
- Thermistor protection
- Dry-running protection

operate alongside motor control "at a higher level in the background." They can be active or not, according to the control function selected.

Protective Extra Low Voltage (PELV)

Protective measure against electric shock (formerly referred to as "protective extra low voltage with safe isolation").

In contrast to an SELV circuit, live parts and exposed conductive parts of the equipment may be grounded and connected to the protective conductor. Safe isolation means that the primary circuit of the transformer must be separated from the secondary circuit by double or reinforced insulation. PELV is used whenever operational reasons dictate that live conductors of the low voltage or bodies of the equipment must be grounded. This is the case, for instance, if equipotential bonding is necessary to prevent sparking in containers or hazardous areas. However, owing to the chassis ground, dangerous leakage currents can flow through the body regardless of the low voltage if a fault occurs in the higher-level power system.

Protocol data unit (PDU)

Consists of function code and the data

Record

Record.

RT communication

As a motor management system, SIMOCODE pro V PN does not have any time-critical communication functions itself but it does support the PROFINET hardware RT used. The integrated 2-port switch is therefore used to forward RT data.

SELV

Safety extra low voltage Low electric voltage that offers significant protection against electric shock due to its low value and insulation. For certain requirements, the highest voltage must be defined below 50 V AC or 120 V smoothed DC, especially if direct contact with live parts is permissible. At a nominal voltage of 120 V, the greatest peak value in a smoothed DC system is 140 V, and at a nominal voltage of 60 V it is 70 C.

Use of power supply units according to IEC 60536, protection class III (SELV or PELV):

SFB

System function block A block integrated in the S7 CPU operating system that can be called like a function block (FB) in the user program if required.

SFC

System function:

A function integrated in the S7 CPU operating system that can be called like a function (FC) in the user program if required.

Shared device

Shared device is the function with which an IO device is used simultaneously by two or more IO controllers.

Use of this function depends on whether the automation system supports the function. It is configured using the configuration tool of the automation system, e.g. with STEP 7 HW Config.

SIL (Safety Integrity Level)

Measure, defined in IEC 61508, for the safety-related performance of an electrical or electronic control device.

The IEC standard defines four SIL levels SIL1 to SIL4, which are defined as the safety implementations of electrical and electronic equipment. The SIL value describes the specified safety function in the event of a fault.

SIMATIC

Name of products and systems for industrial automation from Siemens AG.

SIMATIC PDM

You can also configure SIMOCODE pro using the SIMATIC PDM (Process Device Manager) software. The following options exist:

- SIMATIC PDM as a standalone program
- PDM integrated in STEP 7

SIMOCODE ES (TIA Portal)

Standard parameterization software for SIMOCODE pro.

SIMOCODE pro S7 slave

The SIMOCODE pro S7 slave is a special slave with the following characteristics:

- It supports the S7 model (diagnostic interrupts, process interrupts)
- It can be parameterized

SIMOCODE pro object manager (OM)

Part of SIMOCODE ES. When SIMOCODE ES and SIMOCODE pro object manager are installed on a PC/PG, SIMOCODE ES can be called directly from STEP 7 HW Config. This enables simple and universal SIMATIC S7 configuration.

SIMOCODE pro PCS-7 library

The SIMOCODE pro PCS 7 library is used to connect SIMOCODE pro to the SIMATIC PCS 7 process control system. It contains:

- The diagnostics and driver modules corresponding to the diagnostics and driver concept of SIMATIC PCS 7
- The elements (symbols and faceplates) necessary for operating and monitoring.

Service packs and hot fixes:

The PCS 7 libraries are subject to continual updating and improvement. You can download the current service packs and hot fixes in the Industry Online Support.

Simple Network Management Protocol (SNMP)

Network protocol for monitoring and controlling network elements (e.g. switches).

Slave

PROFIBUS DP is based on a master-slave architecture. Telegrams are sent by the master to the addressed station (slave) and responded to by the slave.

Stalled rotor protection

If the motor current rises above an adjustable stalled rotor protection level (current threshold), a defined and delayable response can be configured for SIMOCODE pro. In this case, for example, the motor can be shut down independently of the overload protection. The stalled rotor protection is only active after the parameterized class time has elapsed, e.g. for Class 10E after 10 seconds, and prevents unnecessarily high thermal and mechanical loads as well as premature aging of the motor.

Standard function

Standard functions are typical motor functions that can be activated according to need and, as applicable, individually set for each motor feeder. They are already available, work independently of the selected control function and can be used/activated as optional additions.

Station

A device that can send, receive or amplify data via the bus, e.g. master, slave.

Statistical data

SIMOCODE pro makes statistical data available, which can be read out, for example, with SIMOCODE ES (TIA Portal) under Commissioning → Service Data / Statistical Data.

STEP7

The basic STEP 7 software is the standard tool for the SIMATIC S7, SIMATIC C7, and SIMATIC WinAC automation systems.

Stop category 0

Non-controlled shutdown by immediately switching off the power to the machine's drive elements.

System interface cover IP54

Cover to protect the system interface on the door adaptor or on the operator panel/operator panel with display from soiling or to seal it.

Temperature module (TM)

The temperature module offers the option of expanding the SIMOCODE pro V device series by an analog temperature monitoring system. With this, up to three analog sensor measuring circuits (two-wire or three-wire systems) can be connected. The temperatures recorded can be fully integrated into the process, can be monitored and are also available for a higher-level automation system. You can, for example, implement analog temperature monitoring of the motor windings, bearings, coolant or gearbox oil. SIMOCODE pro V supports various sensor types (NTC, KTY83/84, PT100 and PT1000) for use with solid, liquid, or gaseous media.

Temperature monitoring

See temperature module (TM).

Terminal block

Insulating part comprised of one or more terminals, insulated from one another, for mounting on a strip.

Test Position Feedback (TPF)

If the motor feeder is in the test position, its main circuit is isolated from the network. However, the control voltage is connected.

The "cold run" function test is performed with the feeder in this state. This means the motor feeder is tested without a current in the main circuit.

Thermistor protection

SIMOCODE pro V provides the option of connecting thermistor sensors (binary PTC) for monitoring the motor temperature.

TN-C system

In a TN-C system (FR Terre Neutre Combiné) 1 wire is used simultaneously as a protective earth (PE) and neutral wire (N).

TN-S system

In a TN-S system (FR Terre Neutre Séparé) the neutral wire and the protective earth are led separately from the transformer up to the appliance.

Trip class

See "Class".

UKCA marking

UK Conformity Assessed: Product marking required in the United Kingdom for all Ex products that are placed on the market in Great Britain (England, Wales and Scotland). It replaces the CE marking. The CE marking is still required in Northern Ireland in addition to the UKCA marking.

UKEX approval

UK Type Examination approval for products in potentially explosive atmospheres, issued by a British notified body - British equivalent for ATEX, of the regulation governing equipment and protective systems for intended for use in potentially explosive atmospheres from 2016 ("The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016" (SI 2016:1107))

Unbalance protection

The extent of the phase unbalance can be monitored and transmitted to the control system. A definable and delayable response can be triggered when an adjustable limit has been overshot. If the phase unbalance is more than 50 %, the tripping time is also automatically reduced in accordance with the overload characteristic since the heat generation of the motors increases in asymmetrical conditions.

Universal Current (UC)

Universal current. Property of devices that can be operated with both AC and DC.

USB PC cable

The USB-PC cable is used to connect the USB interface of the PC to the system interface of a basic unit for device parameterization.

Voltage monitoring

See monitoring voltage

Voltage monitoring

SIMOCODE pro supports two-phase undervoltage monitoring of either a three-phase network or a one-phase network for freely selectable limits, direction of rotation (for AC) or readiness to start. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized and delayed. Voltage measurement is performed using current/voltage measuring modules.

Win SIMOCODE-DP converter

Software tool for converting "old" Win SIMOCODE-DP parameter files (3UF5 device series) into SIMOCODE ES parameter files for SIMOCODE pro.

Y connecting cable

Connecting cable with which a connection can be made via the system interface from a SIMOCODE pro basic unit to both an initialization module and a current measuring module.

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"

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SIEMENS

Industrial Controls

Motor management and control devices
Parameterizing SIMOCODE pro

Operating Manual

10/2022
A5E40507630002A/RS-AF/006

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Smart Infrastructure
Electrical Products
Postfach 10 09 53
93009 Regensburg
GERMANY

A5E40507630002A/RS-AF/006
Ⓟ 10/2022 Subject to change

Table of contents

Introduction

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1.1 Important notes

Scope of application

This manual is applicable to the listed SIMOCODE pro system components. It contains a description of the components applicable at the time of printing the manual. SIEMENS reserves the right to include updated information about new components or new versions of components in a Product Information.

Manual Collection

A Manual Collection (https://support.industry.siemens.com/cs/ww/en/view/109743951), a collection of the following five SIMOCODE pro manuals is at your disposal in Industry Online Support:

- SIMOCODE pro - 1 Getting Started
- SIMOCODE pro - 2 System Manual
- SIMOCODE pro - 3 Parameterization
- SIMOCODE pro - 4 Applications
- SIMOCODE pro - 5 Communication

SIMOCODE pro response tables

Specific responses (deactivated, signaling, warning, tripping) can be parameterized for various SIMOCODE pro functions, such as overload. These are always displayed in tabular form:

- "X" = Applicable
- "—" = Not applicable
- Default values are marked "d" for "default" in parentheses.

Response	Function 1	Function 2	Function 3
Tripping	—	X (d)	X
Warning	X (d)	X	—
Signaling	X	X	—
Deactivated	X	X	X (d)
Delay	0 ... 25.5 s (default: 0)	—	—

Brief description of the responses:

- Tripping: The contactor controls QE* are tripped. A fault message is generated which is available as a diagnosis via PROFIBUS DP. The fault message and the device-internal signal remain on until the appropriate length of time has elapsed or the cause of the fault has been eliminated and acknowledged.
- Warning: In addition to the device-internal signal, a warning signal is generated that is available as diagnostics via the communication bus.
- Signaling: Only a device-internal signal is generated, which can be further processed as required.
- Deactivated: The appropriate function is switched off, no signals are generated.

A delay time can also be set for specific responses.

Further information

Please read the operating instructions of the respective components. You can find the operating instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man).

You can find further information on the Internet:

- SIMOCODE pro (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/catl)
- Siemens Industry Online Support (SIOS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

Disclaimer of liability

The products described here have been developed to carry out safety-related functions as part of a complete plant or machine. In general, a complete safety system consists of sensors, evaluation units, signaling devices and methods for safe tripping. The manufacturer is responsible for ensuring safe functioning of the complete plant or machine. Siemens AG, its subsidiaries, and associated companies (hereinafter referred to as "Siemens") are not in a position to guarantee every characteristic of a complete plant or machine not designed by Siemens.

Siemens also denies all responsibility for any recommendations that are made or implied in the following description. No new guarantee, warranty, or liability claims above those beyond the scope of the Siemens general terms of delivery can be derived from the following description.

1.2 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

Link: Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en)

Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**
  Answers to frequently asked questions
- **Manuals/operating instructions**
  Read online or download, available as PDF or individually configurable.
- **Certificates**
  Clearly sorted according to approving authority, type and country.
- **Characteristics**
  For support in planning and configuring your system.
- **Product announcements**
  The latest information and news concerning our products.
- **Downloads**
  Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
  Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**
  Technical product data for support in planning and implementing your project

Link: Product support (https://support.industry.siemens.com/cs/ww/en/ps)

mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**
  Search for request number, product or subject
- **My filters**
  With filters, you limit the content of the online support to different focal points.

- **My favorites**
  With favorites you bookmark articles and products that you need frequently.
- **My notifications**
  Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.
- **My products**
  With product lists you can virtually map your control cabinet, your system or your entire automation project.
- **My documentation**
  Configure your individual documentation from different manuals.
- **CAx data**
  Easy access to CAx data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams
- **My IBase registrations**
  Register your Siemens products, systems and software.

1.3 Siemens Industry Online Support app

Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:

Android

iOS

1.4 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

1.5 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert.

1.6 Current information about operational safety

Important note for maintaining operational safety of your system

DANGER

Hazardous Voltage

Can Cause Death, Serious Injury or Risk of Property Damage

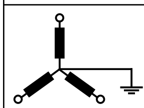
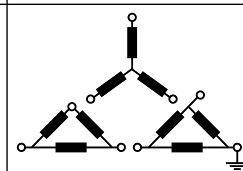
Please take note of our latest information!

Systems with safety-related characteristics are subject to special operational safety requirements on the part of the operator. The supplier is also obliged to comply with special product monitoring measures. We therefore also provide information in the newsletters Industrial controls (https://new.siemens.com/global/en/products/automation/industrial-controls/forms/newsletter.html) and Safety Integrated (https://new.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/newsletter.html) about new products, further technical developments as well as standards and guidelines.

1.7 Notes for SIMOCODE pro regarding IEC60947-4-1:2018

1.7.1 Line system configurations

The voltage information regarding the SIMOCODE pro current and current/voltage measuring modules is valid for the following line system configurations according to IEC 60947-4-1:

Three-phase four-wire systems	Three-phase three-wire systems
	
[V]	[V]
--	230
230 / 400	400
260 / 440	440
--	500
400 / 690	600

The nameplates of the current/voltage measuring modules state a maximum line voltage of 400/690 V.

1.7.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

1.7.3 Touch current

A protective impedance is present in each of the 3UF711x-1xA01-0 / 3UF712x-1xA01-0 current/ voltage measuring modules. This protective impedance is 7.2 MΩ per phase (product version E04 and higher).

⚠ DANGER

Hazardous touch current

When connecting multiple SIMOCODE systems in parallel, make sure that no hazardous touch current occurs.

The SIMOCODE basic units in the 110-240 V AC/DC version include galvanic isolation. This avoids the effect of parallel connection via a central supply voltage for multiple systems when these basic units are used.

The SIMOCODE basic units in the 24 V DC version do not include galvanic isolation.

NOTICE

PELV power supply required

When using numerous current/voltage measuring modules with these basic devices, deploy a PELV power supply, for example, to prevent a potential touch current.

NOTICE

Ground leakage current

Pay attention to any resulting ground leakage current that may occur.

1.8 Recycling and disposal

For environmentally-friendly recycling and disposal of your old device, contact a company certified for the disposal of used electrical and electronic equipment, and dispose of the device as specified in the regulations for your particular country.

Function blocks

2

2.1 Function blocks - input and output types, structure

See also Chapter Function blocks - overview (Page 17).

Properties

Function blocks are stored internally in the SIMOCODE pro system, e.g. for the administration of various control stations, for the set control function, or for motor protection. Every function block has a name and can be equipped with inputs and outputs. The inputs and outputs are used for the internal connection of the various function blocks and, thus, the setup of a device-internal logic instead of an externally wired logic in the control circuit.

The following table shows the possible input types of the internal function blocks of SIMOCODE pro:

Table 2-1 Input types of the internal function blocks of SIMOCODE pro

Input	Example
Plugs (binary)	Function blocks in the basic unit may have binary plugs. These are connected to binary sockets via software. They are relevant for parameterization, e.g. with SIMOCODE ES (TIA Portal).
Plugs (analog)	Function blocks in the basic unit may have analog plugs. These are connected via software to analog sockets. They are relevant for parameterization, e.g. with SIMOCODE ES (TIA Portal). Example: 2-byte word for cyclic send data.
Screw terminals	Screw terminals are outside, e.g. "BU Inputs" function block. Control devices and auxiliary switches are normally connected there.
Control data from the communication bus	e. g. from the DP master to SIMOCODE pro

The following table shows the possible output types of the internal function blocks of SIMOCODE pro:

Table 2-2 Output types of the internal function blocks of SIMOCODE pro

Output	Example
Sockets (binary)	Function blocks in the basic units may have binary sockets. These sockets are assigned to binary plugs in the software. They are relevant for parameterization, e.g. with SIMOCODE ES (TIA Portal).
Sockets (analog)	Function blocks in the basic units may have analog sockets. These sockets are assigned to analog plugs in the software. They are relevant for parameterization, e.g. with SIMOCODE ES (TIA Portal). Example: 2-byte word, max. current I_max.
Screw terminals	Screw terminals are outside, e.g. "BU Output" function block. The contactors, for example, are connected here.

Message data to the communication bus	e. g from SIMOCODE pro to the DP master
Binary terminal block	Internal binary signals (binary sockets) that are not assigned to a function block (fault, status, other), e.g. "Status - Device o. k. (in the CFC editor)
Analog terminal block	Internal analog signals (analog sockets) that are not assigned to a function block, e.g. "Phase Unbalance" (in the CFC editor).

Diagram of basic structure

The following function block diagram (example) shows the basic structure of SIMOCODE pro with its external inputs and outputs and internally stored function blocks:

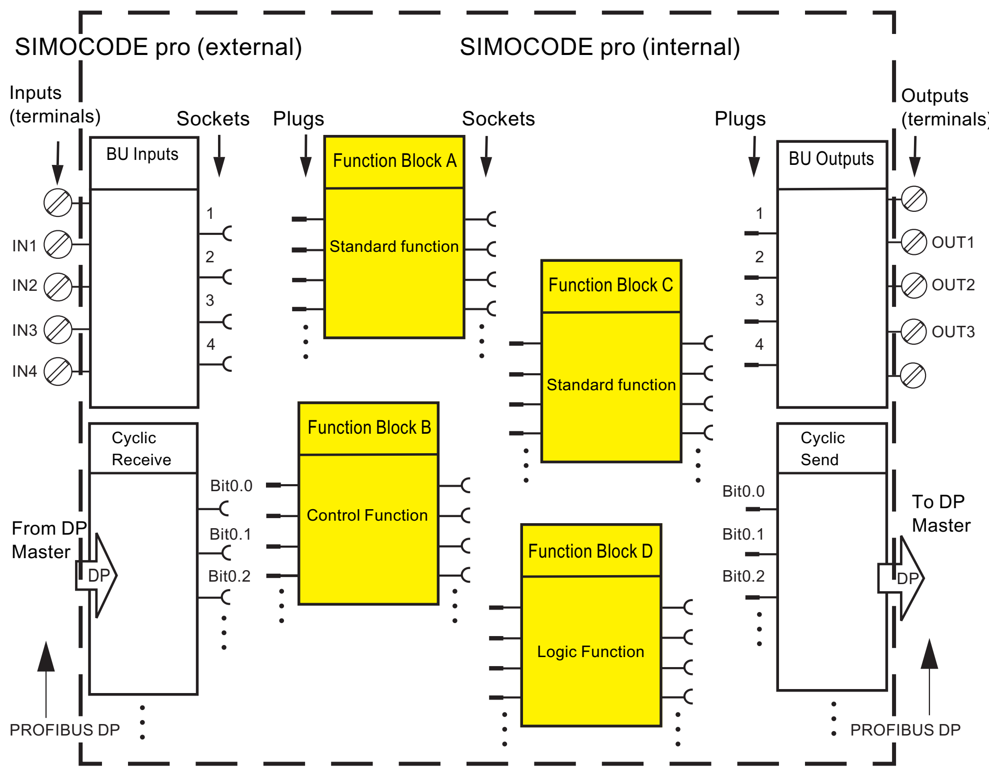


Figure 2-1 Basic structure of SIMOCODE pro

Connecting plugs with sockets

Note

The function block plugs and sockets have **not** already been connected at the factory with the binary inputs and the relay outputs of the basic unit.

The internal wiring (connection between plugs and sockets) is determined by the selected application. 1)

Note

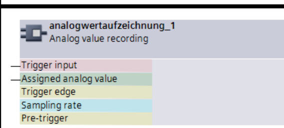
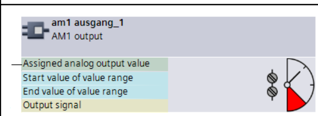
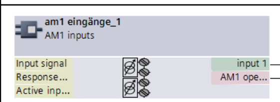
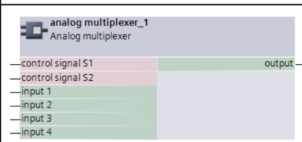
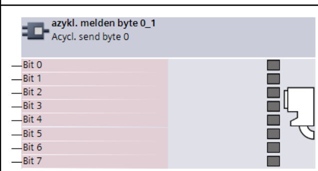
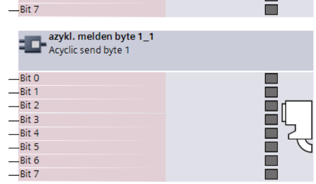
When you have already installed external wiring, but have not yet parameterized SIMOCODE pro:

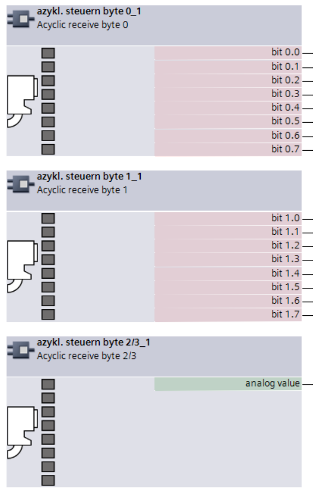
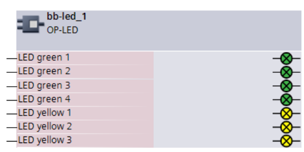
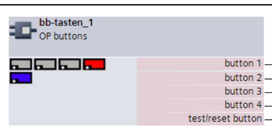
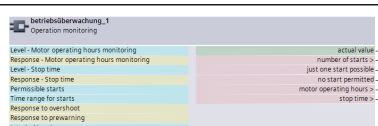
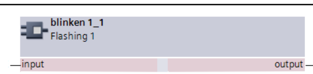
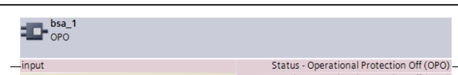
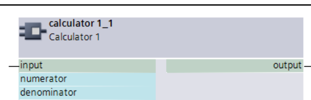
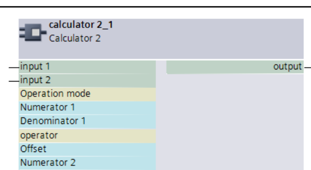
If you press a button now, the contactors will not be energized. [1)]

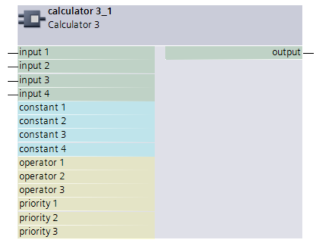
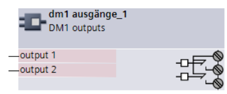
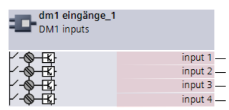
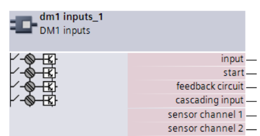
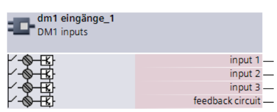
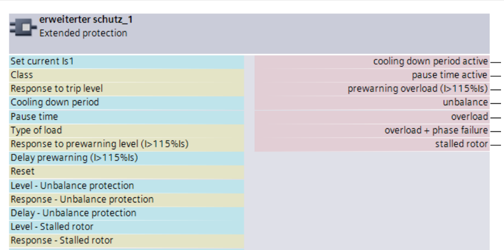
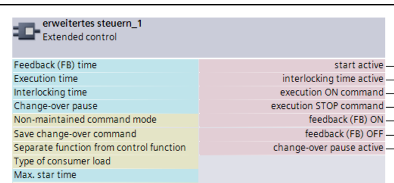
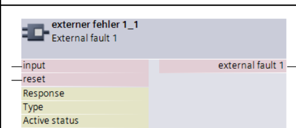
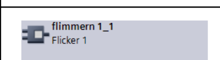
1) If you select and load a preset application (e.g. the reversing starter) in SIMOCODE ES (TIA Portal), all links and interlocks for the reversing starter will be set up in the basic unit.

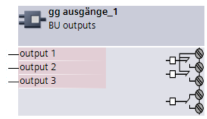
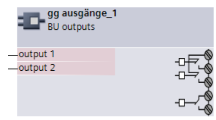
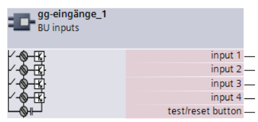
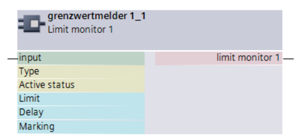
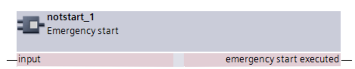
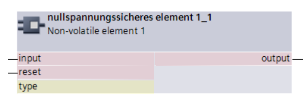
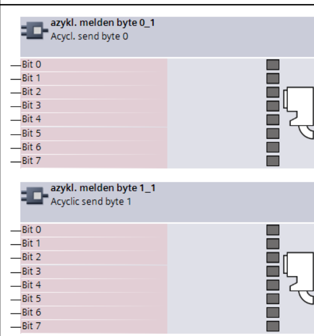
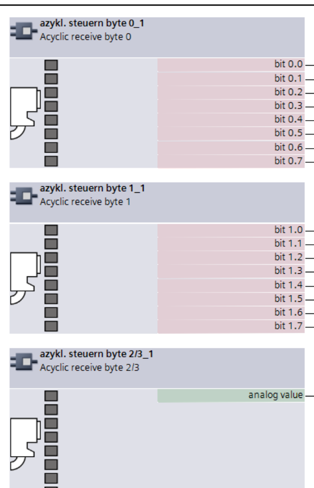
2.2 Function blocks - overview

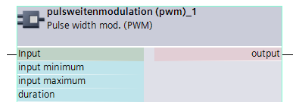
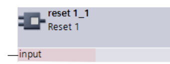
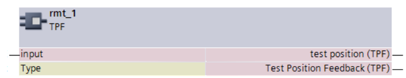
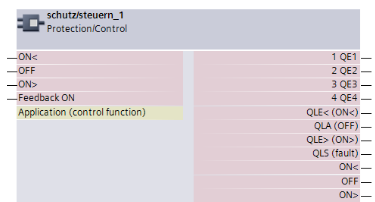
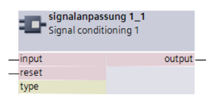
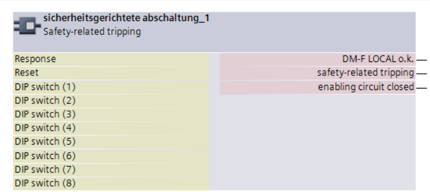
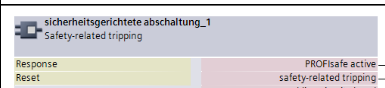
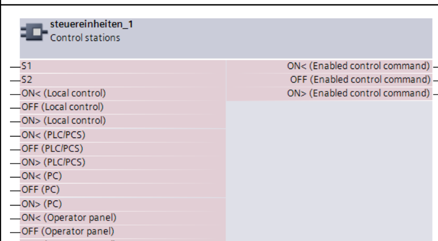
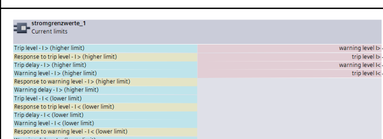
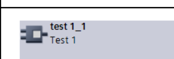
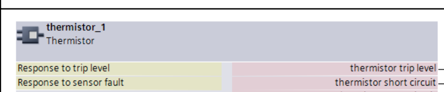
Overview of the function blocks (alphabetical)

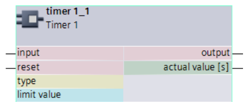
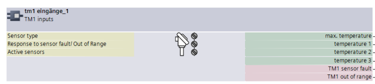
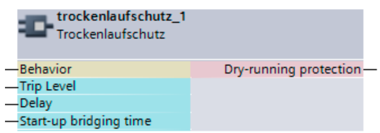
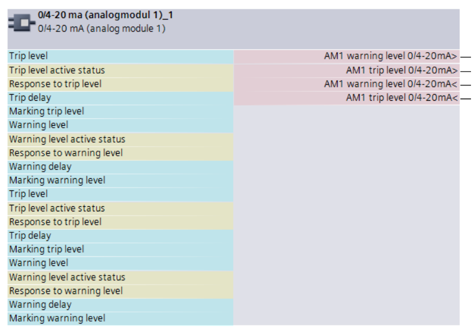
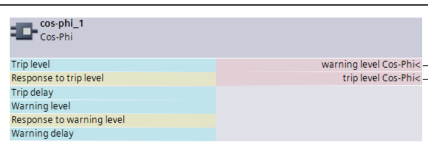
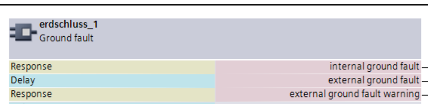
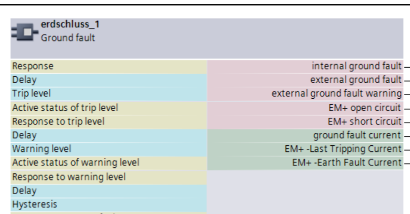
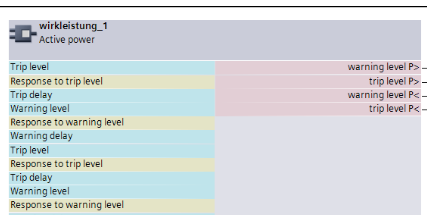
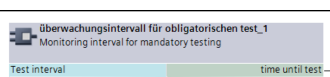
Function block	View in SIMOCODE ES (TIA Portal)	Section
Analog value recording		See Analog value recording (Page 188)
Analog module 1/2 output		See Analog module output (Page 165)
Analog module 1/2 inputs		See Analog module inputs (Page 184)
Analog multiplexer		See Analog multiplexer (Page 244)
Acyclic send byte 0 (1)		See Acyclic Send (Page 171)

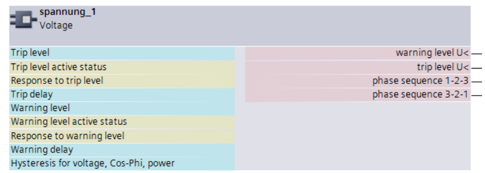
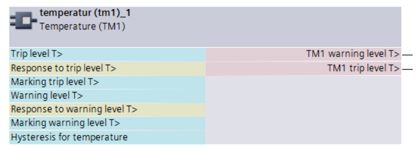
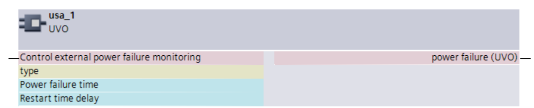
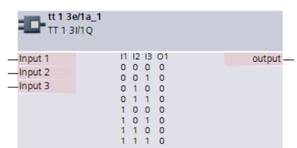
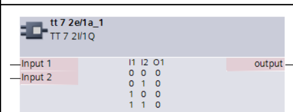
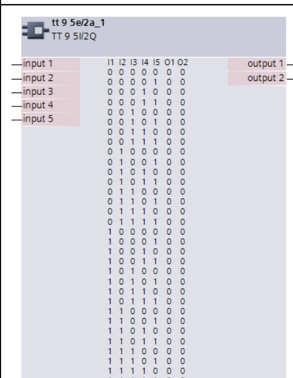
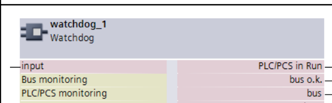
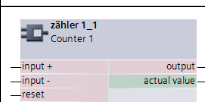
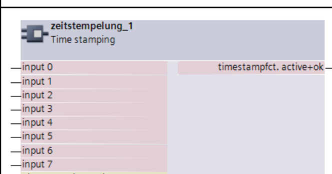
Function block	View in SIMOCODE ES (TIA Portal)	Section
Acyclic receive byte 0 (1, 2/3)		See Acyclic Receive (Page 186)
Operator panel LED		See Operator panel LEDs (Page 160)
Operator panel buttons		See Operator panel buttons (Page 176)
Operation monitoring		See Operation monitoring (Page 149)
Flashing 1 (2, 3)		See Flashing (Page 233)
Operational Protection Off (OPO)		See Operational Protection Off (OPO) (Page 200)
Calculator 1		See Calculators (calculation modules) 1, 2 (Page 238)
Calculator 2		See Calculators (calculation modules) 1, 2 (Page 238)

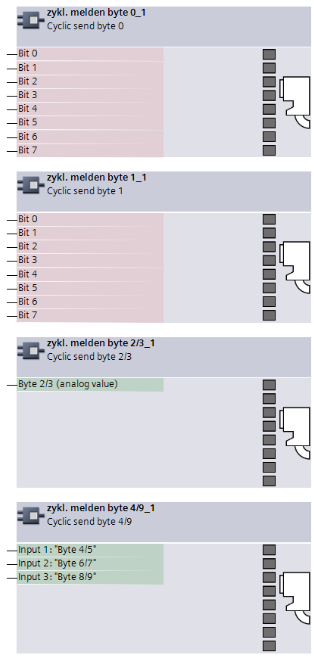
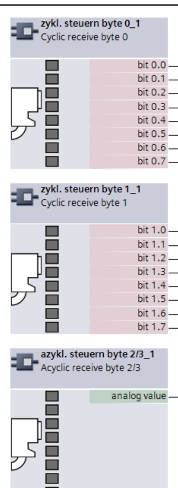
Function block	View in SIMOCODE ES (TIA Portal)	Section
Calculators 3, 4		See Calculators (calculation modules) 3, 4 (Page 242)
Digital module 1 (2) outputs		See Digital module outputs (Page 163)
Digital module 1 (2) inputs		See Digital module inputs (Page 179)
Digital module 1 (2) inputs, DM-F = DM-F Local or DM-F PROFIsafe	 	See Digital module inputs (Page 179)
Extended protection		See Motor control (Page 67)
Extended control		See Motor control (Page 67)
External fault 1 (2, 3, 4, 5, 6)		See External fault (Page 197)
Flicker 1 (2, 3)		See Flickering (Page 234)

Function block	View in SIMOCODE ES (TIA Portal)	Section
Basic unit outputs, SIMO-CODE pro C/V basic units		See Basic unit outputs (Page 158)
Basic unit outputs, SIMO-CODE pro S basic unit		See Basic unit outputs (Page 158)
Basic unit inputs		See Basic unit inputs (Page 175)
Limit monitor 1 (2, 3, 4, 5, 6)		See Limit monitor (Page 235)
Emergency start		See Emergency start (Page 204)
Non-volatile ele-ment 1 (2, 3, 4)		See Non-volatile ele-ments (Page 230)
OPC UA send data 0 (1)		See OPC-UA send (Page 172)
OPC UA receive data 0 (1, 2/3)		See OPC UA Receive (Page 187)

Function block	View in SIMOCODE ES (TIA Portal)	Section
Pulse width modulator		See Pulse width modulator (Page 246)
Reset 1 (2, 3)		See Test / Reset (Page 191)
TPF (test position feedback)		See Test position feedback (TPF) (Page 195)
Protection/Control		See Motor control (Page 67)
Signal conditioning 1 (2, 3, 4, 5, 6)		See Signal conditioner (Page 227)
Safe tripping, DM-F Local		See Safety-related tripping (Page 205)
Safe tripping, DM-F PROFIsafe		See Safety-related tripping (Page 205)
Control stations		See Control stations (Page 67)
Current limits		See Current limit monitoring (Page 135)
Test 1 (2)		See Test / Reset (Page 191)
Thermistor		See Thermistor protection (Page 47)

Function block	View in SIMOCODE ES (TIA Portal)	Section
Timer 1 (2, 3, 4, 5, 6)		See Timer (Page 223)
Temperature module 1/2 inputs		See Temperature module inputs (Page 182)
Dry-running protection by active-power monitoring		See Dry-running protection of centrifugal pumps by active power monitoring (Page 49)
Monitoring 0/4-20 mA (analog module 1, 2)		See 0/4 - 20 mA monitoring (Page 146)
Cos phi monitoring		See Cos phi monitoring (Page 142)
Ground-fault monitoring with ground-fault module 3UF7500		See External ground-fault monitoring with a 3UF7500 ground-fault module and 3UL22 differential current transformer (Page 132)
Ground-fault monitoring with ground-fault module 3UF7510		See External ground-fault monitoring with a 3UF7510 ground-fault module and 3UL23 residual current transformer (Page 133)
Power monitoring		See Active power monitoring (Page 143)
Monitoring interval for mandatory testing		See Monitoring interval for mandatory testing (Page 155)

Function block	View in SIMOCODE ES (TIA Portal)	Section
Voltage monitoring		See Voltage monitoring (Page 139)
Temperature monitoring 1/2		See Temperature monitoring (analog) (Page 152)
Undervoltage off (UVO)		See Power failure monitoring (UVO) (Page 202)
Truth table 3I/ 1O (1, 2, 3, 4, 5, 6, 10, 11)		See Truth table for 3I / 1O (Page 215)
Truth table 2I/1O (7, 8)		See Truth table for 2I / 1O (Page 219)
Truth table 5I/2O (9)		See Truth table for 5I / 2O (Page 220)
Watchdog		See Watchdog (Bus monitoring, PLC/PCS monitoring) (Page 211)
Counter 1 (2, 3, 4, 5, 6)		See Counter (Page 221)
Time stamp		See Timestamping (Page 212)

Function block	View in SIMOCODE ES (TIA Portal)	Section
Cyclic send byte 0 (1, 2/3, 4/9, 10/10)		See Cyclic Send (Page 169)
Cyclic receive byte 0 (1, 2/3, 4/5)		See Cyclic Receive (Page 185)

Software for parameterization, control, diagnostics and testing 3

3.1 Software packages

Software overview

With the communication-capable switching devices, the user-friendliness of the parameterization software and good system integration (in other words, the ability to integrate optimally and quickly into the most diverse plant configurations and process automation systems) also play an important role alongside the device functionalities and the hardware configuration.

For this reason, the SIMOCODE pro system provides suitable software tools for consistent, time-saving parameter assignment, configuring and diagnostics:

- SIMOCODE ES (TIA Portal) for totally integrated commissioning and service
- SIMOCODE pro PCS 7 function block library for total integration into PCS 7

SIMOCODE ES in the TIA Portal

SIMOCODE ES (TIA Portal) is the central software for configuration, commissioning, operation and diagnostics of SIMOCODE pro with PROFIBUS, PROFINET, EtherNet/IP and Modbus RTU.

SIMOCODE ES Version V17 is available as a powerful successor to Version 2007, which is based on the central engineering framework Totally Integrated Automation Portal (TIA Portal).

SIMOCODE ES V17 is integrated seamlessly when further TIA Portal-based software such as STEP 7 or WinCC is available, thus enabling users to achieve a consistent, efficient and intuitive solution for all automation tasks.

However, use of SIMOCODE ES V17 as stand-alone software also provides these advantages.

You can choose between two versions of SIMOCODE ES:

- SIMOCODE ES Basic
- SIMOCODE ES Professional

From V15, the powerful SIMOCODE ES Basic tool for commissioning or maintenance personnel is available for downloading free of charge in the Siemens Industry Online Support.

SIMOCODE ES Professional is a perfect tool for engineers or configuration engineers due to its extended scope of functions and integrated graphic editor. Unlike the Basic version, SIMOCODE ES Professional also permits parameter assignment and diagnostics via PROFIBUS/PROFINET/Ethernet. The display of all operating, service and diagnostic data supplies important information about the current state of the motor and plant at all times – everywhere on PROFIBUS/PROFINET/Ethernet.

More information

- Industry Mall (see Parameter assignment, configuration and visualization for SIRIUS (https://mall.industry.siemens.com/mall/en/de/Catalog/Products/10026777))
- Industry Mall (see Technical specifications (https://support.industry.siemens.com/cs/ww/en/ps/16716/td))
- Software download:
  – SIMOCODE ES V17 (TIA Portal), basic functional scope including Professional Trial License (https://support.industry.siemens.com/cs/ww/en/view/109793078)
  – SIMOCODE ES 2007 (https://support.industry.siemens.com/cs/ww/en/view/109750623)

SIMOCODE ES V17	Basic	Professional
Access via the local interface on the device	✓	✓
Parameter assignment in list form	✓	✓
Parameter assignment via expert list	-	✓
Bulk engineering	-	✓
Working with libraries	✓	✓
Printing of parameters in list form	✓	✓
Operator control	✓	✓
Diagnostics	✓	✓
Test	✓	✓
Service data	✓	✓
Analog value recording [1)]	✓	✓
Trend display of measured values	-	✓
Parameter assignment with convenient graphical display	-	✓
Parameter assignment via the integrated graphic editor (CFC-based)	-	✓
Printing of diagrams	-	✓
Parameter comparison	-	✓
Access via PROFIBUS / PROFINET / Ethernet	-	✓
Teleservice via MPI	-	✓
Routing [2)]	-	✓
Firmware update basic units [1)]	✓	✓

1) For SIMOCODE pro V

2) See Requirements for using the routing function with SIMOCODE ES (TIA Portal) (https://support.industry.siemens.com/cs/ww/en/view/109738745)

Working with libraries

Users can create copy templates for SIMOCODE pro device configuration and can manage them in global or project libraries.

This way, individual modules, diagrams and complete device configurations can be saved as reusable elements for frequently occurring tasks.

Integrated graphic editor

The graphic editor is part of SIMOCODE ES Professional. It is based on the Continuous Function Chart (CFC) and adds a powerful tool to the parameterizing interface that enables easy parameterization of devices by drag & drop. Furthermore, all the parameters can also be edited directly in the graphic editor. Extremely compact documentation of all configured parameters is possible, as is the graphic online presentation of the configured device functions including all signal states during operation.

Online functions for commissioning and diagnostics

To this end, SIMOCODE ES provides powerful functions for commissioning and diagnostics of motor feeders. Besides a detailed display of status information and the causes of faults, all available measurement and statistics data can be retrieved online. Access to the fault and event memory and also to analog values recorded on the device, e.g. current or voltage, is also possible.

Trend display of measured values

With this online function, SIMOCODE ES can present the trends of different measured values. It is thus possible, for example, to record and evaluate the startup behavior of a motor or its behavior in different load conditions.

Integration into the central engineering framework

When using other TIA Portal-based software such as STEP 7 or WinCC, for example, the configuration for devices and networks for all components used is created in a standardized environment.

Teleservice via MPI

The Professional version supports the use of MPI Teleservice (comprising the Teleservice software and various Teleservice adapters) for remote diagnostics of the devices. This facilitates diagnostics and maintenance, and it shortens response times for service purposes.

SIMOCODE ES 2007

SIMOCODE ES 2007 is the previous version of the SIMOCODE ES (TIA Portal) software for SIMOCODE pro. It only includes the basic units for PROFIBUS and PROFINET.

SIMOCODE ES 2007 provides the SIMOCODE pro motor management system with a user-friendly and clear user interface with which to configure, operate, monitor and test SIMOCODE pro in the field or from a central location via PROFIBUS. By displaying all operating, service and diagnostic data, SIMOCODE ES supplies important information on whether maintenance work is required or, in the event of a fault, helps prevent faults or localize and rectify them once they have occurred.

Unnecessary plant downtimes can be prevented by changing parameters online (even during operation).

In addition, the graphical editor enables extremely ergonomic and user-friendly parameterization by dragging and dropping: Inputs and outputs of function blocks can be linked graphically and the parameters set. Configured functions can be described in detail and device parameterization can be documented graphically using comments. This speeds up commissioning and simplifies plant documentation. The optimized user interface and integrated graphic editor are used to assign parameters.

Further functions: Operation, diagnostics, testing, S7 routing, teleservice via MPI, STEP 7 object manager.

The following software packages are available:

- SIMOCODE ES 2007 Basic
- SIMOCODE ES 2007 Standard
- SIMOCODE ES 2007 Premium

See also Software components (Page 29) for more information.

You will find a demo version and the latest updates on the Internet: SIMOCODE ES 2007 (https://support.industry.siemens.com/cs/ww/en/view/109750623)

OM SIMOCODE pro Object Manager

The OM SIMOCODE pro Object Manager is a component of SIMOCODE ES 2007. When SIMOCODE ES and OM SIMOCODE pro are installed on a PC / programming device, SIMOCODE ES can be called directly from STEP 7 V5.x hardware configuration. This enables simple and universal SIMATIC S7 configuration.

SIMOCODE pro PCS 7 library

The SIMOCODE pro PCS 7 function block library is used to simply and conveniently integrate SIMOCODE pro into the SIMATIC PCS 7 process control system. The SIMOCODE pro PCS 7 function block library contains the diagnostic and driver blocks that correspond to the diagnostic and driver concept of SIMATIC PCS 7 and the elements (symbols and faceplates) necessary for operating and monitoring. The application is integrated by graphic interconnection using the CFC Editor.

Signal processing and technological functions of the SIMOCODE pro PCS 7 function block library are based on the SIMATIC PCS 7 standard libraries (Driver Blocks, Technological Blocks) and are optimized for SIMOCODE pro. Users who until now have configured motor feeders in conventional technology via signal blocks and motor or valve blocks can thus easily change to the SIMOCODE pro PCS 7 block library.

The SIMOCODE pro PCS 7 block library allows the user to run the required engineering software on one engineering station (single license) including the runtime software for executing the AS modules in one automation system (single license). If the AS blocks are to be used in additional automation systems, the corresponding number of runtime licenses are required, which are supplied without a data medium.

Note

The PCS 7 libraries are subject to continual updating and improvement.

You can download the current service packs and hot fixes from SIMOCODE pro (https://www.siemens.com/simocode) → Download Software.

Note

Observe the respective system versions!

GSD file

To integrate SIMOCODE pro as a standard slave into SIMATIC S7 or any standard DP master system (automation system). The latest version is on the Internet at GSD file (https://support.industry.siemens.com/cs/ww/en/ps/14280/dl). Further information on integrating DP slaves can be found in the automation system documentation.

Win SIMOCODE-DP converter

Software tool for converting "old" Win SIMOCODE-DP parameter files (3UF5 device series) into SIMOCODE ES parameter files for SIMOCODE pro.

See SIMOCODE ES 2007 (https://support.industry.siemens.com/cs/ww/en/view/109750623).

3.2 Software components

Selection and ordering data: See Catalog IC10 (https://support.industry.siemens.com/cs/ww/en/view/109771990).

Parameters 4

4.1 Motor protection

4.1.1 Motor protection functions

Description

The motor protection functions "Overload Protection", "Unbalance Protection", "Stalled Rotor Protection", and "Thermistor Protection" are described in the following Chapters:

Overload protection (Page 33)

Unbalance protection (Page 46)

Stalled rotor protection (Page 46)

Thermistor protection (Page 47).

Schematic

The following schematic shows the "Extended Protection" function block ("Overload protection," "Unbalance protection," and "Stalled rotor protection") with optional parameter settings and events.

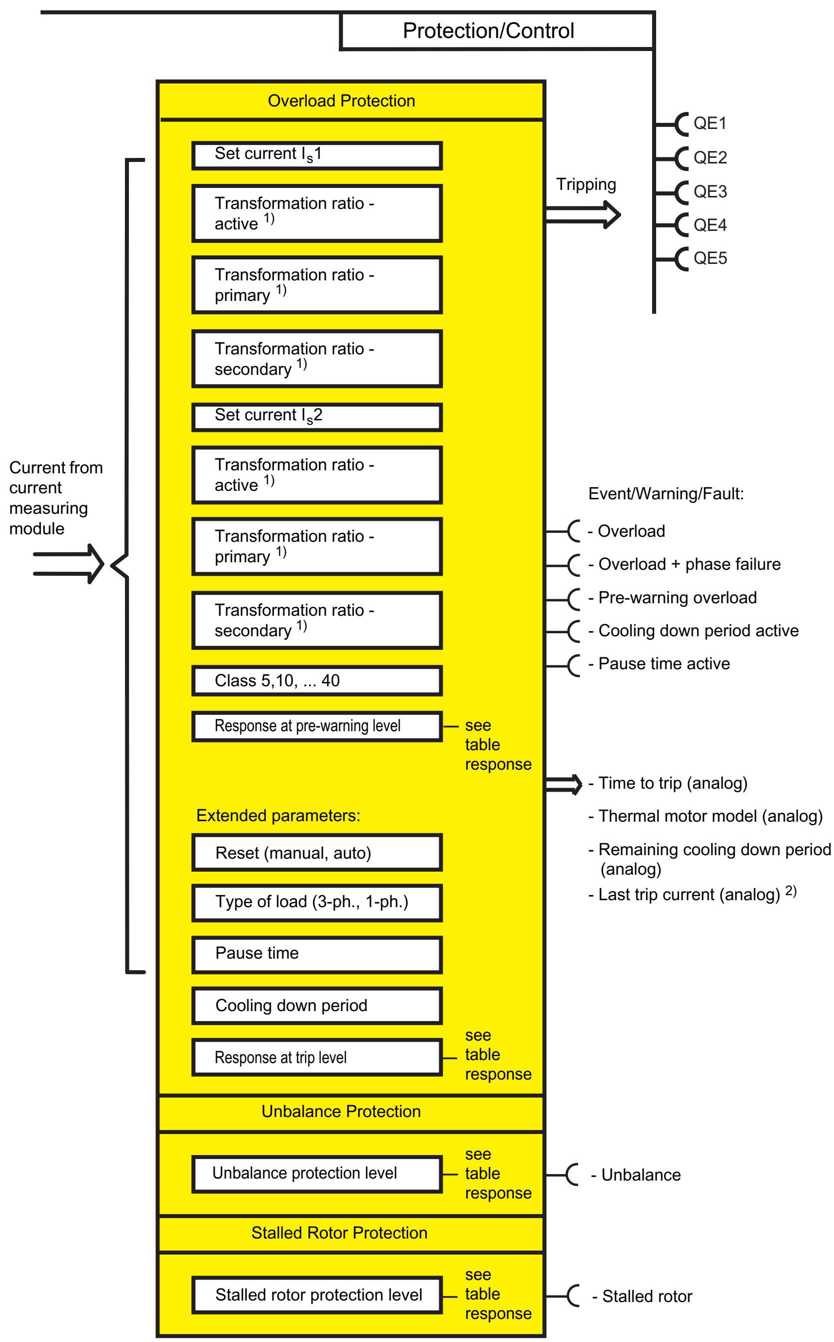


Figure 4-1 "Extended Protection" function block ("Overload Protection," "Unbalance Protection," and "Stalled Rotor Protection")

1) Adjustable transformation ratio when using interposing transformers with SIMOCODE pro V PB, version *E03* and higher

2) If tripped due to overload

Adjustable responses "Overload Protection," "Unbalance Protection," and "Stalled Rotor Protection"

Response	**Prewarning level "overload protection"**	**Trip level "overload protection"**	**Level "unbalance"**	**Level "stalled rotor protection"**
deactivated	X	X	X	**X**
signal	X	X	X	X
warn	**X**	X	**X**	X
trip	—	**X**	X	X
delay	0 to 25.5 s (**0.5 s**)	—	0 to 25.5 s (**0.5 s**)	0 to 25.5 s (**0.5 s**)

Responses for "Overload Protection", "Unbalance Protection" and "Stalled Rotor Protection"

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Note

Deactivate Unbalance Protection in SIMOCODE ES when the load type is set to single-phase!

4.1.2 Overload protection

4.1.2.1 Overload protection function

SIMOCODE pro protects three-phase or AC motors in accordance with IEC 60947-4-1 requirements. The trip class can be set to eight different settings ranging from Class 5E to Class 40E. Thus, the tripping time can be adapted precisely to the power-up behavior of the motor, improving utilization of the motor capacity. Additionally, the "Thermal motor model" and time to overload trip are calculated and made available to the control system. After an overload trip, the remaining cooling down period is displayed (see Class). The motor current is saved in the case of an overload trip.

Depending on the control function, the set current I_s is separately parameterizable for one or two speeds (I_s1 and I_s2).

The rated motor current is usually set with **set current I_s1**. This value can be found on the type plate of the motor. The overload trip characteristic is calculated based on this value.

The **set current I_s2** is only required for motors with two speeds to guarantee the suitable overload protection for the higher speed too. Generally, I_s2 should be set higher than I_s1.

4.1.2.2 Set current Is1

Setting ranges for current setting I_s1

Range: Depends on the selected current measuring module or current / voltage measuring module.

Current setting I_s1 when using a current measuring module or a 1st generation current / voltage measuring:

- 0.3 to 3 A (default: 0.3)
- 2.4 to 25 A
- 10 to 100 A
- 20 to 200 A
- 63 to 630 A

Current setting I_s1 when using a 2nd generation current / voltage measuring module:

- 0.3 to 4 A (default: 0.3)
- 3 to 40 A
- 10 to 115 A
- 20 to 200 A
- 63 to 630 A

Transformation ratio - active

When using an interposing transformer, or if the main supply cable is looped several times through the current measuring module or the current / voltage measuring module, you can enter the transformation ratio of the interposing transformer. Activate the checkbox if you wish to use this option. The parameterized current setting continues to correspond here to the actual rated motor current and does not have to be converted.

The transformation ratio is calculated from the ratio between the rated motor current [A] and the measured current [A] or any multiple of the ratio.

Note

This parameter is only available when using SIMOCODE pro V PB basic unit above version *E03*.

Transformation ratio - primary

Enter the primary current here, with the "Transformation ratio - active" checkbox activated. Range: 0 to 8191.875 (default: 0).

Transformation ratio - secondary

Enter the secondary current here, with the "Transformation ratio - active" checkbox activated. Range: 0 to 15 (default: 0).

4.1.2.3 Set current Is2

Setting ranges for current setting I_s2

Range: Depends on the selected current measuring module or current / voltage measuring module.

Current setting I_s2 when using a current measuring module or a 1st generation current / voltage measuring module:

- 0.3 to 3 A (default: 0.3)
- 2.4 to 25 A
- 10 to 100 A
- 20 to 200 A
- 63 to 630 A

Current setting I_s1 when using a 2nd generation current / voltage measuring module:

- 0.3 to 4 A (default: 0.3)
- 3 to 40 A
- 10 to 115 A
- 20 to 200 A
- 63 to 630 A

Transformation ratio - active

When using an interposing transformer, or if the main supply cable is looped several times through the current measuring module or the current / voltage measuring module, you can enter the transformation ratio.

Activate the checkbox if you wish to use this option. The parameterized current setting continues to correspond here to the actual rated motor current and does not have to be converted.

The transformation ratio is calculated from the ratio between the rated motor current [A] and the measured current [A] or any multiple of the ratio.

Note

This parameter is only available when using SIMOCODE pro V PB above version *E03*.

Transformation ratio - primary

Enter the primary current here, with the "Transformation ratio - active" checkbox activated. Range: 0 to 8191.875 (default: 0).

Transformation ratio - secondary

Enter the secondary current here, with the "Transformation ratio - active" checkbox activated. Range: 0 to 15 (default: 0).

Note

In the case of motors with two speeds, the same or different transformation ratios can be set for each speed, depending upon whether the same or two different interposing transformers is/are used for each speed.

4.1.2.4 Application example

Example 1:

Rated motor current: 700 A.
A 3UF18 68-3G current transformer (205 to 820 A) is used as interposing transformer (transformation ratio 820 : 1), the secondary side is looped once through a current measuring module (0.3 A to 3 A):
Transformation ratio for I_s = 820 : 1; I_s = 700 A

Settings (primary and secondary)

- Set current I_s1: 700 A
- I_s1 Transformation ratio primary: 820
- I_s1 Transformation ratio secondary: 1

Example 2:

Rated motor current: 225 A.
A 3UF1868-3G current transformer (205 to 820 A) is used as interposing transformer (transformation ratio 820 : 1), the secondary side is looped twice through a current measuring module (0.3 A to 3 A):
Transformation ratio for I_s = 820 : 2; I_s = 225 A

Settings (primary and secondary)

- Set current I_s1: 225 A
- I_s1 Transformation ratio primary: 820
- I_s1 Transformation ratio secondary: 2

Example 3:

The motor cable is looped twice through a current measuring module (0.3 to 3 A, for a motor with a rated current of 0.25 A):
Transformation ratio for I_s = 1 : 2; I_s = 0.25 A

Settings (primary and secondary)

- Set current I_s1: 0.25 A
- I_s1 Transformation ratio primary: 1
- I_s1 Transformation ratio secondary: 2

4.1.2.5 Further overload protection parameters

Class

The Class (trip class) defines the maximum time within which SIMOCODE pro must trip from cold at 7.2 times the current setting I_s (motor protection to IEC 60947). SIMOCODE pro meets the requirements of tolerance band E according to IEC / EN 60947-4-1 in respect of the accuracy of the tripping times. Please note that with startups > "Class 10E", the permissible AC3 current of the contactor may have to be reduced (derated), i.e. you must select a larger contactor.

Overload characteristics for 2nd generation current / voltage measuring modules (e.g. 3UF7110-1AA01-0) and dry-running protection (e.g. 3UF712.-1.A01-0)

The following graph shows the trip classes 5E, 7E, 10E (d), 15E, 20E, 25E, 30E, 35E and 40E for 3-pole balanced loads:

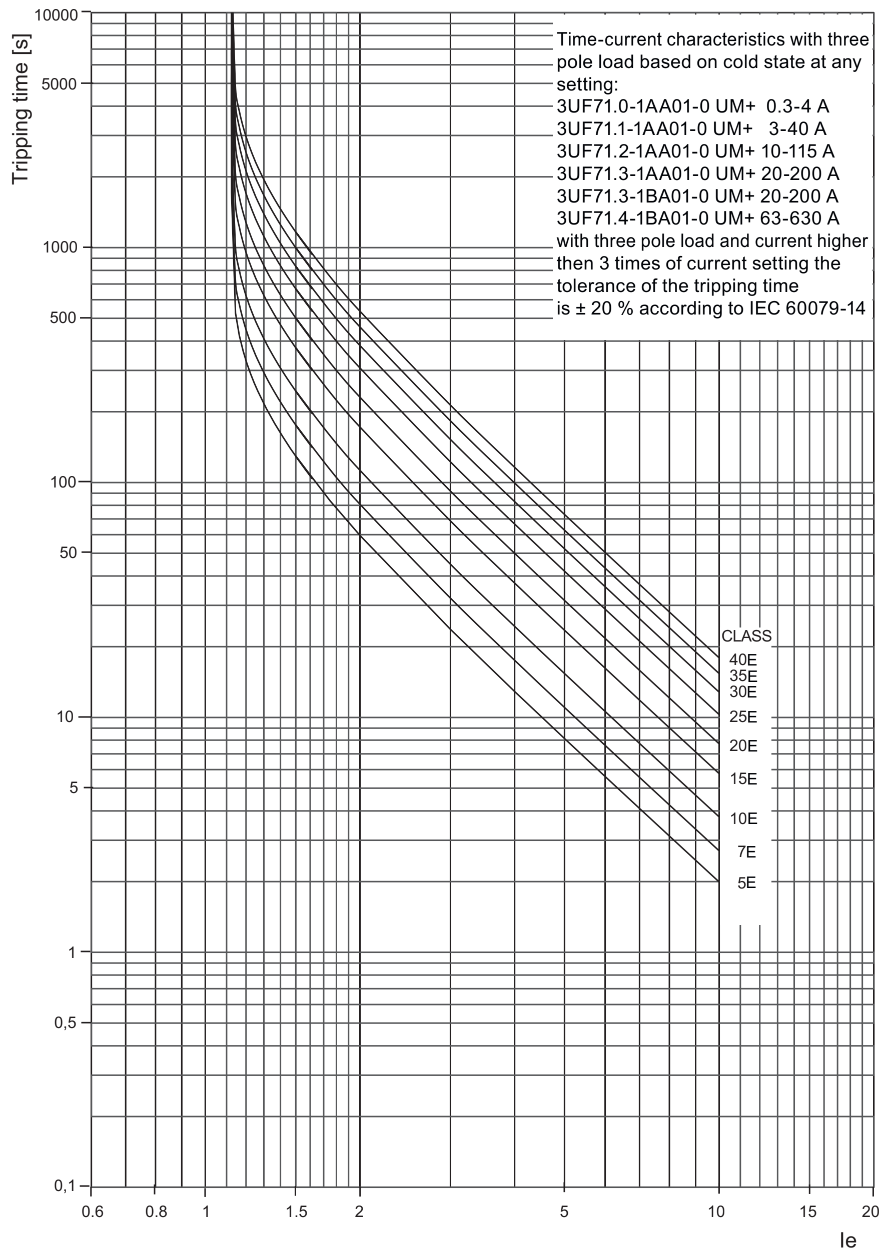


Figure 4-2 Trip classes for 3-pole loads, 2nd generation current / voltage measuring modules

The following graph shows the trip classes 5E, 7E, 10E (d), 15E, 20E, 25E, 30E, 35E, and 40E for 2-pole loads:

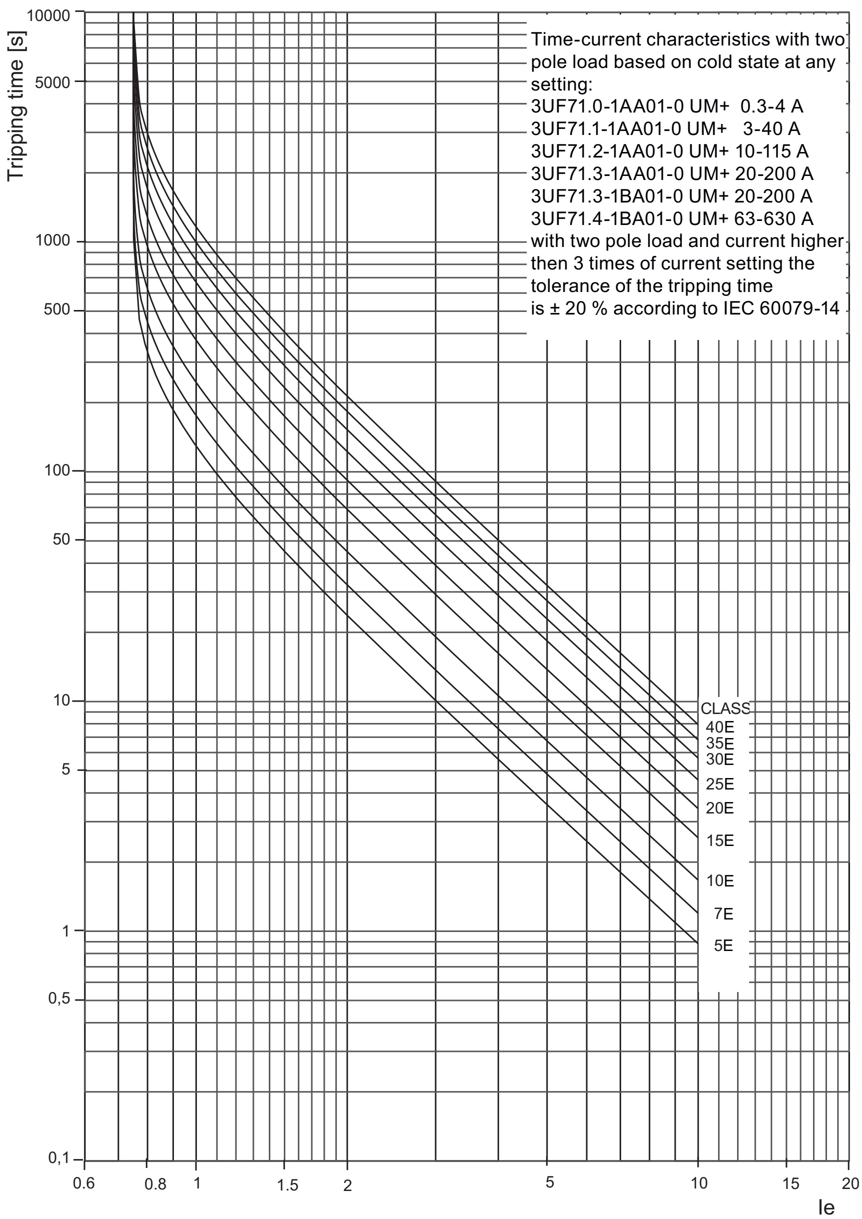


Figure 4-3 Trip classes for 2-pole loads, 2nd generation current / voltage measuring modules

Overload characteristics for current measuring modules, 1st generation current / voltage measuring modules (e.g. 3UF7110-1AA00-0) and 2nd generation current / voltage measuring modules in compatibility mode (e.g. 3UF7110-1AA01-0)

The following graph shows the trip classes 5E, 10E (d), 15E, 20E, 25E, 30E, 35E and 40E for 3-pole balanced loads:

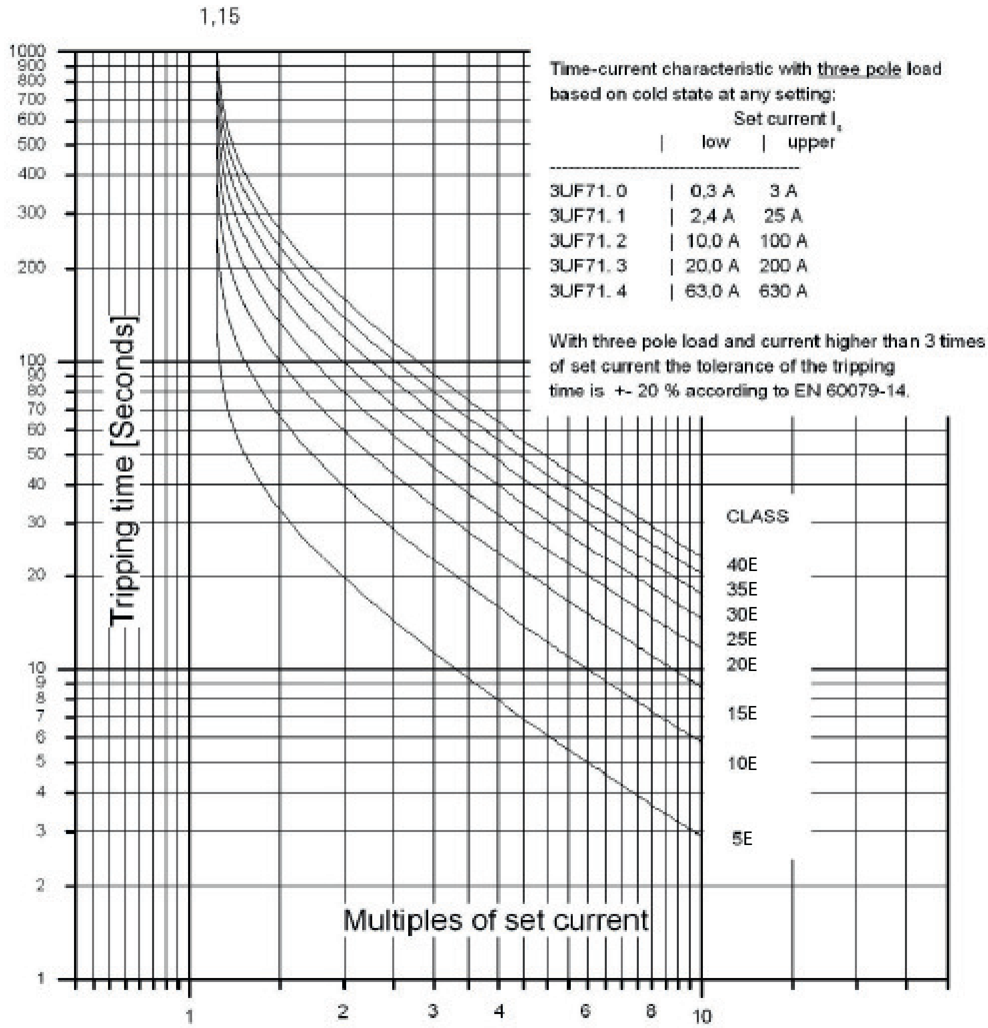


Figure 4-4 Trip classes for 3-pole balanced loads, current measuring modules and 1st generation current / voltage measuring modules

The following graph shows the trip classes 5E, 10E (d), 15E, 20E, 25E, 30E, 35E, and 40E for 2-pole loads:

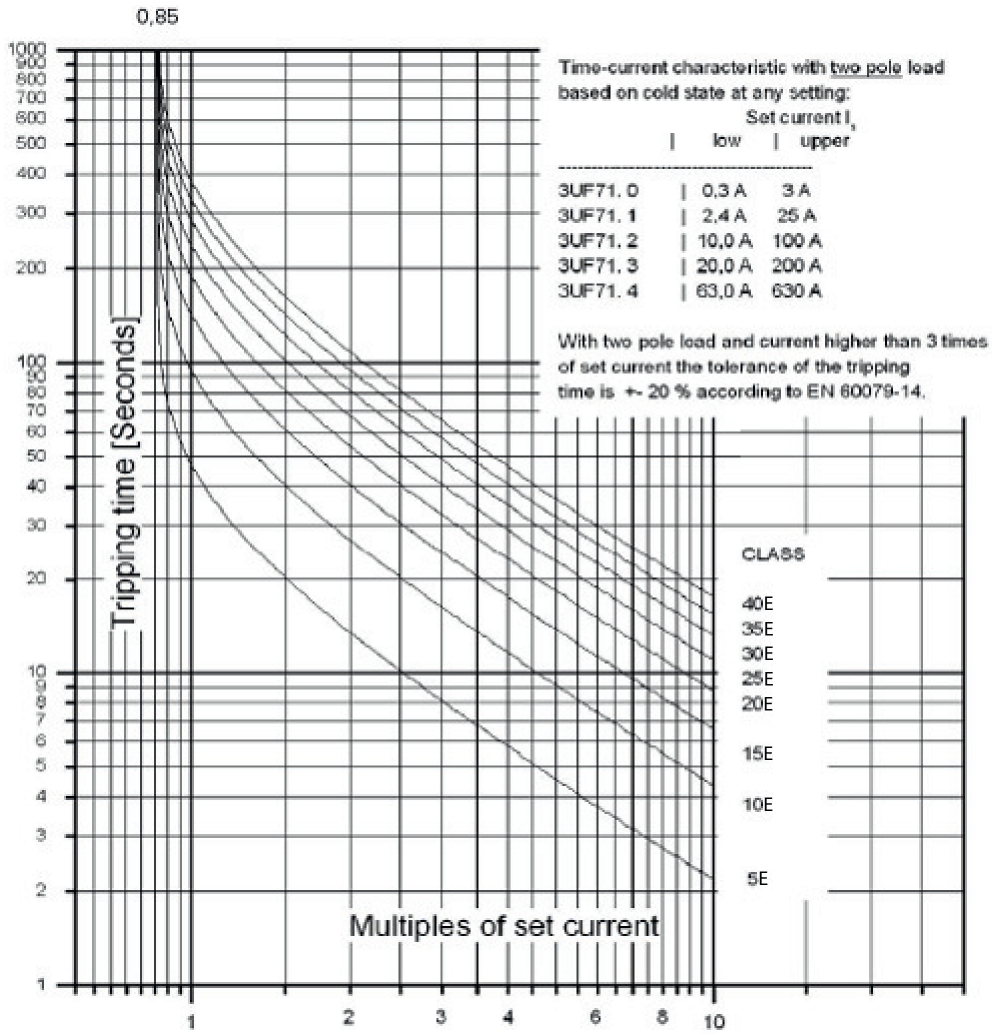


Figure 4-5 Trip classes for 2-pole loads, current measuring modules and 1st generation current / voltage measuring modules

Note

Type of tripping characteristic

If a 1st generation 3UF711*-1AA00-0 current / voltage measuring module is configured in a parameterization, but a 2nd generation 3UF711*-1AA01-0 current / voltage measuring module is used, the tripping characteristic remains that of the 1st generation current / voltage measuring module.

Merely replacing the measuring module hardware does not change the tripping behavior.

Note

Tripping characteristics

The latest tripping characteristics for SIMOCODE pro can be found in Siemens Industry Online Support (SIOS) (https://support.industry.siemens.com/cs/ww/en/ps). Enter the search term "3UF7" and filter for "characteristic" in the search area.

Response to overload

The SIMOCODE pro response to overload can be additionally adjusted here.

Further information: See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7) and Table "Responses" in Chapter Motor protection functions (Page 31).

Note

With motors for Ex e applications, the response must remain set to "trip"!

Cooling down period

The cooling down period is the amount of time that must elapse before an overload trip can be reset. This is usually 5 minutes. The thermal memory (motor model – see below) is deleted after the cooling down period elapses. Supply voltage failures of SIMOCODE pro during this time extend the specified time correspondingly.

Range: 60 to 6553.5 s (default: 300 s).

Thermal motor model (thermal memory)

"At operating temperature" state

In the "at operating temperature" state, the tripping times are reduced by the factors listed in the table. These factors apply to 3-pole balanced loads, Class 5E to Class 40E.

Table 4-1 Factors for trip times at operating temperature for 2nd generation current/voltage measuring modules

x I_s	Preload as a percentage of the current setting I_s				
	20	**40**	**60**	**80**	**100**
2	0.97	0.89	0.75	0.54	0.24
3	0.97	0.88	0.73	0.51	0.22
4	0.97	0.88	0.72	0.51	0.22
5	0.97	0.88	0.72	0.51	0.21
6	0.96	0.87	0.72	0.50	0.21
7.2	0.96	0.88	0.72	0.50	0.22
8	0.97	0.87	0.72	0.50	0.22
9	0.98	0.87	0.72	0.51	0.21

x I_s	Preload as a percentage of the current setting I_s				
10	0.97	0.87	0.74	0.50	0.21

When the rated motor current (Ie) is at 100%, the value "thermal motor model" is 79% in a steady state, and 100% at the moment of an overload trip.

Table 4-2 Factors for trip times at operating temperature for current measuring modules and 1st generation current/voltage measuring modules and 2nd generation current/voltage measuring modules in compatibility mode.

x I_s	Preload as a percentage of the current setting I_s					
	0	**20**	**40**	**60**	**80**	**100**
2	1	0.88	0.74	0.58	0.40	0.19
4	1	0.85	0.69	0.52	0.35	0.16
6	1	0.84	0.68	0.51	0.34	0.15
7.2	1	0.84	0.68	0.51	0.33	0.15
8	1	0.84	0.67	0.51	0.33	0.15

For the 1st generation, the following applies:

When the rated motor current (I_s) is at 100%, the value "thermal motor model" is 87% in a steady state and 100% at the moment of an overload trip.

Example of 1st generation devices:

You have operated and switched off a motor with current setting 100 % I_s.

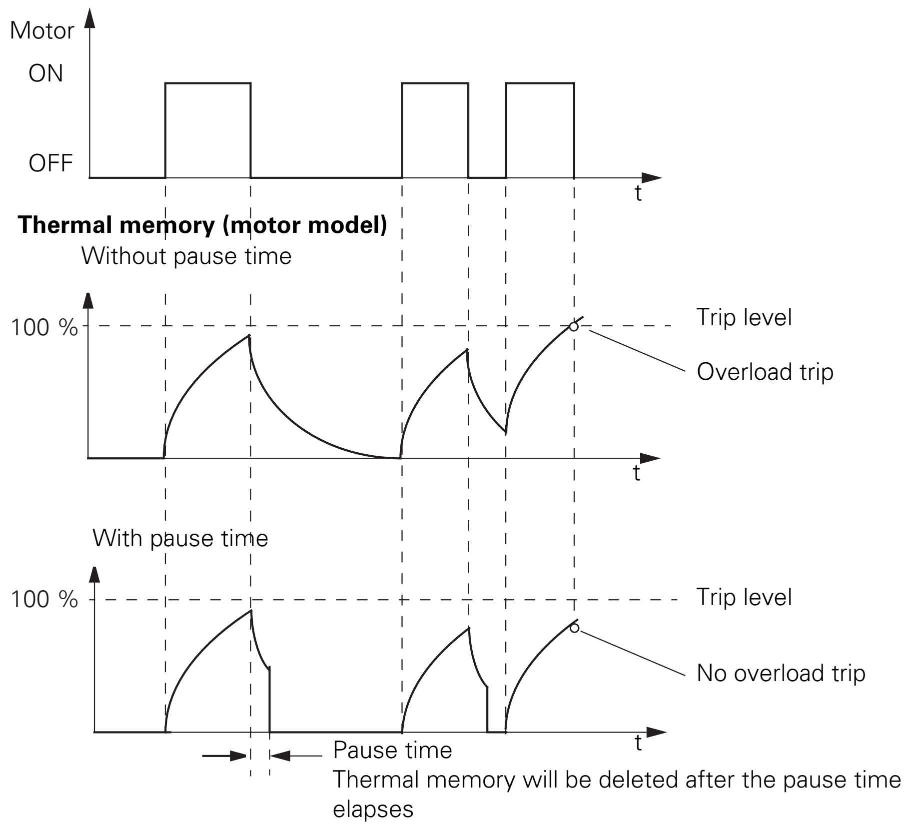
You immediately switch the motor back on. This causes an overload trip with 2 x I_s, Class 10E.

- Tripping time in cold state: approximately 40 s (acc. to tripping characteristic)
- Factor for tripping time with preload 100 % I_s: 0.19 (see Table)
- Reduced tripping time: 0.19 x 40 s = 7.6 s.

Pause time

The pause time is the specified time for the cooling down response of the motor when tripped under normal operating conditions (not in the case of an overload trip). After this interval, the thermal memory in SIMOCODE pro is erased and a new cold restart is possible. This means that many startups can be performed in a short space of time.

The following schematic shows the cooling down response with and without pause time:



Note

Both the motor and the switching devices must be dimensioned specifically for this load!

Pause time: 0 to 6553.5 s (default: 0)

Load type

You can select whether SIMOCODE pro is to protect a 1-phase or a 3-phase load. For a 1-phase type of load, the internal ground-fault monitoring and the unbalance protection must be deactivated. Phase failure monitoring is deactivated automatically.

Load type 1-phase, 3-phase (default)

Note

Decoupling module

When using a 1st generation current / voltage measuring module a decoupling module may be necessary.

See table "Decoupling module requirements for star networks" in Chapter 8.6 "Decoupling module (DCM) for 1st generation current/voltage measuring modules (e.g. 3UF711.1AA000)" in SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Delay prewarning

The "Delay" parameter (default: 0.5 s) defines the length of time for which the prewarning level (1.15 x I_s) must be permanently exceeded before SIMOCODE pro will execute the desired response. If no setting is made, there will be no response. In the event of a loss of phase or an unbalance > 50%, the prewarning level will be reached earlier, at approximately 0.85 x I_s.

Reset

If the "Reset" parameter is set to "Auto," the "Overload," "Overload + Unbalance," and "Thermistor" faults will be acknowledged automatically:

- If the cooling time has expired
- If the thermistor value has dropped back down to the specified resetting value

If the "Reset" parameter is set to "Manual", the faults must be acknowledged by a reset signal:

- "TEST/RESET" button on the basic unit
- "TEST/RESET" button on operator panel
- Standard functions "Reset"

For this, the "Reset - Input" (plugs) must be connected to the corresponding sockets, e.g. using reset via bus.

Reset: Manual, Auto (default: manual).

WARNING

Unexpected restart of the motor

The "Auto-Reset" mode must not be used for applications where an unexpected motor restart may cause personal injury or damage to property.

4.1.3 Unbalance protection

Description

The extent of the phase unbalance can be monitored and transmitted to the control system. A definable and delayable response can be triggered when an adjustable limit has been overshot. If the phase unbalance is more than 50 %, the tripping time is also automatically reduced in accordance with the overload characteristic since the heat generation of the motors increases in asymmetrical conditions.

Phase balance formula

The phase unbalance is calculated using the following equation:

$$\text{Phase unbalance} = \frac{\max([I_{max} - I_{avg}] \; ; \; [I_{min} - I_{avg}])}{I_{avg}} \qquad I_{avg} = \frac{I1+I2+I3}{3}$$

Level

The level of unbalance to which SIMOCODE pro should react is set here.

Level: 0 to 100 % (default: 40 %)

Response

Here you can choose the response of SIMOCODE pro in case of phase unbalance:
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7) and Table "Responses" in Chapter Motor protection functions (Page 31).

Delay

The unbalance level must be exceeded for the period of the set delay time before SIMOCODE pro executes the desired response. If no setting is made, there will be no response.

Setting range: 0 to 25.5 s (default: 0.5 s).

4.1.4 Stalled rotor protection

Description

If the motor current rises above an adjustable stalled rotor protection level (current threshold), a defined and delayable response can be configured for SIMOCODE pro. In this case, for example, the motor can be shut down independently of the overload protection. The stalled rotor protection is only active after the parameterized class time has elapsed, e.g. for Class 10E after 10 seconds, and prevents unnecessarily high thermal and mechanical loads as well as premature aging of the motor.

Level

When the stalled rotor level is exceeded, SIMOCODE pro reacts according to the selected response.

Level: 0 to 1020 % of I_s (default: 0).

Note

Rounding

Intermediate values are automatically rounded.

Response

You can define the response to overshoot of the stalled rotor level here: See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7) and Table "Responses" in Chapter Motor protection functions (Page 31).

Delay

The "Delay" parameter determines the length of time that the stalled rotor level must be permanently exceeded before SIMOCODE pro executes the desired response. If no setting is made, there will be no response. Setting range: 0 to 25.5 s (default: 0.5 s).

4.1.5 Thermistor protection

Description

Thermistor protection is based on a direct temperature measurement in the motor via binary PTC thermistors which can be connected to the SIMOCODE pro basic unit.

Thermistor protection is used in the case of:

- Motors with high switching frequencies
- Converter operation
- Motors with heavy starting
- Intermittent duty and/or braking operation
- Restricted air supply
- Speeds below the rated speed.

In this case, the sensors are mounted in the winding slot or bearing of the motor.

Schematic and characteristic curve

The resistance of the thermistors increases rapidly (abruptly) when the temperature limit is reached.

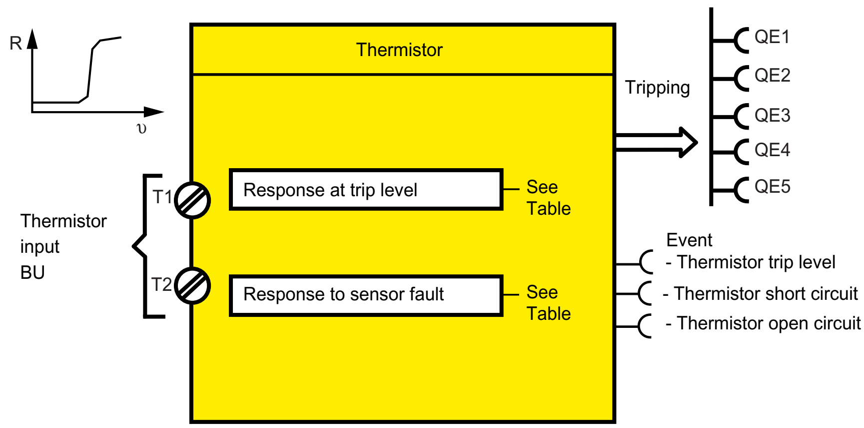


Figure 4-6 Thermistor function block (thermistor protection)

Response

- Overtemperature:
  Here you can select the SIMOCODE pro response to violation of the trip level for overtemperature.

Note

With motors for Ex e applications, the response must be set to "trip"!

- Sensor fault (sensor circuit fault): Here you can select the SIMOCODE pro response in the case of a short circuit or open circuit in the thermistor sensor cable.

Table 4-3 "Thermistor protection, binary" response

Response	Trip level	Sensor fault
deactivated	—	X
signal	X	X
warn	X	X (d)
trip	X (d)	X

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

4.2 Dry-running protection of centrifugal pumps by active power monitoring

Description

With the function shown here, you can implement dry-running protection for centrifugal pumps with a radial-flow impeller, even in hazardous areas, by active-power monitoring. You can use this protection function either alone or in addition to the general "active-power monitoring" described in Chapter Active power monitoring (Page 143). The general function "active-power monitoring" is not approved for use in hazardous areas. SIMOCODE pro can indirectly monitor the state of a device or system via the active power. By monitoring the active power of a pump motor, conclusions can be drawn about the flow rate from the active power level. As the flow rate (delivery rate) decreases, the active power decreases in centrifugal pumps with a radial-flow impeller (progressive delivery characteristic). For dry-running protection, the motor and therefore the pump is disconnected when the active power falls below a minimum value. In addition to avoiding damage to the pump, SIMOCODE pro can contribute, in particular, to explosion protection of centrifugal pumps that handle flammable media or are installed in hazardous areas. In this case, the explosion protection conforms with type of protection b by "control of ignition sources", ignition protection system b1, e.g. acc. to DIN EN 80079-37. The response of SIMOCODE pro on reaching the freely selectable trip level can be delayed. A startup bridging time can also be parameterized.

The protective function "dry-running protection of centrifugal pumps by active-power monitoring" requires the use of a basic unit combined with a current/voltage measuring module and is implemented in the following device types:

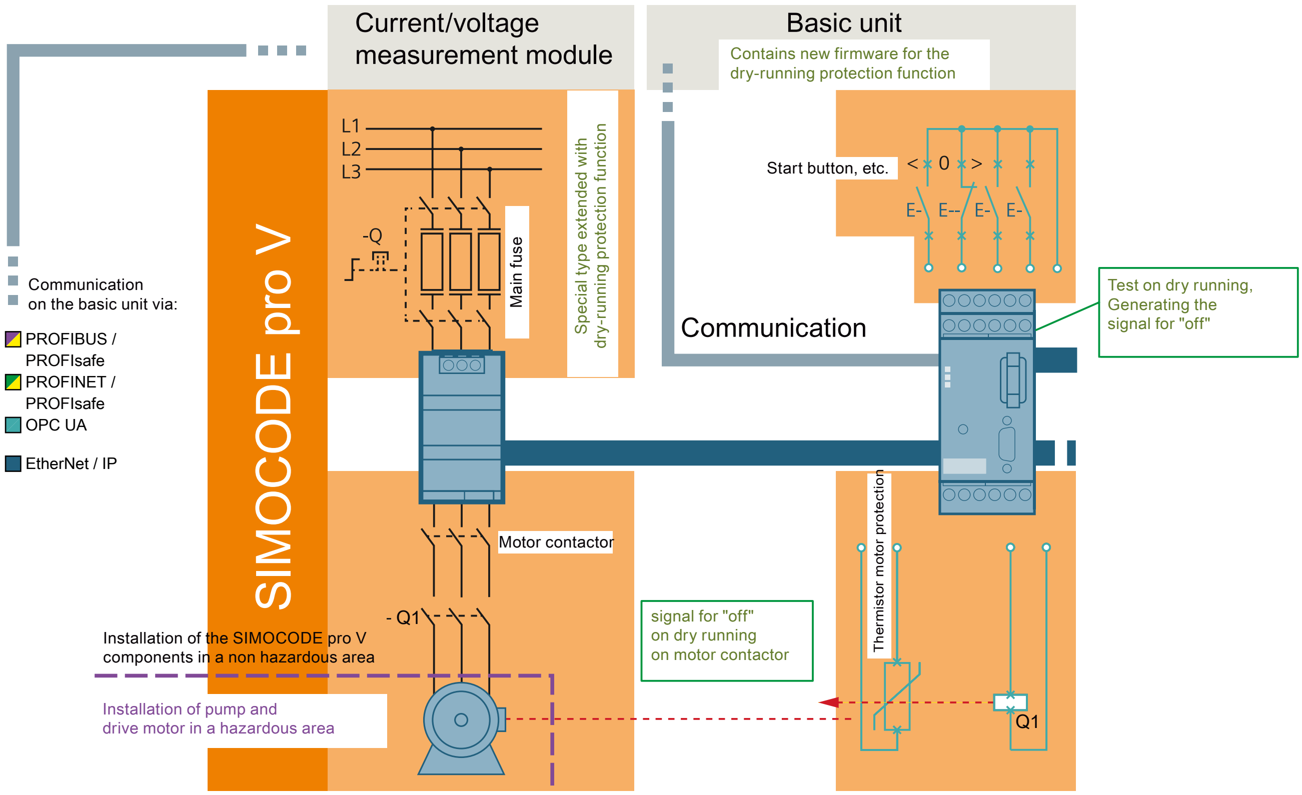
Basic units with PTB 18 ATEX 5003 X / ITS 21 UKEX 0455 X:

- 3UF7010-1A.00-0 (from product version *E16*)
- 3UF7011-1A.00-0 (from product version *E13*)
- 3UF7013-1A.00-0 (from product version *E04*)
- Current/voltage measuring modules: 3UF712.-1.A01-0.

Note

Use exclusively with the control function "direct starter" (direct-on-line starter)

The function "dry-running protection of centrifugal pumps by active-power monitoring" can be used exclusively with the control function "direct starter" (direct-on-line starter).



When the motor contactor is closed, the function "dry-running protection of centrifugal pumps by active-power monitoring" is activated. In the current/voltage measuring module, the measured values for the active power are calculated from the rms values of the measured currents and voltages of the 3 phases and transferred to the basic unit. There, the measured values are compared with the stored trip level. If the system is not in the start-up bridging phase, the delay time starts on undershooting. If the undershooting is pending for the entire delay time, after the delay time expires a signal for "motor off" is generated and sent to the motor contactor. This disconnects the motor from the line power supply. At the same time, the error message "dry-run pump" appears.

NOTICE
Interposing transformers are not permissible
Use of interposing transformers in conjunction with the function dry-running protection is not permissible.

Note

Measuring range of the current / voltage measuring module

The measuring range of the current/voltage measuring module selected for the "dry-running protection of centrifugal pumps by active-power monitoring" function must include the currents both at the minimum delivery flow rate Q_{MIN} / P_{MIN} / I_{MIN} and at the operating point Q_{OPT} / P_{OPT} / I_{OPT} (as well as the rated motor current I_N).

If necessary, you can modify the use range of a module by mounting multiple primary windings (see Chapter "Measuring current with an external current transformer (interposing transformer)") in the SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957)).

Note

An additional warning threshold can be set

You can optionally configure an additional warning threshold for undershooting the active power using the function "active-power monitoring" (see Active power monitoring (Page 143)) which will give an alarm before the trip level P_{TRIP} is undershot.

However, this warning threshold is not part of the approval for use in hazardous areas.

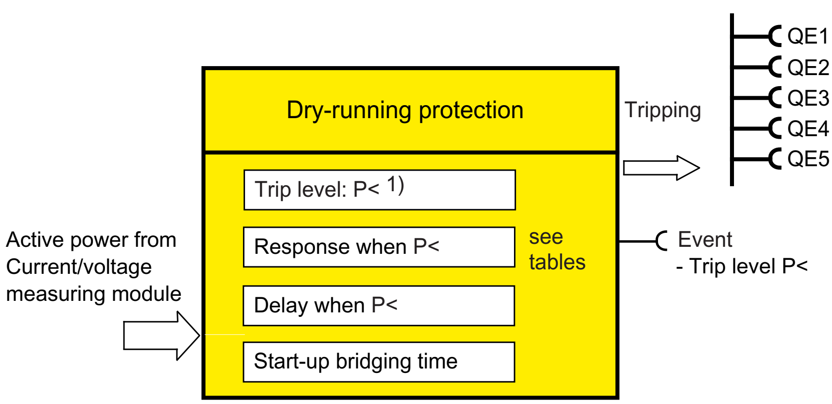


Fig. 4-37 Function block "dry-running protection"

Trip level P_{TRIP}

For dry-running protection of centrifugal pumps by active power monitoring, a trip level can be parameterized for the lower limit:

Trip level:

- P_{TRIP} < (lower limit): 0 - 750000 W (default setting: 0)

Trip level active status

The trip level is active only if the motor is running (the criterion being contactor control), the start-up procedure has been completed, and there is no test position feedback (TPF) (run+).

Response to trip level P_{TRIP} < (lower limit):

Here, you can set how SIMOCODE pro will respond if the set trip level is undershot:

See also "Tables of responses of SIMOCODE pro" in Chapter "Important information" in SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Table 4-4 "Trip level" response for dry-running protection by active-power monitoring

Response	Trip level
Deactivated	X (d)
Signal	-
Warn	-
Trip	X
Delay (ongoing operation, including regular switch-off)	0 to 10 s (default: 0.5 s, in steps of: 0.1 s)
Start-up bridging (starting operation)	0 to 60 s (default: 0 s, in steps of: 0.5 s)

Note

Delay time

The delay time (ongoing operation, including regular switch-off) is used to increase reliability by avoiding false tripping (e.g. due to measured-value noise or transient voltage dips) or on undershooting P_{TRIP} on regular switch-off of the pump and prior closure of the shut-off valve on the discharge side.

Specify a startup bridging time if the trip level P_{TRIP} is undershot while the pump is starting (depending on the procedure for opening the shut-off valve on the discharge side).

Reset

You must acknowledge the faults with a reset signal, after checking and remedying the fault where applicable.

- "TEST/RESET" button on the basic unit
- "TEST/RESET" button on operator panel
- Standard function "Reset"

For this purpose, you must connect the inputs "reset input" (connector) to the corresponding sockets, e.g. on reset via the bus.

Application areas

SIMOCODE pro can be used for dry-running protection of centrifugal pumps with a sufficiently progressive pump characteristic curve (sufficiently steep). This chapter provides some example pump characteristic curves for various types of impeller. A characteristic curve is progressive when the active power P increases continuously as the flow rate Q increases (see radial-flow impeller; in practice, most centrifugal pumps have a radial-flow impeller).

A pump characteristic curve is progressive when the ratio of the active power P_{MIN} with the minimum flow rate Q_{MIN} to the active power P_{OPT} at the optimum flow rate (operating point) Q_{OPT} meets the following condition:

$P_{MIN} / P_{OPT} < 0.80$

This condition is met on nearly all centrifugal pumps with an radial-flow impeller.

NOTICE
Test before installation of SIMOCODE pro for dry-running protection of centrifugal pumps
Before installing SIMOCODE pro for dry-running protection of centrifugal pumps, check whether the condition for a sufficiently progressive pump characteristic curve is met based on the medium-specific pump characteristics of the pump manufacturer. For approximation, you can assume that the ratio of the pump shaft outputs ($P_{P,MIN} / P_{P,OPT}$) is similar in magnitude to the ratio of the active powers (P_{MIN} / P_{OPT}).

NOTICE
Coordination of the "pump + motor" combination is required
Coordinate the "pump + motor" combination in a suitable way. In particular, you must not overdimension the motor too much. In the partial load range, the efficiency of the motor decreases disproportionately. The characteristic of the pump + motor combination is therefore less steep.

Example types of impeller, example pump characteristic curve

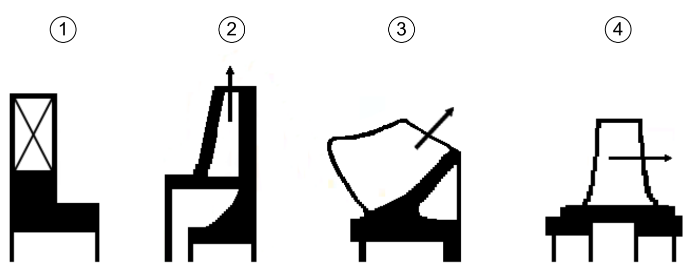


Figure 4-7 Example types of impeller of centrifugal pumps (source: SIHI Group)

① Vane-type impeller

② Radial-flow impeller

③ Mixed-flow impeller

④ Axial-flow impeller (propeller)

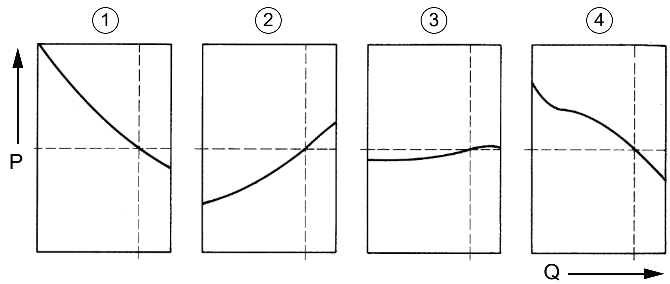


Figure 4-8 Example pump characteristic curve for different types of impeller of centrifugal pumps (source: SIHI Group)

① Vane-type impeller

② Radial-flow impeller

③ Mixed-flow impeller

④ Axial-flow impeller

SIMOCODE pro can be used, in particular, also for dry-running protection of centrifugal pumps that handle flammable media or are installed in a hazardous area.

WARNING

Ex applications

Before using SIMOCODE pro for Ex applications check whether the Ex approvals of SIMOCODE pro cover the relevant use case (see SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957), Chapter "Safety and commissioning information for Ex areas" and the labeling on the device).

NOTICE

Example evaluation of ignition hazard assessment

You will find information on the possible contribution of SIMOCODE pro to the Ex protection concept for centrifugal pumps in the example ignition hazard assessment at the end of this chapter.

Note

Sealing system

For centrifugal pumps that are monitored for dry running with SIMOCODE pro, there are no restrictions with respect to the sealing system. For example, simple and double-acting mechanical seals, magnetic drive pumps, and canned motor pumps are conceivable.

Parameter input

The parameters used for the "dry-running protection of centrifugal pumps by active power monitoring" function

- P_{TRIP}: Trip value for the active power on undershooting (trip level)
- $t_{V,TRIP}$: Delay time for tripping during ongoing operation
- t_{BRIDGE}: Start-up bridging time

can be set either by direct input into the device via the engineering software SIMOCODE ES or via the menu-guided input sequence during teach-in with the wizard (see separate description in this chapter). With direct input you additionally have to set the "Behavior" parameter manually to "Trip". With teach-in this is done automatically after leaving the last dialog window.

At the start of the wizard, you open the commissioning editor in the project for the SIMOCODE device in question in the online view. You will find the wizard there under "dry-running protection".

NOTICE

The conditions for sufficient distance from dry running and a sufficiently progressive pump characteristic curve must be met

If you enter the trip level directly via the engineering software, you must take the following measures:

- Check that the conditions for sufficient distance of the trip level from the dry-run state ($P_{Trip} > 1.1 * P_{MIN}$) are met.
- Check by active power monitoring that the conditions for a sufficiently progressive pump characteristic curve ($P_{MIN} / P_{OPT} < 0.80$) are met
- Manually check that the permissible range of current ($I_U < I < I_O$) and voltage (93 V < U < 794 V) have been met using the respective 3UF7 system

External measuring equipment is not approved for determining the operating point parameters.

NOTICE

Access/authorization concept for input or modification of parameter values

When using SIMOCODE pro for Ex applications, ensure a suitable access/authorization concept for input or modification of parameter values.

The method of operation of the parameters is illustrated in the following figure and described in the following sections.

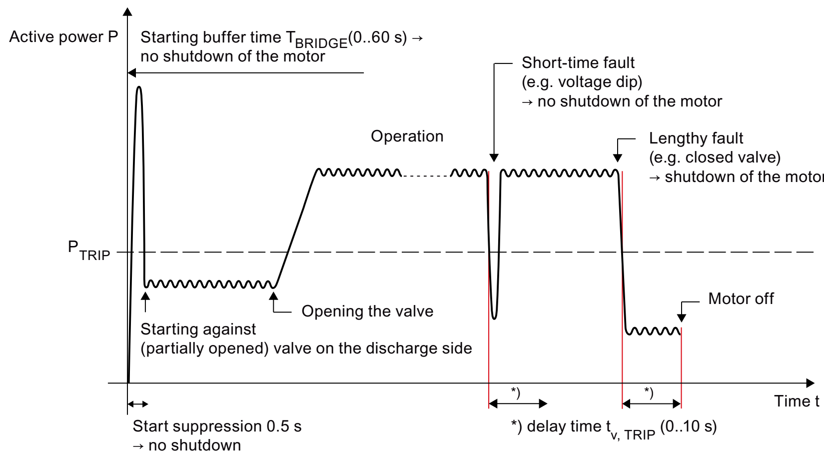


Figure 4-9 Method of operation of the parameters used for dry-running protection of centrifugal pumps by active-power monitoring

Parameter trip value P_{TRIP}

No simple mathematical relation can be stated between the flow rate of a centrifugal pump and the active power on the motor. The influencing factors include material data and installation and operating and ambient conditions.

However, for a certain installed arrangement of the pump, motor, and surrounding plant, a phenomenological, reproducible relationship can be established between the flow rate Q and the active power P. If the operating points are not sufficiently known, the ratios can be determined at the operating point (Q_{OPT}/P_{OPT}) and at the minimum flow rate (Q_{MIN} / P_{MIN}) specified by the pump manufacturer as part of a so-called teach-in (see separate description in this chapter).

Via the menu-guided input sequence (dry-running protection wizard), you can set the trip level for the active power P_{TRIP} (trip value) during the teach-in. It is formed from the measured active power P_{MIN} at minimum flow rate Q_{MIN} multiplied by factor 1.1. This factor is used to establish a sufficient distance between the active power at the trip level and in the dry running state, taking account of the measurement uncertainties.

Alternatively, direct input of the trip value is also possible. Procedure:

- Read off the active power P_{OPT} at the operating point
- Read off the active power P_{MIN} at minimum flow rate, set $P_{TRIP} \geq 1.1\ P_{MIN}$
  - Read off an alternative active power P_a at alternative flow rate Q_a below P_{opt} during ongoing operation and derive the trip value while meeting the condition $P_{opt} > P_{trip} > 1.1 * P_a$ at Pa $\geq P_{min}$.
- Manually check for sufficient scope for progression of the active power characteristic (P_{MIN} / $P_{OPT} < 0.80$)
- Set $P_{TRIP} \geq 1.1 * P_{MIN}$.

NOTICE

Partial load operating states of the pump.

When defining the trip level, consider any potential partial load operating states of the pump.

Parameter delay time $t_{V,TRIP}$

The delay time $t_{V,TRIP}$ during ongoing operation of the centrifugal pump (including switch-off) is used to increase the reliability by avoiding false tripping on transient undershooting of the trip value during ongoing operation (e.g. due to measured-value noise or transient voltage dips).

With parameter $t_{V\,TRIP}$, false tripping is also avoided on regular switch-off of the pump. Depending on the procedure for closing the shutoff valve on the discharge side, the trip level P_{TRIP} may possibly be undershot.

WARNING

Preventing back flow of the content of the pipe on the discharge side

Prevent back flow of the content of the pipe on the discharge side with suitable measures.

Reason: Back flow of pumps with permanent-magnet motors can result in a generator effect with the danger of sparking on the terminal board.

NOTICE

Signal "motor off" is pending

As soon as the signal "motor off" is pending (the criterion being contactor control), the dry-running protection no longer triggers a fault.

NOTICE

Delay time

Select the delay time $t_{V,TRIP}$ to be sufficiently short so that the dry-running protection function is retained for the specific "pump + motor" system.

Start-up bridging time parameter t_{BRIDGE}

SIMOCODE pro is suitable for the dry-running protection of centrifugal pumps during ongoing operation.

Note

Minimum active power threshold

During start-up, the following effect can occur: Undershooting a minimum active power threshold by starting the pump against a (partially opened) valve on the discharge side.

NOTICE
Start-up bridging time t_{BRIDGE}
Provide a start-up bridging time t_{BRIDGE} against false tripping during which the dry-running protection by active power monitoring is deactivated due to active-power.
If the trip level is still undershot after expiry of t_{BRIDGE} , then the delay time $t_{V,TRIP}$ starts to run from this instant.
As part of a safety assessment, you must decide whether additional measures for dry-running protection are required based on the start-up bridging time t_{BRIDGE} for starting and how they should be handled (e.g. organizationally or by devices).

NOTICE
Manufacturer specifications
Note any data of the manufacturer of the centrifugal pump on the length of the starting operation against a (partially opened) valve on the discharge side.

The following effects may also occur during starting of the pump:

- Transient (< 1 s) undershooting of the active power threshold because starting is performed based on active power = 0 and based on electrical effects (e.g. inertia of the motor contactor). False trips are avoided by a start-up override of 500 ms that is permanently in the device and cannot be modified.
- Transient (< 1 s) starting overcurrent (inrush) during which no dry running can be detected by undershooting a minimum active power threshold. Does not result in false tripping and is therefore non-critical in respect of the Ex protection because of the short duration.

Logging of the set parameter values

After input or modification of parameter values, we recommend recording the defined numeric values, including the time of input, and archiving the log file. This is important, in particular, when using SIMOCODE pro as part of a an Ex protection concept.

To generate a log file, use the print function of SIMOCODE ES. The log file also contains the parameters set for the "dry-running protection" function.

Note

Log reset

If you modify the dry-running parameters without using a wizard, an existing log from a wizard is reset.

Checking and changing the set parameter values

If necessary, check and correct the set parameter values for suitability for the dry running protection function. This applies, in particular, to the trip value P_{TRIP}. Checking may be necessary, for example, in the following cases:

- After changes (e.g. impeller replacement) or repairs on the pump, on the pump motor or on the surrounding plant (pipes, valves, vessels, etc. in the intake path and in the discharge path)
- On changing the medium being pumped
- On changes to the operating conditions
- At regular intervals, in accordance with legal requirements (e.g. test cycle for Ex protection)

NOTICE
Measuring devices
Ensure that the measuring devices used are functioning correctly when inspected (e.g. flow meter). Calibrate them, if necessary.

Procedure for teach-in using the dry running protection wizard

Requirements:

Perform the teach-in with the real medium to be pumped under real operating conditions (e.g. temperatures, pressures).

Requirements:

- The starting phase of the pump must have been completed.
- As a prerequisite in the plant, we recommend flow rate measurement on the discharge side.

Note

Automation

To reduce manual interventions, you can store the relevant sequences for a (partially) automated teach-in in your process control system, if required.

Note

Password protection must have been deactivated

If password protection is activated, you must deactivate it.

Note

Setting a temporary trip level

In teach-in, the plant is temporarily operated with minimum flow rate Q_{MIN}, which results in minimum active power P_{MIN}.

To avoid false tripping, but still ensure basic protection against dry running, you should set a temporary trip level before teach-in, the value of which is smaller than the expected minimum active power P_{MIN}.

We recommend the following settings:

- Temporary trip level: At least 30% above the pump shaft power at zero delivery (see pump characteristic curve)
- Delay time $t_{V,TRIP}$ = 0 or as short as possible

As the trip level, enter this value by direct input using the SIMOCODE ES engineering software and transfer the change to the device. You will find the parameters in the project for the SIMOCODE pro device in question in the parameter editor under the respective SIMOCODE parameters "Parameters → Dry-running protection".

WARNING

Using and resetting the temporary trip level

The temporary trip level only provides basic protection and does not provide dry-running protection for applications in hazardous areas.

Reset this temporary trip level before resuming production if the teach-in sequence is not completed!

WARNING

Qualified personnel required

The teach-in has to be carried out by qualified responsible specialist personnel.

Failure to follow proper procedures results in **personal injury and damage to property**.

WARNING

Information provided by the pump manufacturer

The manufacturer's instructions must be observed.

NOTICE
Device parameterization during starting (only affects system in which SIEMENS process controls are used) If the startup parameter block is deactivated (for PROFINET, "Fieldbus interface→ Startup parameter block" has the default setting "deactivated"), the SIMOCODE pro device parameters are stored in the CPU of the automation system and transferred to SIMOCODE pro via PROFIBUS or PROFINET when the system starts. Parameters that were transferred directly to the device during the teach-in would then be overwritten. Therefore ensure before teach-in starts that the startup parameter block is activated and effective in the device. If you want to use the device parameterization during startup nevertheless, proceed as follows: • Compile the control hardware after completion of the teach-in and load it into the CPU. In this way, the SIMOCODE pro device parameters with the up-to-date settings for the dry-running protection function are loaded into the CPU • Now deactivate the startup parameter block in the SIMOCODE pro device parameters and transfer this change to the SIMOCODE pro basic unit. This procedure ensures that the device parameters transferred to SIMOCODE pro during system startup contain the up-to-date settings for the dry-running protection function.

NOTICE
Use of a memory module If a memory module is used, you must ensure that the parameter settings are updated on the memory module after the teach-in process.

Performing the "teach-in" with the dry-running protection wizard

The procedure of a teach-in is illustrated in the example pump characteristic curve (see below). Flow rate measurement on the discharge side is assumed.

At the start of the menu-guided input sequence, open the commissioning editor in the project for the SIMOCODE device in question in the online view. You will find the wizard there under "dry-running protection".

NOTICE
Time monitoring of the teach-in The teach-in is monitored by a timer in the device's firmware, which becomes active when inactivity is detected. If the system remains at the same dialogue window for a period of 10 min and if simultaneously the timer is not reset manually SIMOCODE pro goes into the fault condition; an error message to that effect is displayed and the motor is switched off. You can restart the timer manually at any time during ongoing operation in each dialogue window of the wizard with the "Reset Timer" button.

First start the pump (according to the instructions provided in the documentation of the pump manufacturer) and ensure that the pump has attained operating conditions (especially temperature).

Next, perform the following steps as you are prompted in the input sequence:

1. Starting the dry-running protection wizard: Start the dry-running protection wizard in the online view of the commissioning editor of SIMOCODE ES
2. Check the currently active settings during teach-in: After the wizard has been started, the parameters of the dry-running protection function currently active in the device are displayed:
   – Response
   – Trip level
   – Tripping delay time
   – Start-up bridging time

   Check the settings for use of a temporary trip level (see instruction "Setting a temporary trip level" at the beginning of this chapter)

NOTICE
Changing the currently active setting
You can only change the currently active setting by entering the parameters directly in the engineering software. Close the dry-running protection wizard to do this.
Remember that the pump is still in operation (limited by the timer that monitors during inactivity).

3. Setting the flow rate to the operating point Q_{opt}: Set the optimum flow rate within your plant configuration and manually enter the numeric value for the operating point Q_{OPT} that you can read off from the flow rate measuring device on the discharge side (SIMOCODE pro records the associated active power P_{OPT}).
4. Setting of the flow rate to Q_{MIN}: Set the minimum flow rate within your plant configuration and manually enter the numeric value for the minimum flow rate Q_{MIN} that you can read off the flow rate measuring device on the discharge side (SIMOCODE pro records the associated active power P_{MIN}).
5. Display of the calculated trip level: The trip value determined by the system $P_{TRIP} = 1,1 * P_{MIN}$ for the active power is displayed.
6. Setting of the delay times:
   – Enter the delay time $t_{V,TRIP}$ for ongoing operation of the centrifugal pump (default value: 0.5 s)
   – Enter the start-up bridging time t_{BRIDGE} (default value: 0 s)
7. Display of the summary, checking and activation of the dry-running protection function: Check the displayed parameter values (P_{TRIP}, $t_{V,TRIP}$, t_{BRIDGE}) for the dry-running protection by active-power monitoring and the set values pairs P_{OPT} / Q_{OPT} and P_{MIN} / Q_{MIN}.

After confirmation, the input sequence is exited and the modified parameter values are activated in the device by the teach-in.

NOTICE

Delivery flow rate must be sufficiently large

Before activation of the parameter values, make sure that the delivery flow rate is sufficient at this instant.

This avoids unwanted tripping.

NOTICE

Tests performed by the device

In SIMOCODE pro, the preconditions for the use of the function "dry-running protection" are checked during the teach-in. A check is made to see whether the following conditions are met:

- Progressive pump characteristic curve (P_{MIN} / P_{OPT} < 0.80)
- Current in the permissible range ($I_U < I < I_o$)
- Voltage in the permissible range (93 V < U < 794 V)

If one of the above conditions is not met, an error message is output. In this case you must

- close the dry-running protection wizard
- eliminate the error and then restart the dry-running protection wizard
- if necessary also restart the pump beforehand.

Check the determined absolute values for P_{OPT} and P_{MIN} for plausibility irrespective of this (where applicable by comparing the pump characteristics). Determine the cause for obvious deviations before activating the dry-running protection function.

NOTICE

Checks in case of manual direct input of the trip level

If you entered the trip level manually with the engineering software, check for the following conditions:

- the conditions for a sufficiently progressive pump characteristic curve
- the conditions for sufficient distance of the trip level from the dry-run state
- the conditions for the permissible range of current and voltage

Note

Log file

For documentation purposes, we recommend generating and printing out a log file after parameter setting by teach-in.

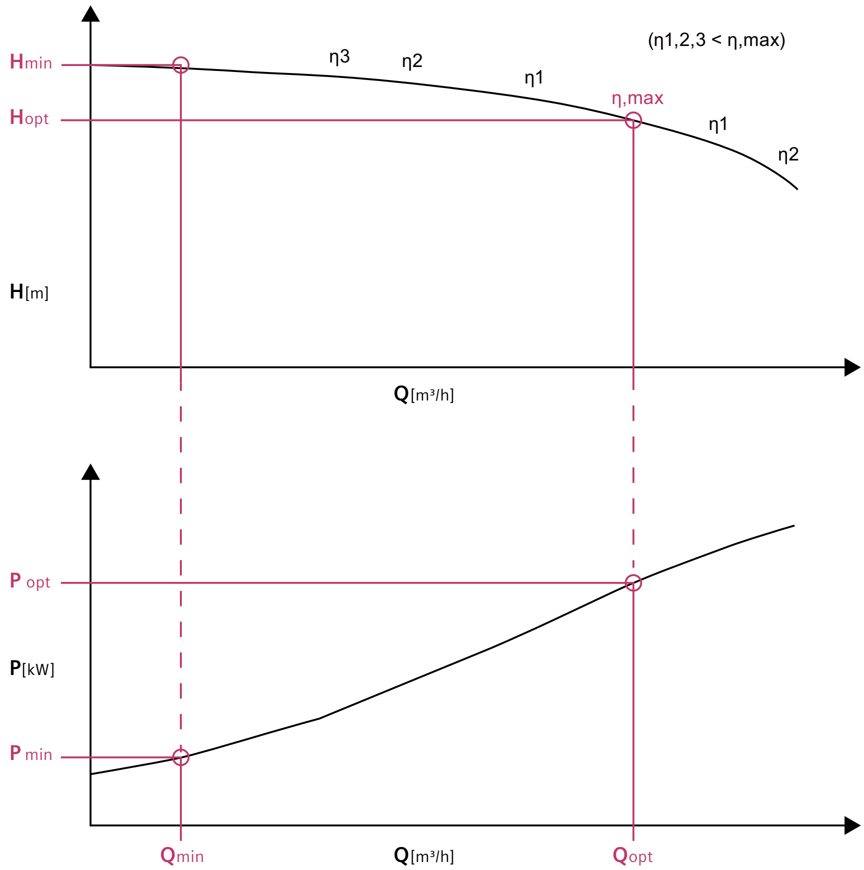


Figure 4-10 Example monitoring parameters for the teach-in illustrated in the characteristic curve of a centrifugal pump with a radial-flow impeller for water at a speed of 1450 rpm (example); source: KSB SE & Co. KGaA

Alternatives when a flow measurement is missing on the discharge side

If no stationary flow rate measurement is provided, we recommend the following alternatives, for example:

- Mobile flow rate measurement by ultrasound in clamp-on technology (calibration required)
- Determine the flow rate via level change in a vessel
- Procedure as for hydraulic acceptance tests for centrifugal pumps acc. to DIN EN ISO 9906

Ignition hazard assessment acc. to ISO 80079-36 for centrifugal pumps in hazardous areas – prevention of an ignition source from becoming active with the help of dry-running protection by active power monitoring with SIMOCODE pro (example illustration)

According to the data in DIN EN ISO 80079-37, Chapter 1 and Chapter 4, for non-electrical devices (centrifugal pumps in this case) for use in explosive atmospheres, an ignition hazard assessment must be performed according to DIN EN ISO 80079-36 (protection by control of ignition sources "b"). For each individual identified ignition hazard, suitable protection measures must be defined depending on the fault conditions to be considered. This ignition hazard assessment must be performed by the manufacturer of centrifugal pumps that are approved for use in hazardous areas.

As the plant operator, you are responsible for use of devices as intended, in particular in hazardous areas, considering the influencing factors of the environment.

The following exemplary ignition hazard assessment according to DIN EN ISO 80079-36 is an example illustration and documentation for centrifugal pumps. It refers exclusively to ignition hazards that can be reduced by the use of SIMOCODE pro for dry-running protection by active-power monitoring and lists the control measures required for this. It does not purport to be complete. As the plant operator, you must adapt, detail, and expand this ignition hazard assessment to the local conditions in any case.

serial no.	1		2					3			4					
	Ignition hazard		Assessment of the frequency of occurrence without application of an additional measure					Measures applied to prevent the ignition source becoming effec-tive			Frequency of occurrence incl. measures applied					
	a	b	a	b	c	d	e	a	b	c	a	b	c	d	e	f
	Potential ignition source	Description / basic cause (Which conditions originate which ignition hazard?)	In normal operation	during foresee-able mal-function	during rare mal-function	Not relevant	Reasons for assessment	Description of the measure applied	Basis (citation of standards, technical rules, experimen-tal results)	Technical documentation (evidence including relevant features listed in column 1)	In normal operation	During foreseeabl e	during rare mal-function	Not relevant	Resulting EPL in respect of this ignition hazard	Necessary restrictions
1.1	Hot surface	power losses dissipated as heat		X			The maximum surface temperature of the pump has been defined by the pump supplier in the course of a type-examination for worst case conditions during normal operation.	Monitoring of minimum flow by Control Products (e.g. SIMOCODE pro) (by monitoring if the active power falls below a minimum value); trip criteria have been defined according to the operating manual for the pump	ch. 6.5.1 of ISO 80079-37	EU-type examination certificate / Certificate of Conformity (CoC) according to IEC Ex; Manual Collection SIMOCODE pro; SIL Verification Report (Dekra Exam) con-cerning functional safety; instructions according to the operating manual for the pump			X		Gb	T...
1.2					X		flow and temperature monitoring, failure of monitoring devices cannot be ex-cluded (rare malfunction)							X	Ga	T...
1.3		temperature of the pumped medium in conjunction with hydraulic losses of the pump as well as power dissipation of the motor		X			The maximum surface temperature was defined in a type test of the manufacturer in the most unfavorable conditions, but in normal operation The permissible temperature of the medium to be pumped is defined in the operating instructions.						X		Gb	T...
1.4					X		Flow rate and temperature monitoring, failure of monitoring equipment cannot be excluded (rare fault)							X	Ga	T...
1.5		pump is operating against a closed valve or a down-stream blockage (continuous opera-tion + shut-down)		X			In normal operation the pump will not operate against closed valve or downstream blockage. This case is only relevant for anticipated malfunctions.						X		Gb	T...
1.6					X		Flow and temperature monitoring, Failure of monitoring devices cannot be ex-cluded (rare malfunction)							X	Ga	T...
1.7	mechanical spark	Impeller hits casing (in case of malfunction without or with only little liquid)			X		Formation of sparks inside pump - only relevant if simultaneously too less liquid is present	Monitoring of permanent liquid filling inside pump during operation by Control Product (e.g. SIMOCODE pro) (by monitoring if the active power falls below a minimum value); avoidance of simultaneous occur-rence of an effective ignition source and an explosive atmosphere						X	Ga	T...
1.8		Loose metal parts in the medium being pumped (in case of a fault without liquid or with just a little liquid)			X									X	Ga	T...
1.9		Impeller rubs against casing (in case of malfunction without or with only little liquid)			X									X	Ga	T...
1.10		Unintended ingress of particles from outside (in case of malfunction without or with only little liquid)			X			Monitoring of permanent liquid filling inside pump during operation by Control Product (e.g. SIMOCODE pro) (by monitoring if the active power falls below a minimum value); avoidance of simultaneous occur-rence of an effective ignition source and an explosive atmos-phere; prevention of ingress of particles from outside, e.g. installation of a strain-er, operator's respon-sibility.						X	Ga	T...
1.11	Electrical sources	Backflow of liquid through the pump caused by "slurping mode" (repeated periods of incomplete conveying of liquid rests) after emptying of a ves-sel			X		Pump is operating as electric generator; electro-magnetic induc-tion of voltage at terminal box of motor; formation of sparks by flashover	Monitoring of minimum flow by Control Products (e.g. SI-MOCODE pro) (by monitoring if the active power falls below a minimum value); trip criteria have been defined according to the operating manual for the pump; application of a motor with adequate type of protection (e.g. Ex d, Ex e)					X		Gb	T...
Resulting EPL including all existing ignition hazards															Gc bis Ga	T...

Figure 4-11 Example ignition hazard assessment for centrifugal pumps in hazardous areas according to EN ISO 80079-36 - Representation of the possible contribution of SIMOCODE pro to prevent an ignition source from becoming active with the help of dry-running protection by active power monitoring

4.3 Motor control

4.3.1 Control stations

4.3.1.1 Description of functions of control stations

Control stations - overview

Control stations are places from which control commands are issued to the motor. The "Control Stations" function block is used for administration, switching and prioritization of these different control stations. SIMOCODE pro allows parallel administration of up to four different control stations. Dependent on the set control function, up to five different control commands can be transmitted from every control station to SIMOCODE pro.

Control stations can be:

- **Local** in the direct vicinity of the motor; control commands via pushbuttons.
- **PLC/PCS or PLC/PCS [PN]**, switching commands are issued by the automation system (remote).
- **PC or PC/OPC UA [HMI]**, control commands are issued via an operator control station or via PROFIBUS DPV, OPC UA or PROFINET with the SIMOCODE ES software.
- **Operator panel**, control commands are issued via the buttons of the operator panel in the control cabinet door.

Examples of control commands:

- **Motor ON (ON >), Motor OFF (OFF)** for a direct starter
- **Motor CCW (ON <), Motor OFF (OFF), Motor CW (ON >)** for a reversing starter
- **Motor SLOW (ON >), Motor FAST (ON >>), Motor OFF (OFF)** for a Dahlander circuit.

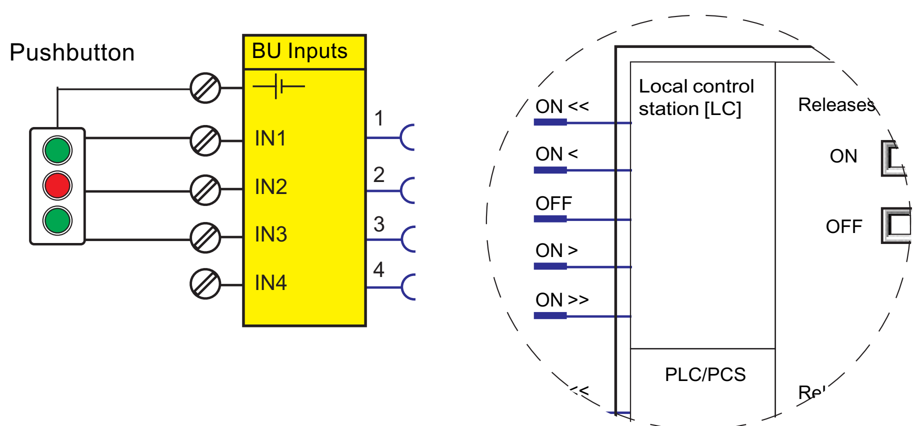
The plugs of the "Control Stations" function block must be connected to any sockets (e.g. binary inputs on the basic unit, control bits from the bus, etc.) for the control commands to take effect. Up to five different control commands can come from each control station. Up to five plugs (plug ON <<, ON <, OFF, ON >, ON >>) are available on the function block for each control station. The number of active plugs depends on the control function selected. With a direct starter, for example, only the plugs "ON >" and "OFF" are active.

Control stations

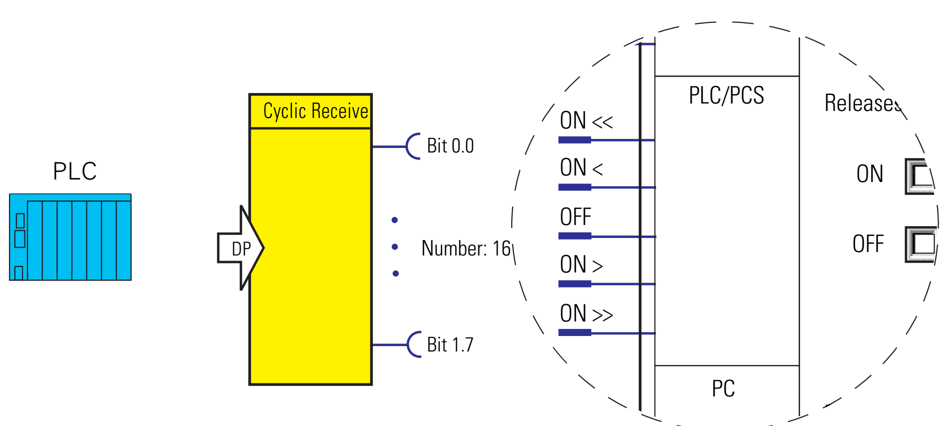
- **Control station - local control:** In this case, the command devices are usually in the immediate vicinity of the motor and are wired to the inputs of SIMOCODE pro. The plugs of the "Control Stations" function block must be connected to any sockets (normally the function blocks for the basic units or the digital module inputs – BU Inputs, DM Inputs) for the control commands to take effect.

Note

The OFF command "LC OFF" is 0-active. This ensures that SIMOCODE pro shuts the motor down safely if an open circuit occurs in the supply cable, for example. The precondition is that the control station is active.



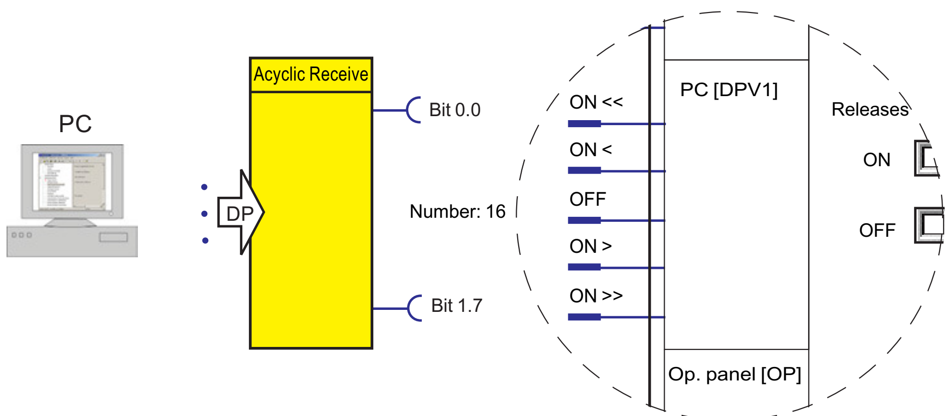
- **PLC/PCS or PLC/PCS [PN] control station:** This control station is primarily intended for control commands from the automation system (PLC / PCS) via the cyclic receive telegram of the bus. The plugs of the "Control Stations" function block must be connected to any sockets, typically with cyclic receive, for the control commands to take effect.



- **PC or PC/OPC UA [HMI] control station:** This control station is primarily intended for switching commands on an arbitrary PC that, along with the automation system, is used as a second master on PROFIBUS DP or that, as a client, accesses the data made available by SIMOCODE pro, as server, via OPC UA. The control commands are sent via the Acyclic receive telegram from PROFIBUS DPV1 or are transferred using a client-server connection via OPC UA.

Note

If the SIMOCODE ES or SIMATIC PDM PC software is connected to SIMOCODE pro via communication bus, its control commands automatically take effect via the PC [DPV1] or "PC PC/OPC UA" control station. At the same time, the enabled commands for this control station also take effect for SIMOCODE ES.



- **Control station - operator panel:** This control station is primarily intended for control commands issued via the buttons on the 3UF72 operator panel, which is mounted in a control cabinet door, for example. The plugs of the "Control Stations" function block must be connected to any sockets (normally to the function block for the buttons of the operator panel - OP buttons) for the control commands to take effect.

Note

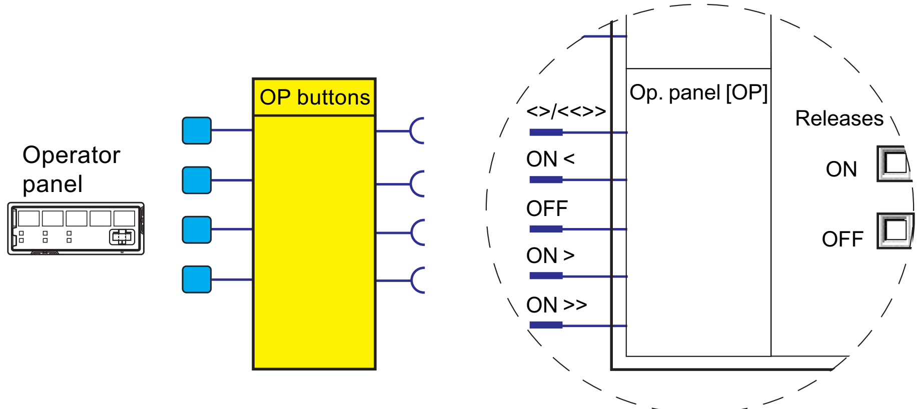
Control functions with two speeds

Since the operator panel only has four buttons for controlling the motor feeder, one button must be used as a speed changeover button for control functions with two speeds and two directions of rotation. For this purpose, this button must be assigned to the internal control command "[OP]<>/<<>>".

Note

"Operator panel [OP]" control station

If the SIMOCODE ES PC software on a programming device is connected to SIMOCODE pro via the system interface, its control commands automatically take effect via the "Operator panel [OP]" control station. At the same time, the enabled commands for this control station also take effect for SIMOCODE ES.



4.3.1.2 Operating modes and mode selectors

Operating modes

You can use the control stations either individually or in combination. There are four different operating modes available for selection:

- Local 1
- Local 2
- Local 3
- Remote / Automatic: In this operating mode, the system must communicate via PLC.

Not all control stations are usually connected. If more than one control station (e.g. local and PLC / PCS) is connected, it makes sense and is also mandatory to operate the control stations selectively. Four operating modes are provided for this purpose which can be selected via two control signals (mode selectors). For each individual control station in every operating mode, it can be stipulated if "ON commands" and / or "OFF commands" are to be accepted. The operating modes are controlled in such a way that only one operating mode is active at any one time.

Example: There are three operating modes in a system:

Table 4-5 Operating modes

Operating mode	Description
Key-operated switch operation, e.g. Local 1	Only local control inputs are permitted! All other control stations are disabled.
Manual operation, e.g. Local 3	Only operator panel control commands and local control commands can be issued.
Remote operation, e.g. remote / automatic	Only PLC/PCS control commands are permitted; only OFF commands are permitted locally.

The key-operated switch must be read in via an input to select these operating modes. The remote switching operation should be controlled via the bus. The key-operated switch operation has priority over all other operating modes.

Mode selector

The S1 / S2 mode selectors are used to switch between the operating modes "Local 1," "Local 2," "Local 3," and "Remote/Automatic." To do this, plugs S1 and S2 must be connected to any sockets (e.g. device inputs, communication bus control bits, etc.).

The table below shows the operating modes depending on the signal states of mode selectors S1 and S2:

Table 4-6 Operating modes depending on S1 and S2

Input	Operating mode			
	Local 1	**Local 2**	**Local 3**	**Remote / Automatic**
S1	0	0	1	1
S2	0	1	0	1

The different operating modes for enabling the control stations can be used to specify the switch authorizations for the individual control stations:

- Local control [LC]
- PLC/PCS [DP] or PLC/PCS [PN]
- PC [DPV1] or PC/OPC-UA [HMI]
- Operator panel (OP)

Only the following are active:

- the operating mode set by plugs S1 and S2 of the "Control Stations" function block and
- the enables selected there.

Example of a dynamic mode selection as a function of time:

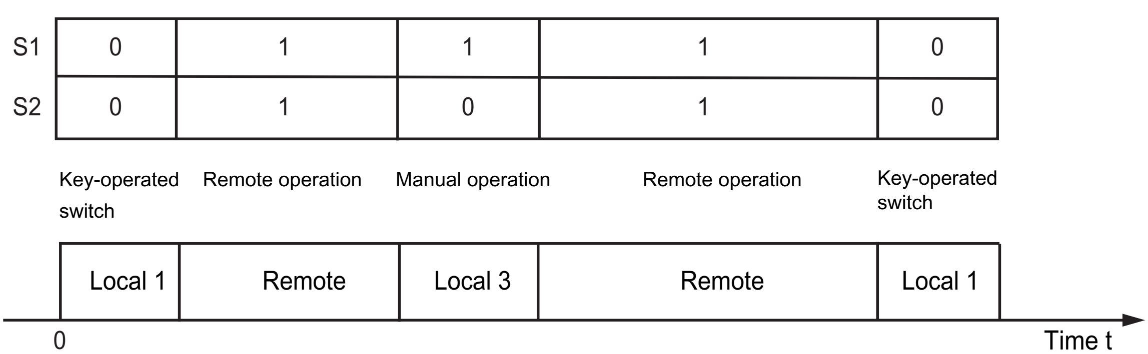


Figure 4-12 Example - mode selection

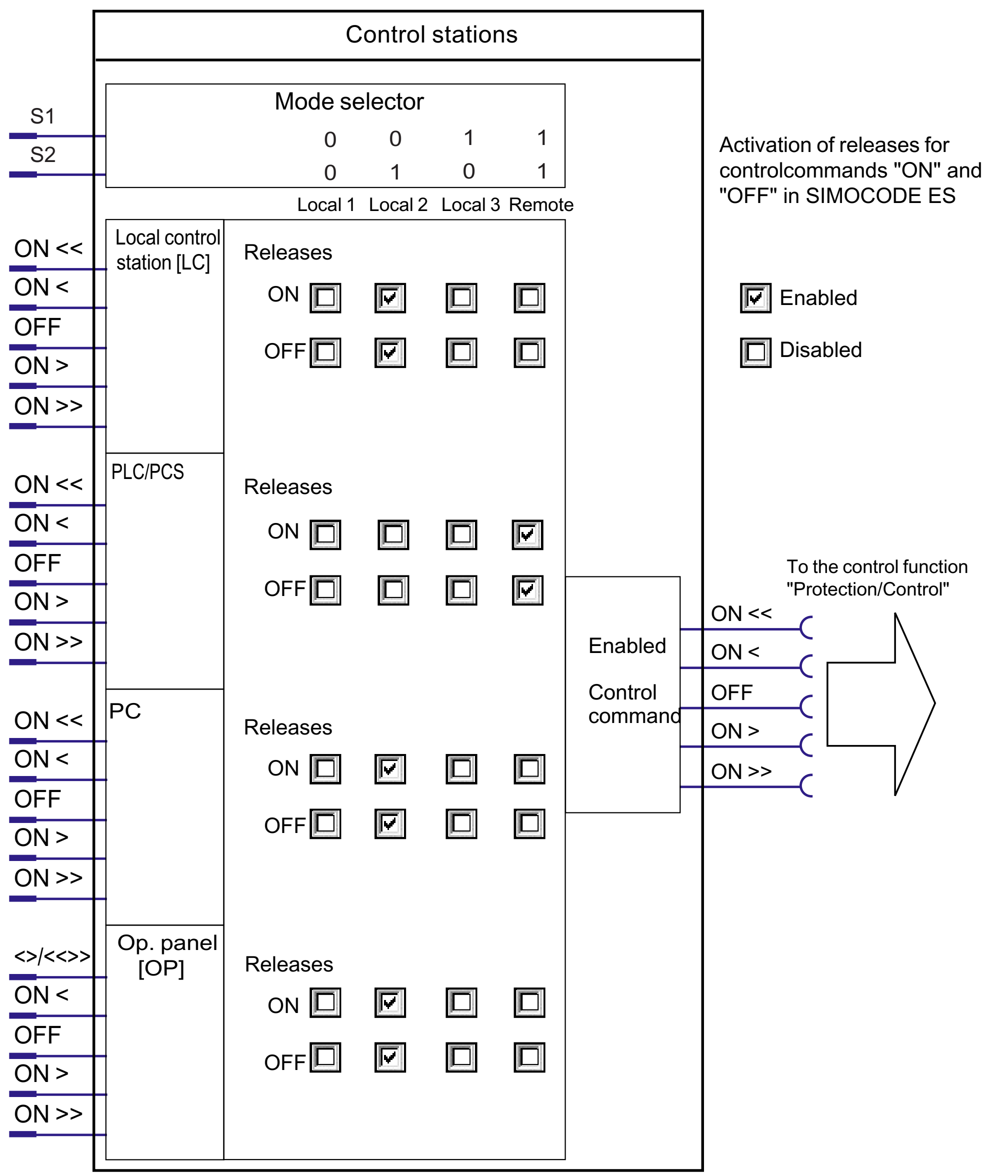
4.3.1.3 Enables and enabled control command

Enables

Enables, which have to be activated, are assigned to the "ON" and "OFF" control commands for each control station in every operating mode. That is, depending on the mode, it is possible to define for each control station whether it is permitted to switch the motor on only, off only, or on and off. The relevant checkbox is selected in the "Control stations" dialog box in SIMOCODE ES.

Diagram of enables and enabled control command

The following diagram shows the "Control Stations" function block and the operating modes:



Example of enabled commands

The following diagram shows an example of enabled commands for the "Local 2" operating mode, "Dahlander reversing starter" control function:

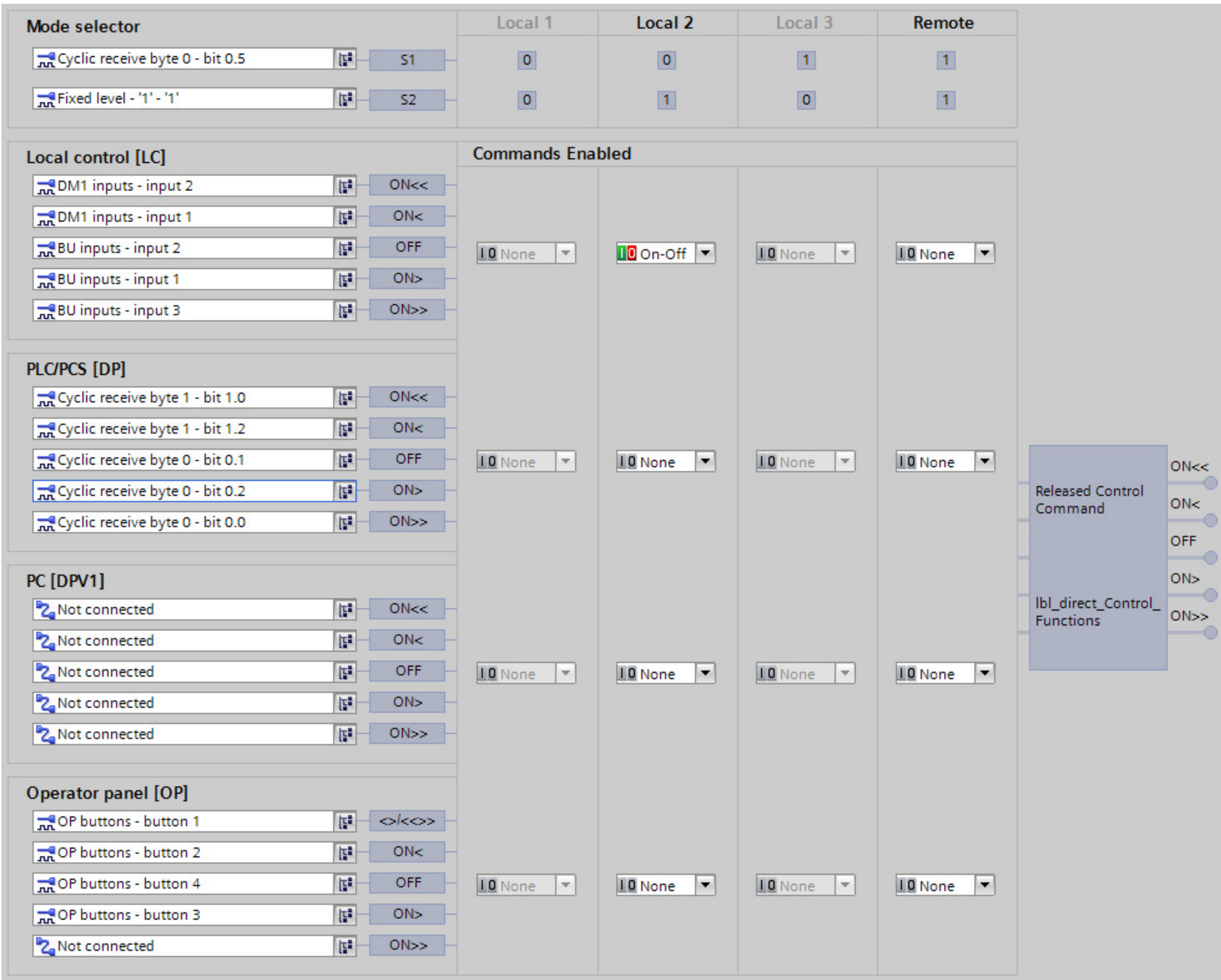


Figure 4-13 Example of enabled commands

In the example, the motor can only be switched on and off in the "Local 2" operating mode via the buttons (local) connected to the inputs of the basic unit and the digital module.

4.3.1.4 Control station settings

Table 4-7 Control station settings

Control stations	Description
LC	Activates the control station via any signal (any sockets, but typically device inputs). The "OFF" plug is 0-active on the control station [LC].
ON <<	
ON <	
OFF	
ON >	
ON >>	
PLC/PCS	Activates the control station via any signal (any sockets, but typically control bits from the bus).
ON <<	
ON <	
OFF	
ON >	
ON >>	
PC	Activates the control stations via any signal (any sockets, but typically control bits from the bus).
ON <<	
ON <	
OFF	
ON >	
ON >>	
Operator panel [OP]	Activates the control stations via any signal (any sockets, but typically buttons on the operator panel)
<>/<<>>	
ON <	
OFF	
ON >	
ON >>	
Mode selector	For switching between the 4 operating modes Local 1, Local 2, Local 3 and remote with any signals (any sockets, e.g. device inputs, control bits from/via the bus.).
S1	
S2	

4.3.2 Control functions

4.3.2.1 Overview and description of control functions

Control functions - overview

Depending on the device series, the system provides the following control functions:

Table 4-8 Control functions

Control function	SIMOCODE pro			
	BP	GP		HP
	C	S	V PN GP	V PB, V MR, V PN, V EIP
Overload relay (Page 86)	✓	✓	✓	✓
Direct starter (direct-on-line starter) (Page 87)	✓	✓	✓	✓
Reversing starter (Page 89)	✓	✓	✓	✓
Circuit breaker (Page 91)	✓	✓	✓	✓
Star-delta starter (Page 93)	—	✓	✓	✓
Star-delta reversing starter (Page 96)	—	—	—	✓
Dahlander starter (Page 100)	—	—	—	✓
Dahlander reversing (Page 102)	—	—	—	✓
Pole-changing starter (Page 105)	—	—	—	✓
Pole-changing reversing starter (Page 108)	—	—	—	✓
Solenoid valve (Page 111)	—	—	—	✓
Positioner 1 to Positioner 5 (Page 113)	—	—	—	✓
Soft starter (Page 117)	—	✓	✓	✓
Soft starter with reversing contactor (Page 120)	—	—	—	✓

Control functions (e.g. direct starters, reversing starters) are used for controlling load feeders. They are characterized by the following important features:

- Monitoring the switch-on / switch-off process
- Monitoring the ON / OFF status
- Tripping if a fault occurs.

SIMOCODE pro monitors these statuses using the "Feedback ON" auxiliary control input, which is usually derived directly from the current flow in the main circuit, via the current measuring modules.

All the necessary interlocks and logic operations for the respective applications are already implemented in the control functions. Control functions include:

- Plugs for control commands ON <<, ON <, OFF, ON >, ON >> that are usually connected with the "Enabled control command" sockets.
- Auxiliary control inputs (plugs), e.g. Feedback ON
- Sockets for
  - Contactor controls QE1 to QE5.
  - Displays (lamp controls) QL, QLS.
  - Statuses, e.g. "Status - ON <<, Status - ON >>."
  - Faults, e.g. "Fault - feedback (FB) ON," "Fault - antivalence."
- Settings, e.g. interlocking time, non-maintained command mode ON / OFF, etc.
- A logic component with all necessary interlocks and connections for the control function.
- Like control functions, the motor protection with its parameters and signals is active "at a higher level in the background". Motor protection and thermistor protection are independent functions that switch off the motor when activated via the control functions. Detailed description: See Chapter Motor protection (Page 31).

Control function schematic

The following schematic shows a general view of the control function ("Protection/Control" function block):

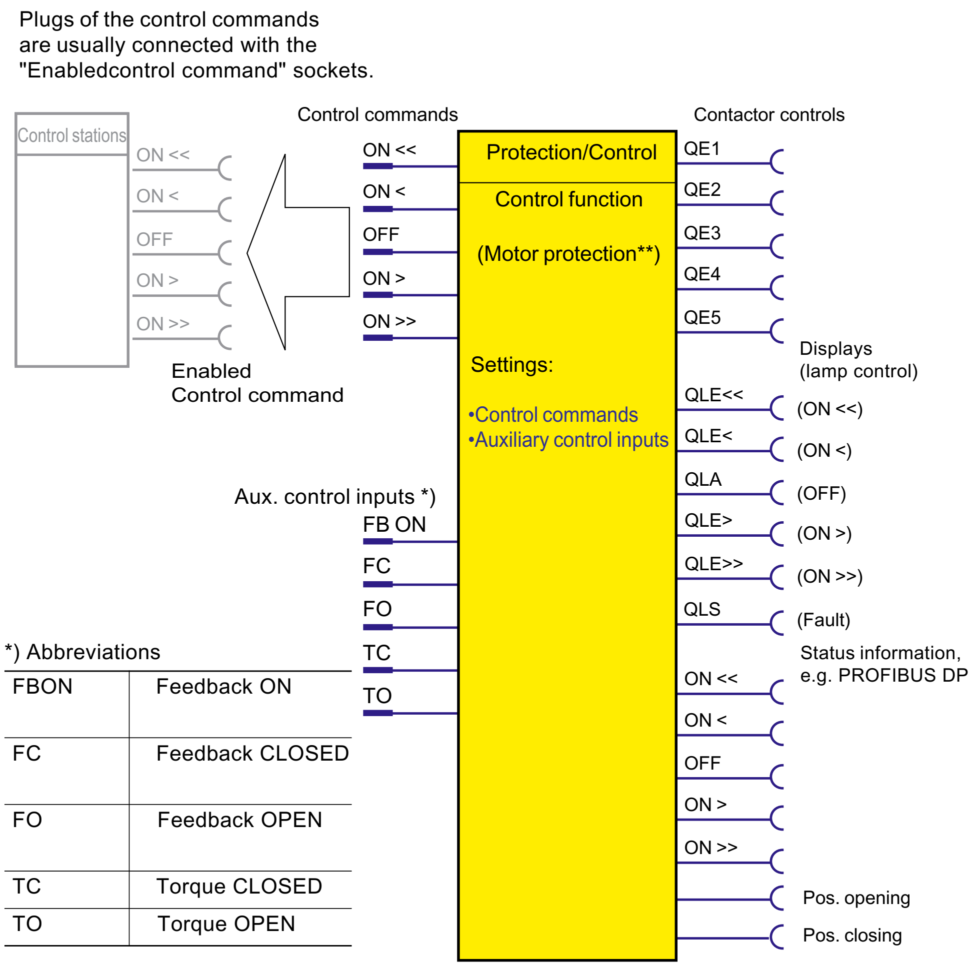


Figure 4-14 "Protection/Control" function block

**) See also Chapter Motor protection (Page 31)

Contactor controls

The QE contactor controls are switched dependent on the incoming control commands and taking the specified control function into consideration including all corresponding interlocks, feedbacks, corresponding parameters and the higher-level motor protection. In general, the QE contactor controls are directly connected to the outputs of the basic unit or the digital modules and switch the connected contactors using relays. The number of usable QE contactor controls is directly dependent on the set control function.

Lamp controls and status information:

The feeder status feedback is signaled via the status information or the QL lamp controls. They are all directly dependent on the status of the auxiliary control input "FB ON". The number of usable lamp controls and status information is directly dependent on the specified control function.

Feeder status feedback:

- Status information, e.g. "Status ON <": These are transmitted, for example, via bus to the automation system and signal the status of the feeder there.
- Displays (lamp control) "Display - QLE <": These can, for example, activate a signal lamp or a pushbutton lamp for status display

  Note

  If the motor is running in test operation, the QLE ... / QLA lamp outputs show a different response (e.g. flashing).

- In addition to the status signals, the "QL..." lamp controls additionally indicate the following:
  - Unacknowledged fault (lamp output general fault QLS is flashing)
  - Saving change-over command (QLE lamp outputs are flickering)
  - Lamp test: All QL outputs are activated for approx. 2 s.

Extended status and fault messages

- Additional status information:
  - Start active: If "Motor" is selected as the load type, this signal is present during the start process of the motor for the duration of the specified class time (e.g. 10 s for Class 10E). Exceptions are the "Overload relay" and "Solenoid valve" control functions.
  - Interlocking time active: For control functions with a change in the direction of rotation, the signal remains present until the specified interlocking time has elapsed.
  - Change-over pause active: For the "Dahlander starter," "Pole-changing starter," and "Star-delta" control functions, the signal is present after changeover until the specified time has elapsed.
- Additional status information for the "Positioner" or "Solenoid valve" control function:
  - Feedback CLOSED (FC)
  - Feedback OPEN (FO)
  - Torque CLOSED (TC)
  - Torque OPEN (TO).
    These feedback signals specify the present status of the corresponding limit switch and/or torque switch. The amount of usable status information is directly dependent on the selected control function.
- Additional fault information for the "Positioner" or "Solenoid valve" control function:
  - Stalled positioner: The torque switch has been activated before the corresponding limit switch. The positioner may have stalled.
  - Double 0: Both torque switches have responded ("positioner" control function only)
  - Double 1: Both limit switches have responded.
  - End position: Positioner or valve has left the end position without receiving a control command
  - Antivalence: The changeover contacts of the limit switches do not issue an antivalent signal ("Positioner 5" control function only).

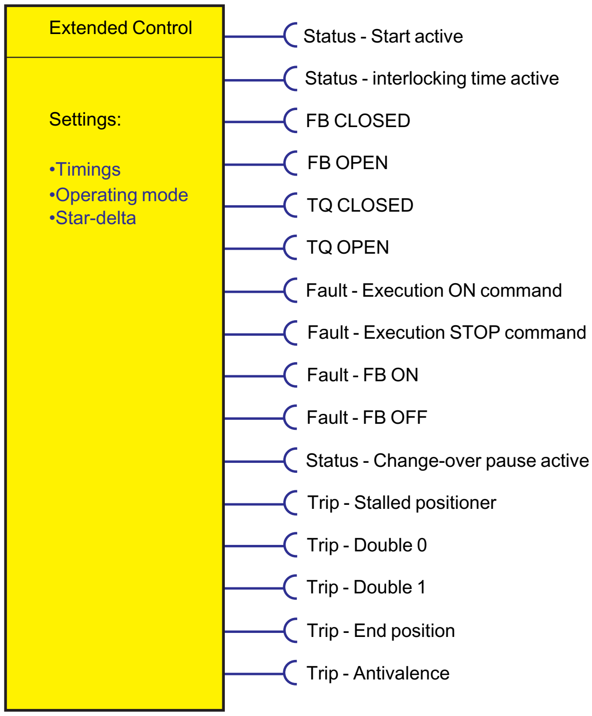


Figure 4-15 "Extended control" function block

4.3.2.2 Application selection, settings and definitions of control functions

Application selection

If you select and load a preset application via the "Add new device" command (e.g. the reversing starter) in SIMOCODE ES, all protective functions, links and interlocks for the reversing starter are set up in the basic unit. These can be flexibly adapted and expanded.

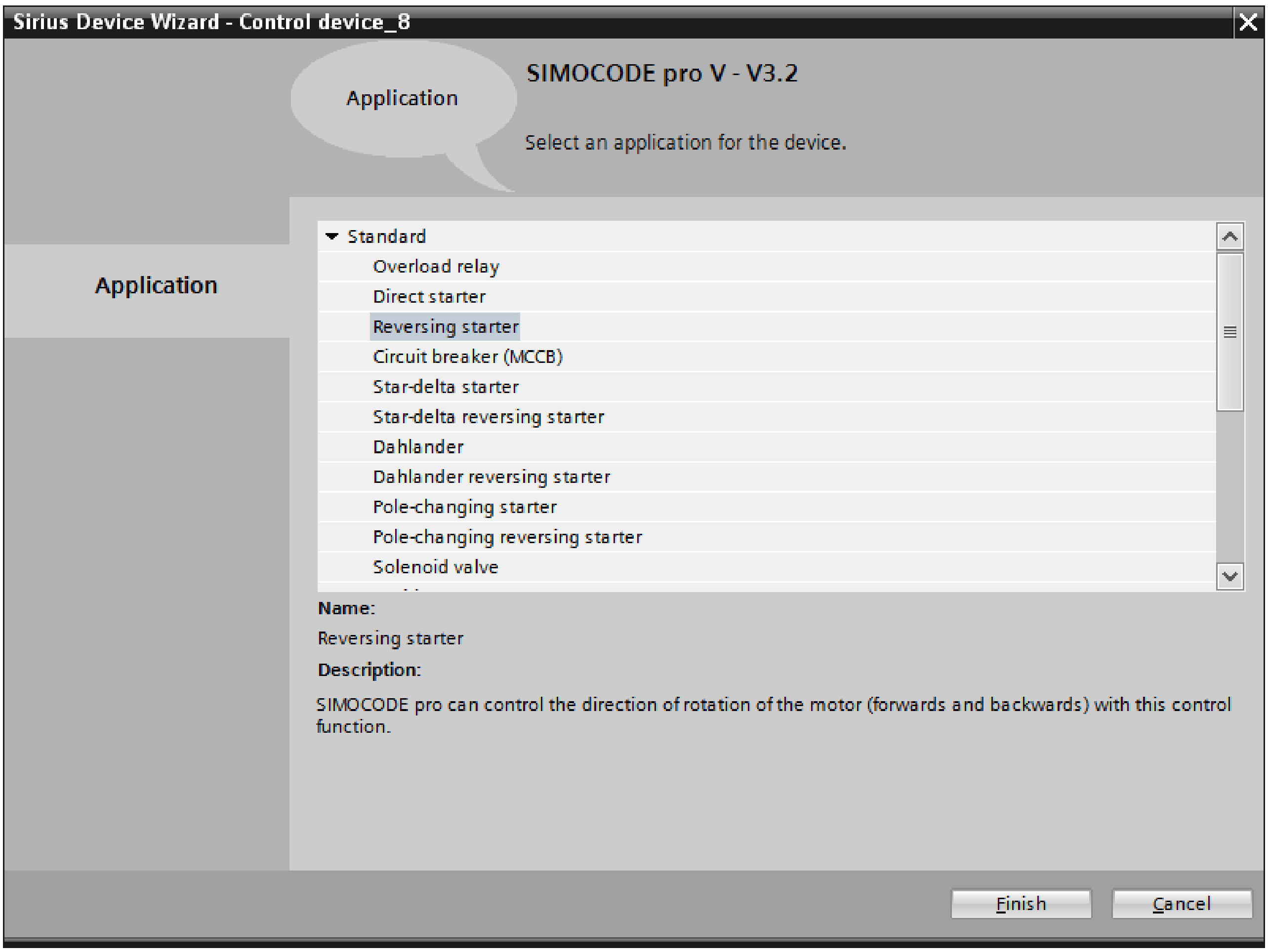


Figure 4-16 Application selection with SIMOCODE ES

Depending on the basic unit used, you can choose from among the following control functions:

Table 4-9 Application selection

Control function	Short Description	Further information
Overload relay	SIMOCODE pro responds like an overload relay.	See "Overload relay" control function (Page 86)
Direct starter (direct-on-line starter)	Switching motor on and off	See "Direct starter" control function (Page 87)

Control function	Short Description	Further information
Reversing starter	Control of direction of rotation of motors (forward, reverse)	See "Reversing starter" control function (Page 89)
Molded-case circuit breaker (MCCB)	Switches a circuit breaker on and off (e.g. 3WL, 3VA)	See "Molded case circuit breaker (MCCB)" control function (Page 91)
Star-delta starter	To limit the starting current, SIMOCODE pro initially starts a motor with a star-connected stator winding and then switches it to delta.	See "Star-delta starter" control function (Page 93)
Star-delta reversing starter	Star-delta starter with both directions of rotation (forward, reverse)	See "Star delta reversing starter" control function (Page 96)
Dahlander starter	Control of motors with only one stator winding in two speed steps (fast, slow)	See Control function "Dahlander starter" (Page 100)
Dahlander reversing starter	Dahlander starter with both directions of rotation (clockwise, counter-clockwise)	See Control function "Dahlander reversing starter" (Page 102)
Pole-changing starter	Control of motors with two stator windings in two speed steps (fast, slow)	See "Pole-changing starter" control function (Page 105)
Pole-changing reversing starter	Pole-changing starter with both directions of rotation (forward, reverse)	See "Pole-changing reversing starter" control function (Page 108)
Solenoid valve	Control of a solenoid valve	See "Solenoid valve" control function (Page 111)
Positioner (1, 2, 3, 4, 5)	Activation of positioners or actuators. Versions 1 to 5	See "Positioner" control function (Page 113)
Soft starter	Control of the 3RW soft starter	See "Soft starter" control function (Page 117)
Soft starter with reversing contactor	Control of the 3RW soft starter, including an additional reversing contactor	See "Soft starter with reversing contactor" control function (Page 120)

Parameters for control functions

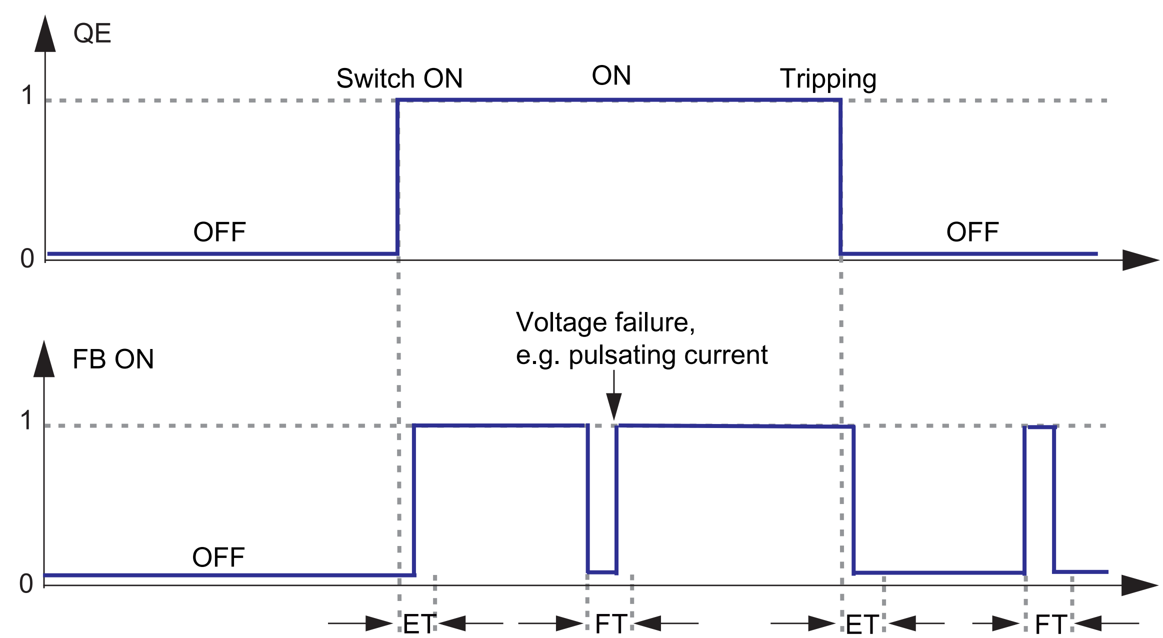
Table 4-10 General settings and definitions

Parameter	Description
ON <<, ON <, OFF, ON >, ON >>	Are usually connected with the "Enabled control command" sockets of the "Control Station" function block. From there, the control commands come from the different control stations. The number of active inputs depends on the control function chosen. With a direct starter, for example, only the inputs "ON >" and "OFF" are active. Default setting: Connected
FB ON [1)]	Auxiliary control input "Feedback ON" (connection with any socket, usually with "Status - Motor current flowing" socket) as factory default. An auxiliary contact from the contactor is not required for signaling. Depending on the control function chosen, this state is signaled by the QLE1 to QLE5 displays and by the "Status - ON <<, - ON <, - ON >, - ON >>" signals. "No motor current flowing" means: the motor is switched off. An auxiliary contact from the contactor is not required for signaling. This state is signaled by the QLA display and the "Status - OFF" signal. Default setting: Status - Motor current flowing
FC, FO, TC, TO	Auxiliary control inputs for the "Positioner" and "Solenoid valve" control functions that are normally connected with the inputs of the basic unit or the digital modules and are used to query the present status of the torque switch and the limit switches that are hard-wired to the inputs.
Non-maintained command mode	• Deactivated (default setting): The control command on the corresponding plug of the control stations "ON <, ON <<, ON >, ON >>" is saved. It can only be revoked by an "OFF" control command from the corresponding control station. An auxiliary contact for locking the contactor is not required. Motor feeders are usually operated in locking mode. Locking is preset. • Activated: Depending on the control function chosen, non-maintained command mode acts on the plugs of all control stations "ON <, ON <<, ON >, ON >>". A control command is only effective as long as there is a "high signal".
Saving change-over command	• Deactivated (default setting): Change-over commands for switching from one direction of rotation / rotational speed to the other are only implemented with a previous "OFF" and after the interlocking time / change-over pause has elapsed. This setting is usually used and is preset. • Activated: Change-over commands for switching from one direction of rotation / rotational speed to the other are implemented without a previous "OFF" once the interlocking time / change-over pause has elapsed. If the selected direction / speed cannot be executed immediately due to a parameterized interlocking time / change-over pause, the selection is signaled by flickering QLE displays. Your selection can be cancelled at any time with "OFF".
Separating DM-FL/FP function from control function	• Deactivated (default setting): Safety-related tripping via the DM-F modules also affects the SIMOCODE pro control function, so that the contactor control is always tripped, too. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: Safety-related tripping via the DM-F modules does not affect the SIMOCODE pro control function, so that the contactor control is not tripped. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.

Parameter	Description
Load type	You can select from the following: • Motor (default) • Resistive load (e.g. heater): Since overcurrent generally does not flow during start-up on a resistive load, the "Start active" status is not signaled. In this case, the startup override does not occur for the "signal," "warn," and "tripping" functions.
Feedback time 1)	SIMOCODE pro monitors the status of the feeder (ON or OFF) via FB ON. If the status of FB ON changes - without a corresponding switching command - "Fault - Feedback (FB)" switches off the feeder. Default setting: 0.5 s The feedback time can be used to suppress such "feedback faults" for a defined period of time, e.g. in the case of network switchover. When the motor is switched off, SIMOCODE pro continuously checks whether FB ON = 0. If the current flows longer than the set feedback time without the "ON" control command being issued, a fault message "Fault - feedback (FB) ON" is issued. The contactor controls can only be connected after the fault has been rectified. When the motor is switched on, SIMOCODE pro continuously checks whether FB ON = 1. If no current flows for longer than the set feedback time without the "OFF" control command being issued, a fault message "Fault - feedback (FB) OFF" is issued. The contactor controls are deactivated.
Execution time 1)	SIMOCODE pro monitors the switch-on and switch-off process. The switch-on or switch-off process must be completed within this time. Default setting: 1.0 s After the "ON" control command is issued, SIMOCODE pro must be able to detect current in the main circuit within the execution time. Otherwise, the fault message "Fault - Execution ON command" will be issued. SIMOCODE pro deactivates the contactor controls. After the "OFF" control command is issued, SIMOCODE pro must not be able to detect current in the main circuit after expiry of the execution time. Otherwise, the fault message "Fault - Execution OFF command" will be issued. The contactor controls can only be connected after the fault has been rectified.
Interlocking time	SIMOCODE pro prevents, e.g. in the case of reversing starters, both contactors from switching on at the same time. Changing from one direction of rotation to the other can be delayed via the interlocking time. Default setting: 0 s.
Change-over pause	With the control functions "Dahlander starter" and "Pole-changing starter", switching from FAST to SLOW can be delayed by the time configured. In the "Star-delta" control function, the change-over pause extends the time between switching off the star contactor and switching on the delta contactor by the time configured. Default setting: 0.00 s

Parameter	Description
Max. star time	With the "Star-delta starter" and the "Star-delta reversing starter" control functions: Time-dependent switching from star to delta. Max. star time: 0 - 255 s. Default setting: 20 s.
Current measuring module built into the delta circuit or the supply cable	With control function "Star-delta starter" or "Star-delta reversing starter": The current setting and the switching levels for star-to-delta switching depend on the installation location of the current measuring module: • in delta circuit (default): current setting I_s is reduced to I_{rated} x 1/√3 • In supply cable: current setting

Behavior of "feedback message ON" [1)]



ET: Execution time
FT: Feedback time

Figure 4-17 Execution time (ET) and feedback time (FT) in relation to FB ON

1)

Note

Behavior with a current less than 12 % of I_s

At a current less than 12% of the motor's rated current I_e, the "Current I_max (% of I_e)' and "Current I_Lx (% of I_e)" is indicated as 0 %. Equally, the binary "Status - Motor current flowing" signal remains set to logical zero.

Faults

The contactor controls are deactivated.

The following signals are also output:

- A flashing signal on the QLS lamp control
- A flashing signal on the "GEN. FAULT" LED
- The "Status - General fault" signal
- The corresponding signaling bit of the fault.

4.3.2.3 "Overload relay" control function

Description

With this control function, SIMOCODE pro functions like a solid-state overload relay. Control commands (e.g. ON, OFF) cannot be issued to the load. Control stations and inputs of the control function (e.g. ON >, OFF), do not have any function in the case of overload relays. When the control voltage is applied, SIMOCODE pro automatically closes the QE3 contactor control; it remains active until it is deactivated by the fault message of a protection or monitoring system.

The QE3 contactor control must be connected to any relay output that switches off the contactor coil of the motor contactor in case of overload.

Schematic

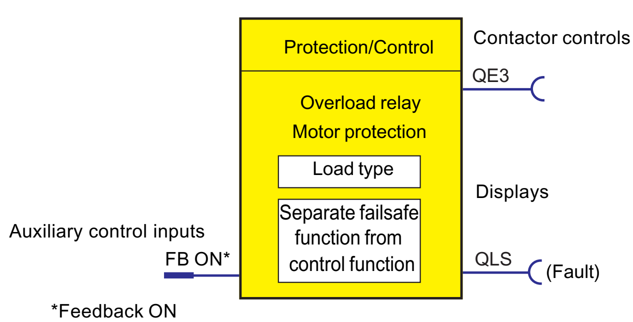


Figure 4-18 Schematic of the "Overload relay" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-11 Overload relay settings

Overload relay	Description
FB ON	"Feedback ON" auxiliary control input Connection with any socket, usually with "Status - current flowing" socket
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related disconnection by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.

Note

In the case of overload, the QE3 output is set (=1) and is only reset after an overload trip (=0).

This output closes when the overload function is parameterized.

Note

Monitoring the number of starts is not possible for this control function.

4.3.2.4 "Direct starter" control function

Description

SIMOCODE pro can switch a motor on and off with this control function.

Control commands

- Start with "ON >" activates the QE1 internal contactor control.
- Stop with "OFF" deactivates the QE1 internal contactor control.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Every fault message causes the QE1 contactor control to be deactivated.

Schematic

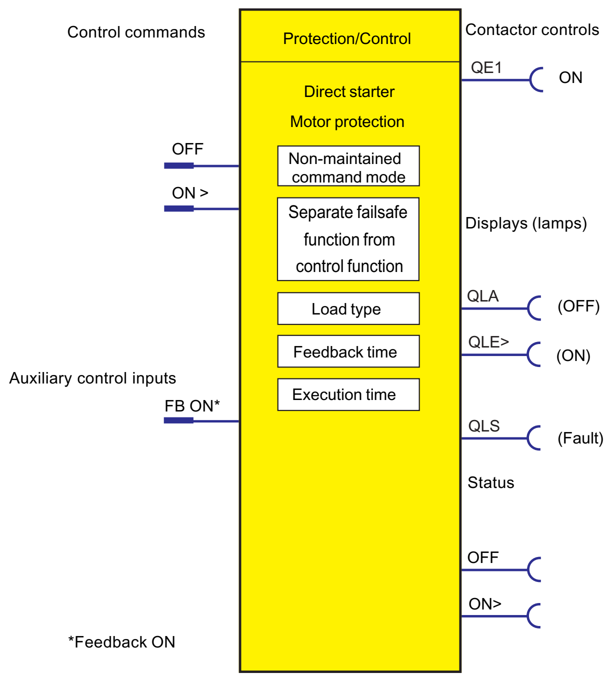


Figure 4-19 Schematic of the "Direct starter" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-12 Direct starter settings

Direct starter (direct-on-line starter)	**Description**
OFF	Control command OFF Connection with any socket, usually with "Enabled control command OFF" socket
ON >	Control command ON Connection with any socket, usually with "Enabled control command - ON >" socket
FB ON	"Feedback ON" auxiliary control input Connection with any socket, usually with "Status - current flowing" socket
Non-maintained command mode	• Deactivated (default setting) • Activated

Direct starter (direct-on-line starter)	Description
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1.0 s)

4.3.2.5 "Reversing starter" control function

Description

With this control function, SIMOCODE pro can control the direction of rotation of the motor (forwards and backwards).

Control commands

- Start with "ON >" activates the QE1 contactor control (clockwise, i.e. forwards)
- Start with "ON <" activates the QE2 contactor control (counterclockwise, i.e. reverse)
- Stop with "OFF" deactivates internal contactor controls QE1 and QE2.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Every fault message causes contactor controls QE1 and QE2 to be deactivated.

Switching the direction of rotation

The direction of rotation can be switched once the "Status - ON >" or "Status - ON <" signal has expired (motor is switched off) **and** the interlocking time has elapsed:

- Via the "OFF" control command
- Directly when "Saving change-over command" is activated.

SIMOCODE pro prevents both contactors from switching on at the same time. Changing from one direction of rotation to the other can be delayed via the interlocking time.

Schematic

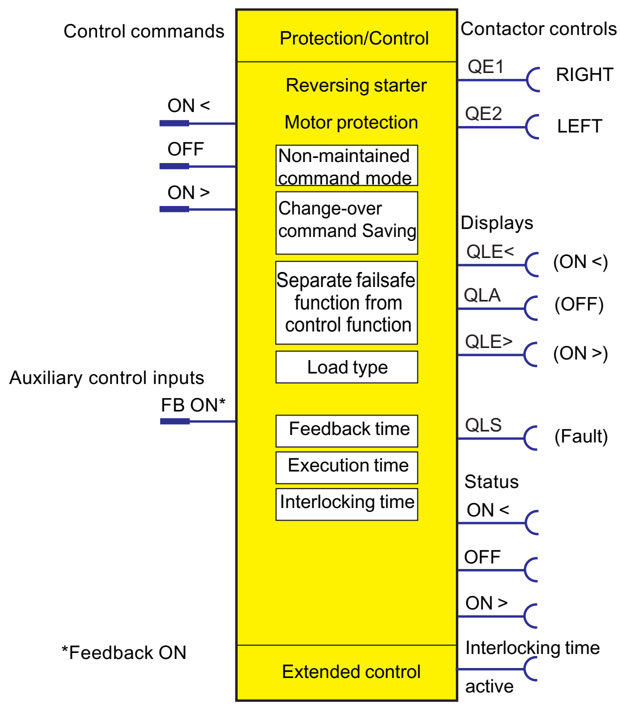


Figure 4-20 Schematic of the "Reversing starter" control function, "Protection/Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-13 Reversing starter settings

Reversing starter	Description
ON <	Control command ON <, counter-clockwise Connection with any socket, usually with "Enabled control command - ON <" socket
OFF	Control command OFF Connection with any socket, usually with "Enabled control command OFF" socket
ON >	Control command ON >, clockwise Connection with any socket, usually with "Enabled control command - ON >" socket
FB ON	"Feedback ON" auxiliary control input Connection with any socket, usually with "Status - current flowing" socket
Non-maintained command mode	• Deactivated (default setting) • Activated
Saving change-over command	• Deactivated (default setting) • Activated

Reversing starter	Description
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1.0 s)
Interlocking time	Range 0 to 255 s (default: 0 s)

4.3.2.6 "Molded case circuit breaker (MCCB)" control function

Description

SIMOCODE pro can mainly switch circuit breakers (e.g. 3WL, 3VA) on and off with this control function. The circuit breakers are then connected to the bus via SIMOCODE pro.

Control commands

- Start with "ON >" activates the QE1 contactor control for a pulse of 400 ms.
- Stop with "OFF" activates contactor control QE3 for a pulse of 400 ms.
- With "Reset", the QE3 contactor control is activated for a pulse of 400 ms when the circuit breaker is tripped (alarm switch = ON).

The pulse of a control command is always fully executed before the "counter pulse" is set.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Making internal assignments

You have to make the following assignments:

1. Assign the QE1 contactor control to the relay output that is connected to the "ON connection" of the motorized operating mechanism of the circuit breaker.
2. Assign the QE3 contactor control to the relay output that is connected to the "OFF connection" of the motorized operating mechanism of the circuit breaker.

3. Assign the SIMOCODE pro input that is connected to the auxiliary switch (AUXS) of the circuit breaker to the auxiliary control input "Feedback ON".
4. Assign the SIMOCODE pro input which is connected to the alarm switch (AS) of the circuit breaker to the input (socket) of the "External fault 1" standard function.

Schematic

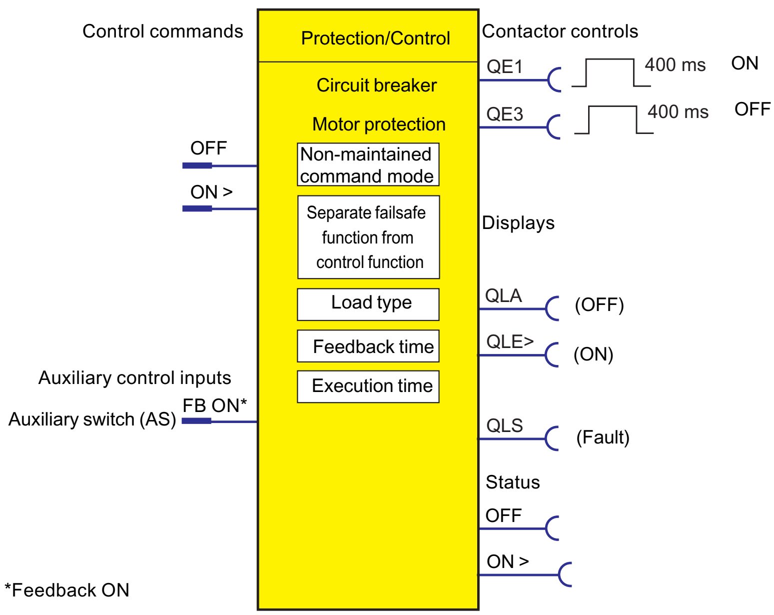


Figure 4-21 Schematic of the "Circuit breaker" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-14 Circuit breaker settings

Circuit breaker	Description
OFF	Control command OFF (Connection with any socket, usually with "Enabled control command OFF" socket)
ON >	Control command ON (Connection with any socket, usually with "Enabled control command ON >" socket)
FB ON	Auxiliary control input "Feedback ON" (connection always with socket, (input), that the auxiliary switch of the circuit breaker is connected to).
Non-maintained command mode	• Deactivated (default setting) • Activated

Circuit breaker	Description
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMO-CODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	A repeated ON pulse is only output by the QE1 contactor control once the set feedback time has elapsed. The feedback time should therefore be set higher than the motor off time of the motorized operating mechanism of the circuit breaker. Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1.0 s)

4.3.2.7 "Star-delta starter" control function

Description

Star-delta starting is used to limit the starting current and to avoid overloading the line supply. In this control function, SIMOCODE pro initially starts the motor with a star-connected stator winding and then switches it to delta.

Control commands

- Start with "ON" first activates the QE1 contactor control (star contactor) and then immediately activates the QE3 contactor control (line contactor)
- Stop with "OFF" deactivates contactor controls QE1, QE2, and QE3.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets. Every fault message causes the QE1, QE2 and QE3 contactor controls to be deactivated.

Switching from star to delta

For this purpose, SIMOCODE pro first deactivates QE1 contactor control again, before connecting QE2 contactor control (delta contactor). SIMOCODE pro switches over from star to delta:

- Current-dependent, for decreasing current below the following thresholds:
  - Transformer installed in delta circuit: $I < 150\ \%\ I_s$
  - Transformer installed in supply cable: $I < 90\ \%\ I_s$
- Time-dependent to the time set in the parameter "Max. star time" when the current in star operation does not sink below this threshold.

Safety guidelines

Note

It is recommended that contactor controls QE* are wired to the relay outputs of the basic unit.

Note

if the SIMOCODE pro S basic unit is used, an additional multifunction module is required for this control function.

The typical change-over time from star to delta is between 100 ms and 150 ms.

Note

Spurious tripping can occur if you use the internal ground-fault detection for star-delta connections. During delta operation, the summation current is non-zero due to harmonics.

Note

If the current measuring module is switched to delta (normal case), a current which is 1/√3 times smaller must be set for the star-delta starter control function.

Example: $I_n = 100$ A

$I_s = I_n \times 1/\sqrt{3}$

$I_s = 100\ \text{A} \times 1/\sqrt{3} = 57.7\ \text{A}$

Current to be set $I_s = 57.7$ A

Change-over pause

The switching time from star to delta can be extended by the change-over pause. Reason: For motors with a high ratio between starting current and rated current, the line voltage plus motor EMF might result in a very high delta starting current if the change-over pause is too short. The motor EMF decreases if the pause is longer.

Schematic

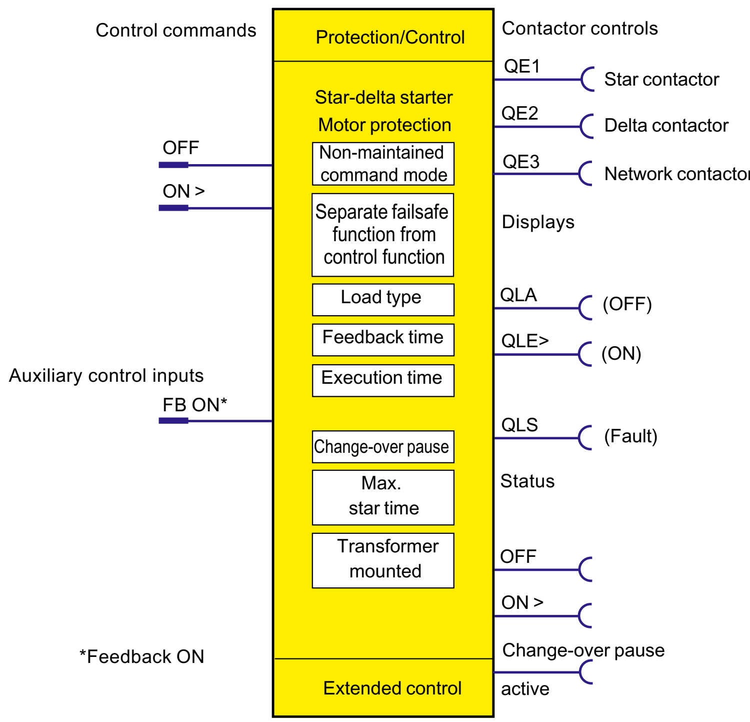


Figure 4-22 Schematic of the "Direct starter" control function, "Protection/Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-15 Star-delta starter settings

Star-delta starter	Description
OFF	Control command OFF (Connection with any socket, usually with "Enabled control command OFF" socket)
ON >	Control command ON (Connection with any socket, usually with "Enabled control command ON >" socket)
FB ON	Auxiliary control input "Feedback ON" (connection with any socket, usually with "Status - current flowing" socket)
Non-maintained command mode	• Deactivated (default setting) • Activated
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related disconnection by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.

Star-delta starter	Description
Load type	You can select from the following: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1 s)
Change-over pause	Range 0 to 655.3 s (10 ms steps) (default: 0.00 s)
Max. star time	Time-dependent switching from star to delta. Range 0 to 255 s (default: 20 s)
Current measuring module installed [1)]	The current setting and the switching levels for star-to-delta switching depend on the installation location of the current measuring module: • In delta circuit: Current setting I_s is reduced to I_n x 1/√3 (default) • In supply cable: Current setting $I_s = I_n$ (rated current of the motor)

Note

1) If a current / voltage measuring module is in use, the transformer must be connected in the supply cable!

It is also necessary to select "Line-to-line voltage" under "Device configuration → Voltage display".

4.3.2.8 "Star delta reversing starter" control function

Description

With this control function, a motor can be started in both directions of rotation in star-delta operation.

Control commands

- **CW rotation:** Start with "ON >" first activates the QE1 contactor control (star contactor) and then immediately activates the QE3 contactor control (line contactor, clockwise rotation)
- **Counter-clockwise rotation**: Start with "ON <" first activates the QE1 contactor control (star contactor) and then immediately activates the QE4 contactor control (line contactor, counter-clockwise rotation)
- **Stop** with "OFF" deactivates contactor controls QE1, QE2, QE3, and QE4.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Every fault message causes the QE1, QE2, QE3 and QE4 contactor controls to be deactivated.

Switching from star to delta

For this purpose, SIMOCODE pro first deactivates contactor control QE1 before connecting contactor control QE2 (delta contactor).
SIMOCODE pro switches over from star to delta:

- Current-dependent, for decreasing current below the following thresholds:
  - Transformer installed in delta circuit: $I < 150\ \%\ I_s$
  - Transformer installed in supply cable: $I < 90\ \%\ I_s$
- Time-dependent to the time set in the parameter "Max. star time" when the current in star operation does not sink below this threshold.

Switching the direction of rotation

The direction of rotation can be switched once the "Status - ON >" or "Status - ON <" signal has expired (motor is switched off) **and** the interlocking time has elapsed:

- Via the OFF control command.
- Directly when "Saving change-over command" is activated.

SIMOCODE pro prevents both contactors from switching on at the same time. Switching from one direction of rotation to the other can be delayed via the "interlocking time."

Startup is always performed in star mode

Safety guidelines

Note

It is recommended that the QE1 and QE2 contactor controls are wired to the relay outputs of the basic unit. You need at least 1 digital module for this control function.

Note

Spurious tripping can occur if you use the internal ground-fault detection for star-delta connections. During delta operation, the summation current is non-zero due to harmonics.

Note

If the current measuring module is switched to delta (normal case), a current which is $1/\sqrt{3}$ times smaller must be set for the star-delta starter control function.

Example: $I_n = 100$ A

$I_s = I_n \times 1/\sqrt{3}$

$I_s = 100\ \text{A} \times 1/\sqrt{3} = 57.7\ \text{A}$

Current to be set $I_s = 57.7$ A

Change-over pause

The switching time from star to delta can be extended by the change-over pause. Reason: For motors with a high ratio between starting current and rated current, the line voltage plus motor EMF might result in a very high delta starting current if the change-over pause is too short. The motor EMF decreases if the pause is longer.

Schematic

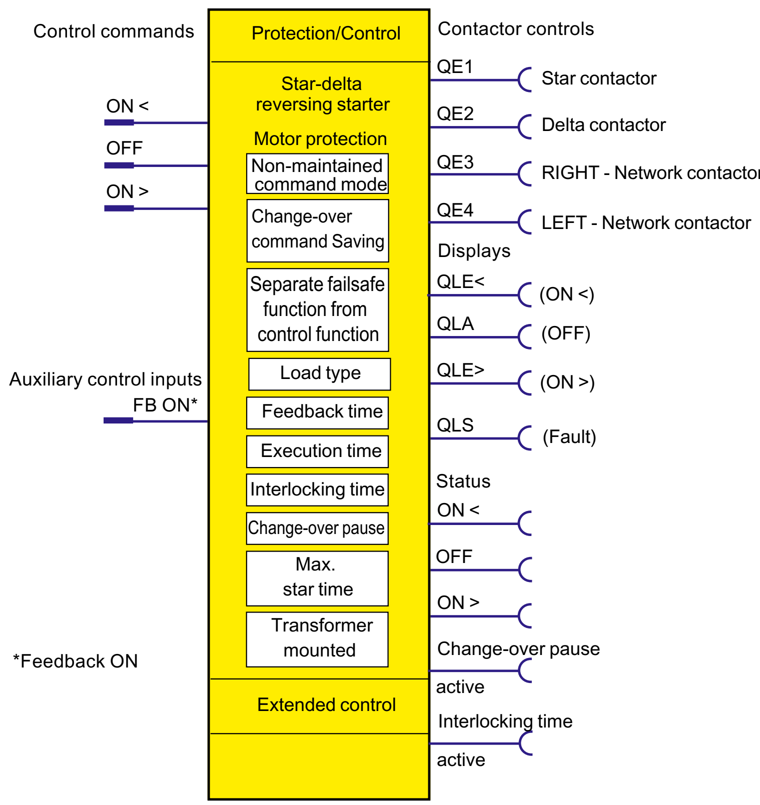


Figure 4-23 Schematic of the "Star-delta reversing starter" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-16 Star-delta reversing starter settings

Star-delta reversing starter	Description
Voltage display (in the device configuration)	Select "Line-to-line voltage"
Motor control → Control function:	
OFF	Control command OFF Connection with any socket, usually with "Enabled control command OFF" socket

Star-delta reversing starter	Description
ON >	Control command ON > Connection with any socket, usually with "Enabled control command ON >" socket
ON <	Control command ON < Connection with any socket, usually with "Enabled control command ON <" socket
FB ON	"Feedback ON" auxiliary control input Connection with any socket, usually with "Status - current flowing" socket
Non-maintained command mode	• Deactivated (default setting) • Activated
Saving change-over command	• Deactivated (default setting) • Activated
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1 s)
Change-over pause	Range 0 to 655.3 s (10 ms steps) (default: 0 s)
Interlocking time	Range 0 to 255 s (default: 0 s)
Max. star time	Time-dependent switching from star to delta. Range 0 to 255 s (default: 20 s)
Current measuring module installed [1)]	The current setting and the switching levels for star-to-delta switching depend on the installation location of the current transformer / current measuring module: • in delta circuit (default): Current setting I_s is reduced to I_n x $1/\sqrt{3}$ • In supply cable: Current setting $I_s = I_n$ (rated current of the motor)

Note

1) If a current / voltage measuring module is in use, the transformer must be connected in the supply cable!

4.3.2.9 Control function "Dahlander starter"

Description

With this function, SIMOCODE pro can control motors with only one stator winding at two speeds (FAST and SLOW). SIMOCODE pro connects the stator winding via the contactors so that there is a high pole number at low speed and a low pole number at high speed.

Control commands

- **SLOW**: Start with "ON >" first activates the QE2 contactor control (SLOW).
- **FAST**: Start with "ON >>" first activates the QE3 contactor control (star contactor, FAST) and then immediately activates the QE1 contactor control (line contactor, FAST).
- **Stop** with "OFF" deactivates contactor controls QE1, QE2, and QE3.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Every fault message causes the QE1, QE2 and QE3 contactor controls to be deactivated.

Switching the speed

The speed can be switched once the "Feedback ON" signal has expired (motor is switched off) **and** on change-over from "FAST" → "SLOW" after the change-over pause has elapsed:

- Via the "OFF" control command
- Directly when "Saving change-over command" is activated.

SIMOCODE pro prevents the contactors for the "FAST" speed from being switched on at the same time as the contactor for the "SLOW" speed.

Change-over pause

The "Change-over pause" parameter can be used to delay switching from "FAST" → "SLOW" to give the motor enough time to run down.

Note

Two current settings must be set for this control function:

- I_s1 for the SLOW speed
- I_s2 for the FAST speed.

Depending on the current range, the current can in many cases be directly measured at both speeds with a single current transformer. Otherwise you will need two external current transformers appropriate for the relevant speed (e.g. 3UF18 with a 1 A secondary transformer rated current), whose secondary cables must lead through the current measuring module within the range 0.3 to 3 A. The current setting I_s1 or I_s2 must be converted according to the secondary currents of the external transformers. For more information, see Chapter Overload protection (Page 33).

Schematic

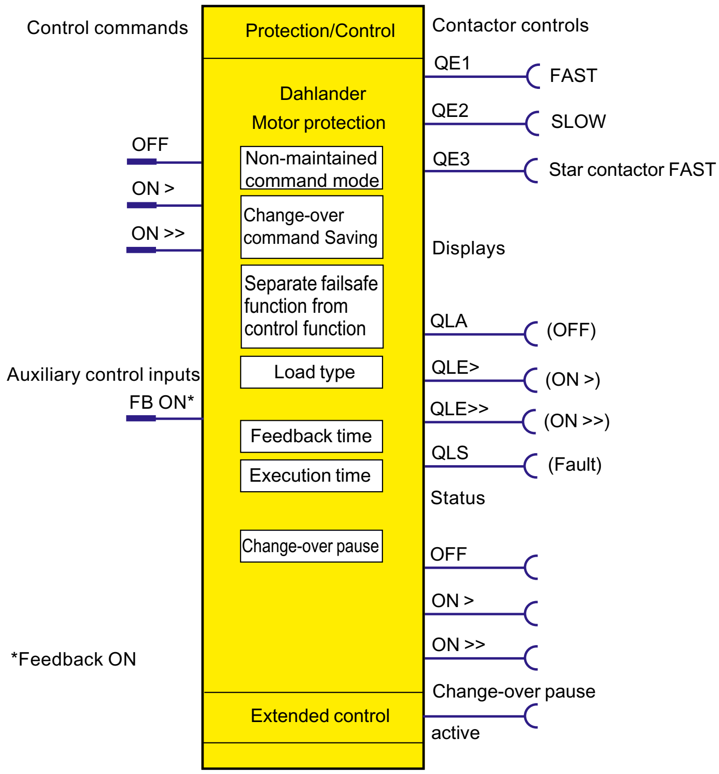


Figure 4-24 Schematic of the "Dahlander starter" control function, "Protection/Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-17 Settings for Dahlander starters

Dahlander starter	Description
OFF	Control command OFF Connection with any socket, usually with "Enabled control command OFF" socket
ON >	Control command ON > (SLOW) Connection with any socket, usually with "Enabled control command ON >" socket
ON >>	Control command ON >> (FAST) Connection with any socket, usually with "Enabled control command ON >>" socket
FB ON	"Feedback ON" auxiliary control input Connection with any socket, usually with "Status - current flowing" socket
Non-maintained command mode	• Deactivated (default setting) • Activated

Dahlander starter	Description
Separate fail-safe function from control function	• Deactivated (default setting): • A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Saving change-over command	• Deactivated (default setting) • Activated
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1.0 s)
Change-over pause	Range 0 to 655.3 s (10 ms steps) (default: 0.00 s)

4.3.2.10 Control function "Dahlander reversing starter"

Description

This control function can be used to change the direction of rotation of a motor at both speeds.

Control commands

- **RIGHT-SLOW:** Start with "ON >" activates contactor control QE2 (CW-SLOW)
- **RIGHT-FAST:** Start with "ON >>" first activates contactor control QE3 (star contactor FAST) and then immediately activates contactor control QE1 (CW-FAST)
- **LEFT-SLOW:** Start with "ON <" activates contactor control QE4 (CCW-SLOW)
- **LEFT-FAST:** Start with "ON <<" first activates contactor control QE3 (star contactor FAST) and then immediately activates contactor control QE5 (CCW-FAST)
- **Stop** with "OFF" deactivates the contactor controls.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets. It does not matter in what order the control commands are given. Every fault message causes the contactor control to be deactivated.

Switching the direction of rotation

The direction of rotation can be switched once the "Status - ON >" or "Status - ON <" signal has expired (motor is switched off) **and** the interlocking time has elapsed:

- Via the OFF control command
- Directly when "Saving change-over command" is activated.

SIMOCODE pro prevents both contactors from switching on at the same time. Switching from one direction of rotation to the other can be delayed via the "interlocking time."

Switching the speed

The speed can be switched once the "Feedback ON" signal has expired (motor is switched off) **and** on change-over from "FAST" → "SLOW" after the change-over pause has elapsed:

- Via the OFF control command
- Directly when "Saving change-over command" is activated.

Change-over pause

The "Change-over pause" parameter can be used to delay switching from "FAST"→"SLOW" to give the motor enough time to run down.

Safety guidelines

Note

You need at least one digital module for this control function. This control function cannot be implemented with bistable relay outputs.

Note

Two current settings must be set for this control function:

- I_s1 for the SLOW speed
- I_s2 for the FAST speed.

Depending on the current range, the current can in many cases be directly measured at both speeds with a single current transformer. Otherwise you will need two external current transformers appropriate for the relevant speed (e.g. 3UF18 with a 1 A secondary transformer rated current), whose secondary cables must lead through the current measuring module within the range 0.3 to 3 A. The current setting I_s1 or I_s2 must be converted according to the secondary currents of the external transformers. For more information, see Chapter Overload protection (Page 33).

Schematic

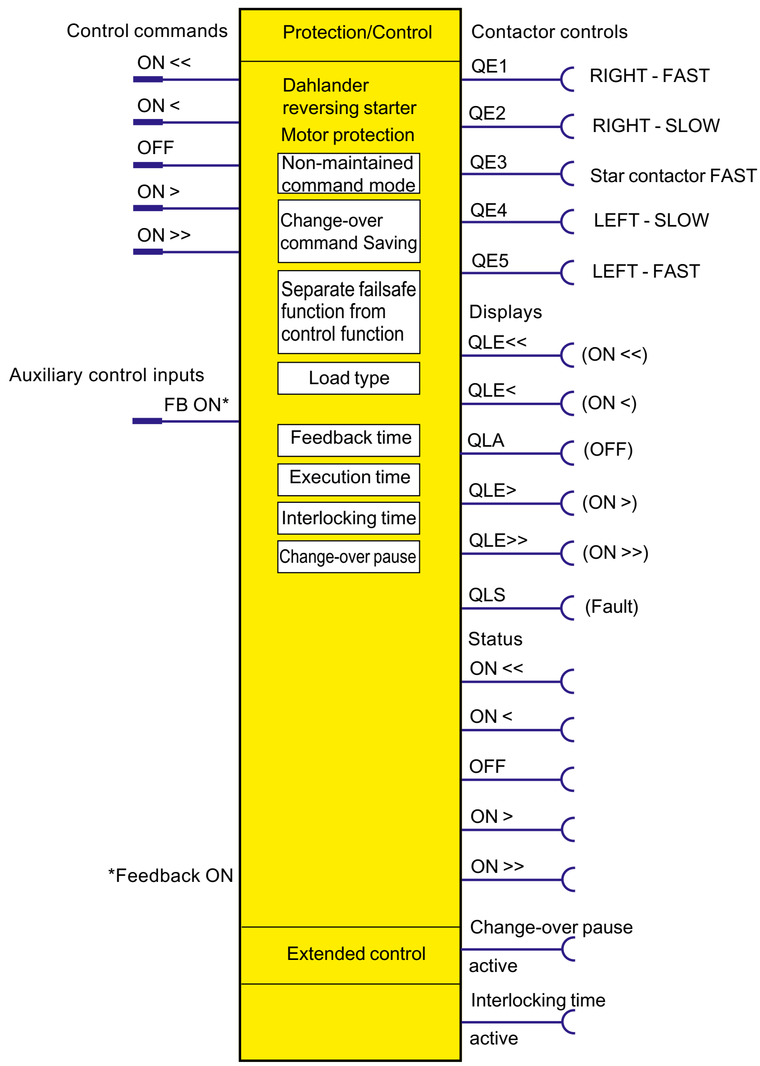


Figure 4-25 Schematic of the "Dahlander starter" control function, "Protection/Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-18 Control function settings for Dahlander reversing starter

Dahlander reversing starter	Description
OFF	Control command OFF (Connection with any socket, usually with "Enabled control command OFF" socket)
ON	Control command ON > (CW, SLOW) (connection with any socket, usually with "Enabled control command ON >" socket)
ON >>	Control command ON >> (CW, FAST) (connection with any socket, usually with "Enabled control command ON >>" socket)

Dahlander reversing starter	Description
ON <	Control command ON < (CCW, SLOW) (connection with any socket, usually with "Enabled control command - ON <" socket)
ON <<	Control command ON << (CCW, FAST) (connection with any socket, usually with "Enabled control command ON <<" socket)
FB ON	Auxiliary control input "Feedback ON" (connection with any socket, usually with "Status - current flowing" socket)
Non-maintained command mode	• Deactivated (default setting) • Activated
Saving change-over command	• Deactivated (default setting) • Activated
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1.0 s)
Interlocking time	Range 0 to 255 s (default: 0 s)
Change-over pause	Range 0 to 655.3 s (10 ms steps) (default: 0.00 s)

4.3.2.11 "Pole-changing starter" control function

Description

With this control function, SIMOCODE pro can control motors with two stator windings at two speeds (FAST and SLOW).

Control commands

- **SLOW:** Start with "ON >" first activates the QE2 contactor control (SLOW).
- **FAST:** Start with "ON >>" activates QE1 contactor control (FAST)
- **Stop** with "OFF" deactivates the contactor controls.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

It does not matter in what order the control commands are given.

Every fault message causes the contactor control to be deactivated.

Switching the speed

The speed can be switched once the "Feedback ON" signal has expired (motor is switched off) **and** on change-over from "FAST"→"SLOW" after the change-over pause has elapsed:

- Via the OFF control command.
- Directly when "Saving change-over command" is activated.

Change-over pause

The "Change-over pause" parameter can be used to delay switching from "FAST"→"SLOW" to give the motor enough time to run down.

Note

Two current settings must be set for this control function:

- I_s1 for the SLOW speed
- I_s2 for the FAST speed.

Depending on the current range, the current can in many cases be directly measured at both speeds with a single current transformer. Otherwise you will need two external current transformers appropriate for the relevant speed (e.g. 3UF18 with a 1 A secondary transformer rated current), whose secondary cables must lead through the current measuring module within the range 0.3 to 3 A. The current setting I_s1 or I_s2 must be converted according to the secondary currents of the external transformers. For more information, see Chapter Overload protection (Page 33).

Schematic

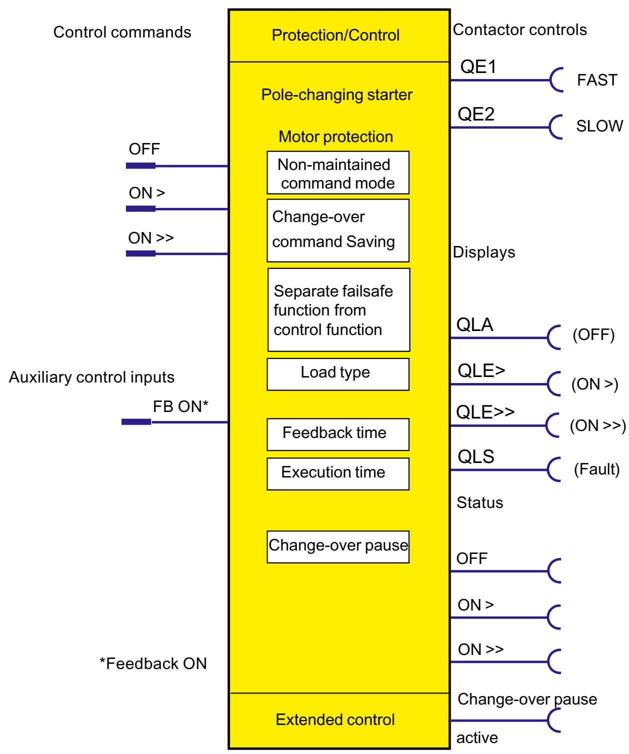


Figure 4-26 Schematic of the "Pole-changing starter" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-19 Pole-changing starter settings

Pole-changing starter	Description
OFF	Control command OFF (connection with any socket, usually with "Enabled control command - OFF" socket)
ON >	Control command ON > (SLOW) (connection with any socket, usually with "Enabled control command - ON >" socket)
ON >>	Control command ON >> (FAST) (connection with any socket, usually with "Enabled control command - ON >>" socket)
FB ON	Auxiliary control input "Feedback ON" (connection with any socket, usually with "Status - current flowing" socket)
Non-maintained command mode	• Deactivated (default setting) • Activated
Saving change-over command	• Deactivated (default setting) • Activated

Pole-changing starter	Description
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1.0 s)
Change-over pause	Range 0 to 655.3 s (10 ms steps) (default: 0.00 s)

4.3.2.12 "Pole-changing reversing starter" control function

Description

This control function can be used to change the direction of rotation of a motor at both speeds.

Control commands

- **RIGHT-SLOW:** Start with "ON >" first activates the QE2 contactor control (RIGHT-SLOW)
- **RIGHT-FAST:** Start with "ON >>" activates contactor control QE1 (CW-FAST)
- **LEFT-SLOW:** Start with "ON <" activates contactor control QE4 (CCW-SLOW)
- **LEFT-FAST:** Start with "ON <<" activates contactor control QE5 (CCW-FAST)
- **Stop** with OFF deactivates the contactor controls.

The control commands can be issued to SIMOCODE pro from any control stations. Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

It does not matter in what order the control commands are given. Every fault message causes the contactor control to be deactivated.

Switching the direction of rotation

The direction of rotation can be switched once the "Status - ON >" or "Status - ON <" signal has expired (motor is switched off) **and** the interlocking time has elapsed:

- Via the "OFF" control command
- Directly when "Saving change-over command" is activated.

SIMOCODE pro prevents both contactors from switching on at the same time. Switching from one direction of rotation to the other can be delayed via the "interlocking time."

Switching the speed

The speed can be switched once the "Feedback ON" signal has expired (motor is switched off) **and** on change-over from "FAST"→"SLOW" after the change-over pause has elapsed:

- Via the "OFF" control command
- Directly when "Saving change-over command" is activated.

Change-over pause

SIMOCODE pro prevents the contactors for "FAST" and "SLOW" from being switched on simultaneously. The "Change-over pause" can be used to delay switching from "FAST"→"SLOW" to give the motor enough time to run down.

Safety guidelines

Note

At least one additional digital module is required for this control function.

Note

Two current settings must be set for the pole-changing starter:

- I_s1 for the SLOW speed
- I_s2 for the FAST speed.

Depending on the current range, the current can in many cases be directly measured at both speeds with a single current transformer. Otherwise you will need two external current transformers appropriate for the relevant speed (e.g. 3UF18 with a 1 A secondary transformer rated current), whose secondary cables must lead through the current measuring module within the range 0.3 to 3 A. The current setting I_s1 or I_s2 must be converted according to the secondary currents of the external transformers. For more information, see Chapter Overload protection (Page 33).

Schematic

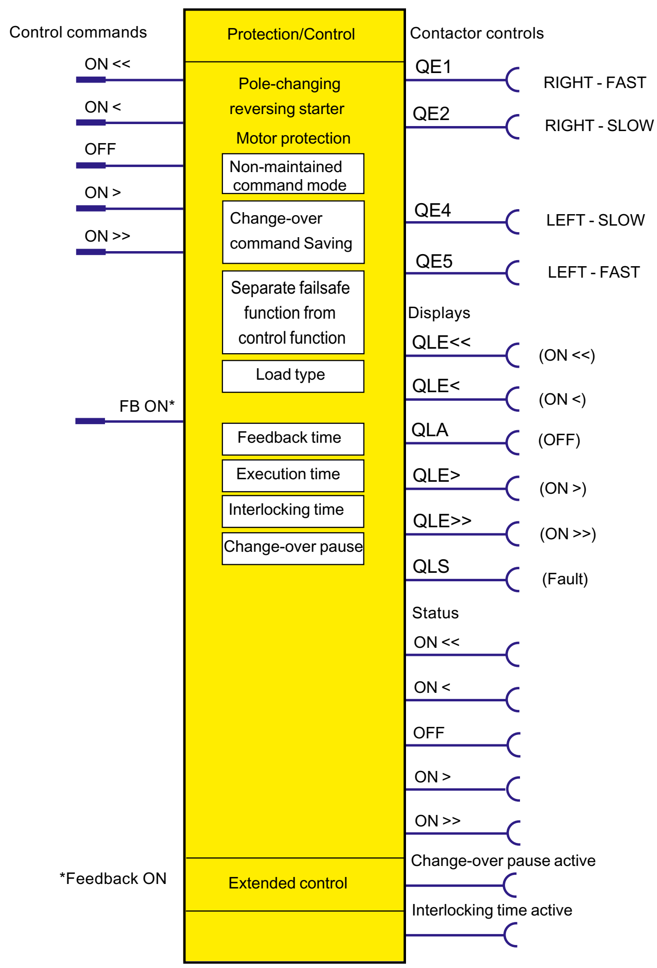


Figure 4-27 Schematic of the "Pole-changing reversing starter" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-20 Pole-changing reversing starter settings

Pole-changing reversing starter	Description
OFF	Control command OFF (connection with any socket, usually with "Enabled control command - OFF" socket)
ON >	Control command ON > (CW, SLOW) (connection with any socket, usually with "Enabled control command ON >" socket)
ON >>	Control command ON >> (CW, FAST) (connection with any socket, usually with "Enabled control command ON >>" socket)

Pole-changing reversing starter	Description
ON <	Control command ON < (CCW, SLOW) (connection with any socket, usually with "Enabled control command - ON <" socket)
ON <<	Control command ON << (CCW, FAST) (connection with any socket, usually with "Enabled control command ON <<" socket)
FB ON	Auxiliary control input "Feedback ON" (connection with any socket, usually with "Status - current flowing" socket)
Non-maintained command mode	• Deactivated (default setting) • Activated
Saving change-over command	• Deactivated (default setting) • Activated
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Range 0 to 6553.5 s (default: 1.0 s)
Interlocking time	Range 0 - 55 s (default: 0 s)
Change-over pause	Range 0 to 655.3 s (10 ms steps) (default: 0.00 s)

4.3.2.13 "Solenoid valve" control function

Description

SIMOCODE pro can use this function to control a solenoid valve. The solenoid valve is brought into the corresponding end position using the control commands "OPEN" and "CLOSE". SIMOCODE pro must be informed via corresponding limit switches (FC, FO) when the end position has been reached.

Control commands

- **OPEN:** Start with "ON >" activates the QE1 internal contactor control.
- **CLOSE:** Start with "OFF" deactivates the QE1 internal contactor control.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Every fault message causes the QE1 contactor control to be deactivated and puts the solenoid valve into the "CLOSED" position.

Safety guidelines

Note

The motor protection functions are not active. A current measuring module is not necessary.

Note

If both limit switches respond at the same time (FO = 1 and FC = 1), the solenoid valve is immediately switched off via the fault message "Fault - Double 1" (= "CLOSED").

If the end position feedback does not correspond to the control command, the valve is switched off with the fault message "Fault - end position fault" (="CLOSED").

Note

Fault - Execution OFF command is issued if the "OPEN" end position is not reached in the parameterized time.

Fault - Execution ON command is issued if the "CLOSED" end position is not reached in the parameterized time.

Schematic

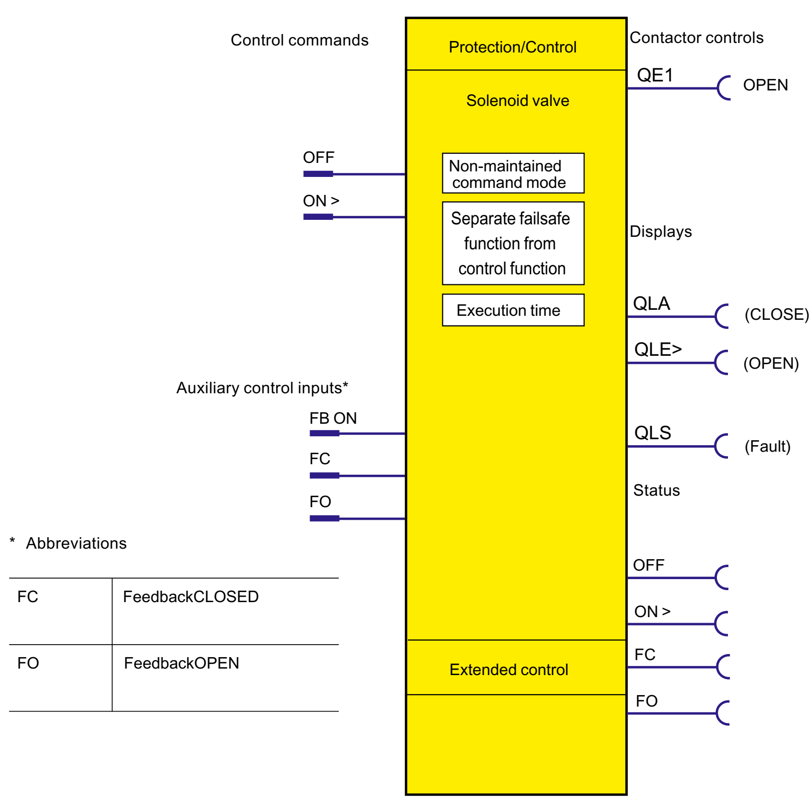


Figure 4-28 Schematic of the "Solenoid valve" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-21 Solenoid valve control function settings

Solenoid valve	Description
OFF	Control command OFF (CLOSED) (connection with any socket, usually with "Enabled control command OFF" socket)
ON >	Control command ON (OPEN) (connection with any socket, usually with socket "Enabled control command - ON >")
Non-maintained command mode	• Deactivated (default setting) • Activated
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules is also effected by the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Execution time	Time until the end position is reached. Range 0 to 6553.5 s (default: 1.0 s)

4.3.2.14 "Positioner" control function

Description

SIMOCODE pro can control positioners / actuators with this function. The positioner is moved into the corresponding end position with the "OPEN" and "CLOSED" control commands and is deactivated via its limit switches (1-active) or torque switches (0-active). The response of the limit / torque switches must be passed to SIMOCODE pro via its inputs.

Control commands

- **OPEN:** Start with "ON >" activates contactor control QE1 until "End position OPEN" is reached (Feedback OPEN)
- **CLOSE:** Start with "ON <" activates contactor control QE2 until "End position CLOSED" is reached (Feedback CLOSED)
- **Stop** with "OFF" deactivates the contactor controls. The drive remains in the present position.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Function schematic

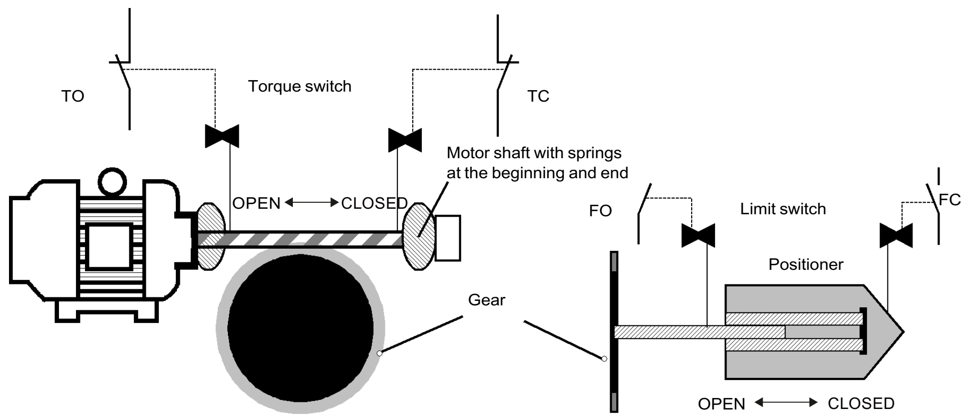


Figure 4-29 Function schematic of the torque and limit switches when controlling positioners

Switching the direction of travel

The direction of travel can be switched once the "Feedback ON" signal has expired (motor is switched off) **and** the interlocking time has elapsed:

- Via the "OFF" control command.

SIMOCODE pro prevents both contactors from switching on at the same time. Switching from one direction of travel to the other can be delayed via the "interlocking time".

Note

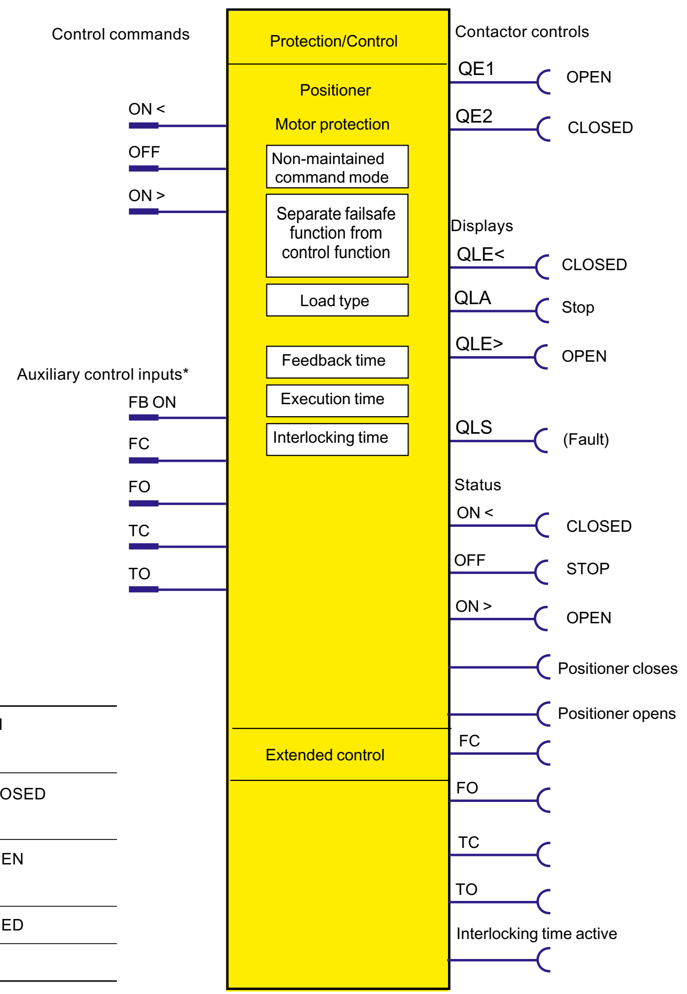
The corresponding torque switch must not respond before the associated limit switch when the torque switch TO (OPEN) and/or TC (CLOSED) is connected! In this case, the positioner is switched off immediately with the fault message "Fault - stalled positioner." If both limit switches respond simultaneously (FO=1 and FC=1), the positioner is switched off immediately with the fault message 'Fault - double 1'. If both torque switches respond at the same time (FO=0 and FC=0), the positioner is immediately switched off with the fault message "Fault - double 0." If the end position feedback does not correspond to the control command, the positioner is switched off with the fault message "Fault - end position fault."

Note

Fault - Execution OFF command is issued if the "OPEN" end position is not reached in the parameterized time.

Fault - Execution ON command is issued if the "CLOSED" end position is not reached in the parameterized time.

Schematic



*Abbreviations

FB ON	Feedback ON
FC	Feedback CLOSED
FO	Feedback OPEN
TC	Torque CLOSED
TO	Torque OPEN

Figure 4-30 Schematic of the "Positioner" control function, "Protection / Control" function block

Types of positioner control

The following table shows the five types of positioner control:

Table 4-22 Types of positioner control

Type **Tripping**	**TC** **Torque closed**	**FC** **Limit closed**	**FO** **Limit open**	**TO** **Torque open**
Positioner 1 After reaching the end position FO (OPEN) or FC (CLOSED).	—	X	X	—
Positioner 2 After reaching the end position FO (OPEN) or FC (CLOSED) and response of the associated torque switch TO (OPEN) or TC (CLOSED)	X	X	X	X
Positioner 3 After reaching the end position FO (OPEN). After reaching end position (CLOSED), the respective torque switch TC must also respond after the limit switch FC has responded.	X	X	X	—
Positioner 4 After reaching the end position FC (CLOSED). After reaching end position FO (OPEN), the respective torque switch FO must also respond after the limit switch TO has responded.	—	X	X	X
Positioner 5 After reaching the end position or the torque. The valve actuator is monitored either just with the limit switches or just with the torque switches. The switches are implemented as change-over contacts and are checked for antivalence. In the case of non-antivalent feedback (e.g. FC=0 and TC=0), SIMOCODE pro detects an open circuit and deactivates the positioner with the fault message "Fault - Antivalence"	**Antivalent active**		**Antivalent active**	

Note

The signals of the torque switches and the limit switches must be wired to the inputs of the basic unit. Torque switches must be 0-active, whereas the limit switches must be 1-active.

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-23 Positioner control function settings

Positioner	Description
ON <	Control command ON < (CLOSED) (connection with any socket, usually with "Enabled control command - ON <" socket)
OFF	Control command STOP (connection with any socket, usually with "Enabled control command - OFF" socket)
ON >	Control command ON (OPEN) (connection with any socket, usually with "Enabled control command - ON >" socket)
FB ON	Auxiliary control input "Feedback ON" (connection with any socket, usually with "Status - current flowing" socket)
FC	Auxiliary control input "Feedback CLOSED" (connection with any socket, usually with the socket of an input to which the limit switch is wired.)
FO	Auxiliary control input "Feedback OPEN" (connection with any socket, usually with the socket of an input to which the limit switch is wired.)
TC	Auxiliary control input "Torque CLOSED" (connection with any socket, usually with the socket of an input to which the torque switch is wired.)
TO	Auxiliary control input "Torque OPEN" (connection with any socket, usually with the socket of an input to which the torque switch is wired.)
Non-maintained command mode	• Deactivated (default setting) • Activated
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules is also effected by the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Time until the end position is reached. Range 0 to 6553.5 s (default: 1.0 s)
Interlocking time	Range 0 to 255 s (default: 0 s)

4.3.2.15 "Soft starter" control function

Description

With this control function, SIMOCODE pro can activate the 3RW soft starter. Thus, the 3RW soft starters are connected via SIMOCODE pro to the bus.

Control commands

- Start with "ON >" activates contactor controls QE1 and QE4.
- Stop with "OFF" first deactivates contactor control QE4. When the signal "Feedback ON" has expired, the QE1 contactor control is deactivated 3 s later in order to facilitate a smooth run down via the soft starter.
- With "Reset", the QE3 contactor control is activated for 20 ms and sends the soft starter an acknowledgement signal via a parameterizable relay output.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets.

Every fault message causes the contactor control to be deactivated.

Making internal assignments

You have to make the following assignments:

1. Assign the QE1 contactor control to the relay output which controls the coil of the line contactor.
2. Assign contactor control QE4 to any relay output from which the "ON input" of the soft starter is to be controlled.
3. Assign the QE3 contactor control to the relay output that supplies the 20 ms acknowledgment signal to the soft starter.
4. Assign the "ON >" and "OFF" control commands to the enabled control commands.
5. Assign the SIMOCODE pro input to which the "Fault" signal output of the soft starter is connected to the input (socket) of the standard function "External fault 1."
6. The "startup end" signal of the soft starter can also be wired to one of the inputs and processed by SIMOCODE pro.

Note

In order to avoid disconnections due to faults, the "Execution time" parameter in SIMOCODE pro must be set at least to the soft run-down time of the soft starter.

Note

If the SIMOCODE pro S basic unit is used, an additional multifunction module is required for this control function.

Schematic

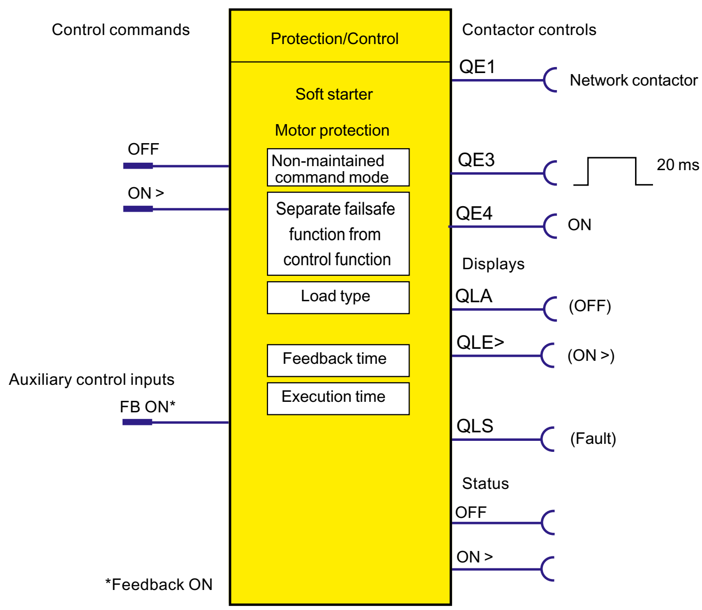


Figure 4-31 Schematic of "Soft starter" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Application selection, settings and definitions of control functions (Page 81).

Table 4-24 Soft starter settings

Soft starter	Description
OFF	Control command OFF (connection with any socket, usually with "Enabled control command OFF" socket)
ON >	Control command ON (connection with any socket, usually with "Enabled control command ON >" socket)
FB ON	Auxiliary control input "Feedback ON" (connection with any socket, usually with socket "Status - current flowing")
Non-maintained command mode	• Deactivated (default setting) • Activated
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.

Soft starter	Description
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	At least ≥ soft run-down time Range 0 to 6553.5 s (default: 1.0 s)

4.3.2.16 "Soft starter with reversing contactor" control function

Description

With this control function, SIMOCODE pro can activate the 3RW soft starter including an additional reversing contactor. Thus, the 3RW soft starters are connected via SIMOCODE pro to the bus. SIMOCODE pro can also control the direction of rotation of the motor (forwards and backwards).

Control commands

- Start with "ON >" activates contactor controls QE1 and QE4 (clockwise, i.e. forwards)
- Start with "ON <" activates contactor controls QE2 and QE4 (counterclockwise, i.e. reverse).
- Stop with "OFF" first deactivates contactor control QE4. When the "Feedback ON" signal is no longer issued, contactor control QE1 / QE2 is deactivated 3 s later to leave enough time for a soft run-down via the soft starter.
- With "Reset", the QE3 contactor control is activated for 20 ms and sends the soft starter an acknowledgement signal via a parameterizable relay output.

The control commands can be issued to SIMOCODE pro from any control stations (see also Description of functions of control stations (Page 67)). Thus, the inputs (plugs) must be connected to the corresponding sockets, preferably to the "Enabled control command" sockets. Every fault message causes the contactor controls to be deactivated.

Switching the direction of rotation

The direction of rotation can be switched once the "Status - ON >" or "Status - ON <" signal has expired (motor is switched off) AND the interlocking time has elapsed:

- Via the "OFF" control command
- Directly when "Saving change-over command" is activated.

SIMOCODE pro prevents both contactors from switching on at the same time. Switching from one direction of rotation to the other can be delayed via the interlocking time.

Making internal assignments

You have to make the following assignments:

1. Assign the QE1 contactor control to the relay output which controls the coil of the line contactor (right).
2. Assign the QE2 contactor control to the relay output which controls the coil of the line contactor (left).
3. Assign the QE4 contactor control to any relay output from which the "ON input" of the soft starter should be controlled.
4. Assign the QE3 contactor control to the relay output that supplies the 20 ms acknowledgment signal to the soft starter.
5. Assign the "ON >", "ON <" and "OFF" control commands to the enabled control commands.
6. Assign the SIMOCODE pro input to which the "Fault" signal output of the soft starter is connected to the input (socket) of the standard function "External fault 1."
7. The "startup end" signal of the soft starter can also be wired to one of the inputs and processed by SIMOCODE pro.

Note

An additional digital module may be necessary for this control function.

Schematic

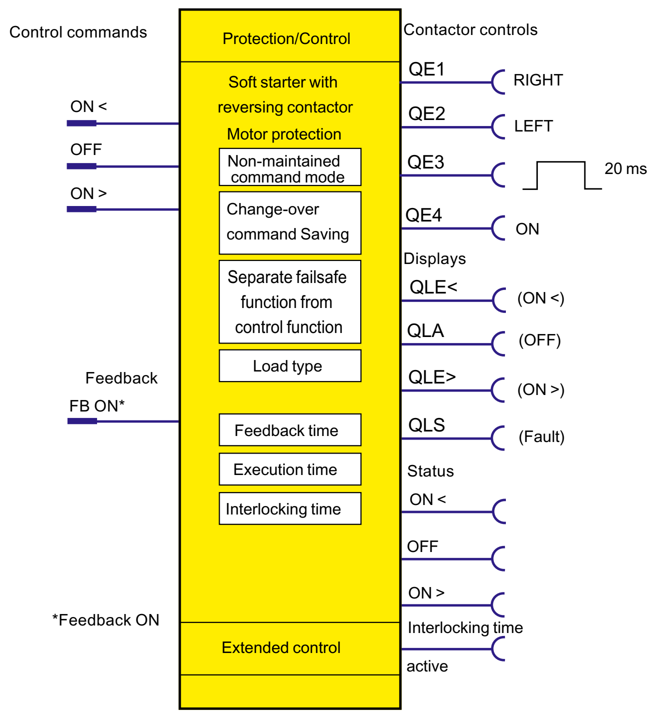


Figure 4-32 Schematic of the "Soft starter with reversing contactor" control function, "Protection / Control" function block

Settings

You will find detailed explanations of the settings in Chapter Application selection, settings and definitions of control functions (Page 81).

Table 4-25 Soft starter with reversing contactor settings

Soft starter with reversing contactor	**Description**
ON >	Control command ON > (clockwise) (connection with any socket, usually with "Enabled control command - ON >" socket)
OFF	Control command OFF (connection with any socket, usually with "Enabled control command OFF" socket)
ON <	Control command ON < (counterclockwise) (connection with any socket, usually with "Enabled control command - ON <" socket)
FB ON	Auxiliary control input "Feedback ON" (connection with any socket, usually with "Status - current flowing" socket)
Non-maintained command mode	• Deactivated (default setting) • Activated
Saving change-over command	• Deactivated (default setting) • Activated

Soft starter with reversing contactor	Description
Separate fail-safe function from control function	• Deactivated (default setting): A safety-related tripping by the DM-F modules also affects the SIMOCODE pro control function, avoiding additional follow-on fault messages. This setting is selected for applications where safety-related tripping directly affects the motor controlled by SIMOCODE pro. • Activated: A safety-related tripping by the DM-F modules does not affect the SIMOCODE pro control function. This setting is selected for applications where safety-related tripping does not affect the motor controlled by SIMOCODE pro.
Load type	You can choose between: • Motor (default) • Resistive load (see Chapter Application selection, settings and definitions of control functions (Page 81))
Feedback time	Range 0 to 25.5 s (default: 0.5 s)
Execution time	Execution time ≥ Soft run-down time Range 0 to 6553.5s (default: 1.0 s)
Interlocking time	Range 0 to 255 s (default: 0 s)

4.3.3 Active control stations, contactor controls, lamp controls and status information for the control functions

Table 4-26 Active control stations of control functions

Designation / control function	Control station				
	ON <<	ON <	OFF	ON >	ON >>
Overload 1) 2) 3)	-	-	-	-	-
Direct starter 1) 2) 3)	-	-	OFF	ON	-
Reversing starter 1) 2) 3)	-	CCW	OFF	CW	-
Circuit breaker 1) 2) 3)	-	-	OFF	ON	-
Star-delta starter 2) 3)	-	-	OFF	ON	-
Star-delta reversing starter 2)	-	CCW	OFF	CW	-
Dahlander starter 2)	-	-	OFF	SLOW	FAST
Dahlander reversing starter 2)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Pole-changing starter 2)	-	-	OFF	SLOW	FAST
Pole-changing reversing starter 2)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Solenoid valve 2)	-	-	CLOSED	OPEN	-
Positioner 1 2)	-	CLOSED	Stop	OPEN	-
Positioner 2 2)	-	CLOSED	Stop	OPEN	-
Positioner 3 2)	-	CLOSED	Stop	OPEN	-
Positioner 4 2)	-	CLOSED	Stop	OPEN	-
Positioner 5 2)	-	CLOSED	Stop	OPEN	-
Soft starter 2) 3)	-	-	OFF	ON	-
Soft starter with reversing contactor 2)	-	CCW	OFF	CW	-

Table 4-27 Contactor control with control functions

Designation / control function	Control station				
	QE1	QE2	QE3	QE4	QE5
Overload 1) 2) 3)	-	-	Active	-	-
Direct starter 1) 2) 3)	ON	-	-	-	-
Reversing starter 1) 2) 3)	CW	CCW	-	-	-
Circuit breaker 1) 2) 3)	ON pulse	-	OFF pulse	-	-
Star-delta starter 2) 3)	Star contactor	Delta contactor	Line contactor	-	-
Star-delta reversing starter 2)	Star contactor	Delta contactor	RIGHT line contactor	LEFT line contactor	-
Dahlander starter 2)	FAST	SLOW	Star contactor FAST	-	-
Dahlander reversing starter 2)	CW-FAST	CW-SLOW	Star contactor FAST	CCW-SLOW	CCW-FAST
Pole-changing starter 2)	FAST	SLOW	-	-	-
Pole-changing reversing starter 2)	CW-FAST	CW-SLOW	-	CCW-SLOW	CCW-FAST
Solenoid valve 2)	OPEN	-	-	-	-
Positioner 1 2)	OPEN	CLOSED	-	-	-
Positioner 2 2)	OPEN	CLOSED	-	-	-
Positioner 3 2)	OPEN	CLOSED	-	-	-
Positioner 4 2)	OPEN	CLOSED	-	-	-
Positioner 5 2)	OPEN	CLOSED	-	-	-
Soft starter 2) 3)	ON line contactor	-	Reset	ON command	-
Soft starter with reversing contactor 2)	RIGHT line contactor	LEFT line contactor	Reset	ON command	-

Table 4-28 Lamp control with control functions

Designation / control function	Lamp control				
	QLE << (ON <<)	**QLE < (ON <)**	**QLA (OFF)**	**QLE > (On >)**	**QLE >> (ON >>)**
Overload 1) 2) 3)	-	-	-	-	-
Direct starter 1) 2) 3)	-	-	OFF	ON	-
Reversing starter 1) 2) 3)	-	CCW	OFF	CW	-
Circuit breaker 1) 2) 3)	-	-	OFF	ON	-
Star-delta starter 2) 3)	-	-	OFF	ON	-
Star-delta reversing starter 2)	-	CCW	OFF	CW	-
Dahlander starter 2)	-	-	OFF	SLOW	FAST
Dahlander reversing starter 2)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Pole-changing starter 2)	-	-	OFF	SLOW	FAST
Pole-changing reversing starter 2)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Solenoid valve 2)	-	-	CLOSED	OPEN	-

Designation / control function	Lamp control				
Positioner 1 2)	-	CLOSED	Stop	OPEN	-
Positioner 2 2)	-	CLOSED	Stop	OPEN	-
Positioner 3 2)	-	CLOSED	Stop	OPEN	-
Positioner 4 2)	-	CLOSED	Stop	OPEN	-
Positioner 5 2)	-	CLOSED	Stop	OPEN	-
Soft starter 2) 3)	-	-	OFF	ON	-
Soft starter with reversing contactor 2)	-	CCW	OFF	CW	-

1) SIMOCODE pro C basic unit

2) SIMOCODE pro V basic units

3) SIMOCODE pro S basic unit

4.4 Monitoring functions

4.4.1 Ground fault monitoring

4.4.1.1 Ground-fault monitoring

Residual current monitoring relays are used in industry to:

- Protect systems from damage caused by residual currents
- Prevent production losses caused by unplanned downtime
- Perform maintenance to meet all demands.

In particular, ground-fault monitoring is used in conjunction with 3UL23 residual current transformers to monitor systems where environmental conditions increase the chance of fault currents.

Internal ground-fault monitoring

SIMOCODE pro acquires and monitors all three phase currents. By evaluating the summation current of the three current values, the motor feeder can be monitored for a possible residual current or ground fault.

Internal ground-fault monitoring via current measuring modules or current / voltage measuring modules is only possible for motors with a 3-phase connection in power systems that are either grounded solidly or with low impedance.

NOTICE
Star-delta connection
Spurious tripping can occur if you use internal ground-fault monitoring for star-delta circuits. During delta operation, the summation current is non-zero due to harmonics.

External ground-fault monitoring

The external ground-fault monitoring is normally used in the following cases:

- in cases in which power systems are grounded with high impedance
- in cases, in which precise detection of the ground-fault current is necessary, for example, for condition monitoring.

With ground-fault detection using the residual current transformer 3UL23, it is possible to determine the precise residual current as a measured value to define freely selectable warning and trip levels in a wide range 30 mA to 40 A.

Method of operation:

The main conductors and, if present, the neutral conductor to which the load is connected, are routed through the opening of the residual current transformer 3UL23. Its secondary winding is connected to the ground-fault module.

If an insulation fault occurs, for example, a residual current arises between the incoming and the outgoing currents that is evaluated via the residual-current transformer.

For maximum plant availability, the ground-fault module 3UF7 510-1AA00-0 and the residual current transformer 3UL23 were developed with the following design goals:

- High measuring accuracy: The ground-fault module in conjunction with the residual current transformer 3UL23 achieves a measuring accuracy of ±7.5 %. This enables set limit values to be monitored very precisely. Spurious tripping caused by measuring errors is minimized. The combination of ground-fault module and residual current transformer 3UL23 is designed so that a warning or alarm is triggered at the latest upon exceeding the set limit values. To achieve this, slightly higher residual currents than those actually measured are displayed and compared with the set limit values. The measuring accuracy is -15 % to 0 % of the value displayed. This takes into account the measuring accuracy of monitoring relay and residual current transformer.
- Settable prewarning and trip levels: The threshold levels for the residual current are defined over a very wide range of 30 mA to 40 A. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized, including a delay.
- Permanent self-monitoring: The permanent self-monitoring of the ground-fault module 3UF7 510-1AA00-0 and the connected transformer ensures reliable monitoring of the function. The connected 3UL23 residual current transformer is also permanently monitored for open-circuit or short-circuit. This means cyclic manual tests to verify the function are obsolete.
- Settable active status and delay times of the residual current protection. Depending on the application, the monitoring function can be active permanently, only when the motor is running, or only after the motor has started. This permits the suppression of residual currents that are only measured during motor starting due to high starting currents. Short-term residual currents or immitted interference can be easily suppressed by means of the adjustable tripping delay time.

Use of the residual current transformers 3UL22 and 3UL23:

- Use the residual current transformer 3UL23 to detect residual currents with the ground-fault module 3UF7 510-1AA00-0. The residual current transformer 3UL23 is suitable for detecting pure AC residual currents and AC residual currents with a pulsating DC component.

Note

Precondition for using a 3UF7 510-1AA00-0 ground-fault module

Use of this ground-fault module requires a SIMOCODE pro V PB basic unit, with at least product version *E10* (from 09/2013) or a SIMOCODE pro V PN basic unit with at least product version E04*.

- Use the 3UL22 residual current transformer to detect residual currents with the 3UF7 500-1AA00-0 ground-fault module.

Note

Only monitoring of the residual current trip level possible

With this combination, it is only possible to monitor a trip level of the residual current. Measured values are then not available for the residual current.

Note

Precondition for using a 3UF7 500-1AA00-0 ground-fault module

Use of this ground-fault module requires a SIMOCODE pro V PB basic unit, at least version *E02* or later (from 04/2005).

WARNING

Open-circuit voltage may result in death, serious injury or material damage!

The current transformer output is a constant current power supply. In accordance with U = R * I, the output voltage increases with an increasing resistance. If the connecting terminals of the current transformer are open, the output voltage may become high enough for you to put your life at risk or permanently damage the current transformer.

Avoid operating the unit when open. Operating a network for monitoring safely and without faults requires that the ground fault module and the 3UL23 residual-current transformer have been installed completely. It is absolutely necessary to short-circuit previously installed 3UL23 residual-current transformers when the units are not connected to a ground fault module.

DANGER

No personal or fire protection!

The ground-fault modules 3UF75* monitor that devices and systems are functioning correctly.

They are not suitable for personal protection or protection from fires.

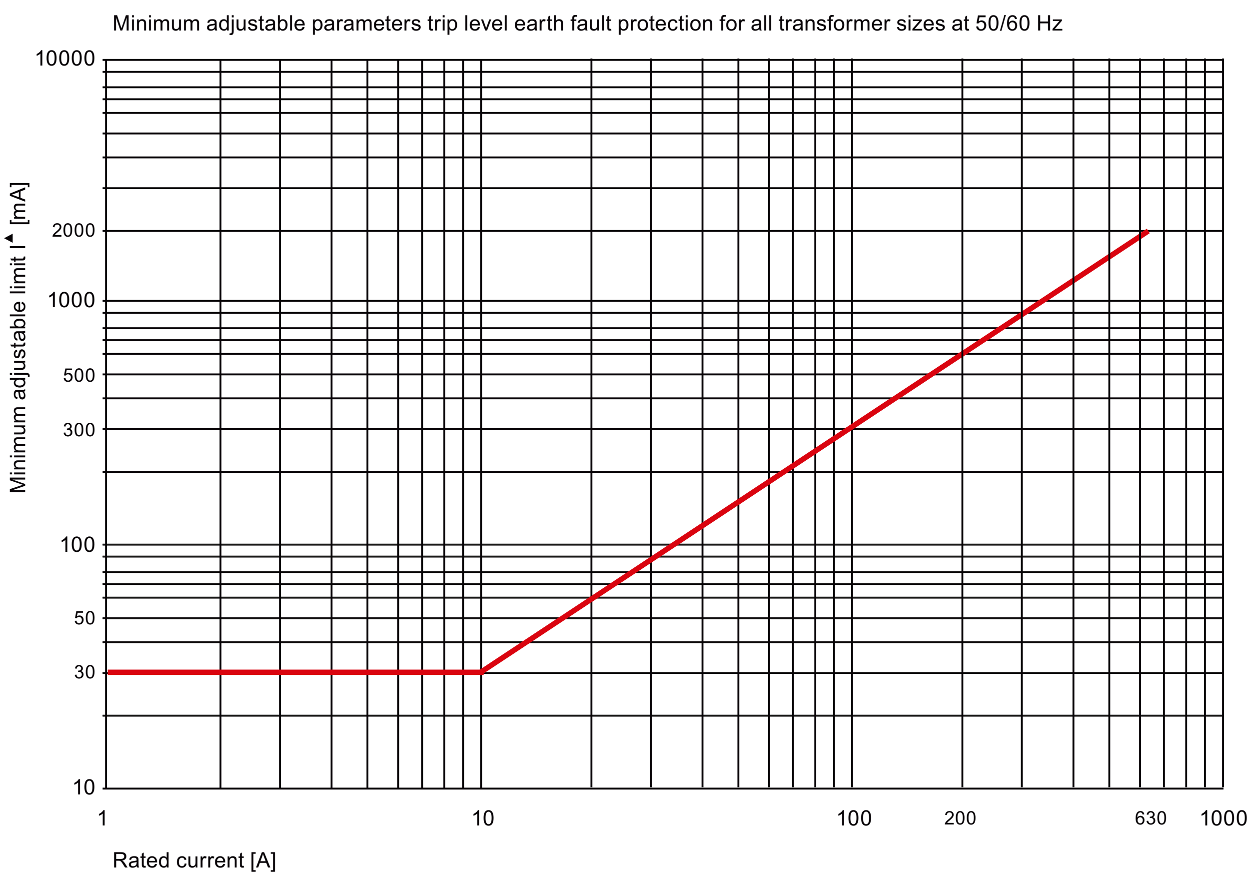
A definable and delayable response can be parameterized in the event a ground fault is detected. A message is output if the ground fault limit is exceeded.

You can define additional trips by parameterization. If the rated fault currents are exceeded, SIMOCODE pro V responds either

- by turning off the contactor controls QE*, or
- by issuing a warning.

4.4.1.2 Limits of fault current measurement

In the event of increasing primary currents, imbalances in the cable routing and current loads in individual cables increasingly cause what appear to be residual currents that are detected by the evaluation units. Spurious tripping may therefore occur if excessively low monitoring limit values have been set at high primary currents. Because of these tolerances in the configuration, the measuring accuracy no longer corresponds to the stated range of ±7.5 %. To avoid spurious tripping, we recommend setting the limit values to the minimum values listed in the following graphic, depending on the applicable primary current.



If monitoring is required within limit values that are lower than those recommended, we recommend the use of delay times, particularly if spurious tripping occurs exclusively during motor startup. If delay times do not lead to the desired result, the use of shield sleeves may considerably lower the minimum possible monitoring limit.

You will find more information in Chapters "2.5.2 Installation specifications" and "2.5.3 Optimization options" in the Manual 3UG4/3RR2 Monitoring Relay (https://support.industry.siemens.com/cs/ww/en/ps/16367/man).

The monitored current waveforms also have a strong influence on the measuring accuracy. In the case of loads with generalized phase control, deviations from the measuring accuracy can occur when monitoring for high residual current limits. The cause of this is the extreme difference between the monitored rms values and the peak values of the residual current. The more extreme the generalized phase control, the shorter the time during which current flows, and the lower the resulting rms value. To achieve and monitor a high rms value in such a case, an extremely high peak value of the residual current is necessary. In the case of high currents, current transformers tend towards saturation in which a further increase in current on the primary side does not result in an equivalent increase on the secondary side. In the case of extreme peak values of the residual current, the measuring accuracy suffers as a result of this principle. Due to the great difference between the peak value and the rms value, monitoring for lower limits is useful.

4.4.1.3 Internal ground-fault monitoring when using a 2nd generation current / voltage measuring module

Settings

You can parameterize two different response levels (trip level, warning level) for monitoring the ground-fault current.

If the ground-fault current exceeds the response level, the current limit monitoring will respond.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

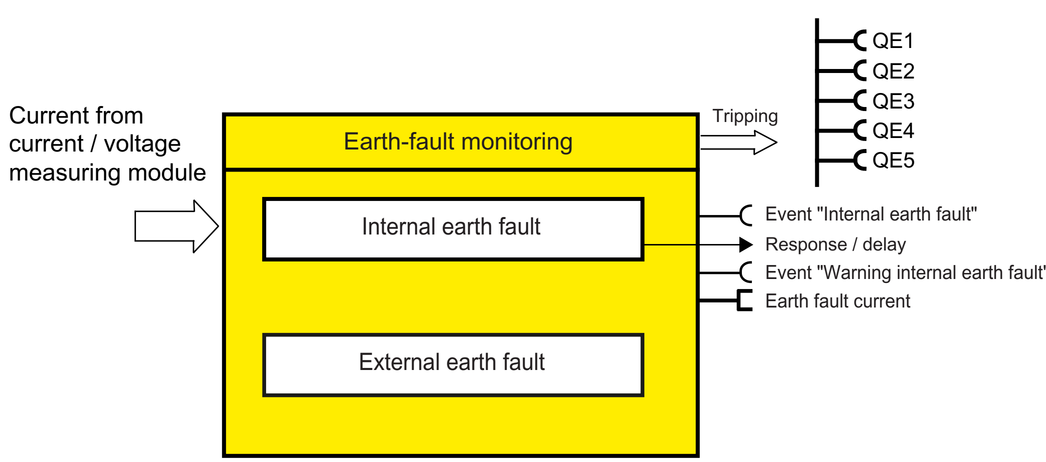


Figure 4-33 "Ground-fault Monitoring" function block

Trip level, warning level

You can parameterize two different response levels (trip level, warning level) for monitoring the ground-fault current.

If the ground-fault current exceeds the response level, the current limit monitoring will respond.

The lowest value for internal ground-fault monitoring that can be set as the warning and trip level is 10% of the set rated motor current I_s.

Trip level	10 to 120 % of I_s in steps of 1% (default: 30)
Warning level	10 to 120 % of I_s in steps of 1% (default: 30)

Two use cases are distinguished depending on the effective motor current through the measuring module:

- Normal stationary use case up to 1.2 x rated motor current I_s: Residual currents greater than the value of the set trip/warning levels are detected. Ground-fault monitoring fulfills the accuracy requirements of IEC 60947-1 Class CI-B.
- Temporary starting or overload operation greater than 1.2 x rated motor current I_s: Responsiveness in the overload range of > 1.2 x rated motor current is reduced to reduce false tripping. Residual currents > I_trip_level + 12.5% x (I_max - 120% x I_s) are detected.

The following levels of accuracy apply to motor currents in the range from 20% x I_u to 120% x I_s:

- I_Fault_Rated in the range 30% to 120% x I_s: Accuracy of the detected residual current with warning or trip level: ±10% according to IEC 60947-1, Annex T, Class CI-A
- I_Fault_Rated in the range 15% to 30% x I_s: Accuracy of the detected residual current with warning or trip level: ±25% according to IEC 60947-1, Annex T, Class CI-B
- I_Fault_Rated in the range 10% to 15% x I_s: No type testing according to IEC 60947-1

Response to trip level

Here you can set how SIMOCODE pro should respond if the trip level is overshot.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-29 Response to "trip level" in ground-fault monitoring

Response	Trip level
deactivated	X (d)
signal	X
warn	—
trip	X
delay	0 to 25.5 s (default: 0.5 s)

Response to warning level

Here you can set how SIMOCODE pro should respond if the warning level is overshot.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-30 Response to "warning level" in ground-fault monitoring

Response	Warning level
deactivated	X
signal	X (d)
warn	X
trip	—
delay	0 to 25.5 s (default: 0.1 s)

Hysteresis

Here you can set the hysteresis for the ground-fault current:

Hysteresis	0 to 15% of the level value in steps of 1% Default: 5 %

4.4.1.4 Internal ground-fault monitoring when using a current measuring module or a 1st generation current / voltage measuring module

Response

Here you can set how SIMOCODE pro will respond to an internal ground fault:

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

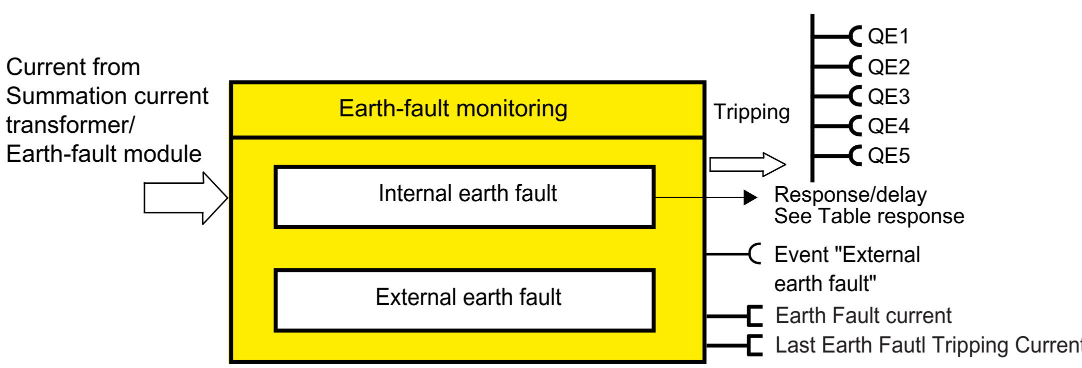


Figure 4-34 "Ground-fault Monitoring" function block

Table 4-31 "Internal ground-fault monitoring" response

Response	Internal ground fault
deactivated	X (d)
signal	X
warn	X

Response	Internal ground fault
trip	X
delay	0 to 25.5 s (default: 0.5 s)

You can activate internal ground-fault monitoring by parameterization. It covers two different operating conditions:

- Normal operation up to 2 x I_s. The actual operating current must be smaller than twice the current setting I_s. Residual currents of > 30 % of the current setting I_s are detected.
- Start-up or overload operation to 2 x I_s. The actual operating current is greater than 2x the current setting I_s. Residual currents of > 15 % of the effective motor current will be detected.

4.4.1.5 External ground-fault monitoring with a 3UF7500 ground-fault module and 3UL22 differential current transformer

Response

Here you can set how SIMOCODE pro will respond to an external ground fault.

You will find more information in Section "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

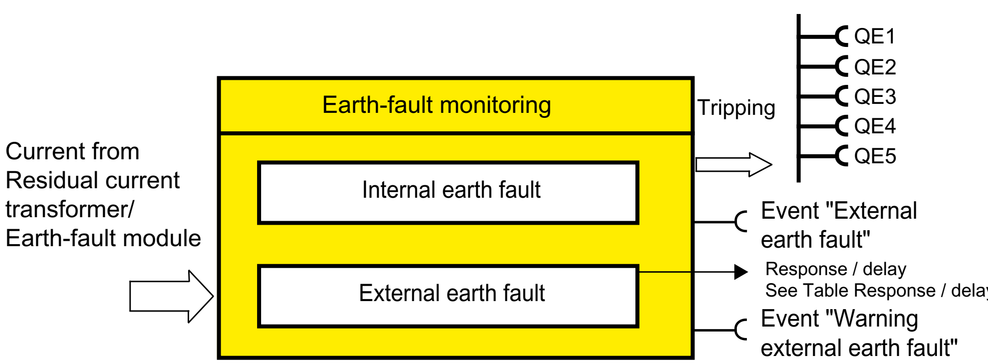


Figure 4-35 "Ground-fault Monitoring" function block

Table 4-32 "External ground-fault monitoring" response

Response	External ground fault
deactivated	-
signal	X (d)
warn	X
trip	X
delay	0 to 25.5 s (default: 0.5 s) [1)]
1) Extension of the residual current transformer delay	

If the response is set to "signal", the message "External ground fault" is generated for a ground fault.

If the response is set to "warn", the message "Warning external ground fault" is generated for a ground fault.

4.4.1.6 External ground-fault monitoring with a 3UF7510 ground-fault module and 3UL23 residual current transformer

Settings

You can parameterize two different response levels (trip level, warning level) for monitoring the ground-fault current.

If the ground-fault current exceeds the response level, the current limit monitoring will respond.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

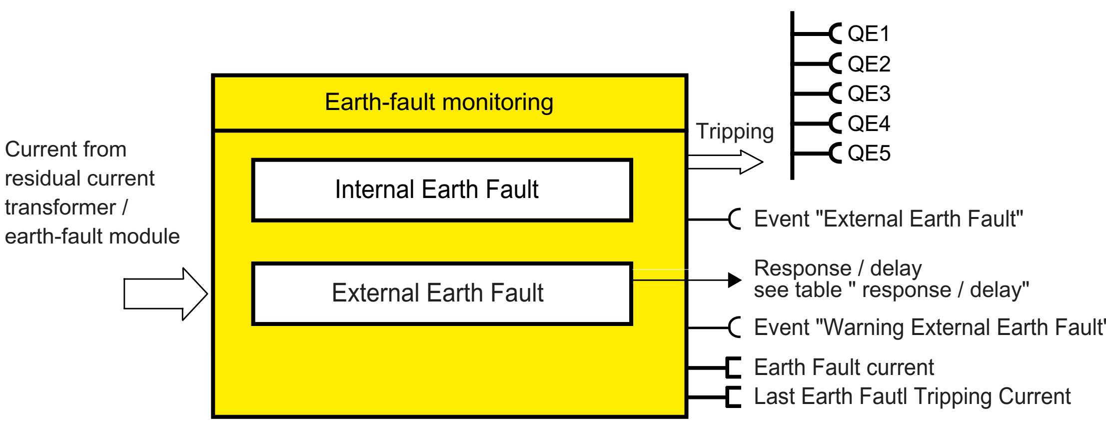


Figure 4-36 "Ground-fault Monitoring" function block

Trip level, warning level

You can parameterize two different response levels (trip level, warning level) for monitoring the ground-fault current.

If the ground-fault current exceeds the response level, the current limit monitoring will respond.

Trip level:	30 mA ... 40 A in 10 mA increments (default: 1000 mA)
Warning level:	30 mA ... 40 A in 10 mA increments (default: 500 mA)

Trip level activity, warning level

Here you can specify in which motor operating states the trip level / warning level will be active:

• Always (on)	Trip level / warning level is always active, regardless of whether the motor is running or at a standstill
• If motor runs, except TPF (run)	Trip level / warning level is only active when the motor is running
• when the motor is on, except TPF, with startup override (run+)	Trip level / warning level is only active when the motor is running and starting has been completed

Response to trip level

Here you can set how SIMOCODE pro should respond if the trip level is overshot.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-33 Response to "trip level" in ground-fault monitoring

Response	Trip level
signal	X (d)
warn	—
trip	X
delay	0 to 25.5 s (default: 0.5 s) 1)
1) Extension of the residual current transformer delay	

Response to warning level

Here you can set how SIMOCODE pro should respond if the warning level is overshot.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-34 Response to "warning level" in ground-fault monitoring

Response	Warning level
deactivated	X (d)
signal	X
warn	X
trip	—
delay	0 to 25.5 s (default: 0.1 s) 1)
1) Extension of the residual current transformer delay	

Hysteresis

Here you can set the hysteresis for the ground-fault current:

Hysteresis	0 to 15% of the level value in steps of 1% Default: 5 %

Response to sensor fault

Here you can set how SIMOCODE pro should respond to a sensor fault. Open circuit and short-circuit to 3UL23 residual current transformer are recognized as sensor faults.

Response	Sensor fault
deactivated	X (d)
signal	X
warn	X
trip	X

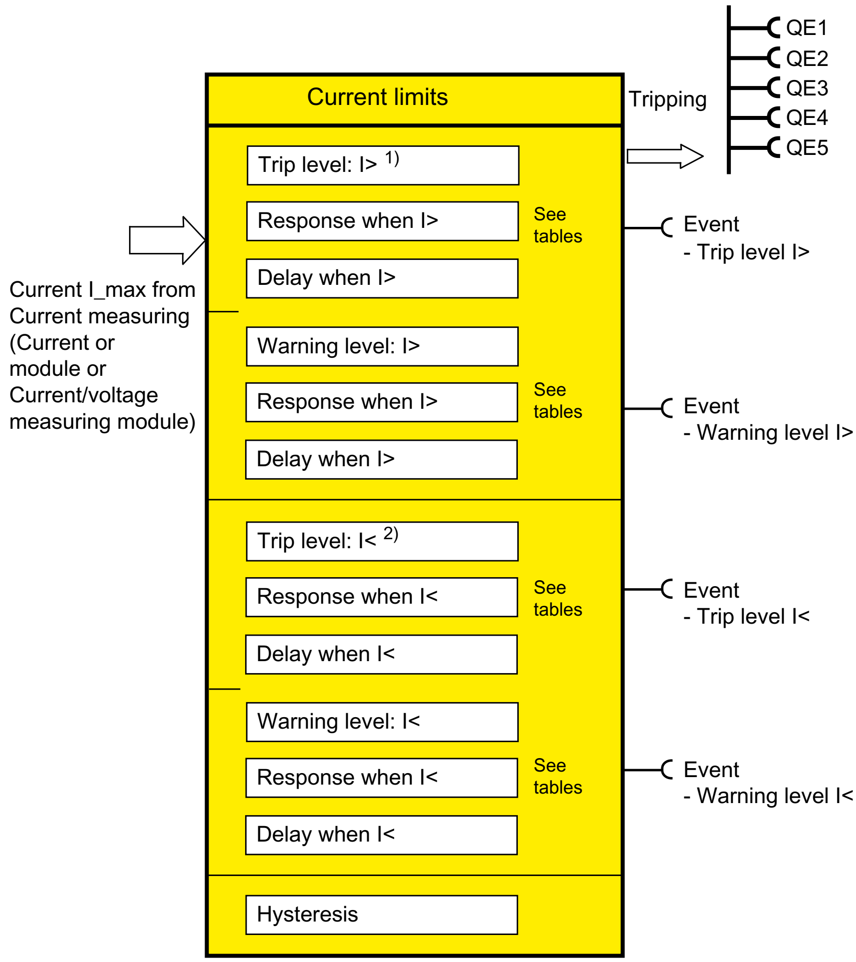
4.4.2 Current limit monitoring

4.4.2.1 Description of functions of current limit monitoring

Monitoring of current limits is used for process monitoring independent of overload protection.

SIMOCODE pro supports two-phase monitoring of the motor current for freely selectable upper and lower current limit values. The response of SIMOCODE pro can be freely configured and delayed if it reaches a prewarning or trip level.

The motor current is measured using current measuring modules or the current / voltage measuring modules.



1) Upper limit
2) Lower limit

Figure 4-37 "Current Limits" function block

4.4.2.2 I> (upper limit)

Trip level, warning level

When monitoring current limits I > (upper limit), two different response levels can be parameterized and monitored: I> (upper limit) trip level, I> (upper limit) warning level

If the current of one or more phases exceeds the response level, current limit monitoring responds.

Trip level	0 to 1020 % of I_s in steps of 4% (default: 0)
Warning level	0 to 1020 % of I_s in steps of 4% (default: 0)

Trip level activity, warning level

The trip level / warning level is active only when the motor is running, the startup procedure has been completed and there is no test position feedback (TPF) (run+).

Response to trip level

Here you can define how SIMOCODE pro will respond if the trip level is undershot.
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-35 "Trip level" response for monitoring current limits I >

Response	Trip level
deactivated	X (d)
signal	X
warn	—
trip	X
delay	0 to 25.5 s (default: 0.5 s)

Response to warning level

Here you can define how SIMOCODE pro will respond if the warning level is overshot.
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-36 "Warning level" response for monitoring current limits I >

Response	Warning level
deactivated	X (d)
signal	X
warn	X
trip	—
delay	0 to 25.5 s (default: 0.5 s)

Hysteresis

Here you can set the hysteresis for the current limits I> (upper limit):

Hysteresis	0 to 15% of the level value in steps of 1% Default: 5 %

4.4.2.3 I< (lower limit)

Trip level / warning level

When monitoring current limits I< (lower limit), two different response levels (trip level / warning level) can be parameterized and monitored:

- I< (lower limit) trip level
- I< (lower limit) warning level

If the current of the phases (I_{max}) drops below the response level, the current limit monitor responds.

Trip level	0 to 1020 % of I_s in steps of 4% (default: 0)
Warning level	0 to 1020 % of I_s in steps of 4% (default: 0)

Trip level activity, warning level

The trip level / warning level is active only when the motor is running, the startup procedure has been completed and there is no test position feedback (TPF) (run+).

Response to trip level

Here you can define how SIMOCODE pro will respond if the trip level is undershot:
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-37 "Trip level" response for monitoring current limits I <

Response	Trip level
deactivated	X (d)
signal	X
warn	—
trip	X
delay	0 to 25.5 s (default: 0.5 s)

Response to warning level

Here you can define how SIMOCODE pro will respond if the warning level is undershot.
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-38 "Warning level" response for monitoring current limits I <

Response	Warning level
deactivated	X (d)
signal	X
warn	X
trip	—
delay	0 to 25.5 s (default: 0.5 s)

Hysteresis

Here you can set the hysteresis for current limits I< (lower limit):

Hysteresis	0 to 15% of the level value in steps of 1% Default: 5 %

4.4.3 Voltage monitoring

Description

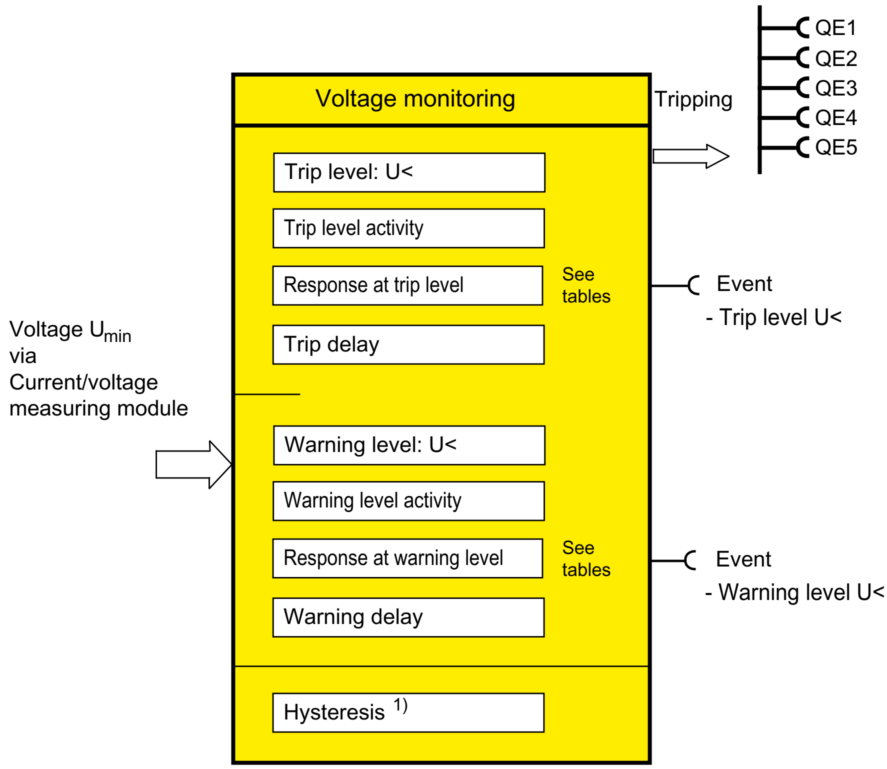
SIMOCODE pro supports two-phase undervoltage monitoring of either a three-phase network or a single-phase network for freely selectable limits. The response of SIMOCODE pro on reaching a prewarning level or trip level can be freely parameterized and delayed.

Voltage measurement is performed using current / voltage measuring modules. This is based on the minimum voltage of all voltages U_{min}.

Note

Please note that only phase voltages are available with SIMOCODE pro V PB basic units up to version *E06*. If required, the line-to-line voltage can be calculated from the phase voltage using the logic module "Calculator 1/2" as follows: Line-to-line voltage = phase voltage * 1.73.

From version *E07* onward, either phase voltage or line-to-line voltage can be used as the basis for monitoring.



1) Hysteresis for voltage, cos phi, power

Figure 4-38 "Voltage Monitoring" function block

Furthermore, even when the motor is switched off, SIMOCODE pro can determine and signal the further availability of the feeder by measuring the voltage directly at the circuit breaker or at the fuses in the main circuit.

Trip level, warning level

You can parameterize two different response levels (trip level/warning level). If the current of one or more phases undershoots the response level or the warning level, voltage monitoring responds.

Trip level:	0 to 2040 V in steps of 8 V (default: 0)
Warning level:	0 to 2040 V in steps of 8 V (default: 0)

Trip level activity, warning level

Here you can specify in which motor operating states the trip level / warning level will be active:

- Always (on)[1) — Trip level / warning level is always active, regardless of whether the motor is running or at a standstill
- Always, except TPF (on+) (default) — Trip level / warning level always effective, regardless of whether the motor is running or at a standstill; Exception: "TPF", i.e. motor feeder is in test position

- If motor runs, except TPF (run) — Trip level / warning level only active if the motor is ON and not in the test position

1) When using the SIMOCODE pro V PB basic unit (product version *E03* and higher) with a current/voltage measuring module

Response to trip level

Here you can set how SIMOCODE pro should respond if the trip level is undershot. See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-39 "Trip level" response for voltage monitoring

Response	Trip level
deactivated	X (d)
signal	X
warn	—
trip	X
delay	0 to 25.5 s (default: 0.5 s)

Response to warning level

Here you can set how SIMOCODE pro should respond if the warning level is undershot. See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-40 "Warning level" response for voltage monitoring

Response	Warning level
deactivated	X (d)
signal	X
warn	X
trip	—
delay	0 to 25.5 s (default: 0.5 s)

Hysteresis for voltage, cos phi, power

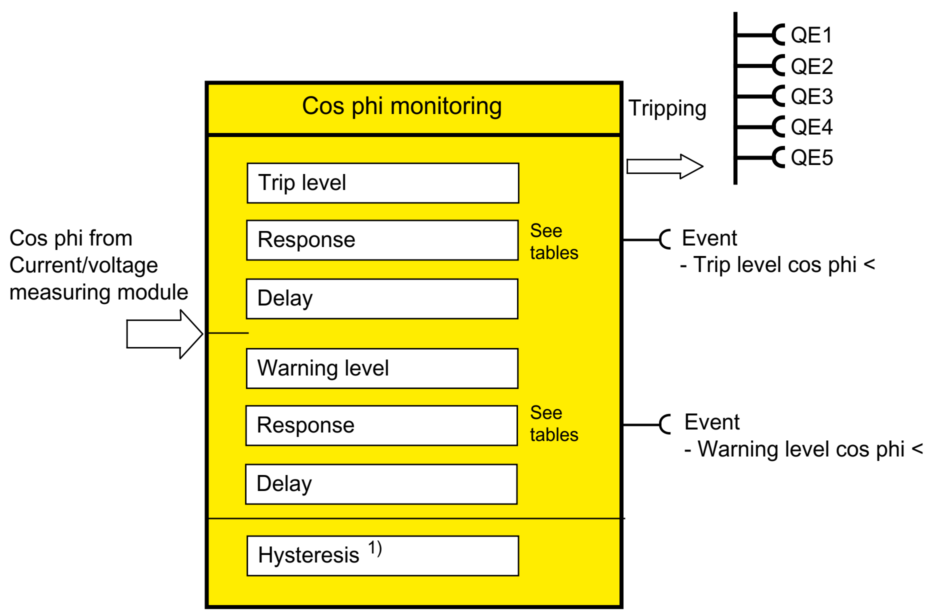
Here you can set the hysteresis for voltage, cos phi and power.

Hysteresis for voltage, cos phi, power	0 to 15% of the level value in steps of 1% (default: 5 %)

4.4.4 Cos phi monitoring

Description

Cos phi monitoring monitors the load condition of inductive loads. The main field of application is for asynchronous motors in 1-phase or 3-phase networks with loads that fluctuate significantly. The power factor fluctuates more than either the motor current or the active power does, particularly in the low-end performance range of a motor. Therefore, power factor monitoring is particularly suitable for distinguishing between no-load operation and faults, e.g. a broken drive belt or drive shaft. If the set trip level or warning level is undershot, a signal is generated or the motor is switched off, depending upon the setting.



1) Hysteresis for voltage, cos phi, power (see "Voltage Monitoring" function block)

Figure 4-39 "Cos Phi Monitoring" function block

Trip level, warning level

You can parameterize two different response levels (trip level / warning level) for cos phi monitoring.

Trip level	0 to 100 % (default: 0 %)
Warning level	0 to 100 % (default: 0 %)

0 % = cos phi = 0.00

50 % = cos phi = 0.50

100 % = cos phi = 1.00

Trip level activity, warning level

The trip level / warning level is active only when the motor is running, the startup procedure has been completed and there is no test position feedback (TPF) (run+).

Response to trip level

Here you can define how SIMOCODE pro will respond if the set trip level is undershot:
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-41 "Trip level" response for cos phi monitoring

Response	Trip level
deactivated	X (d)
signal	X
warn	—
trip	X
delay	0 to 25.5 s (default: 0.5 s)

Response to warning level

Here you can define how SIMOCODE pro will respond if the set warning level is undershot.
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-42 "Warning level" response for cos phi monitoring

Response	Warning level
deactivated	X (d)
signal	X
warn	X
trip	—
delay	0 to 25.5 s (default: 0.5 s)

4.4.5 Active power monitoring

Description

SIMOCODE pro can indirectly monitor the state of a device or system via the active power. For example, by monitoring the active power of a pump motor, conclusions can be drawn from the active power level about the flow rate or fluid fill levels. The active power curve of a motor is a precise reflection of its actual load across the entire range. Excess load results in increased wear of the motor and, thus, may lead to premature motor failure. Insufficient active power can, for example, be a sign of no-load motor operation.
SIMOCODE pro allows two-phase active power monitoring for freely selectable upper and lower limits. The response of SIMOCODE pro when a prewarning or trip level has been reached can be freely parameterized and delayed.
The active power is measured by means of current / voltage measuring modules.

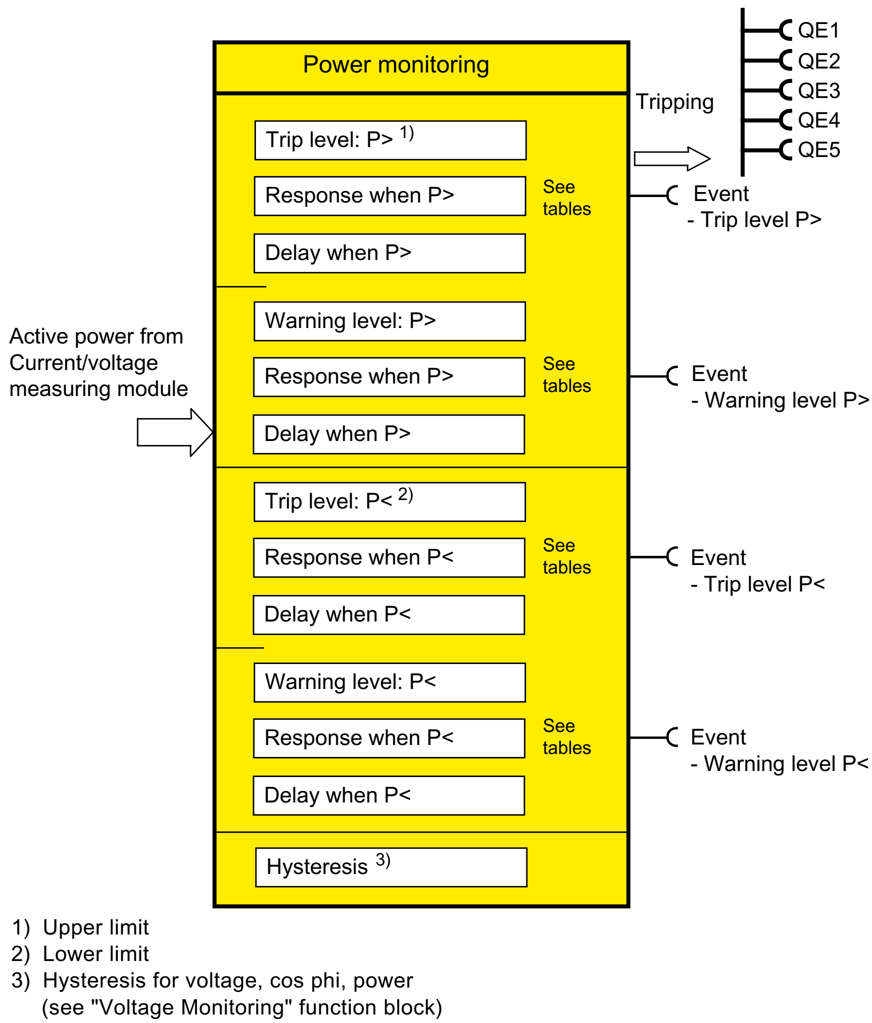


Figure 4-40 "Power Monitoring" function block

Trip level, warning level

With active power monitoring, you can parameterize two different response levels (trip level / warning level) for the upper and lower limits.

Trip level

- P> (upper limit) 0.000 to 4294967.295 kW (default: 0.000 kW)
- P < (lower limit)

Warning level

- P> (upper limit) 0.000 to 4294967.295 kW (default: 0.000 kW)
- P < (lower limit)

Trip level activity, warning level

The trip level / warning level is active only when the motor is running, the startup procedure has been completed and there is no test position feedback (TPF) (run+).

Response to trip level P> (upper limit), P< (lower limit)

Here, you can define the response of SIMOCODE pro in the event that the monitored variable overshoots/undershoots the set trip level:
For further information, see also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-43 "Trip level" response for active power monitoring

Response	Trip level
deactivated	X (d)
signal	X
warn	—
trip	X
delay	0 to 25.5 s (default: 0.5 s)

Response to warning level P> (upper limit), P< (lower limit)

Here, you can define the response of SIMOCODE pro in the event that the monitored variable overshoots/undershoots the set warning level:
For further information, see also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-44 "Warning level" response for active power monitoring

Response	Warning level
deactivated	X (d)
signal	X
warn	X
trip	—
delay	0 to 25.5 s (default: 0.5 s)

4.4.6 0/4 - 20 mA monitoring

Description

With the aid of an analog module, SIMOCODE pro is capable of measuring and monitoring further process variables as desired. For example, the fill level can be monitored to protect a pump against dry operation, or a differential pressure transducer can be used to monitor the degree of pollution in a filter. If the fill level undershoots a specified level, the pump can be switched off and, if a specific differential pressure value is exceeded, the filter must be cleaned.

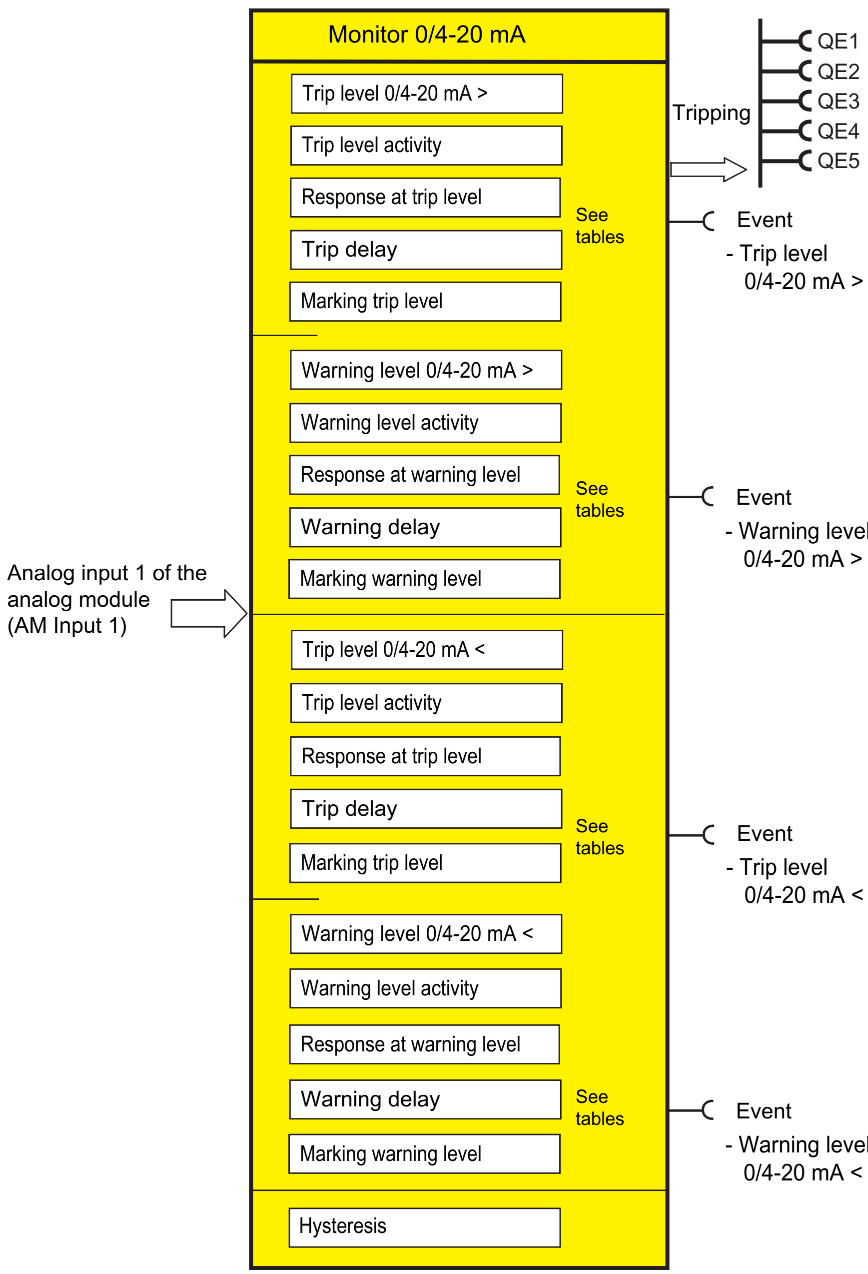


Figure 4-41 "0/4 to 20 mA monitoring" function block

SIMOCODE pro supports two-phase monitoring of the analog signals of a transducer (standardized 0/4-20 mA output signal). The analog signals are routed via the analog module to the 0/4-20 mA (AM1) and 0/4-20 mA (AM2) monitoring function blocks (AM2 only in conjunction with the SIMOCODE pro V PN and pro V EIP basic units).

Trip level, warning level

With 0/4-20 mA monitoring, you can parameterize two different response levels (trip level / warning level) for the upper and lower limits.

Trip level

- 0/4 to 20 > (upper limit)
- 0/4 to 20 < (lower limit)

0.0 ... 23.6 mA / 4.0 ... 22.9 mA (default: 0.0 / 4.0 mA)

Warning level

- 0/4 to 20 > (upper limit)
- 0/4 to 20 < (lower limit)

0.0 ... 23.6 mA / 4.0 ... 22.9 mA (default: 0.0 / 4.0 mA)

Trip level activity, warning level

Here you can specify in which motor operating states the trip level / warning level will be active:

- **Always (on)** — Trip level / warning level is always active, regardless of whether the motor is running or at a standstill
- Always, except TPF (on+) — Trip level / warning level is always active regardless of whether the motor is running or at a standstill, with the exception of "TPF," i.e. motor feeder is in the test position
- If motor is on, except TPF (run) — Trip level / warning level only active if the motor is ON and not in the test position
- If motor is on except TPF, with startup override (run+) — Trip level / warning level is only active when the motor is running, the startup procedure has been completed, and no test position (TPF) is detected

Response to trip level 0/4 to 20 mA > (upper limit), 0/4 to 20 mA < (lower limit)

Here, you can define the response of SIMOCODE pro in the event that the monitored variable overshoots/undershoots the set trip level:
For further information, see also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-45 "Trip level" response for 0/4 to 20 mA monitoring

Response	Trip level
deactivated	X (d)
signal	X
warn	—

Response	Trip level
trip	X
delay	0 to 25.5 s (default: 0.5 s)

Response to warning level 0/4 to 20 mA > (upper limit), 0/4 to 20 mA < (lower limit)

Here, you can define the response of SIMOCODE pro in the event that the monitored variable overshoots/undershoots the set warning level:
For further information, see also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-46 "Warning level" response for 0/4 to 20 mA monitoring

Response	Warning level
deactivated	X (d)
signal	X
warn	X
trip	—
delay	0 to 25.5 s (default: 0.5 s)

Marking

The marking is saved in the device and assigned and displayed in the Faults / Warnings online dialog. Optional marking for identifying the message, e.g. "0/4 to 20 >"; range: maximum 10 characters.

Note

Changing the marking of Ethernet and PROFINET connections

Each change to the marking requires that the communication interface be restarted when the web server is active. A new start interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Hysteresis for 0/4 to 20 mA

Here you can set the fluctuation range for the analog signal:

Hysteresis for the analog signal	0 to 15 % in steps of 1 % (default: 5 %)

Note

Monitoring of a second process variable via input 2 of the analog module can be done, for example, by free limit monitors.

4.4.7 Operation monitoring

4.4.7.1 Operation monitoring

Motor operation monitoring - use

SIMOCODE pro can monitor the operating hours and stop times of a motor and restrict the number of startups in a defined time frame to avoid plant downtimes due to failed motors caused by running or being stopped for too long.
If an adjustable limit value is exceeded, a signal or warning can be generated that indicates maintenance or replacement of the motor in question is required. After the motor has been replaced, the operating hours and stop times can be reset, for example.

To avoid excessive thermal loads and premature wear of the motor, it is possible to limit the number of motor startups for a specifiable period. The number of still possible starts is available in the SIMOCODE pro for further processing.

The limited number of possible starts can be indicated by prewarnings.

Note

Operating hours, motor stop times and the number of motor starts can be monitored completely in the device and/or transmitted to the automation system via the communication bus.

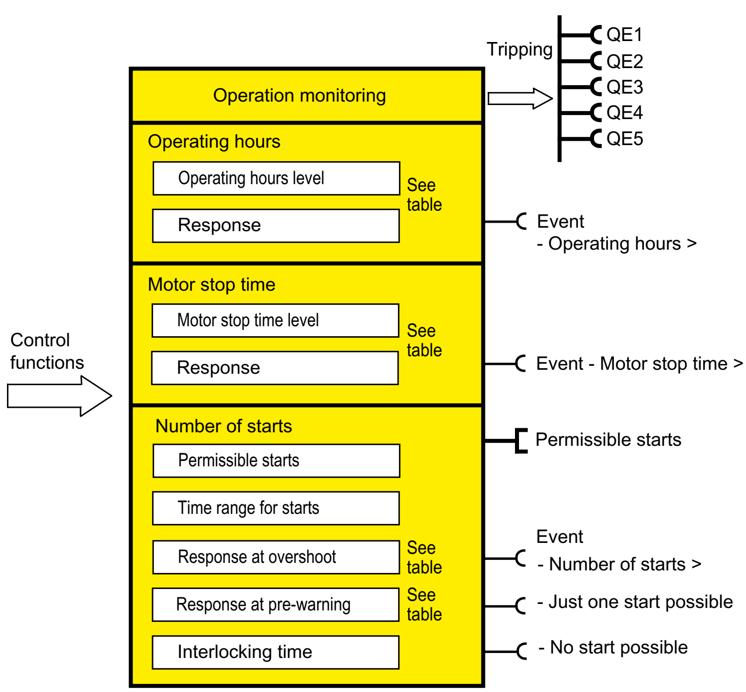


Figure 4-42 "Operation Monitoring" function block

Response

Table 4-47 "Operation monitoring" response

Response	Operating hours monitoring - level	Stop time monitoring - level	Number of starts - overshoot	Number of starts - prewarning
deactivated	X (d)	X (d)	X (d)	X (d)
signal	X	X	X	X
warn	X	X	X	X
trip	—	—	X	—

4.4.7.2 Operating hours monitoring

Motor operating hours monitoring - use

The motor operating hours monitoring function enables the operating hours (service life) of a motor to be recorded so that motor maintenance prompts can be generated in good time as applicable.

Level

If the operating hours exceed the set response level, the monitoring function responds.

Level 0 to 1193046 hours (default: 0 h)

Active status

Unless deactivated, this function is always active, independent of whether the motor is running or not (operating state "ON").

Response

You can define the response to overshoot here.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7) and Table "Responses" in Chapter Operation monitoring (Page 149).

4.4.7.3 Motor stop time monitoring

Motor stop time monitoring - use

System parts for important processes often have dual drives (A and B drives). Ensure that these are always operated alternately. This prevents long motor stop times and reduces the risk of non-availability.

The motor stop time monitoring function can be used, for example, to generate an interrupt, thus initiating connection of the motor.

Level

The length of the permissible motor stop time is stipulated here; if exceeded, the monitoring function responds.

Level 0 to 65535 hours (default: 0 h)

Active status

Unless deactivated, this function is always active, independent of whether the motor is running or not (operating state "ON").

Response

You can define the response to overshoot of the permissible stop time here:

See also "Tables of responses of SIMOCODE pro" in Important notes (Page 7) and Table "Response of operation monitoring" in Operation monitoring (Page 149).

4.4.7.4 Monitoring the number of starts

Number of starts monitoring - use

Monitoring the number of starts can protect system parts (motors and switching devices such as soft starters and converters) from too many start processes within a parameterizable time frame and thus prevent damage. This is also particularly useful for commissioning or manual control.

The schematic below illustrates the principle of monitoring the number of starts:

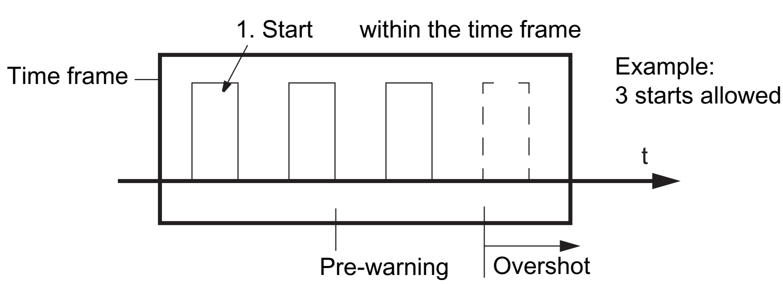


Figure 4-43 Monitoring the number of starts

Permissible starts

The maximum permissible number of starts is set here. The time interval "Time range for starts" commences to run after the first start. After the second to last permissible start has been executed, the "Just one start possible" pre-warning is generated.

Permissible starts: 1 to 255 (default: 1)

Time range for starts

The time range for permissible start processes is set here. The maximum number of starts is only available again after the parameterized time range for starts has elapsed. The number of available starts is shown by the analog value "Permissible starts - Actual value".

Time range for starts:	00:00:00 to 18:12:15 hh:mm:ss (default: 00:00:00)

Active status

Unless deactivated, this function is always active, independent of whether the motor is running or not (operating state "ON").

Response to overshoot

You can define the response to overshoot of the number of starts within the time range for starts here:

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7) and Table "Responses" in Chapter Operation monitoring (Page 149).

Response to pre-warning

You can define the response after the penultimate start here.

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7) and Table "Responses" in Chapter Operation monitoring (Page 149).

Interlocking time

If a new start command is issued within the time range for starts after the last permissible start, this new start command will no longer be executed if the setting "Response to overshoot - tripping" has been set. "Fault - No. of starts >" will be displayed and the set interlocking time activated.

Interlocking time	00:00:00 to 18:12:15 hh:mm:ss (default: 00:00:00)

4.4.8 Temperature monitoring (analog)

Schematic and characteristic curve

Temperature monitoring of, for example, motor windings, motor bearings, coolant and gearbox temperature, can be carried out via up to three analog temperature sensors such as NTC, KTY 83/84, PT100, PT1000.

SIMOCODE pro supports two-phase monitoring for overtemperature: Separate levels for warning and tripping temperature can be set.

Temperature monitoring takes into account the highest temperature of all the sensor measuring circuits of the temperature module.

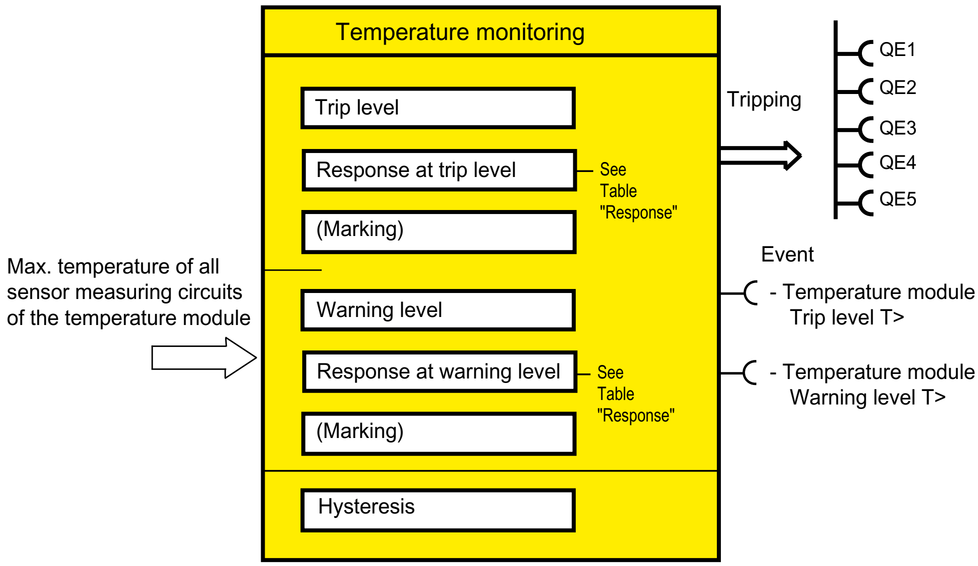


Figure 4-44 "Temperature Monitoring" function block

Settings

Table 4-48 "Temperature monitoring" settings

Temperature	Description
Trip level T >	-273° - 65262°C (default: -273°)
Response to trip level T >	Setting of response when the temperature is overshot (see the following table and Chapter Important notes (Page 7))
Marking for trip level T >	No parameters. Optional marking for identifying the message, e.g. "Temperature>"; range: Maximum 10 characters
Warning level T >	-273° - 65262°C (default: -273°)
Response to warning level T >	Setting of response when the temperature is overshot (see the following table and Chapter Important notes (Page 7))
Marking warning level T >	No parameters. Optional marking for identifying the message, e.g. "Temperature>"; range: maximum 10 characters.
Hysteresis	0° to 255°C in steps of 1°C (default: 5°C)

Trip level activity, warning level

The trip level / warning level is always active, independent of whether the motor is running or not (operating state "ON").

Response

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Overtemperature: Here you can select how SIMOCODE pro should respond when the temperature has overshot the warning level / trip level.

Table 4-49 "Overtemperature" response

Response	Warning level T >	Trip level T >
deactivated	X (d)	—
signal	X	X (d)
warn	X	—
trip	—	X

Note

With motors for Ex e applications, the response must be set to "trip"!

Note

The sensor type, the number of measuring circuits in use and the response to a sensor fault must be set in the Temperature module inputs (TM1 / 2 inputs) function block if temperature monitoring is used.

Note

To monitor several sensor measuring circuits individually and independently, a suitable number of free limit monitors can be connected to the temperature module inputs (TM1 / 2 inputs) function block and differing limits set for the individual temperature sensors, instead of the temperature monitoring function block.

4.4.9 Monitoring interval for mandatory testing

Description

Function for monitoring the interval between the connection and the tripping of the enabling circuit (actuator tripping). The monitoring time starts anew every time the enabling circuit closes. This function supports you in complying with test intervals that require verification.
In the enabling circuit of the DM-F Local and the DM-F PROFIsafe, relay contacts perform safety-related tripping. Whether the relay contacts of the enabling circuit actually open or not, can only be established via a change in the switching state of the contacts.
The "Monitoring interval for mandatory testing" function supports the system operator in the monitoring of the time that has elapsed since the last connection of the enabling circuit.
When the adjustable limit has been reached, the set reaction follows (deactivated, signal, warn; see response). This is logged in the event memory.
This monitoring function is an organizational measure that supports the system operator in detecting faults by conducting regular tests, see information in the operating instructions on regularly testing the function of a safety device. The monitoring function itself need not be safety-related.

Note

The function "Time until test" is not a safety-related function

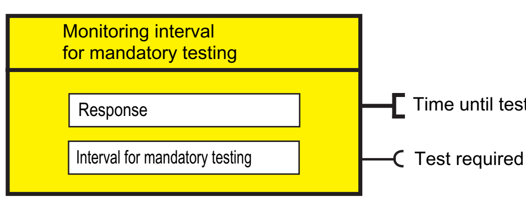


Figure 4-45 "Monitoring interval for mandatory testing" function block

Response

You can set the response here.
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Table 4-50 "Safety-related tripping" response

Response	
deactivated	X
signal	X
warn	X
trip	—

Test interval

Adjustable limit value for the interval for mandatory testing:

Test interval: 0 to 255 weeks (default: 0)

4.4.10 Hysteresis for monitoring functions

The following diagram illustrates the function of the hysteresis for monitoring functions:

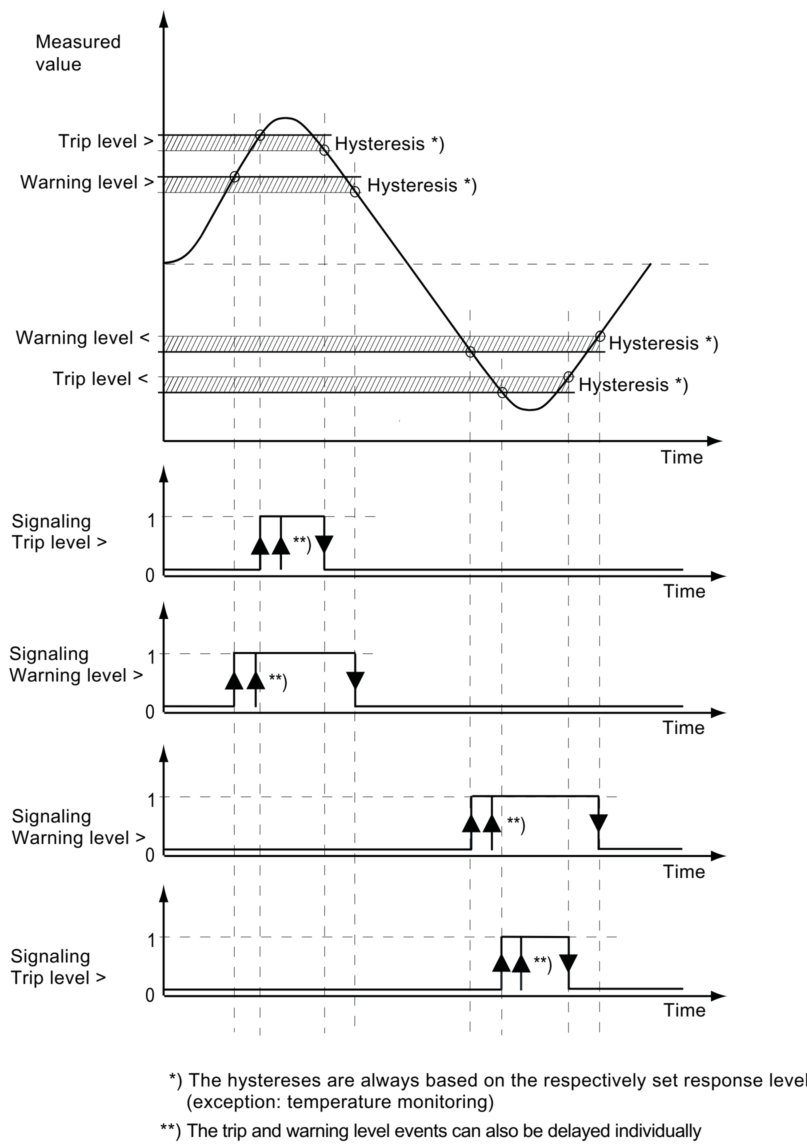


Figure 4-46 The hysteresis operating principle for monitoring functions

TL = Trip level (trip)
WL = Warning level (warn)

4.5 Outputs

4.5.1 Overview of outputs

Description

SIMOCODE pro has various outputs. These are represented by different function blocks in SIMOCODE pro. They are the external SIMOCODE pro interfaces. Within SIMOCODE pro, the outputs are represented as plugs on the corresponding function blocks and can be assigned to any functions or events via connections.

Outputs include:

- Output terminals ⊘, located on the outside of basic unit, digital modules, and on the analog module
- LEDs on the operator panel for visualizing the operating state or different statuses
- Outputs to PROFIBUS DP (cyclic and acyclic).

Schematic

The following schematic shows a general representation of the various types of output:

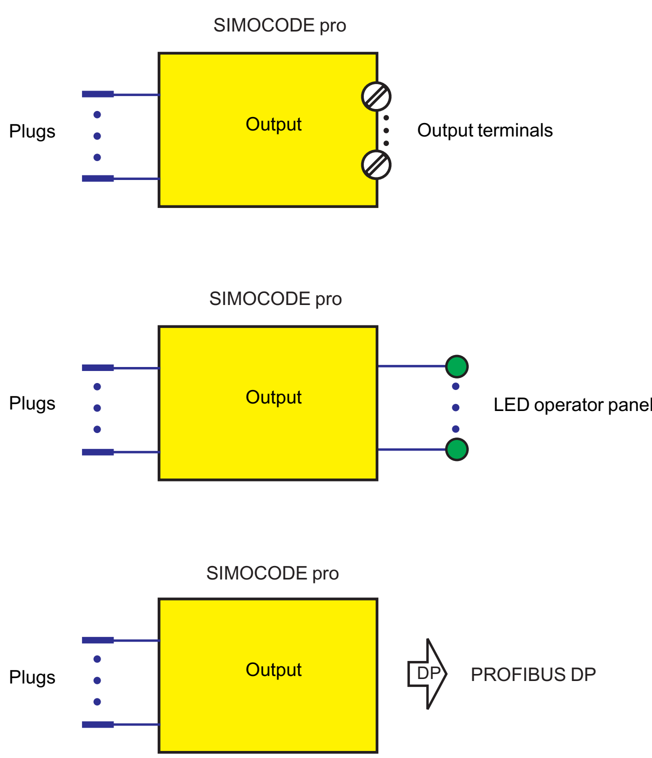


Figure 4-47 General representation of the various output types

Scope and application

Outputs are used, e.g. for controlling motor contactors, displaying states or signaling via the communication bus. The system provides different types of output depending on the device series and the expansion modules in use:

Table 4-51 Outputs

Outputs	SIMOCODE pro						
	BP	GP		HP			
	C	S	V PN GP	V PB	V MR	V PN	V EIP
Basic unit outputs (BU Outputs)	✓	✓	✓	✓	✓	✓	✓
Operator panel LEDs (OP LED)	✓	✓	✓	✓	✓	✓	✓
Digital module 1 outputs (DM1 Outputs)	—	✓ 1)	✓	✓	✓	✓	✓
Digital module 2 outputs (DM2 Outputs)	—	—	—	✓	✓	✓	✓
Analog module output (AM1 output/AM2 output)	—	—	—	✓ 2)	✓ 2)	✓	✓
Acyclic send data (Acyclic send)	✓	✓	—	✓	✓	—	—
OPC-UA send	—	—	✓	—	—	✓	—
Cyclic send data (Cyclic send)	✓	✓	✓	✓	✓	✓	✓

1) for the SIMOCODE pro S basic unit, the DM1 outputs are on the multifunction module.

2) only AM1 output available

4.5.2 Basic unit outputs

Description

SIMOCODE pro has a "BU Outputs" function block with two or three relay outputs. You can, for example, switch contactors or lamps via these relay outputs. For this, the inputs (plugs) of the function block must be connected to the respective sockets (usually the QE contactor controls of the control function). The "BU Outputs" function block consists of:

- Three plugs corresponding to the relay outputs Out1 to Out3
- Three relays
- Output terminals.

In total, one function block "BU outputs" is available on the pro C, pro S, and pro V basic units.

Schematic

The following schematics show the "BU Outputs" function block:

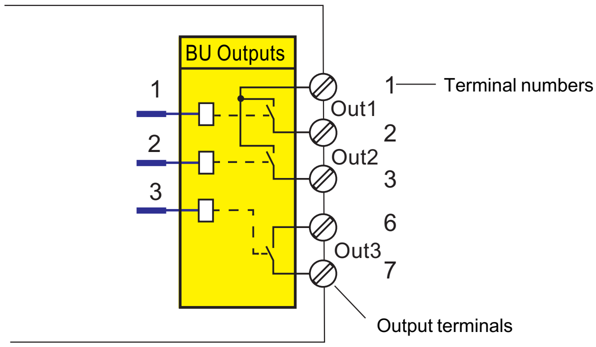


Figure 4-48 "BU Outputs" function block, SIMOCODE pro C, pro V

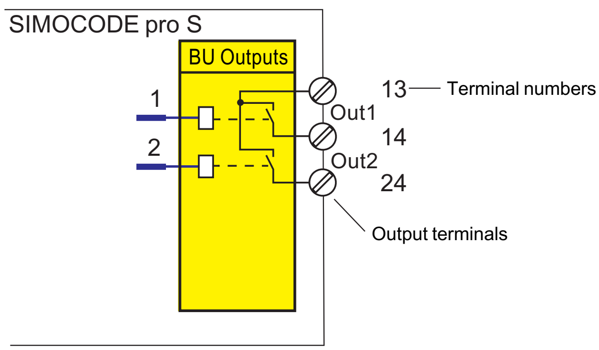


Figure 4-49 Function block "BU outputs," SIMOCODE pro S

Application examples

- Activation of the main contactor in the motor feeder: You can, for example, define which relay output is used for activating the motor contactor in the motor feeder. To do this, connect the desired relay output to the respective "QE..." contactor activation of the control function.
- Activation of lamps for displaying operating states: You can define, for example, which relay outputs are to be used for controlling the lamps / LEDs that display the operating states of the motor (Fault, ON, OFF, FAST, SLOW...). To do this, connect the desired relay output to the respective "QE..." contactor activation of the control function. These are provided specially for activating lamps and LEDs. In addition to the status signals, the "QL..." lamp controls automatically signal the following using a 2-Hz flashing frequency:
  - Test mode (QLE... / QLA lamp outputs are flashing)
  - Unacknowledged fault (lamp output general fault QLS is flashing)
  - Transfer of any other information, status information, warnings, faults, etc. to the relay outputs.
  - Lamp test: All QL outputs are activated for approx. 2 s.

In most cases, the outputs of the basic unit will be connected to the QE or QL outputs. By referring to Table "Active control stations, contactor controls, lamp controls and status information for the control functions," you can determine which QE outputs are required for which control function.

Settings

Table 4-52 Basic unit output settings

BU outputs	Description
Outputs 1 to 3	Control of the "BU Outputs" function block via any signal (any socket, e.g. device inputs, PROFIBUS DP control bits, etc.), usually from the QE contactor controls.

Defaults depend on the selected application (template): See Application selection, settings and definitions of control functions (Page 81).

4.5.3 Operator panel LEDs

Description

SIMOCODE pro has an "OP LED" function block for controlling the seven freely assignable LEDs. The LEDs are in the operator panel and can be used to display any status. For this, the inputs (plugs) of the "OP LED" function block must be connected to the respective sockets (e.g. to the sockets for the status information of the control function).

Note

The "OP LED" function block can only be used if the operator panel (OP) is connected and configured in the device configuration!

The "OP LED" function block consists of:

- Four plugs, "OP LED green 1" to "OP LED green 4," corresponding to the green LEDs. The green LEDs are optically / mechanically allocated to the buttons on the operator panel. They normally display feedback concerning the motor operating state.
- Three plugs, "OP LED yellow 1" to "OP LED yellow 3," corresponding to the yellow LEDs.
- Four green LEDs.
- Three yellow LEDs (not for the operator panel with display).

One "OP-LED" function block is available for the SIMOCODE pro C, pro S, pro V, pro V MR, pro V PN and pro V EtherNet/IP basic units.

LEDs of the operator panel

The following diagram shows the front view of the operator panel and the LEDs:

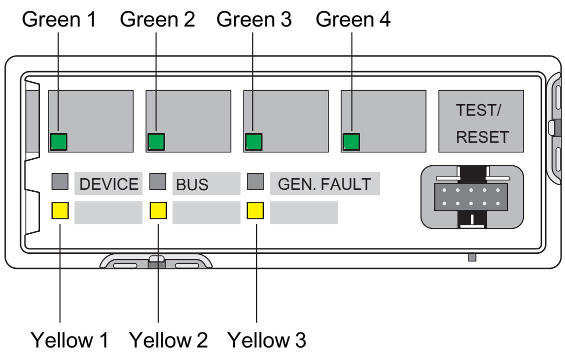


Figure 4-50 LEDs of the operator panel

LEDs of the operator panel with display

The following diagram shows the front view of the operator panel with display and the LEDs:

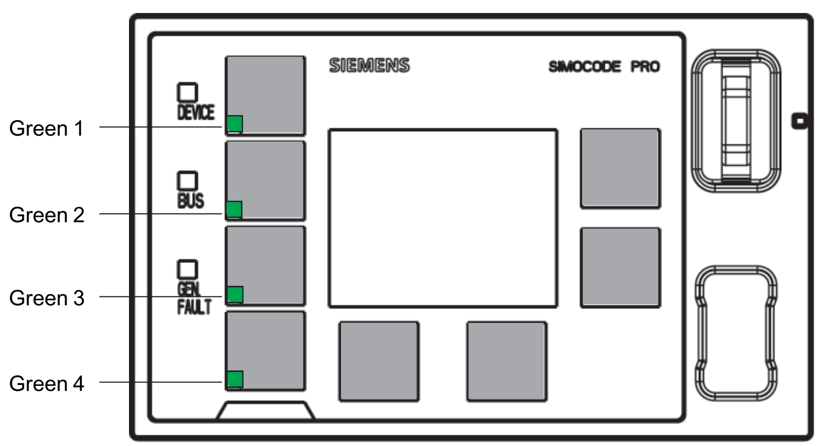


Figure 4-51 LEDs of the operator panel with display

Schematic

The following schematic shows the "OP LED" function block:

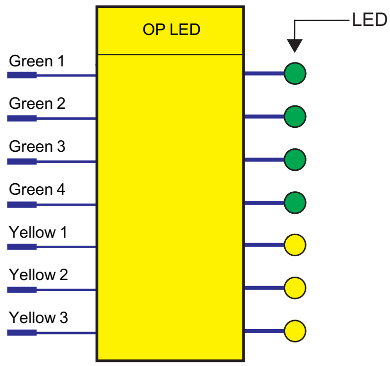


Figure 4-52 Schematic of the "OP LED" function block

Note

The three yellow LEDs mentioned in this section are not available for the operator panel with display. Status information can be read out here directly via the display. While it is still possible to connect the corresponding three plugs via the software, they remain non-functional.

Application examples

- Displaying operating states:
  You can define which LEDs are to be used for displaying the operating states (Fault, ON, OFF, FAST, SLOW...). To do this, connect the desired LED to the respective "QL." lamp control of the control function.
  In many cases, the LEDs are connected with the QL outputs. By referring to Table Active control stations, contactor controls, lamp controls and status information for the control functions (Page 123), you can determine which QL outputs are required for which control functions.
- Transfer of any other information, status information, warnings, faults, etc. to the yellow LEDs.

Settings

Table 4-53 Operator panel LED settings

OP LED	Description
Green 1 to Green 4	The "OP LED" function block can be activated by any signal (any sockets, e.g. "motor" operating state feedback).
Yellow 1 to Yellow 3 1)	The "OP LED" function block can be activated by any signal (any sockets, e.g. displays for status, events, faults).
1) No function when using the operator panel with display	

Defaults depend on the selected application (template): See Chapter Application selection, settings and definitions of control functions (Page 81).

4.5.4 Digital module outputs

Description

SIMOCODE pro has two "DM1 Outputs" and "DM2 Outputs" function blocks, which are each equipped with two relay outputs. You can, for example, switch contactors or lamps via these relay outputs. For this, the inputs (plugs of the "DM Outputs" function blocks) must be connected to the respective sockets (e.g. of the control function).

Note

"DM Outputs" function blocks can only be used if the corresponding digital modules (DM) or multifunction modules (MM) are connected and configured in the device configuration!

Each function block has:

- Two plugs, corresponding to relay outputs Out1, Out2
- Two relays
- Output terminals.

The following are available:

- a "DM1 Outputs" function block on the pro S basic unit 1)
- two function blocks "DM1 outputs" and "DM2 outputs" on the basic units pro V.

Note

1) for the SIMOCODE pro S basic unit, the DM1 outputs are on the multifunction module.

Note

In addition to the two jointly-switched fail-safe enabling circuits, the fail-safe DM-F Local and DM-F PROFIsafe digital modules are equipped with two standard relay outputs, the common potential of which is switched off for safety reasons via an enabling circuit.

From a logical connection point of view, the standard relay outputs are always switched. The state of the fail-safe enabling circuits is not affected by the logical wiring.

Schematic

The following schematic shows the "DM Outputs" function blocks:

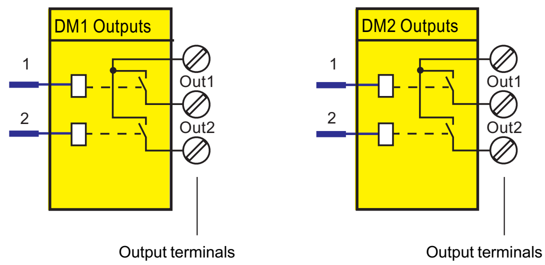


Figure 4-53 Schematic of the "DM1 Outputs" / "DM2 Outputs" function blocks

Application examples

- Activation of the motor contactor in the motor feeder:
  You can, for example, define which relay output is to be used for activating the main contactor in the motor feeder. To do this, connect the desired relay output to the respective "QE" contactor control of the control function.
- Activation of lamps for displaying operating states:
  You can define, for example, which relay outputs are to be used for controlling the lamps/LEDs that display the operating states of the motor (Fault, ON, OFF, FAST, SLOW ...). To do this, connect the desired relay output to the respective "QL..." lamp control of the control function.
- Transfer of any other information, status information, warnings, faults, etc. to the relay outputs.

In many cases, the outputs of the digital module will be connected to the QE outputs. By referring to Table Active control stations, contactor controls, lamp controls and status information for the control functions (Page 123), you can determine which QE outputs are required for which control functions.

Settings

Table 4-54 "DM1 / DM2 Outputs" settings

"DM1 / DM2 Outputs"	Description
Outputs 1 to 2	Control of the "DM1 Outputs" and "DM2 Outputs" function blocks via any signal (any socket, e.g. device inputs, PROFIBUS DP control bits, etc. usually from the QE contactor controls.)

Defaults depend on the selected application (template): See Chapter Application selection, settings and definitions of control functions (Page 81).

4.5.5 Analog module output

Description

You can use analog modules 1 and 2 to expand the SIMOCODE pro V High Performance Basic Unit with one analog output in each case. The corresponding function blocks "AM1 Output" and "AM2 Output" (AM2 Output only in conjunction with the SIMOCODE pro V PN and pro V EIP basic units) allow every analog value (2 bytes/1 word) in SIMOCODE pro to be output as a 0/4 A - 20 mA signal to a connected pointer instrument, for example. If the function block is activated via the "Assigned analog output value" plug using any integer value between 0 and 65535, an equivalent analog signal of 0 to 20 mA or 4 to 20 mA will be sent to the output terminals of the analog module.

Note

The "AM1 Output" and "AM2 Output" function blocks can only be used if the analog module (AM) is connected and configured in the device configuration.

Schematic

The following schematic shows the "AM1 Output" function block:

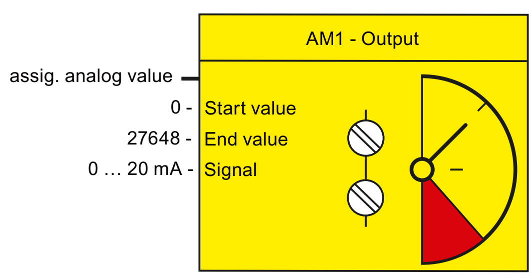


Figure 4-54 Function block "AM1 - output"

Settings

Table 4-55 "Analog module output" settings

Signal/value	Range
Assigned analog output value	Any value (1 word/2 bytes) in SIMOCODE pro
Output signal	0 to 20 mA (default) or 4 ... 20 mA
Start value of value range	0 to 65535 (default: 0)
End value of value range	0 to 65535 (default: 0)

Note

Passive inputs

The inputs of the analog module are passive inputs, i.e. to configure an analog input circuit, each input will require an additional, isolated external current source connected in series. If the output of the analog module is not being used by another application, it can also be used as a current source for an analog module input circuit. The "Start value of value range" and the "End value of value range" of the analog module output have to be set to 65535 for this. Thus, the maximum possible current will always be available via the analog module output.

Application examples

1) Output of the effective motor current - across the entire motor current range

The motor current ranges from 0 to 8 A. The rated current I_N of the motor at nominal load is 2 A.

The set current in SIMOCODE ES I_s corresponds to the rated current I_N (2 A). In SIMOCODE pro, the present phase currents or the maximum current (current IL_1, IL_2, IL_3, max. current I_max) are represented as a percentage of the parameterized current setting I_s in accordance with the selected range:

- 0 A motor current corresponds to 0 % of I_s
- 8 A motor current corresponds to 400 % of I_s
- The smallest unit for the effective motor current in SIMOCODE pro is 1 % (see measured values in data record 94, manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960)).

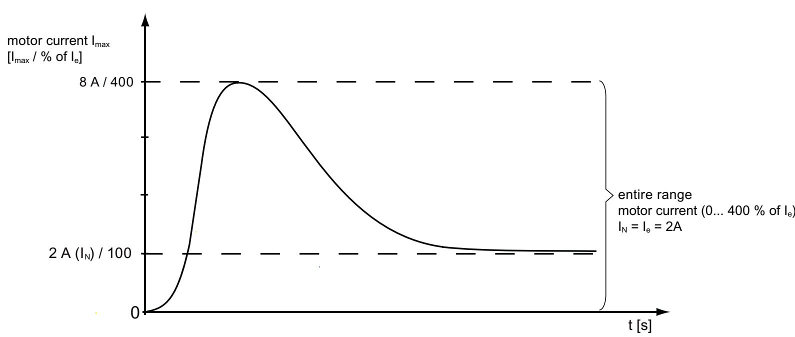


Figure 4-55 Application example: Motor current output - entire range

As a result,

- The "Start value of value range" to be selected is: 0
- The "End value of value range" to be selected is: 400.

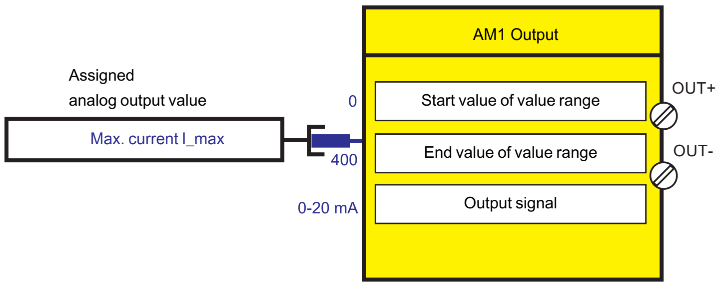


Figure 4-56 Application example: Motor current output - output values to function block AM output

When the parameterized "Output signal" = 0 to 20 mA:

- 0 % motor current: 0 mA at the analog module output
- 400 % motor current: 20 mA at the analog module output.

When the parameterized "Output signal" = 4 to 20 mA:

- 0 % motor current: 4 mA at the analog module output
- 400 % motor current: 20 mA at the analog module output.

2) Output of the effective motor current - only part of the motor current range (overload range)

The motor current ranges from 0 to 8 A. The rated current I_N of the motor at nominal load is 2 A.

The set current in SIMOCODE ES I_s corresponds to the rated current I_N (2 A). However, only the overload range (2 A - 8 A) is to be displayed on an instrument via the analog module output. In SIMOCODE pro, the present phase currents or the maximum current (current IL_1, IL_2, IL_3, max. current I_max) are represented as a percentage of the parameterized current setting I_s in accordance with the selected range:

- 2 A motor current corresponds to 100 % of I_s
- 8 A motor current corresponds to 400 % of I_s
- The smallest unit for the effective motor current in SIMOCODE pro is 1 % (see measured values in data record 94, manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960)).

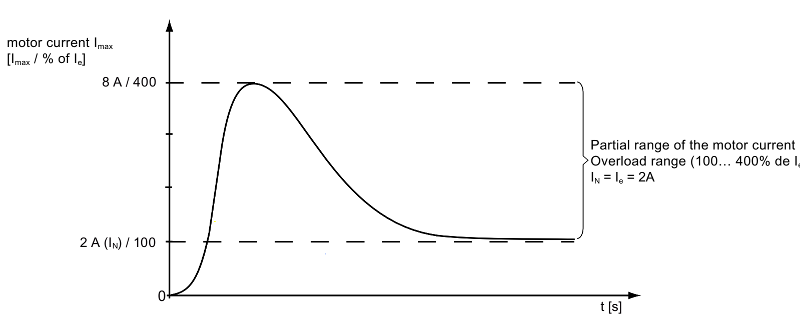


Figure 4-57 Application example: Motor current output - Overload range

As a result,

- The "Start value of value range" to be selected is: 100
- The "End value of value range" to be selected is: 400.

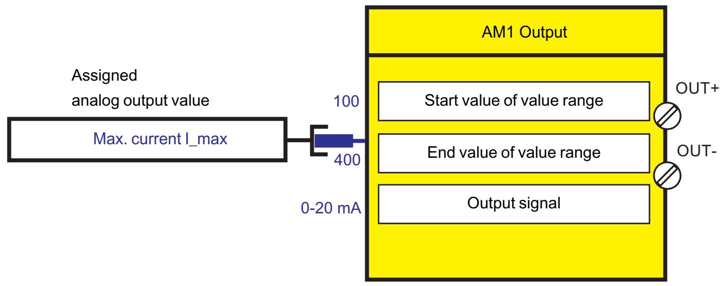


Figure 4-58 Application example: Motor current output - output value to function block AM1 output

When the parameterized "Output signal" = 0 to 20 mA:

- 100 % motor current: 0 mA at the analog module output
- 400 % motor current: 20 mA at the analog module output.

When the parameterized "Output signal" = 4 to 20 mA:

- 100 % motor current: 4 mA at the analog module output
- 400 % motor current: 20 mA at the analog module output.

Note

(relating to examples 1 and 2):

In SIMOCODE pro, phase currents are available as a percentage of the current setting I_s. When using the analog module output to display the present motor current on a connected pointer instrument, the present motor current is always indicated as a percentage of the current setting. If the selected control function is for a motor with only one speed, the pointer instrument can display a percentage (% of I_s) and an absolute value (e.g. in A).

In the case of motors / control functions with two speeds and, thus, two current settings (e.g. pole-changing starters or Dahlander starters), the motor current is only shown on the pointer instrument as a percentage of the present current setting I_s1 or I_s2, depending upon which of the two speeds (slow or fast) currently applies.

3) Output of any analog value from the automation system cyclically via the communication bus

One word (2 bytes) can be transmitted cyclically from the automation system to SIMOCODE pro via PROFIBUS; two words (2 times 2 bytes) can be transmitted via PROFINET. Any value can be output as a 0/4 to 20 mA signal by directly connecting this cyclic control word to the analog module output. If the transmitted value is in S7 Format (0 to 27648), this must be taken into consideration when parameterizing:

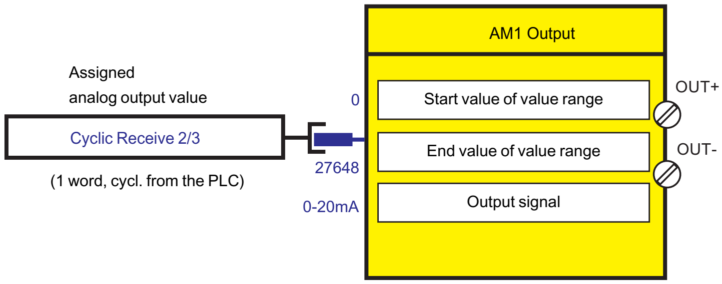


Figure 4-59 Output of an analog value from the automation system

As a result,

- The "Start value of value range" to be selected is: 0
- The "End value of value range" to be selected is: 27648.

When the parameterized "Output signal" = 0 to 20 mA

- 0: 0 mA at the analog module output
- 27648: 20 mA at the analog module output.

When the parameterized "Output signal" = 4 to 20 mA

- 0: 4 mA at the analog module output
- 27648: 20 mA at the analog module output.

4.5.6 Cyclic Send

Description

The "Cyclic Send" function blocks allow you to specify the information to be transferred cyclically to the automation system via the communication bus.

"Cyclic send" function blocks consist of

- 16 bits (two bytes, byte 0 and byte 1 for binary information)
- 9 words (= 18 bytes, for up to 9 analog values, freely parameterizable).

A total of nine "Cyclic Send" function blocks (0, 1, 2/3, 4/9, 10/19, 2-5, 6-9, 10-13, 14-17) are available.

Schematic

The following schematic shows the "Cyclic send" function blocks:

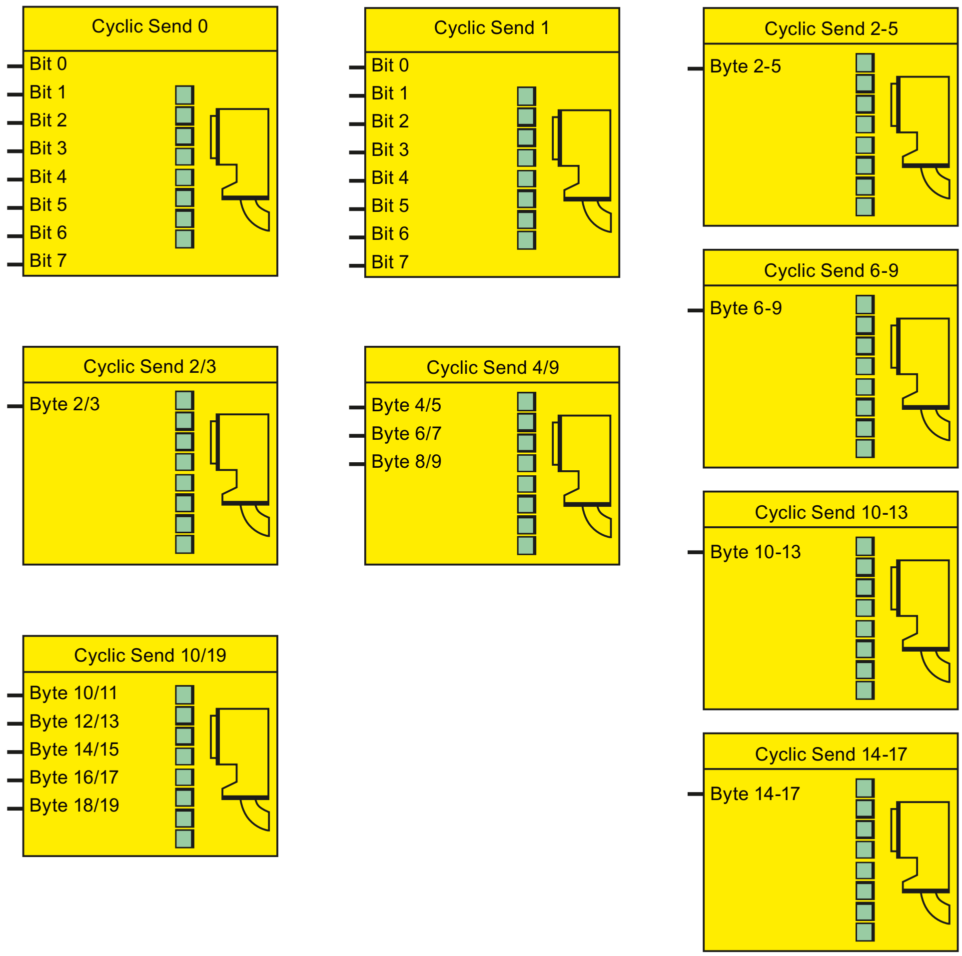


Figure 4-60 Schematic of the "Cyclic send" function blocks

Cyclic PROFIBUS DP services

Cyclic send data is exchanged between the DP master and the DP slave once in every DP cycle. The DP master sends the cyclic receive data to SIMOCODE pro. In response, SIMOCODE pro sends the cyclic send data to the DP master.

Cyclic services for PROFINET / EtherNet/IP

The cyclic send data is exchanged between the IO Device / adapter (SIMOCODE pro) and the IO Controller / scanner (automation system). The IO Controller sends the cyclic receive data to SIMOCODE pro in each case. In response, SIMOCODE pro returns the cyclic send data.

Cyclic send data settings

The cyclic send data is divided up into the following ranges:

- Byte 0/1, bit 0 - bit 7: For assignment of the bits with any signals (e.g. device inputs, events, faults)
- Bytes 2-19: For assignment with any analog values (length: 2 bytes, e.g. maximum current I_max in %, remaining cooling down period, actual value of timers) or floating-point values (length: 4 bytes, only with current/voltage measuring module UM+, e.g. maximum current I_max in A).

The number of available bytes depends on the basic type selected.

The following basic types are available for the following device series:

Basic type	**SIMOCODE pro**				
	C	**S**	**V PN GP**	**V PB**	**V PN**
1 (byte 2-9)	—	✓	✓	✓	✓
2 (byte 2/3)	✓	✓	✓	✓	✓
3 (byte 2-19)	—	—	✓	—	✓

Byte 0 of the send data is already pre-assigned; byte 2/3 is pre-assigned with the max. current I_max.

See also "Telegram description and data access" in the manual "SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960)".

4.5.7 Acyclic Send

Description

In addition to "Cyclic Send" it is also possible to transfer a further 16 bits of binary information to the PLC / PC via acyclic services. The "Acyclic Send" function blocks allow you to specify the information to be transferred acyclically to the automation system via the communication bus. The inputs (plugs) of the function blocks must be connected to the respective sockets.

The Acyclic Send function blocks consist of:

- Eight bits each (= two bytes, byte 0 and byte 1 for binary information)
- One output each to the communication bus

There are two "Acyclic send" function blocks.

Schematic

The following schematic shows the "Acyclic send" function blocks:

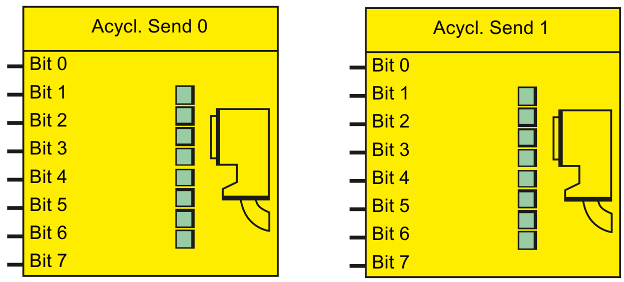


Figure 4-61 Function block "Acyclic send"

Acyclic services

Acyclic send data will only be transferred on request. The information (two bytes) can be found in data record 203. This data record can be read by every master (PLC or PC) that supports the acyclic services of the communication bus.

Settings

Table 4-56 Acyclic send data settings

Acyclic send data	Description
Byte 0 to 1, Bit 0 to bit 7	Setting and resetting of bits by means of any signal (any socket, e.g. device inputs, send data, status information, events, etc.)

4.5.8 OPC-UA send

Description

In addition to "Cyclic Send," it is possible to transfer a further 16 bits of binary information via OPC UA.

With the "OPC UA Send" function block, you can specify which information is to be transferred. The inputs (plugs) of the function blocks must be connected to the respective sockets.

The "OPC-UA send" function blocks each consist of eight bits (= two bytes, byte 0 and byte 1 for binary information).

A total of two "OPC-UA Send" function blocks are available.

Schematic

The following schematic shows the "OPC-UA Send" function blocks:

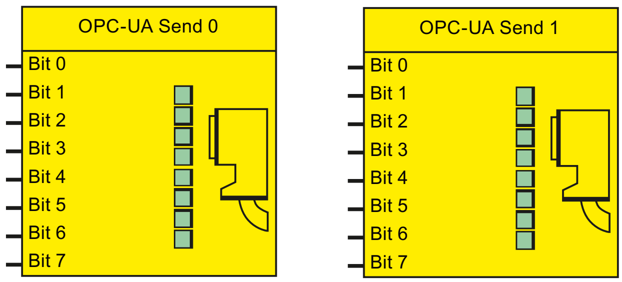


Figure 4-62 "OPC-UA send" function blocks

Settings

Table 4-57 OPC-UA Send Data settings

OPC-UA Send Data	Description
Bytes 0 to 1, bits 0 to 7	Setting and resetting of bits by means of any signal (any socket, e.g. device inputs, send data, status information, events, etc.)

Note

Data record 203 can still be read by every master (PLC or PC) as acyclic send data.

4.6 Inputs

4.6.1 Overview of inputs

Description

SIMOCODE pro has various inputs. These are represented by different function blocks in SIMOCODE pro. These function blocks are the ingoing SIMOCODE pro interfaces. Within SIMOCODE pro, these inputs are represented as sockets on the corresponding function blocks and can be assigned via connections to any functions. Inputs can be:

- Input terminals ⊘, located on the outside of the basic units and digital modules
- Buttons on operator panels (one Test / Reset button, four freely parameterizable buttons), and basic units (one Test / Reset button)
- Temperature module inputs
- Analog module inputs
- Inputs of the communication bus

Schematic

The following schematic shows the general representation of the various input types:

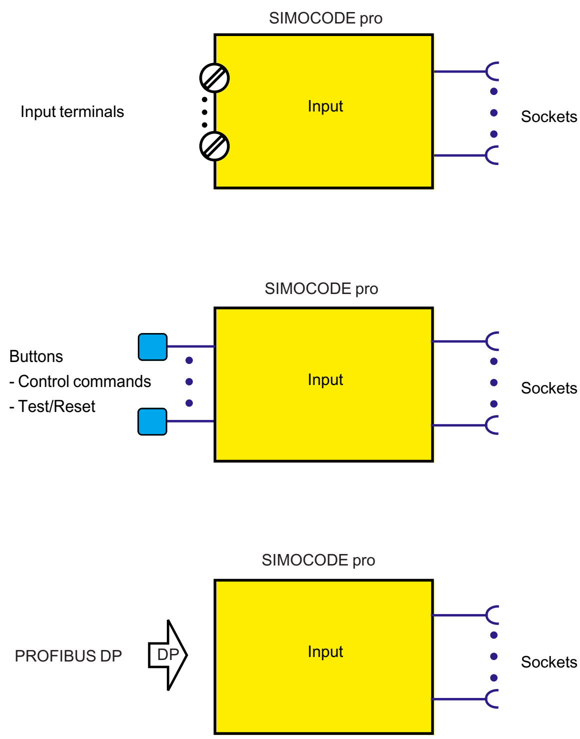


Figure 4-63 General representation of the input types

Scope and application

Inputs are used, for example, to input external signals e.g. via pushbuttons, key-operated switches, etc. These external signals are processed further internally via appropriate connections. The system has different inputs depending upon the device series:

Table 4-58 Inputs

Inputs	**SIMOCODE pro**						
	BP	**GP**		**HP**			
	C	**S**	**V PN GP**	**V PB**	**V MR**	**V PN**	**V EIP**
Basic unit inputs (BU Inputs)	✓	✓	✓	✓	✓	✓	✓
Operator panel buttons (OP Buttons)	✓	✓	✓	✓	✓	✓	✓
Digital module 1 inputs (DM1 Inputs)	—	✓ 1)	✓	✓	✓	✓	✓
Digital module 2 inputs (DM2 Inputs)	—	—	—	✓	✓	✓	✓
Temperature module inputs (TM Inputs)	—	✓	✓	✓	✓	✓	✓

Inputs	SIMOCODE pro						
	BP	GP		HP			
	C	S	V PN GP	V PB	V MR	V PN	V EIP
Analog module inputs (AM Inputs)	—	—	—	✓	✓	✓	✓
Acyclic receive (Acycl. receive)	✓	✓	—	✓	✓	—	—
Cyclic receive (Cycl. receive)	✓	✓	✓	✓	✓	✓	✓
Ethernet - OPC-UA Receive	—	—	—	—	—	✓	—

1) for the SIMOCODE pro S basic unit, the inputs and the temperature input are on the multifunction module.

4.6.2 Basic unit inputs

Description

SIMOCODE pro has a "BU Inputs" function block with four binary inputs connected to common potential. You can connect, for example, the buttons for a local control station to the inputs. These signals can be further processed in SIMOCODE pro by internally connecting the sockets of the "BU Inputs" function block.
The "BU Inputs" function block consists of:

- Input terminals⊘ located on the outside of the basic unit, corresponding to the sockets "BU Input 1" to "BU Input 4"
- Sockets in SIMOCODE pro that can be connected to any plugs, e.g. to the "Control Stations" function block
- A socket for the "TEST / RESET" button:
  The function of the "TEST / RESET" button is generally dependent upon the operating state of the device:
  - Reset function for the acknowledgement of pending faults
  - Test function for carrying out device tests

In addition, other functions can be assigned to the "TEST / RESET" button (e.g. operation of the memory module and of the addressing plug).
See also Chapter Test / Reset (Page 191).

There is 1 "BU Inputs" function block.

Schematic

The following schematic shows the "BU Inputs" function block:

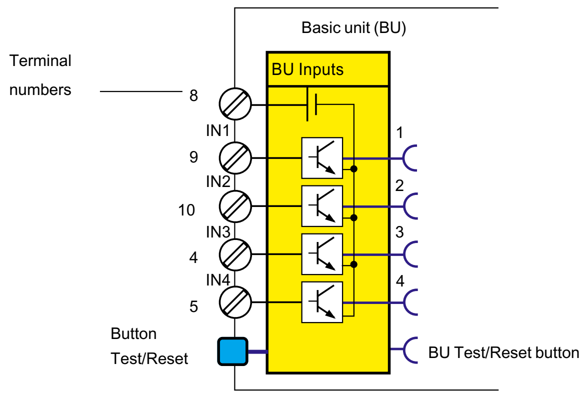


Figure 4-64 Schematic of the "BU Inputs" function block

Application examples

The inputs can be used, for example, for connecting the start and stop buttons of the local control station, which can then be assigned to the "Local Control Station" function block.
If assigned accordingly, the input signals can also be used to activate function blocks such as "Reset" or "External Fault."

Power supply to the inputs

See Chapter on "Wiring basic units, expansion modules and the decoupling module" in SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Settings

Table 4-59 "Basic unit inputs" settings

Inputs	Description
Debounce time	You can set a debounce time for the inputs, if required. Range: 6, 16, 26, 36 ms (default: 16 ms)

4.6.3 Operator panel buttons

Description

The operator panel contains buttons 1 to 4 as well as the "TEST / RESET" button. Correspondingly, the "OP Buttons" function block is available in SIMOCODE pro with five sockets.

Note

The "OP Buttons" function block can only be used if the operator panel (OP) is connected and configured in the device configuration!

Note

The operator panel with display does not have a Test / Reset button. The allocated functions can be carried out via the operator panel menu or via softkeys. Similarly, the corresponding status signal will then be available at the "OP Test / Reset Button" socket.

- Operator panel, buttons 1 to 4: Buttons 1 to 4 are usually used to input control commands for the motor feeder. Control commands can be, for example:
  - Motor ON (ON >), Motor OFF (OFF) for a direct starter
  - Motor CCW (ON <), Motor OFF (OFF), Motor CW (ON >) for a reversing starter
  - Motor SLOW (ON >), Motor FAST (ON >>), Motor OFF (OFF) for a Dahlander circuit.

However, buttons 1 to 4 are not rigidly assigned to the above mentioned control commands, and can be assigned to other functions via different internal connection of the respective function block socket in SIMOCODE pro.

- "TEST / RESET" button. Operator control block: The function of the "TEST/RESET" button is generally assigned to fixed functions:
  - Reset function for the acknowledgement of pending faults
  - Test function for carrying out device tests.
  - Operation of the memory module or the addressing plug

Nevertheless, the status of the "TEST/RESET" button can be picked off at the corresponding socket of the function block and assigned to further functions in SIMOCODE pro.

See also chapters Test / Reset (Page 191) as well as "Setting the PROFIBUS DP address" and "Backing up and saving parameters" in the SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Operator panel buttons

The following figure shows the front view of the operator panel and the buttons:

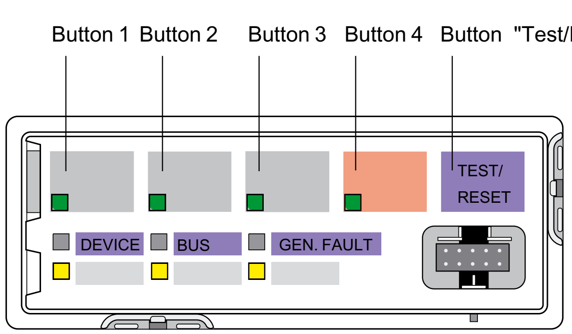


Figure 4-65 Operator panel buttons

Buttons on the operator panel with display

The following figure shows the front view of the operator panel with display and the buttons:

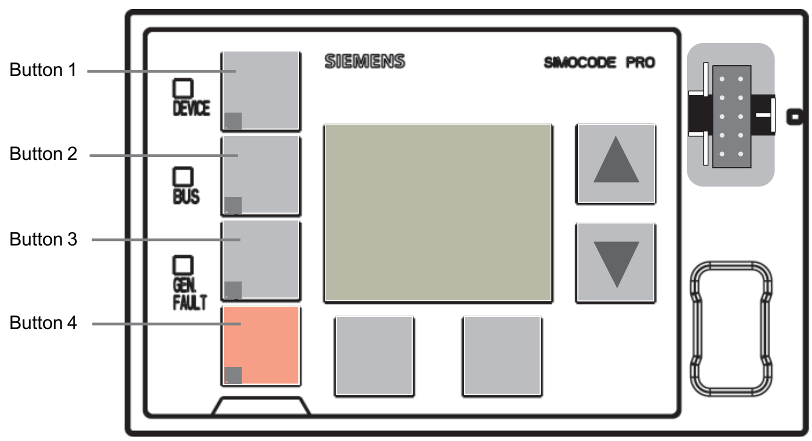


Figure 4-66 Buttons on the operator control block with display

Schematic

The following schematic shows the "OP buttons" function block:

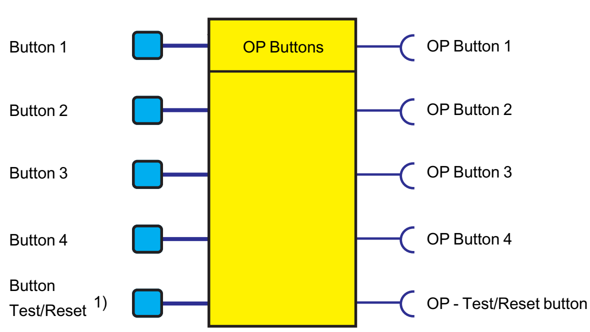


Figure 4-67 Schematic of the "OP Buttons" function block

1) For menu-assisted operation on the operator panel with display

4.6.4 Digital module inputs

Description

SIMOCODE pro has two "DM Inputs" function blocks, each with 4 binary inputs connected to common potential. You can connect, for example, the buttons for a local control station to the inputs. These signals can be further processed in SIMOCODE pro by internally connecting the sockets of the "DM Inputs" function blocks.

Note

"DM Inputs" function blocks can only be used if the corresponding digital modules (DM) or a multifunction module (MM) are connected and configured in the device configuration!

Each "DM Inputs" function block consists of:

- Input terminals ⊘ located on the outside of the digital module, corresponding to the sockets "DM Input 1" to "DM Input 4"
- Sockets in SIMOCODE pro that can be connected to any plugs, e.g. to the "Control Stations" function block

The following are available:

- A function block "DM1 Inputs" on the SIMOCODE pro S multifunction module
- Two function blocks "DM1 inputs" and "DM2 inputs" on the SIMOCODE pro V basic unit.

Schematic

The following schematic shows the "DM1 / DM2 Inputs" function blocks:

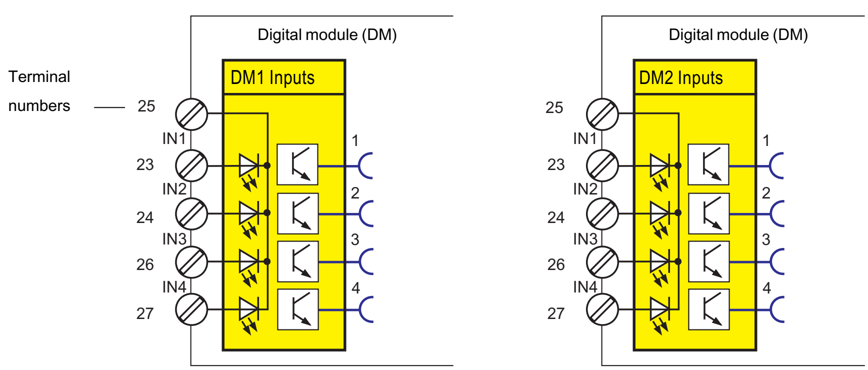


Figure 4-68 Schematic of the "DM1 / DM2 Inputs" function blocks

The following schematic shows the "DM1 Inputs" function block as a DM-F Local fail-safe digital module:

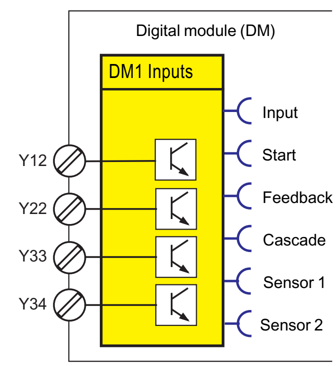


Figure 4-69 Schematic of the "DM1 Inputs" function block as a DM-F Local fail-safe digital module

Table 4-60 Inputs, "DM1 Inputs" function block as a DM-F Local fail-safe digital module

Input	Description
Input	1 - Ready to switch on - logical linking of sensor inputs 1 and 2 and the cascading input, consideration also of discrepancy or cross-fault errors
Start	Start: Start input state (Y33)
Feedback	Feedback: Feedback circuit state (Y34): 1 - closed, 0 - open
Cascading	Cascading input state (1)
Sensor 1	Sensor circuit 1 state (Y12)
Sensor 2	Sensor circuit 2 state (Y22)

The following schematic shows the "DM1 Inputs" function block as a DM-F PROFIsafe fail-safe digital module:

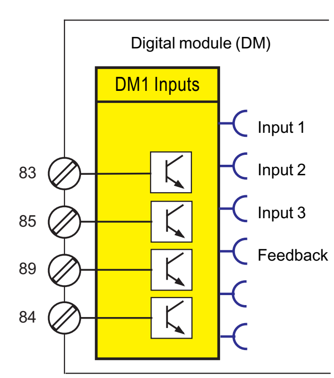


Figure 4-70 Schematic "DM1 Inputs" function block as a DM-F PROFIsafe fail-safe digital module

Table 4-61 Inputs, "DM1 Inputs" function block as a DM-F PROFIsafe fail-safe digital module

Input	Description
input 1	IN1 (84) state
input 2	IN2 (85) state
input 3	IN3 (89) state
Feedback	Feedback circuit state FBC (91): 1 - closed, 0 - open

Input	Description
Sensor 1	—
Sensor 2	—

Application examples

Digital modules allow the number of binary inputs and binary outputs on basic unit to be increased in increments. The high-performance SIMOCODE pro V devices can thus be extended, for example, to a maximum of twelve binary inputs and seven binary outputs. If assigned accordingly, the input signals can be also used to activate, for example, function blocks such as "Reset" or "External Fault". An external fault can be, for example, the binary signal of an external speed monitor, signaling that the nominal speed of a motor has been undershot.

Power supply to the inputs

See "Description of system components → Digital module" and "Description of system components → Fail-safe digital modules" in SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Settings

Table 4-62 "DM1 / DM2 Inputs" settings

Inputs	Description
Debounce time	You can set a debounce time for the inputs, if required. Range: 6, 16, 26, 36 ms (default: 16 ms). These values apply to digital modules with a 24 V DC input supply. The values are approximately 40 ms higher for digital modules with input supplies of 110 to 240 V AC/DC.

Note

Delays for the digital module inputs can only be set, or are only relevant, if "monostable" or "bistable" is set for digital module 1.

If digital module 1 is a DM-F PROFIsafe, then the debouncing time cannot be set.

If digital module 1 is a DM-F Local, then the debouncing times are set using the DIP switch on the front of the DM-F Local.

Non-safety functions (fail-safe digital modules)

- If digital module1 is a DM-F Local, it is a digital module with non-safety inputs, relay outputs and diagnostics in a SIMOCODE pro system.
- If digital module 1 is a DM-F PROFIsafe, it is a digital module with non-safety inputs, relay outputs and diagnostics in a SIMOCODE pro system.

Detailed information on fail-safe digital modules: See "Description of system components → Fail-safe digital modules" in SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

4.6.5 Temperature module inputs

Description

SIMOCODE pro has a "TM1 Inputs" function block with three analog sockets corresponding to the three sensor measuring circuits of the temperature module. The temperature (in K) of the three measuring circuits can be read from these sockets and processed internally. An additional analog socket always supplies the maximum temperature of all three measured temperatures. Furthermore, the two binary sockets of the function block represent the status of the sensor measuring circuits. The analog values can be processed internally and / or transmitted cyclically to the automation system via the "Cyclic Send" function blocks.

Note

The "TM1 Inputs" function block can only be used if the temperature module (TM) or the multifunction (MM) is connected and configured in the device configuration!

Schematic

The following schematic shows the "TM Inputs" function block:

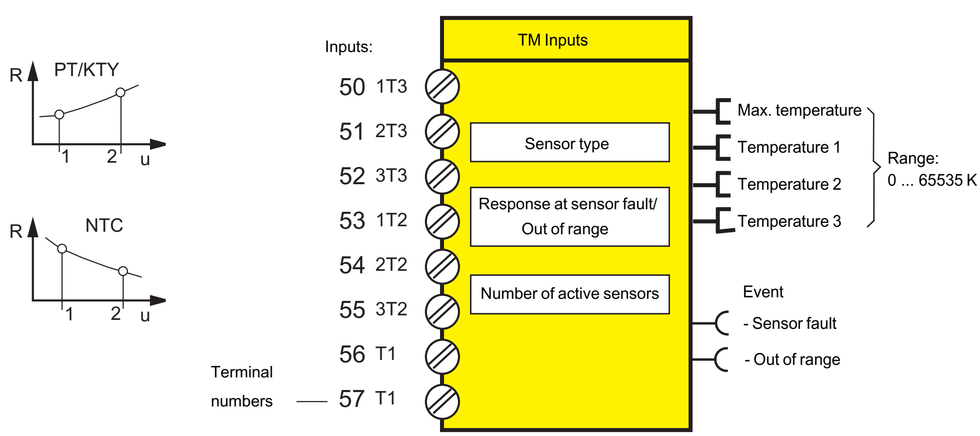


Figure 4-71 Schematic of the "TM Inputs" function block

Notes on wiring

You can connect up to three 2-wire or 3-wire temperature sensors to a temperature module.

You can connect a 2-wire or 3-wire temperature sensor to a multifunction module.

See "Wiring basic units, expansion modules and the decoupling module" in SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957) for further information.

Application examples

Among other things, you can monitor the following motor components:

- Motor windings
- Motor bearings
- Motor coolant temperature
- Motor gearbox oil temperature

The individual temperatures of the three sensor measuring circuits can be monitored independently of each other by connecting free limit monitors.

Settings

Table 4-63 Temperature module input settings

Temperature module	Description
Sensor type	PT100 (default), PT1000, KTY83, KTY84, NTC
Response [1)] to sensor fault/out of range	Deactivated, signal, warn (default), trip
Number of active sensors	1 sensor, 2 sensors, 3 sensors (default)
1) see Table "Sensor fault / Out of range response"	

Table 4-64 "Sensor fault / Out of range" response

Response	Sensor fault/Out of range
deactivated	X
signal	X
warn	X (d)
trip	X
delay	—

See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

4.6.6 Analog module inputs

Description

SIMOCODE pro has an "AM1 Inputs" function block with two analog sockets, corresponding to the two analog inputs of the analog module. The effective analog value of each input can be read from these sockets and processed internally. An additional binary socket of the function block represents the status of the analog measuring circuits. The analog values can be processed internally and / or transmitted cyclically to the automation system via the "Cyclic Send" function blocks.

Note

The "AM1 Inputs" function block can only be used if the respective analog module (AM) has been connected and configured in the device configuration!

Schematic

The following schematic shows the "AM1 Inputs" function block:

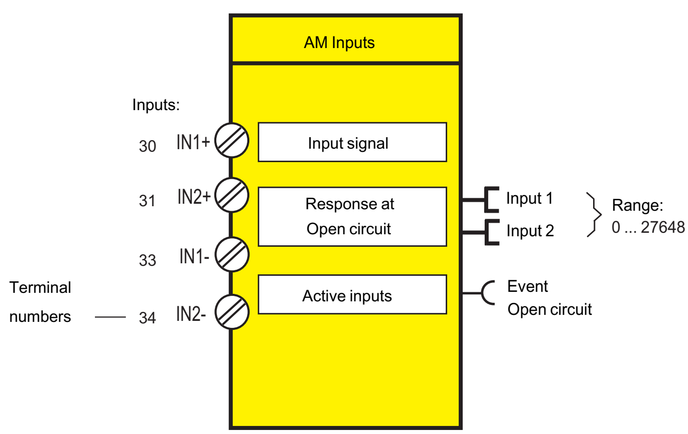


Figure 4-72 Schematic of the "AM1 Inputs" function block

Application examples

Typical applications are:

- Fill-level monitoring for implementing dry running protection for pumps
- Monitoring of pollution in a filter using a differential pressure transducer.

Settings

Table 4-65 Analog module input settings

Analog module	Description
Input signal	0 to 20mA (default), 4 to 20 mA
Response to open circuit	Signal, warn (default), tripping
Active inputs	1 input (default), 2 inputs

Notes

Note

The value of the analog module inputs is in S7 format.

Note

The inputs of the analog module are passive inputs, i.e. to configure an analog input circuit, each input will require an additional, isolated external current source connected in series. If the output of the analog module is not being used by another application, it can also be used as a current source for an analog module input circuit. The "Start value of value range" and the "End value of value range" of the analog module output have to be set to 65535 for this. Thus, the maximum possible current will always be available via the analog module output.

4.6.7 Cyclic Receive

Description

With the "Cyclic Receive" function blocks, you can specify which cyclic data from the automation system will be further processed in SIMOCODE pro. These will normally be PLC / PCS binary control commands. Connection with the "Control stations" function block in SIMOCODE pro will allow the motor to be controlled via PROFIBUS DP / PROFINET / EtherNet/IP. Direct connection of the analog value with the "AM Output" function block will result in, for example, the cyclic output of the value sent via the communication bus at the output of the analog module.

The "Cyclic receive" function blocks consist of:

- 16 bits (byte 0 and byte 1 for binary information)
- One word (= two bytes, byte 2 to 3 for an analog value, freely programmable) for basic type 1.

Overall there are four "Cyclic Receive" function blocks (0, 1, 2/3, 4/5).

Schematic

The following schematic shows the "Cyclic receive" function blocks:

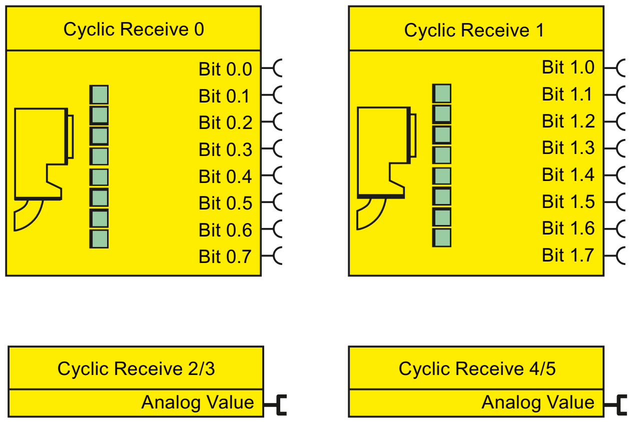


Figure 4-73 Function schematic of cyclic receive data

Cyclic services

The cyclic data is exchanged between master and slave in every communication cycle. The master sends the cyclic receive data (Cyclic Receive) to SIMOCODE pro each time. SIMOCODE pro responds by sending the cyclic send data (Cyclic Send) to the master.

4.6.8 Acyclic Receive

Description

In addition to "Cyclic Receive", it is possible to transfer further data acyclically to SIMOCODE pro via PROFIBUS DP. With the "Acyclic receive" function block, you can specify which acyclic information from the PROFIBUS DP will be further processed in SIMOCODE pro. With the "Acyclic receive" function block, you can specify which information will be further processed in SIMOCODE pro.

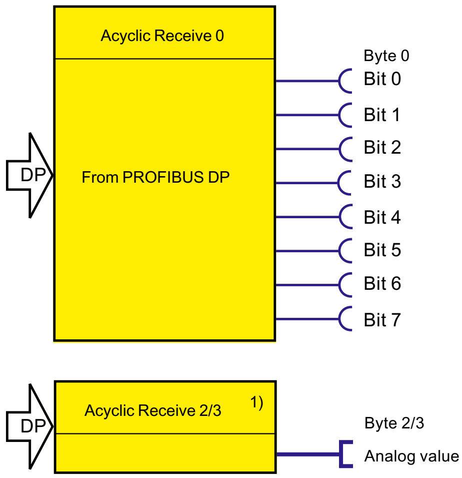
The "Acyclic receive" function blocks consist of:

- Eight bits each (byte 0 and byte 1 for binary information)
- One word (= two bytes, byte 2 to 3 for an analog value, freely parameterizable).

Overall there are three "Acyclic receive" function blocks (0, 1, 2/3)

Schematic

The following schematic shows the "Acyclic receive" function blocks:



1) BU2 with basic type 1 only

Figure 4-74 Function schematic of acyclic receive data

Acyclic services

Acyclic data are transferred only on request.
The information (4 bytes) can be found in data record 202. This data record can be written by every master (PLC or PC) that supports the acyclic services of PROFIBUS DPV1. Connection monitoring is activated every time the data record is received. The content of the data record is deleted after a 5-second time-out has elapsed.

4.6.9 OPC UA Receive

Description

In addition to "Cyclic Receive," it is possible to transfer further data to SIMOCODE pro via OPC-UA. With the "OPC UA Receive" function block, you can specify which information will be further processed in SIMOCODE pro. For this, you only have to link the sockets of the "OPC-UA Receive" function blocks to any other function blocks in SIMOCODE pro.

The "OPC-UA Receive" function blocks consist of:

- Eight bits each (= two bytes, byte 0 and byte 1 for binary information)
- One word (= two bytes, byte 2 to 3 for an analog value, freely parameterizable).

A total of three "OPC-UA Receive" function blocks (0, 1, 2/3) are provided.

Schematic

The following schematic shows the "OPC-UA Receive" function blocks:

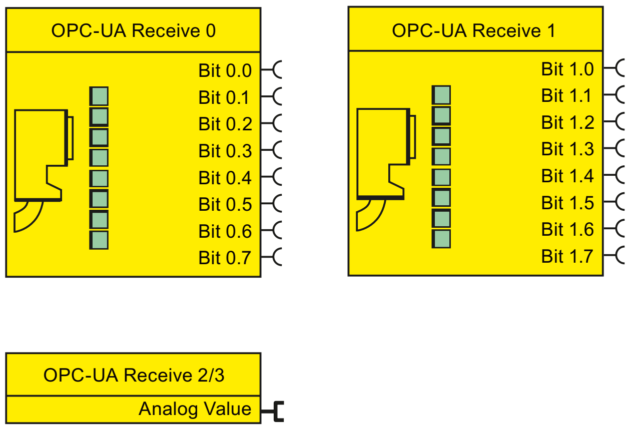


Figure 4-75 Schematic of the "OPC-UA Receive" function blocks

4.7 Analog value recording

4.7.1 Analog value recording description of functions

The "Analog Value Recording" function block can be used to record any analog values (2 bytes / 1 word) in SIMOCODE pro over a set period of time. For example, you can use this function block to record the characteristic curve of the motor current during motor startup.

The recording is made directly in SIMOCODE pro, related to the motor feeder, and independently of the communication bus or the automation system. Every analog value present at the "Allocated analog value" analog socket is recorded and saved. Recording starts on the basis of the edge (positive / negative) via any binary signal at the trigger input of the function block. Up to 60 values can be saved internally in the device. The time frame of the recording is indirectly determined by the selected sampling rate:

Sampling time = sampling rate[s] * 60 values

The pre-trigger can be used to specify how far in advance the recording should commence before the trigger signal is issued. The pre-trigger is set as a percentage of the entire sampling time. In addition, with SIMOCODE ES you can also export the measured curve into a *.csv file for further processing, for example, in MS Excel.

4.7.2 Measured curve, function block and analog value recording application example

Measured curve

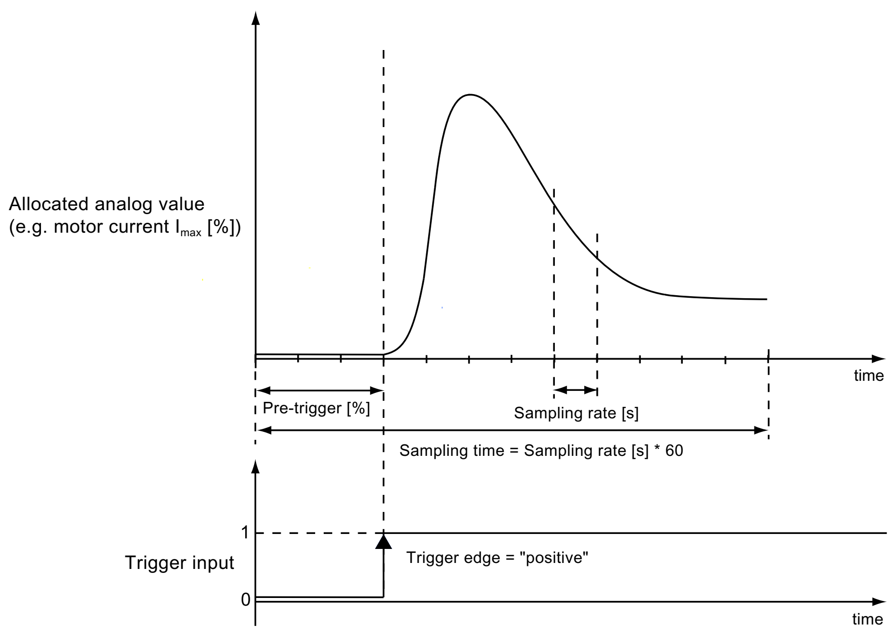


Figure 4-76 Analog value recording of measured curve

The old measured curve will be overwritten in SIMOCODE pro each time a new trigger signal is sent to the trigger input.

Schematic

The following schematic shows the "Analog Value Recording" function block:

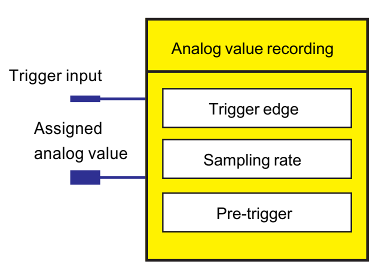


Figure 4-77 Schematic of the "Analog Value Recording" function block

Settings

Table 4-66 "Analog value recording" settings

Signal / value	Range
Trigger input	Activate analog value recording with any signal (any sockets, e.g. device inputs, current flowing)
Allocated analog value	Any value (1 word / 2 bytes) in SIMOCODE pro
Trigger edge	positive (default) / negative
Sampling rate	0.1 to 50 s, in steps of 0.1 s (default: 0.1 s)
Pre-trigger	0 to 100 % in steps of 5 % (default: 0 %)

Application example

Record the motor current when the motor starts / sampling time = 12 s / pre-trigger = 25 % (3 s):

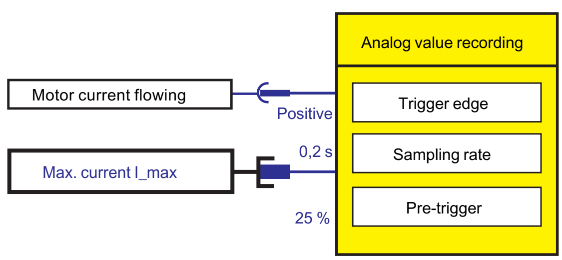


Figure 4-78 Application example of the analog value recording

4.8 Standard functions

4.8.1 Overview of standard functions

Description

So-called "Standard functions" in the form of function blocks are also stored in SIMOCODE pro, and can be used as required.
These function blocks may contain:

- Plugs
- Sockets in the form of status information
- Setting values, e.g. the response when an external fault occurs ("signal," "warn," or "trip").

Schematic

The following schematic shows the general representation of the function block of a standard function:

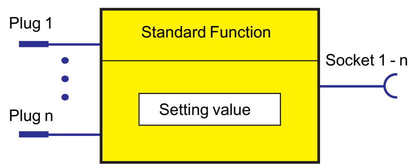


Figure 4-79 General representation of the function block of a standard function

Scope and application

These function blocks work independently of the selected control function and can be used as optional supplements. They are ready to use and only require activating by connecting the plug(s) of the respective function block. Depending on the device series, the system offers several different function blocks for such standard functions.

Table 4-67 Function blocks

Standard function block	**SIMOCODE pro**					
	BP	**GP**		**HP**		
	C	**S**	**V PN GP**	**V PB**	**V MR**	**V PN, V EIP**
Test	2	2	2	2	2	2
Reset	3	3	3	3	3	3
Test Position Feedback (TPF)	1	1	1	1	1	1
External fault	4	4	4	6	6	6
Operational Protection Off (OPO)	—	—	—	1	1	1
Power failure monitoring (UVO)	—	—	—	1	1	1
Emergency start	1	1	1	1	1	1
Watchdog (PLC / PCS monitoring)	1	1	1	1	1	1
Time stamping	—	—	—	1	—	—
Safety-related tripping	—	—	—	1		1

4.8.2 Test / Reset

Test / Reset description

The function of the "TEST / RESET" button on the basic unit or operator panel is generally dependent upon the operating state of the device:

- Reset function: If a fault occurs
- Test function: In other operating states.

In addition to the TEST / RESET buttons, SIMOCODE pro allows internal Test / Reset tripping via the "Test" function blocks. The "Test" function block consists of one plug.

In total, two function blocks, "Test 1" and "Test 2," are provided, each function block having a slightly different function:

- Test 1: Tests / trips the output relays
- Test 2: Does not trip the output relays (normally for testing via the bus).

Schematic

The following schematic shows a general representation of the "Test / Reset" function blocks:

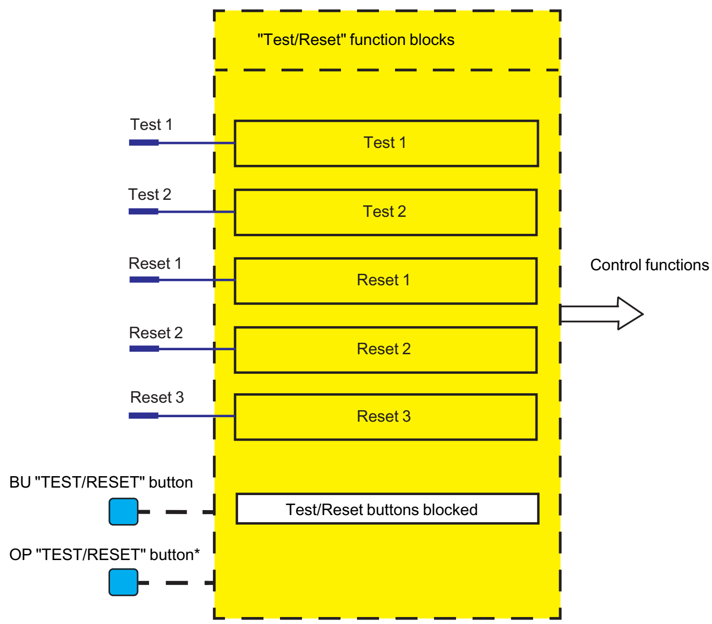


Figure 4-80 "Test / Reset" function blocks

1) The operator panel with display does not have a "TEST/RESET" button. The respective functions can be carried out via the operator panel menu or via softkeys.

Testing

Testing can be carried out as follows:

- Via the "TEST / RESET" button on the basic unit and on the operator panel (can be deactivated), as well as via PC with SIMOCODE ES software.
- Via the plugs of the internal "Test 1" or "Test 2" function blocks
- Via the menu of the operator panel with display (e.g. the "Commands" menu item).

Testing can be terminated at any time - it does not influence the thermal motor model of the overload function, i.e. after switching off via test, the system can be reset immediately. Tripping only occurs for Test 1 when the operating mode is set to "Remote."

Reset function

Resetting can be carried out as follows:

- Via the "TEST / RESET" button on the basic unit and on the operator panel (can be deactivated), as well as via PC with SIMOCODE ES software.
- Using the "Reset input" plug of the internal function blocks via the plugs of the internal function blocks "Reset 1," "Reset 2," and "Reset 3."
- Via the menu of the operator panel with display (e.g. the "Commands" menu item).

The "Reset" function block consists of one plug.

There are three function blocks "Reset 1" to "Reset 3."

All reset inputs (sockets) have equal priority (or function).

Test function

A SIMOCODE pro function test can also be initialized via the test function. The test function comprises the following steps:

- Lamp / LED test (test function activated for < 2 s)
- Test of the device functionality (test function activated for 2 to 5s)
- Switching off the QE (test function activated for > 5 s). The QE can only be switched off using the "Test 1" function block and in the "Local 1-3" operating mode using the "TEST/RESET" button on the basic unit / operator panel.

Test phases

The following table shows the test phases performed when the "TEST / RESET" button is pressed for the required length of time:

Table 4-68 States of the status LEDs / contactor controls during testing

Test phase	State	Without main current		With main current	
		OK	fault *)	OK	Fault
Hardware test / lamp test					
< 2 s	"DEVICE" LED	○ orange	○ green	○ orange	○ green
	"GEN.FAULT" LED	○	○	○	○
	Contactor control	Unchanged	Unchanged	Unchanged	Unchanged
	Show QL *)	○	○	○	○
Results of the hardware test / lamp test					
2 to 5 s	"DEVICE" LED	○ green	○ red	○ green	○ red
	"GEN.FAULT" LED	◐	○	⊗	○
	Contactor control	Unchanged	Deactivated	Unchanged	Deactivated
Relay test					

Test phase	State	Without main current		With main current	
		OK	fault *)	OK	Fault
> 5 s	"DEVICE" LED	● green	● red	● green	● red
	"GEN.FAULT" LED	●	●	●	●
	Contactor control	Deactivated	Deactivated	Deactivated	Deactivated
● LED lighted / switched on ◑ LED flashing ⊗ LED flickering ○ LED off *) "Fault" only displayed after 2 s					

Test settings

Table 4-69 Test settings

Test 1 to 2	Description
Input	Activation of the "Test" function block by any signal (any sockets, e.g. device inputs, communication bus control bits, etc.).
Test / Reset buttons blocked	The blue TEST/RESET buttons on the basic unit and the operator panel are usually intended for acknowledging faults and for performing a device test. The buttons can be disabled with "TEST/RESET keys disabled". These can then be used for other purposes.

Acknowledgment of faults

Generally, the following applies to the acknowledgement of faults:

- Faults can only be acknowledged
  - if the cause of the fault has been eliminated
  - if there is no "ON" control command pending.
- A reset will not be possible if the cause of the fault has not been eliminated and / or if an "ON" control command is pending. The reset will be saved depending on the type of fault. Saving a reset is indicated by the "GEN. FAULT" LED on the basic unit and on the operator panel. The LED changes from flashing to continuous signal.

Automatic acknowledgement of faults

Faults are automatically acknowledged in the following cases:

- A reset has been saved and the cause of the fault is no longer present (user has previously acknowledged the fault)
- Auto reset of an overload trip or thermistor trip if motor protection reset = Auto (an automatic acknowledgment is issued here after expiry of the cooling down period). The motor cannot start immediately since reset cannot be performed when an ON command is pending.

- If a configured module fails, all related faults will be acknowledged automatically. However, a configuration fault will be generated (exception: operator panel, if parameterized accordingly). This ensures that a module fault does not cause the general fault to be acknowledged automatically.
- If a function or module is deactivated in the device configuration (via parameterization), all related faults are acknowledged automatically. The motor cannot start immediately since parameters cannot be entered if an ON command is pending.
- If a parameter of a function is changed from "trip" to "warn", or to "signal" or "deactivated", all related faults will be acknowledged automatically.
- For an external fault: With its own parameter: "Auto-Reset."

Reset settings

Table 4-70 Reset settings

Reset 1 to 3	**Description**
Input	Activation of the "Reset" function block by any signal (any sockets, e.g. device inputs, communication bus control bits, etc.).
TEST/RESET buttons blocked	The blue Test / Reset buttons on the basic unit and the operator panel are usually intended for acknowledging faults and for performing a device test. The buttons can be disabled with "TEST/RESET keys disabled". These can then be used for other purposes. On the operator panel with display, the buttons are disabled via a menu function (default: not disabled).

4.8.3 Test position feedback (TPF)

Description

You can carry out the "Cold run" function test using the "Test Position Feedback (TPF)" function block. For this purpose, the function block input (plug) must be connected to the respective socket. The activated test position will be indicated by the flashing QL of the control function.

The "Test Position Feedback (TPF)" function block consists of

- one plug
- a "Status - test position" socket. It is set if a signal is pending at the input.
- one "Fault - test position feedback error" socket. It is set when
  - "TPF" is activated although current is flowing in the main circuit
  - "TPF" is activated and current is flowing in the main circuit.

In total, one "Test Position Feedback" function block is available.

Note

When the test position is enabled, the QLE / QLA sockets of the control function are activated, to indicate test operation of the motor feeder via a flashing button LED, for example.

Schematic

The following schematic shows the "Test Position Feedback" function block:

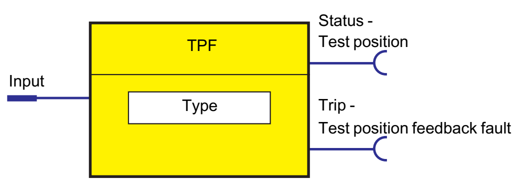


Figure 4-81 "Test Position Feedback" function block

Cold run

If the motor feeder is in the test position, its main circuit is isolated from the network. However, the control voltage is connected.

The "cold run" function test is performed with the feeder in this state. This means the motor feeder is tested without a current in the main circuit.

To differentiate this function from normal operation, it must be enabled via the socket on the function block.

Feedback stating that the motor feeder is isolated from the line voltage on the primary current side can be implemented, for example, via an auxiliary contact of the main switch in the motor feeder that is connected to any device input (terminal). This is then internally connected to the "Test position feedback (TPF) - Input" plug of the function block. When using current / voltage measuring modules, this type of auxiliary contact is entirely unnecessary. The "TPF" function block can be activated by monitoring for undervoltage ("Voltage Monitoring" function block).

Thereafter, the contactor outputs can be set via the control stations (see Chapter Description of functions of control stations (Page 67)), enabling the current-free status to be tested.

If current flows erroneously during test operation, the contactor outputs are switched off by "Fault - Test Position Feedback (TPF)."

Fault message "Fault - Test Position Feedback (TPF)" and acknowledgment

Note

"Fault - Test Position Feedback (TPF)" will be generated if:

- "TPF" is activated, although current is flowing in the motor feeder
- "TPF" is activated and current is flowing in the motor feeder.

Acknowledge with "Reset."

Settings

Table 4-71 Test Position Feedback (TPF) settings

Test Position Feedback (TPF)	Description
Input	Activation of the "Test position feedback (TPF)" function block by any signal (any sockets, e.g. device input)
Type	Specification of the input logic: • NO contact (1-active) (default) • NC contact (0-active)

4.8.4 External fault

Description

The "External Fault 1 to 6" function blocks can be used to monitor any statuses and/or external devices, to generate fault messages and, if necessary, to switch off the motor. To do this, the inputs (plugs) of the External Fault function blocks must be connected to any sockets (e.g. device inputs, communication bus control bits, etc.). External faults can also be "marked" in SIMOCODE pro. This facilitates their allocation to the actual malfunction. Example: monitoring the rotational speed of the motor using an external speed monitor.

The "External Fault" function block consists of:

- two plugs (1 plug for setting, 1 plug for resetting)
- one "Event - external fault" socket. It is set if a signal is pending at the input.

The following are available:

- Four "External Faults 1 to 4" function blocks for the SIMOCODE pro C and pro S basic units
- Six "External Faults 1 to 6" function blocks for the SIMOCODE pro V PB, pro V MB RTU, pro V PN and pro V EIP basic units

Schematic

The following schematic shows the "External Fault" function blocks:

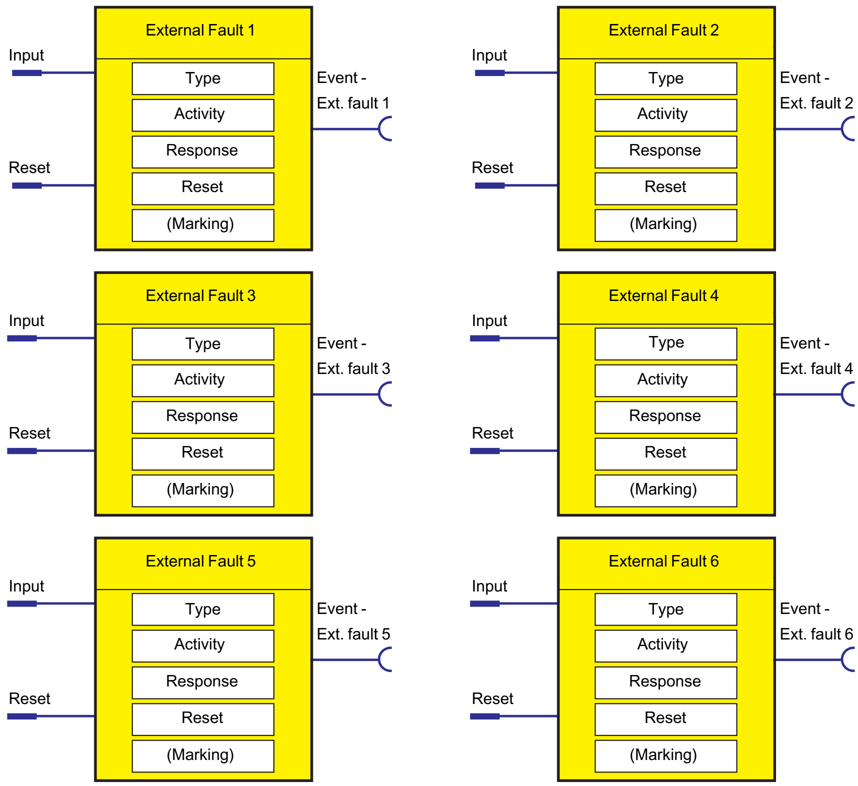


Figure 4-82 "External Fault" function blocks

Special reset options:

A specific reset input is also available in addition to the other reset options (remote reset, Test / Reset buttons, OFF command reset). Furthermore, Auto-Reset can also be activated. See table below.

Settings

Table 4-72 "External Fault" settings

External fault 1 to 6	Description
Input	Activation of the "External Fault" function block by the monitored signal (any sockets, e.g. device inputs, communication bus control bits, etc.)
Type	Specification of the input logic: • NO contact (1-active) (default) • NC contact (0-active)
Active status	Specify in which motor operating state the external fault is to be evaluated: • Always (default): Always evaluate, regardless of whether the motor is running or at a standstill • Only when motor on: Evaluation only if motor is switched ON.

External fault 1 to 6	Description
Response	Specification of the response to an external fault when activated via the input (see the following table and Chapter Important notes (Page 7)).
Reset	Acknowledge the "External fault" fault via any signal (any sockets, e.g. device inputs, communication bus control bits, etc.)
Reset also by	Specification of further (common) acknowledgement options using additional reset types: • Test/Reset buttons on the basic unit and the operator panel or, in the case of the operator panel with display, via the menu (panel reset) (default) • Remote reset: Acknowledgment via reset 1 to 3, DPV1, "Reset" command (default) • Auto reset: The fault resets itself after the cause has been eliminated (after removal of the activation signal) • OFF command reset: "OFF" control command, resets the fault
Marking [1)]	No parameters. Optional marking for designating the event, e.g. "Speed >," e.g. with SIMOCODE ES. Range: maximum 10 characters.

1) Certain special characters are not displayed on the operator panel with display when assigning a name for the external faults.

Note

Changing the marking of all Ethernet and PROFINET connections

Each change to the marking requires that the communication interface be restarted when the web server is active.

A new start interrupts all Ethernet and PROFINET links and reestablishes them afterward.

"External fault" response

Table 4-73 "External fault" response

Response	External fault
trip	X
warn	X
signal	X (d)
deactivated	—

4.8.5 Operational Protection Off (OPO)

4.8.5.1 Response to positioner control function

Description of Operational Protection Off (OPO)

The "Operational Protection Off (OPO)" function block returns the positioner to a safe position. To do this, the input (plug) must be connected to an appropriate socket (e.g. device inputs, communication bus control bits, etc.).

The "Operational Protection Off" function block consists of

- one plug
- one "Status - OPO" socket. It is set if a signal is pending at the input.
- one "Fault - OPO Fault" socket. It is set when the respective, safe end position has been reached.

In total, one "Operational Protection Off (OPO)" function block is available for the pro V basic units.

The following table shows the basic operating principle:

Table 4-74 Basic operating principle of Operational Protection Off (OPO) for the "Positioner" control function

OPO	Initial position when OPO is pending				
	Positioner is open	Positioner opens	Positioner stop/OFF	Positioner closes	Positioner is closed
Reaction to OPO					
Parameterized response "Positioner closes"	Fault reset: With close command → Positioner closes	Fault reset: With close command → Positioner closes	Fault reset: With close command → Positioner closes	— → Positioner closes	—
Parameterized "Positioner opens" response	—	— ← Positioner opens	Fault reset: With open command ← Positioner opens	Fault reset: With open command ← Positioner opens	Fault reset: With open command ← Positioner opens

Schematic

The following schematic shows the "Operational Protection Off (OPO)" function block:

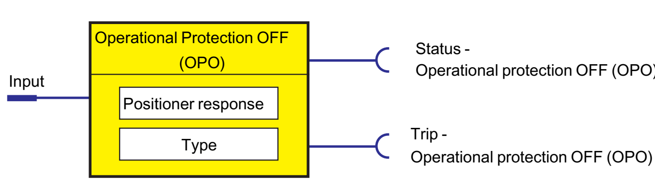


Figure 4-83 "Operational Protection Off (OPO)" function block

Settings

Table 4-75 Operational Protection Off settings

Operational Protection Off (OPO)	Description
Input	Activation of the "Operational Protection Off" function block by the monitored signal (any sockets, e.g. device inputs, etc.)
Positioner response	Specification of the response for the "Positioner" control function when activated via the input: • CLOSE: Positioner runs to the end position in the "CLOSED" direction (default). • OPEN: Positioner moves to the "Open" end position
Type	Specification of the input logic • NO contact (1-active) (default) • NC contact (0-active)

Safety guidelines

Note

A "Fault - Operational Protection Off (OPO)" fault message is not generated if the "OPO" command attempts to run the positioner to the end position if it is approaching or has already reached this end position.

Note

No other control command (counter command or stop command) is performed while "Operational protection Off (OPO)" is active.

Note

The "Fault - Operational protection Off (OPO)" fault message must be acknowledged by the open or closed control command, depending on the present "OPO" end position.

Note

Acknowledgment is performed even if the desired end position has not yet been reached.

Note

The fault message is available as diagnosis via the communication bus.

4.8.5.2 Response to other control functions

For other control functions, the following scenarios can be differentiated between for OPO:

- Motor in operation: The motor is switched Off with a "Fault - Operational Protection Off (OPO)" fault.
- The motor is off. Initially no fault. The "Fault - Operational Protection Off (OPO)" fault only occurs when an "ON command" is issued.

4.8.6 Power failure monitoring (UVO)

Description

The "Power Failure Monitoring (UVO)" function block is activated via the plug. This is performed via an external voltage relay that is connected to the function block via the binary inputs of SIMOCODE pro.

Sequence (see timing charts below):

1. All contactors (QE) are disconnected immediately after the monitoring relay has been operated/the input has been activated (UVO).
2. If the voltage is restored within the "power failure time", the motor will be reset to its previous state considering the signals of the control stations. This can either take place immediately or with a time delay (restart time delay).
3. If the "power failure time" elapses before the voltage returns, the device signals a fault (UVO fault).

Prerequisite: The SIMOCODE pro control voltage is buffered and not interrupted.

In total, one "Power Failure Monitoring" function block is available for the pro V basic units.

Schematic

The following schematic shows the "Power Failure Monitoring (UVO)" function block:

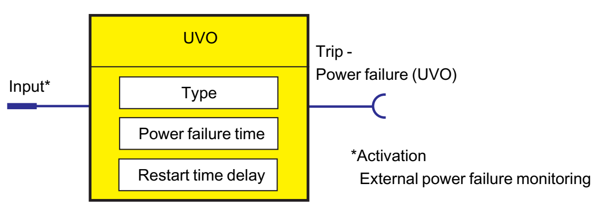


Figure 4-84 "Power Failure Monitoring (UVO)" function block

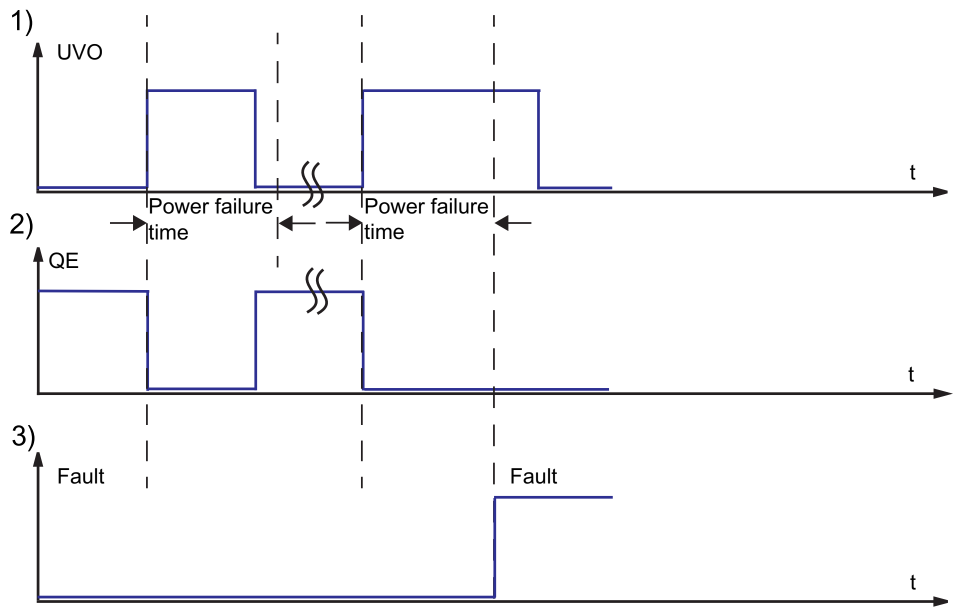


Figure 4-85 Power failure monitoring (UVO) sequence charts

Settings

Table 4-76 Power failure monitoring settings

Power failure monitoring (UVO)	Description
Input (activation)	Activation of the "Power Failure Monitoring (UVO)" function block by the monitored signal (any socket, e.g. device inputs, communication bus control bits, etc.)
Type	Specification of the type of power failure monitoring: • Deactivated (default setting) • No interruption of device power supply. The SIMOCODE pro control supply voltage is maintained. The failure of the line voltage must be detected, for example, by a separate voltage relay.
Power failure time	Time that starts when the power fails. If the line voltage is restored within the power failure time, all drives which were running prior to the power failure are reconnected automatically. If the line voltage is not restored within the power failure time, the drives remain disconnected and the "Fault - Power failure (UVO)" message is generated. Once the line voltage has been restored, this fault message can be acknowledged with "Reset". Range: • 0 to 25.5 s in increments of 0.1 s • 26 to 255 s, in increments of 1 s • 256 to 2550 s in increments of 10 s.
Restart time delay	The restart time delay can be set so that not all motors restart simultaneously. (Line voltage would otherwise dip again.) Range: 0 to 255 s (default: 0 s)

4.8.7 Emergency start

Description

Emergency start deletes the thermal memory from SIMOCODE pro each time it is activated. This allows the motor to be immediately restarted after an overload trip. This function can be used to:

- enable an immediate reset and restart after an overload trip
- delete the thermal memory (motor model) during operation, if required.

NOTICE
Thermal overload of the motor possible!
If emergency starts are performed too frequently this may result in thermal overloading of the motor!

Since the emergency start is "edge-triggered", this function cannot permanently affect the thermal motor model. An emergency start is carried out as follows:

- Using the plug of the function block. To do this, the input (plug) of the function block must be connected to any socket (e.g. device inputs, communication bus control bits, etc.).

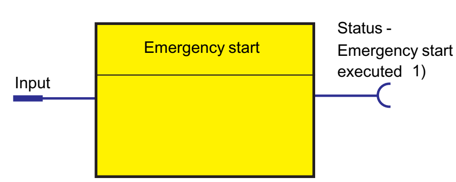
The "Emergency Start" function block consists of:

- one plug
- one "Status - emergency start executed" socket. It is set when an emergency start has been executed.

Overall, there is one "Emergency start" function block available.

Schematic

The following schematic shows the "Emergency Start" function block:



1) The "Emergency start executed" signal is triggered by the edge (input) and reset when the current flows.

Figure 4-86 Emergency Start function block

Settings

Table 4-77 Emergency start settings

Emergency start	Description
Input	Activation of the "Emergency Start" function block by any signal (any sockets, e.g. device inputs, communication bus control bits, etc.).

4.8.8 Safety-related tripping

Description

Note

Please note that the information made available for further processing is in the form of non-safety-related signals.

Note

Please note that the safety-related tripping function block does not itself represent a safety-related function.

The safety function of the DM-F Local is determined exclusively by the setting of the DIP switch on the module.

The safety function of the DM-F PROFIsafe is determined by the fail-safe program in the F-CPU.

Further information: See Manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

The DM-F Local Safety-related tripping function block consists of 3 sockets:

- Event - DM-F LOCAL ok: The DM-F LOCAL is ON.
- Event - safety-related tripping: A safety-related tripping has been performed.
- Status - enabling circuit closed: The enabling circuit is closed.

The DM-F PROFIsafe Safety-related tripping function block consists of 3 sockets:

- Event - PROFIsafe active: Fail-safe communication between the F-CPU and the DM-F PROFIsafe is active.
- Event - safety-related tripping: A safety-related tripping has been performed.
- Status - enabling circuit closed: The enabling circuit is closed.

There is 1 "Safety-related tripping" function block each for SAFETY (Local) and PROFIsafe on the SIMOCODE pro V High Performance basic units.

Schematic

The following schematic shows the "Safety-related tripping" function block:

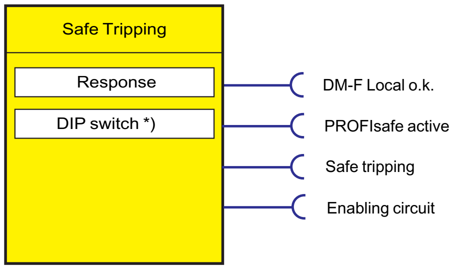


Figure 4-87 "Safe Tripping" function block

SET / RESET button on DM-F Local

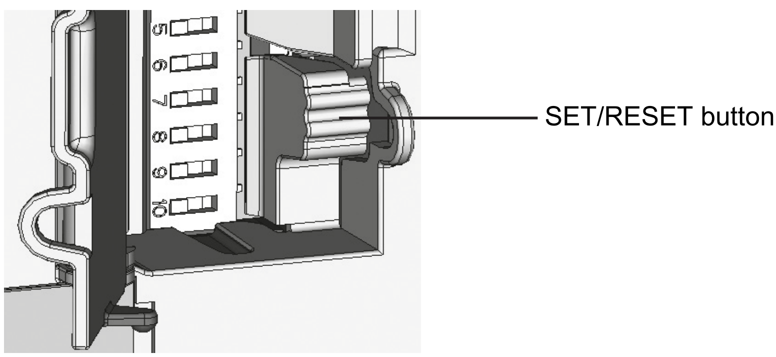


Figure 4-88 SET / RESET button

See ManualSIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

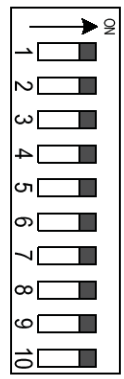
⚠ DANGER

Automatic starting after power failure. Risk of death or serious injury.

In the case of automatic starting after a power failure, the enabling circuits are connected without pressing the Start button.

Settings of the DIP switches on the DM-F Local

Table 4-78 Settings of the DIP switches (DM-F Local)

Switch setting		OFF / ON
1		With /without cross-circuit detection
2		1 NC + 1 NO evaluation / 2 NC evaluation
3		2x 1-channel / 1x 2-channel
4		Debounce time for sensor inputs 50 ms / 10 ms
5		Sensor input automatic start / monitored start
6		Cascading input automatic start / monitored start
7		With / without startup testing
8		With automatic starting / without automatic starting after power failure

Note

The target setting of the DIP switches in the SIMOCODE ES user interface (can be made using the mouse pointer) is transferred to the basic unit on download but does not affect the function of the DM-F Local digital module. The desired function is thus saved as soon as the parameterization has been created.

You must set the effective parameterization via the DIP switches on the front of the DM-F Local (see table below and/or the manual "SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852)"). The basic unit compares the target setting (from the download) with the actual setting on the DM-F Local. If these differ, "Configuration deviation" is output!

Description of the settings of the DIP switches on the DM-F Local

Table 4-79 Description of the settings of the DIP switches, DM-F Local

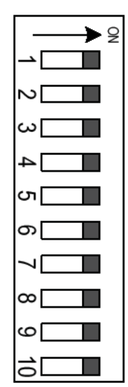
DIP switches (DM-F Local)	Description
With/without cross-circuit detection	Cross-circuit detection is only possible with floating sensors. The sensors must be connected between T1 - Y12, Y33 and T2 - Y22, Y34. The device anticipates the T1 terminal test signal at the terminals Y12 and Y33, and the T2 terminal test signal at the terminals Y22 and Y34. The device detects a sensor fault if the signal at the Y12, Y33 or the Y22, Y34 terminals is not identical to the test signals T1, T2. Cross-circuit detection must be deactivated if electronic sensors such as light arrays or laser scanners are connected. The DM-F Local now no longer monitors the sensor inputs for cross-circuit detection. Usually, the outputs of safety sensors (OSSD) are already monitored for cross-circuits in the sensor itself. If "Without cross-circuit detection" is set on the device, the test outputs T1, T2 are deactivated and may no longer be connected. At the Y12, Y22, Y33, and Y34 inputs, the DM-F LOCAL expects a +24 V DC signal from the same current source as the one from which the device receives its power supply (possible only in the case of DM-F LOCAL-1AB00) or from T3 (static +24 V DC). In the case of the DM-F LOCAL-1AU00 device version, it is imperative to connect the T3 terminal to the floating sensor contacts due to the electrical isolation between the input circuit and the sensor power supply.
1 NC + 1 NO evaluation / 2 NC evaluation	In addition to 2-channel connection of the same types of sensor contacts (NC / NC), sensors with opposite types of contacts (NC / NO), as are frequently used for magnetically-operated switches, can also be evaluated. In this case, ensure that the NC contact is connected to Y12 and the NO contact to Y22.
2x 1-channel / 1x 2-channel	• 2 sensors with one contact each (2x 1-channel) (NC / NC). It is expected that both sensors are AND-connected. Simultaneity is not monitored. • 1 sensor with two contacts each (1x 2-channel) (NC / NC). The system expects both contacts to be simultaneously open.
Debounce time for sensor inputs 50 ms / 10 ms	Any change in the sensor signal during the debounce time is not evaluated. • Debounce time 50 ms: Changes in the switch position of strongly bouncing contacts are suppressed (e.g. position switches on heavy protective doors). • Debounce time 10 ms: The shorter debounce time permits faster tripping in the case of bounce-free sensors (e.g. light arrays).
Sensor input automatic start / monitored start	• Automatic start: The enabling circuits are switched to the operative position as soon as the starting condition at sensor inputs Y12, Y22, Y34 and terminal 1 have been fulfilled. The start button connection terminal Y33 is not queried. • Monitored start: The enabling circuits are switched to the operative position, as soon as the starting condition at sensor inputs Y12, Y22, Y34 and terminal 1 have been fulfilled and the start button at terminal Y33 has subsequently been actuated (start with the falling edge).
Cascading input automatic start / monitored start	• Automatic start: The enabling circuits are switched to the active position as soon as the switch-on condition at cascading input 1 is satisfied, i.e. as soon as a static +24 V DC signal is present (e.g. from T3). • Monitored start: The enabling circuits are switched to the operative position as soon as the starting condition at cascading input 1 has been fulfilled, i.e. as soon as a static +24 V DC signal is present (e.g. from T3), and the start button at terminal Y33 has subsequently been actuated (start with the falling edge).

DIP switches (DM-F Local)	Description
With / without startup testing	After a power failure, startup testing requires that the sensors at Y12 and Y22 are actuated once by the system operator.
With automatic starting / without automatic starting after power failure	The DM-F Local can be parameterized in such a way that the enabling circuits automatically switch to the operative position after a power failure, i.e. without actuation of the start button Y33. Prerequisites: • Y12, Y22 or the cascading input 1 are set to "monitored start." • The starting condition at the sensor inputs and at the cascading input has been fulfilled. • Valid actuation of the start button prior to the power failure, i.e. the enabling circuits were in the operative position.

Settings of the DIP switches (DM-F PROFIsafe)

Before commissioning the DM-F PROFIsafe, set the PROFIsafe address as follows:

Table 4-80 Settings of the DIP switches (DM-F PROFIsafe)

Switch setting		Value
$1 = 2^0$		1
$2 = 2^1$		2
$3 = 2^2$		4
$4 = 2^3$		8
$5 = 2^4$		16
$6 = 2^5$		32
$7 = 2^6$		64
$8 = 2^7$		128
$9 = 2^8$		256
$10 = 2^9$		512

If 1 DIP switch is at ON, the respective value is active. If more than 1 DIP switch is at ON, the respective values must be added.

- Briefly press the SET / RESET button. LEDs 1 to 10 indicate the current PROFIsafe address.
- Setting the PROFIsafe address:
  – Switch off the supply voltage
  – Set the DIP switch configuration
  – Switch on the supply voltage again.

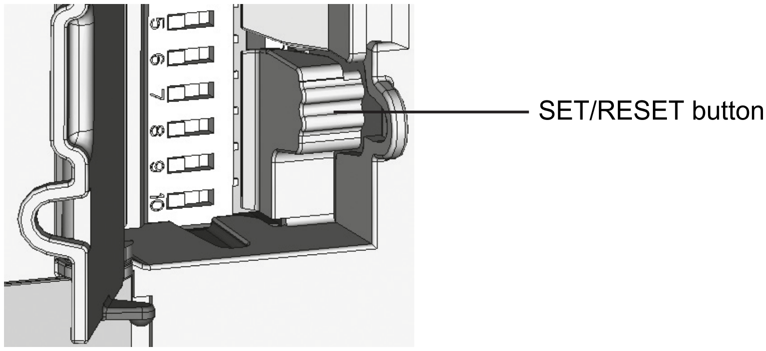


Figure 4-89 SET / RESET button

"Safety-related tripping" response

Here, you set the SIMOCODE pro response to safety-related tripping via DM-F Local or DM-F PROFIsafe.

Note

The response of the modules is not influenced by this setting. If the conditions for safety-related disconnection are met, the enable circuits are always disabled!

Table 4-81 "Safety-related tripping" response

Response	Safety-related tripping
trip	X (d)
Deactivated	X
signal	X
warn	X

Note

In the event that the option "DM-F LOCAL / Separate PROFIsafe function from control function" has been activated under "Motor control > Control function > Operating mode," only "deactivated", "signal," or "warn" can be set as the response, not "trip."

"Safety-related tripping" reset

Here, you can select manual or automatic acknowledgment of SIMOCODE pro faults caused by safety-related tripping.

Reset: Manual (default), Auto

4.8.9 Watchdog (Bus monitoring, PLC/PCS monitoring)

Description

The "Watchdog" function block monitors communication with the PLC via communication bus, as well as the operating state of the PLC in the "Remote" operating mode.

Bus monitoring

With this type of monitoring, the "Fault - bus" fault is generated if

- "Bus monitoring" is active.
- In the "Remote" operating mode (mode selector S1 = 1 and S2 = 1), cyclic data transfer between the PLC and SIMOCODE pro is interrupted, e.g. by interruption of the bus connection.
- "Status - Bus o.k." can always be evaluated. If SIMOCODE pro is cyclically exchanging data with the PLC, "Status - Bus o.k." is set to "1".

PLC / PCS monitoring

With this type of monitoring, the "Fault - PLC/PCS" message is generated if

- "PLC / PCS monitoring" is active.
- For example, the PROFIBUS DP switches to the "CLEAR" status or the PROFINET switches to the "Hold/Stop" status when in the "Remote" operating mode (mode selector S1=1 and S2=1).

The "Status - PLC / PCS in Run" can always be evaluated. If the PROFIBUS DP is in the "CLEAR" state, for example, "Status - PLC/PCS in Run" is set to "0".

If the "PLC/PCS monitoring - input" is connected primarily to the "Cyclic receive - bit 0.7" bit, the status of the PLC is deduced from this bit only.

Schematic

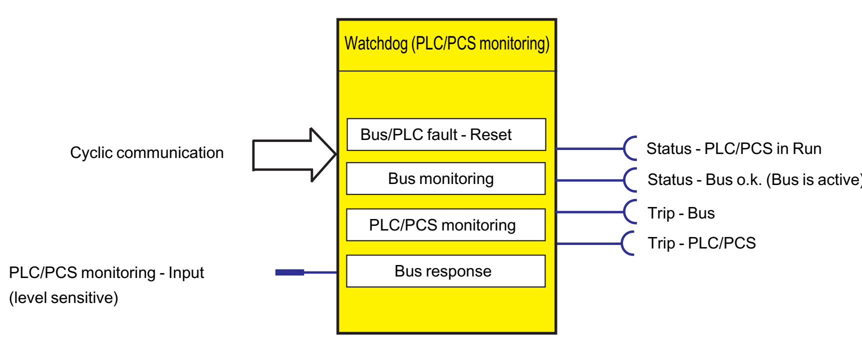


Figure 4-90 "Watchdog (PLC / PCS Monitoring)" function block

NOTICE
PROFIBUS DP "Bus monitoring" and "PLC / PCS monitoring" can only be effective if the DP slave watchdog function is activated in the DP master system.

Settings

Table 4-82 Watchdog settings

Watchdog	Description
PLC / PCS monitoring - Input	Activates the "Watchdog" function block using the monitored signal (any sockets, e.g. the communication bus control bits, etc.)
Bus monitoring	• Activated (default): If a bus fault occurs, the "Fault - Bus" fault message is generated and must be acknowledged • Deactivated: No fault message; however, the "Status - Bus o.k." information can be evaluated at any time.
PLC / PCS monitoring	• Activated (default): If a bus fault occurs, the "Fault - PLC/PCS" fault message is generated and must be acknowledged. • Deactivated: No fault message; however, the "Status - SPS/PLS in Run" information can be evaluated at any time.
Bus/PLC fault - reset	You can select whether faults are to be acknowledged automatically or manually. Range: Manual / Auto (default: manual).

"Bus fault" / "PLC / PCS fault" response

Table 4-83 "Bus fault" / "PLC / PCS fault" response

Response	Bus fault	PLC/PCS fault
Fault	X (d)	X (d)
warn	-	-
signal	-	-
deactivated	X	X

4.8.10 Timestamping

Description

SIMOCODE pro V PB can timestamp up to eight digital signals with high temporal precision (10 ms). In the process, every change in the state of the digital signals will be recorded.

Possible areas of application are:

- Precise chronological recording of faults in a procedural system
- Analysis of system-wide interrelationships
- Recording and signaling of time-critical signal changes

Requirements

To use SIMOCODE pro V time stamping, the DP master being used must support time synchronization functions via PROFIBUS (e.g. DP master connections for SIMATIC S7-400), or a master clock must be used (e.g. SICLOCK).

Process in STEP 7

Time-of-day synchronization for SIMOCODE pro V is activated in STEP 7 HW Config in the slave properties under "Time Synchronization".

Note

The set synchronization interval must correspond to the configuration of the clock master.

For SIMOCODE pro, transmission of time stamped information is analogous to transmission with SIMATIC S7 IM 153-2. Therefore, the "FB 62 TIMESTMP" function block can be used for further processing of time stamped information in the CPU, to transmit time stamped messages from the "Standard Library → Miscellaneous Blocks" library.

Note

The "LADDR" parameter contains the diagnostic address of the DP slave from STEP 7 HW Config. In DP mode "DPV1" of the DP master – integrated via OM SIMOCODE pro – LADDR2 contains the diagnostic address of slot 2 of SIMOCODE pro. For all other configurations, LADDR2 will contain the same address as LADDR.

In contrast to the STEP7 online help for the FB62, when integrating via GSD, the slot number of the module is transmitted with Slot 1 for signal messages, and with Slot 0 for special messages.

You will find further information about the FB 62 in the STEP7 online help.

Schematic

The following schematic shows the "Timestamping" function block:

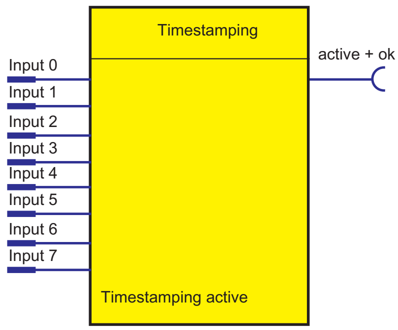


Figure 4-91 "Timestamping" function block

The "Timestamping" function block comprises eight "Timestamping - input 0 to input 7" plugs.

Overall, there is one "Timestamping" function block available.

4.9 Logic modules

4.9.1 Overview of logic modules

Description

Freely programmable logic modules are function blocks that process input signals and supply binary or analog output signals according to their internal logic components. Logic modules can contain:

- Plugs
- An internal logic component
- Sockets
- Settings, e.g. the time for a timer.

Schematic

The following schematic shows a general representation of a logic module:

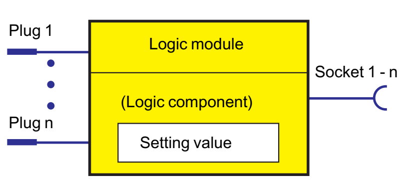


Figure 4-92 General representation of a logic module

Scope and application

You can use the logic modules to carry out additional functions for your application. These can be used, for example, to implement logical operations, time relay functions and counter functions. Depending on the device series, the system provides several logic modules:

Table 4-84 Freely-programmable logic modules

Logic module	**SIMOCODE pro**						
	BP	**GP**		**HP**			
	C	**S**	**V PN GP**	**V PB**	**V MB RTU**	**V PN**	**V EIP**
Truth tables 3 inputs / 1 output	3	4	8	6	6	8	8
Truth table 2 inputs / 1 output	—	2	2	2	2	2	2
Truth tables 5 inputs / 2 outputs	—	—	1	1	1	1	1
Timer	2	2	6	4	4	6	6
Counter	2	2	6	4	4	6	6
Signal conditioning	2	4	6	4	4	6	6
Non-volatile elements	2	2	4	4	4	4	4
Flashing	3	3	3	3	3	3	3
Flicker	3	3	3	3	3	3	3
Limit monitor	—	—	6	4	4	6	6
Calculation modules (calculators)	—	—	4	2 1)	2	4	4
Analog multiplexer	—	—	1	—	—	1	1
Pulse width modulator	—	—	1	—	—	1	1
1) Only for basic unit SIMOCODE pro V PB from version *E03*							

4.9.2 Truth table for 3I / 1O

Description

The truth table for 3I / 1O consists of

- Three plugs
- one logic component
- one socket

You can choose which of the eight possible input conditions an output signal should be generated for.

The following are available:

- three truth tables (1 to 3) for the SIMOCODE pro C basic unit
- four truth tables (1 to 4) for the SIMOCODE pro S basic unit
- six truth tables (1 to 6) for the SIMOCODE pro V PB and pro V MR basic units
- eight truth tables (1 to 6, 10, 11) for the SIMOCODE pro V PN (GP) and pro V EtherNet IP basic units.

Schematic

The following schematic shows the "Truth Table for 3I / 1O" logic modules:

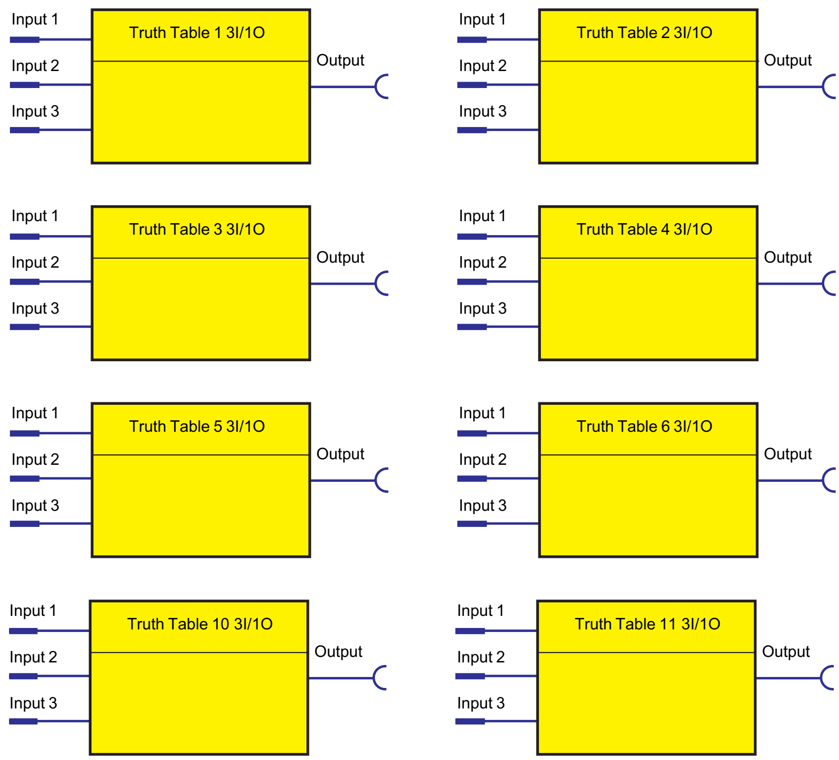
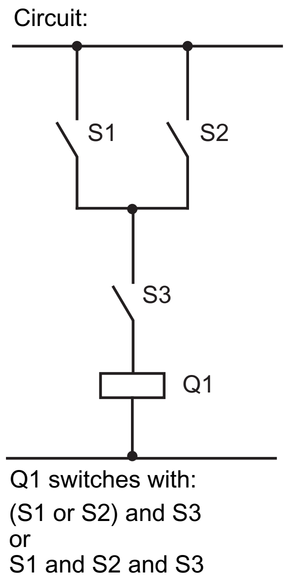


Figure 4-93 "Truth Table for 3I / 1O" logic modules

Example

You want to implement the following circuit:



Truth table, input conditions colored in gray:

S1= Input 1	S2= Input 2	S3= Input 3	Q1= Output
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

Figure 4-94 Example of a truth table

Circuit and parameterization

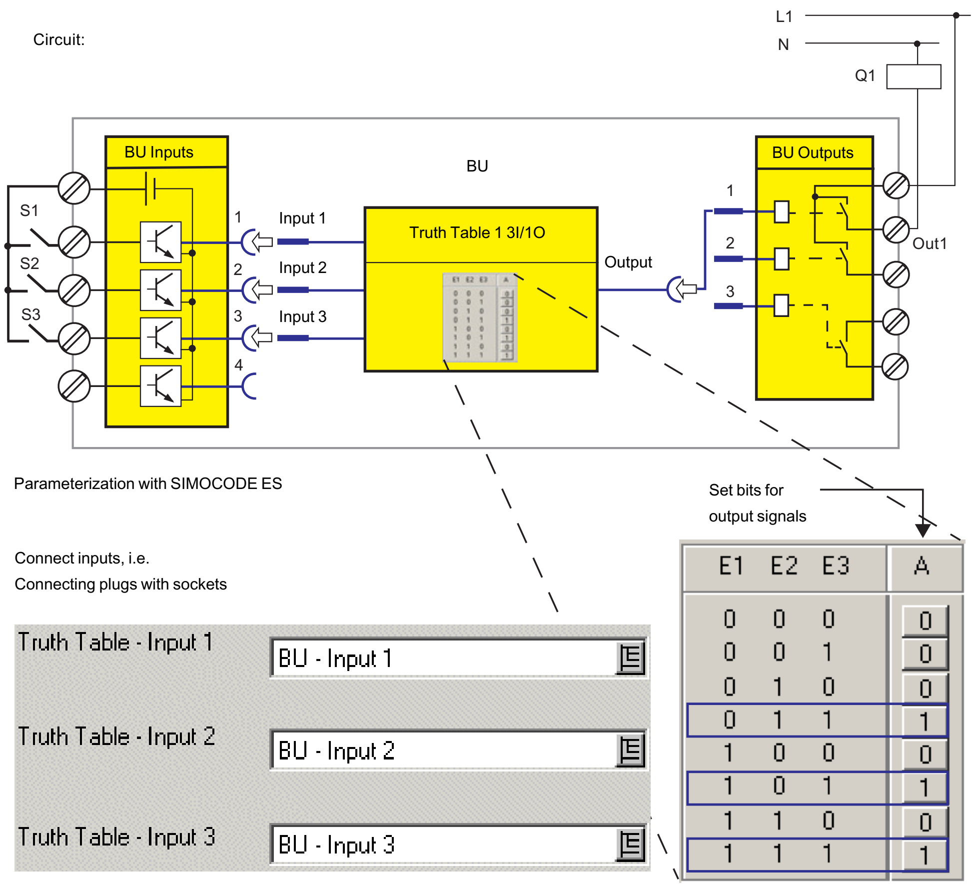


Figure 4-95 Example circuit and parameterization for truth table 3I / 1O

Settings

Table 4-85 Settings for truth table 3I/1O

Truth table for 3I / 1O	Description
Inputs 1 to 3	Activation of the truth table by any signal (any sockets, e.g. device inputs, communication bus control bits, etc.)

4.9.3 Truth table for 2I / 1O

Description

The truth table for 2I / 1O consists of:

- Two plugs
- one logic component
- one socket.

You can choose which of the four possible input conditions an output signal should be generated for.

In total, two truth tables (7 to 8) are available.

Schematic

The following schematic shows the "Truth Table for 2I / 1O" logic modules:

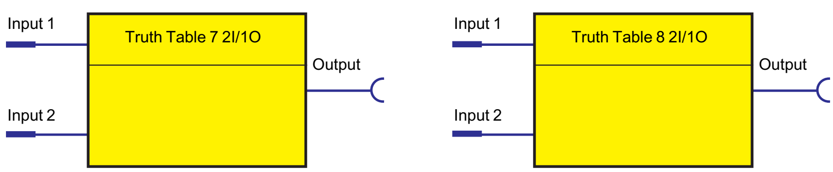
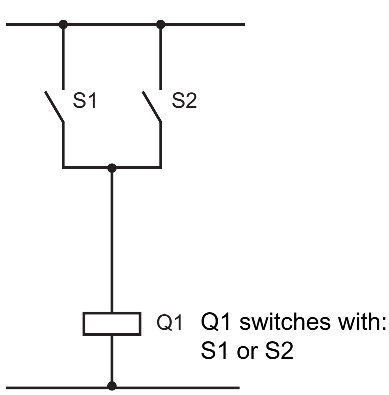


Figure 4-96 "Truth Table for 2I / 1O" logic modules

Example

You want to implement the following circuit:

Circuit:



Truth table, input conditions colored in gray:

S1= Input 1	S2= Input 2	Q1= Output
0	0	0
0	1	1
1	0	1
1	1	1

Figure 4-97 Example of truth table 2I / 1O

Settings

Table 4-86 Settings for truth table 2I/1O

Truth table for 2I / 1O	Description
Inputs 1 to 2	Activation of the truth table by any signal (any sockets, e.g. device inputs, communication bus control bits, etc.)

4.9.4 Truth table for 5I / 2O

Description

The truth table for 5I / 2O consists of:

- five plugs
- one logic component
- Two sockets.

You can choose which of the 32 possible input conditions a maximum of two output signals should be generated for.

In total, one truth table 9 is available for the SIMOCODE pro V basic units.

Schematic

The following schematic shows the "Truth Table for 5I / 2O" logic modules:

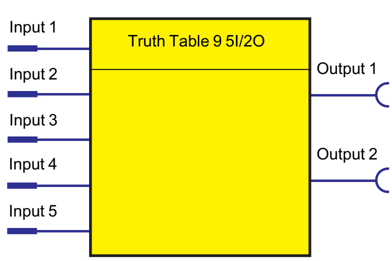


Figure 4-98 "Truth Table for 5I / 2O" logic modules

Settings

Table 4-87 Settings for truth table for 5I / 2O

Truth table 9 (5I / 2O)	Description
Input 1 to 5	Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)

4.9.5 Counter

Description

Counters are integrated in the SIMOCODE pro system. These are activated via the plugs "+" or "-".

The counter output switches to "1" when the preset limit is reached. The counter is reset with "Reset".

The current actual value is available as a socket for further internal processing and can also be transmitted to the automation system.

- Plug +: Increases the actual value by 1 (maximum: limit).
- Plug –: Reduces the actual value by 1 (minimum: 0).
- Reset: Resets the actual value to 0.

The counter consists of

- three plugs (input +, input – and reset)
- one logic component
- one socket
- One "Actual value" analog socket with the current value in the range between 0 and the limit. The value is retained even in the event of a power failure.

The following are available:

- two counters (1 to 2) for the SIMOCODE pro C and pro S basic units
- four counters (1 to 4) for the SIMOCODE pro V PB and pro V MR basic units
- six counters (1 to 6) for the SIMOCODE pro V PN (GP) and pro V EIP basic units.

Schematic

The following schematic shows the "Counters" logic modules:

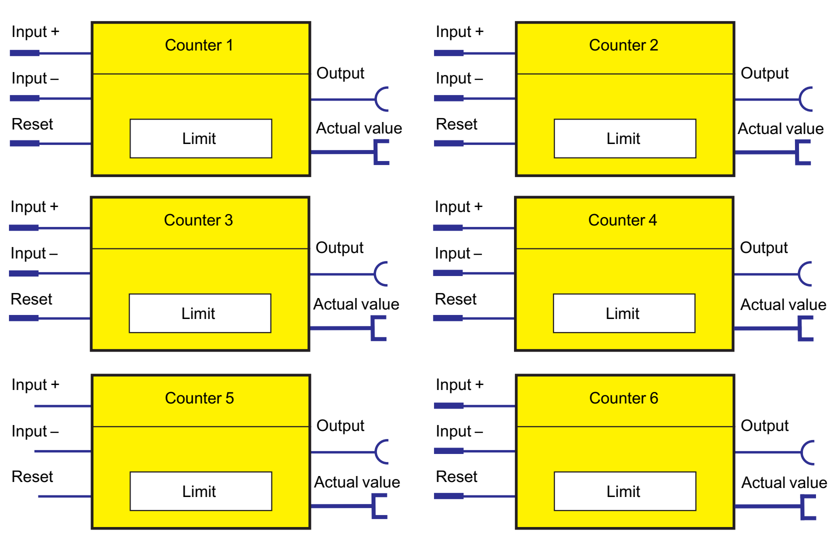


Figure 4-99 "Counter" logic modules

Note

The time between the events to be counted depends on

- The input delay
- The device cycle time.

Note

The actual value remains the same

- During parameterization or failure of the supply voltage
- If there are simultaneous input signals at input + and input -.

Note

The output is always 0 if a reset is pending.

Note

Since the counter sets the output as soon as the actual value has reached the preset value, the output is permanently set at a value = 0 as long as no reset is applied.

Settings

Table 4-88 Counter settings

Counters 1 to 6	Description
Input +	Increments actual value by 1 Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Input -	Decrements the actual value by 1. Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Reset	Reset the actual value to 0 (count value and output). Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Limit	Value that can be reached when counting and at which the counter issues an output signal. Range: 0 to 65535 (default: 0)

4.9.6 Timer

Description

The timer consists of:

- two plugs (input and reset)
- one socket
- one "Actual value" analog socket with the actual value.

The current actual value is available as a socket for further internal processing and can also be transmitted to the automation system.

If an input signal is pending, the timer issues an output signal according to the chosen timer type:

- With closing delay
- With closing delay with memory
- With OFF delay
- With fleeting closing

The following are available:

- two timers (1 to 2) for the SIMOCODE pro C and SIMOCODE pro S basic units
- four timers (1 to 4) for the SIMOCODE pro V PB and pro V MR basic units
- six timers (1 to 6) for the SIMOCODE pro V PN and pro V EIP basic units.

Schematic

The following schematic shows the "Timers" logic modules:

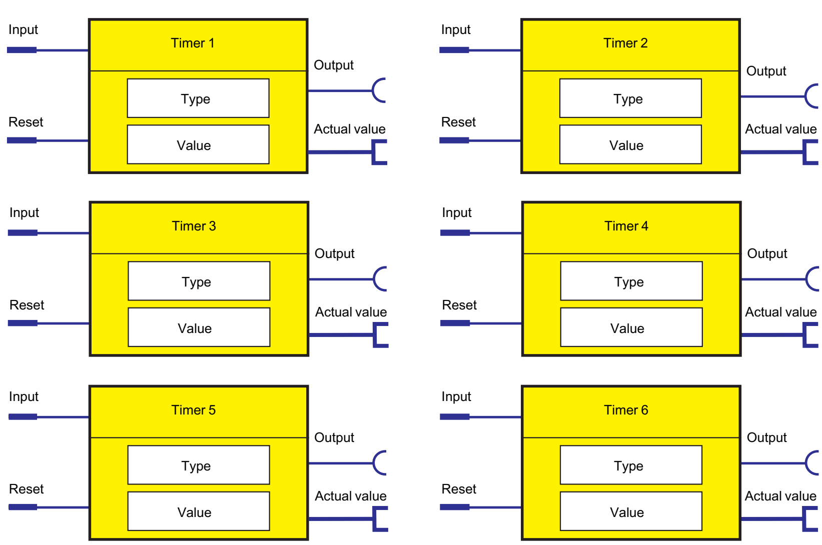


Figure 4-100 "Timer" logic modules

Note

The output is always 0 if a reset is pending.

Note

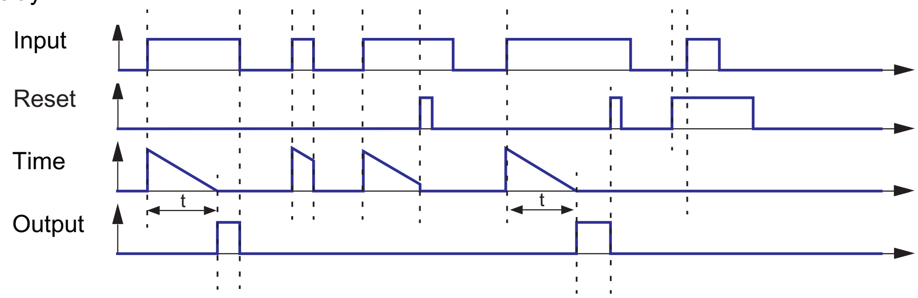
The response of the plugs of all timers (input, reset) has been completely changed to level-active for the SIMOCODE pro C basic unit from version *E05* and higher and the SIMOCODE pro V PB basic unit from version *E03* and higher. Use of an unchanged parameter file utilizing integrated timers may thus result in a different response if such basic units are used. For example, if "Fixed level - '1'" is set at the timer input, the timer function is automatically restarted after the timer reset occurs. However, in timers with the parameterized type = "With fleeting closing", there is no change in the response.

Output response of the timer

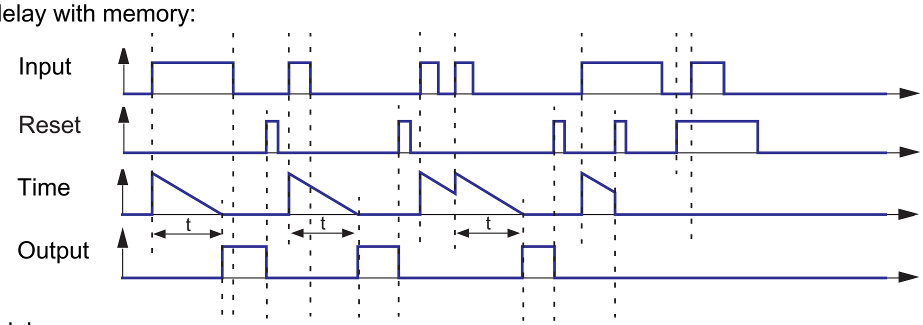
For

- SIMOCODE pro C basic unit **up to** version *E05*
- SIMOCODE pro V PB basic unit **up to** version *E03*

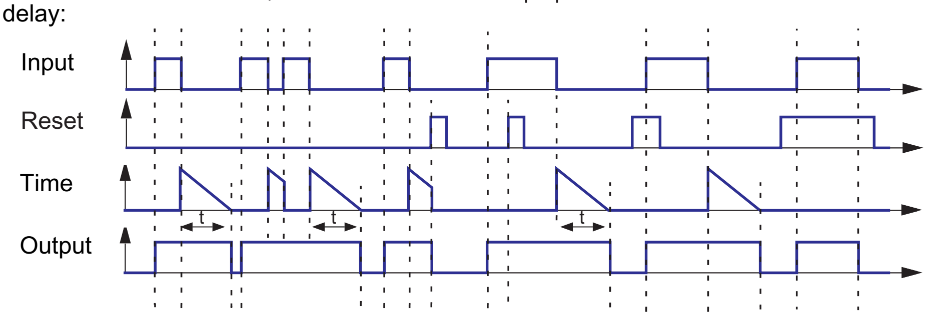
With closing delay:



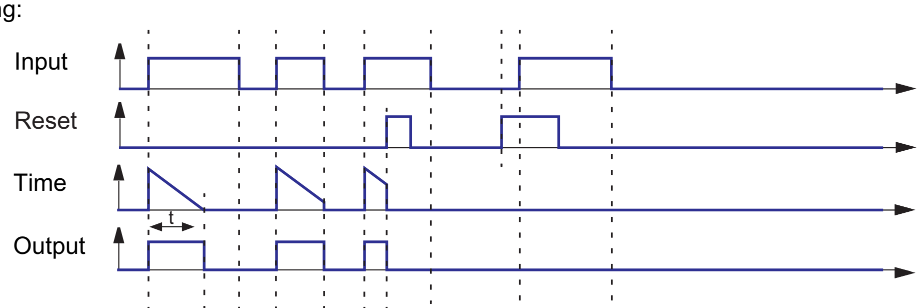
With closing delay with memory:



With opening delay:



Fleeting closing:

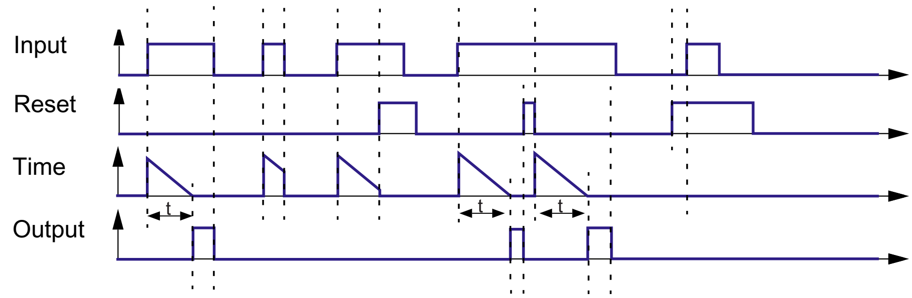


Output response of the timer

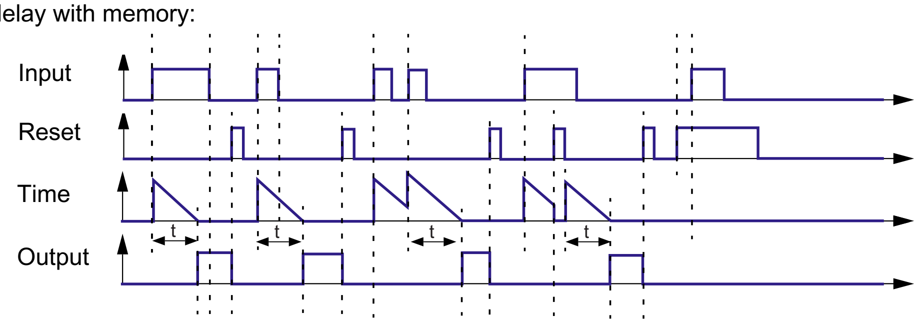
For

- SIMOCODE pro C basic unit **from** version *E05*
- SIMOCODE pro V PB basic unit **from** version *E03*
- SIMOCODE pro S basic unit
- all other SIMOCODE pro V basic units

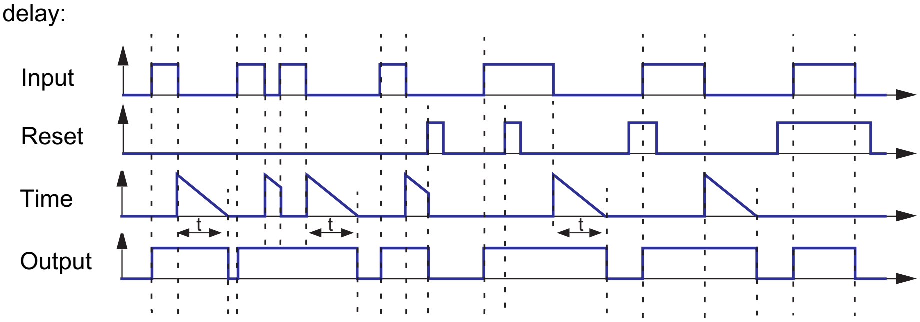
With closing delay:



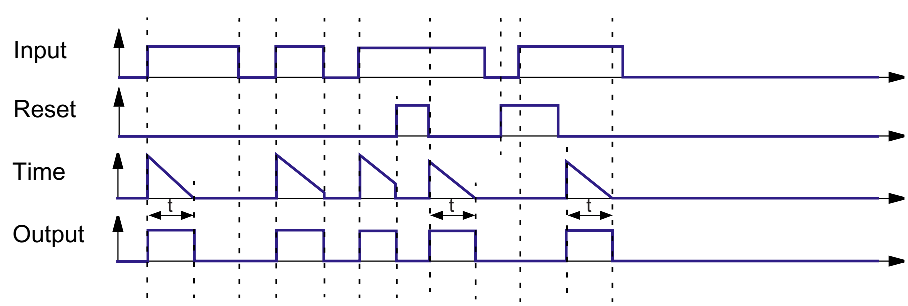
With closing delay with memory:



With opening delay:



Fleeting closing:



Timer settings

Table 4-89 Timer settings

Timers 1 to 6	Description
Input	Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Reset	Resetting the actual value to 0. Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Type	Different output responses Range: With closing delay (default), closing delay with memory, with OFF delay, with fleeting closing
Value	Time during which the timer provides an output signal when activated, depending on the output response (type). Range: 0 to 6553.5, unit 100 ms (default: 0)

4.9.7 Signal conditioner

Description

If an input signal is pending, the signal conditioning issues an output signal according to the selected signal conditioning type:

- Non-inverting
- Inverting
- Edge rising with memory
- Edge falling with memory

You can set the output response.

The signal conditioning consists of:

- two plugs (input and reset)
- one logic component
- one socket

The following are available:

- two signal conditionings (1 to 2) for the SIMOCODE pro C basic unit
- four signal conditionings (1 to 4) for the SIMOCODE pro S, pro V PB, and pro V MR basic units
- six signal conditionings (1 to 6) for the SIMOCODE pro V PN (GP) and pro V EIP basic units.

Schematic

The following schematic shows the "Signal conditioning" logic modules:

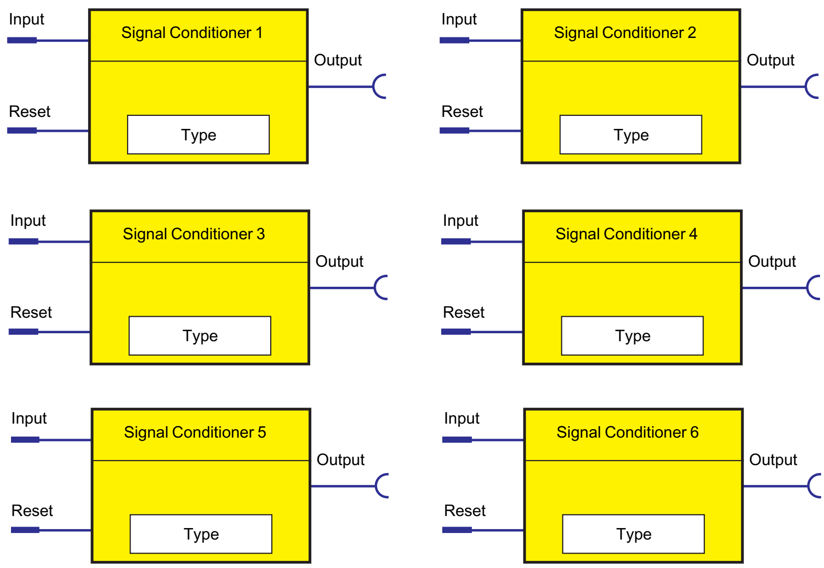


Figure 4-101 "Signal conditioning" logic modules

Note

The output is always 0 if a reset is pending.

Types of signals / output responses

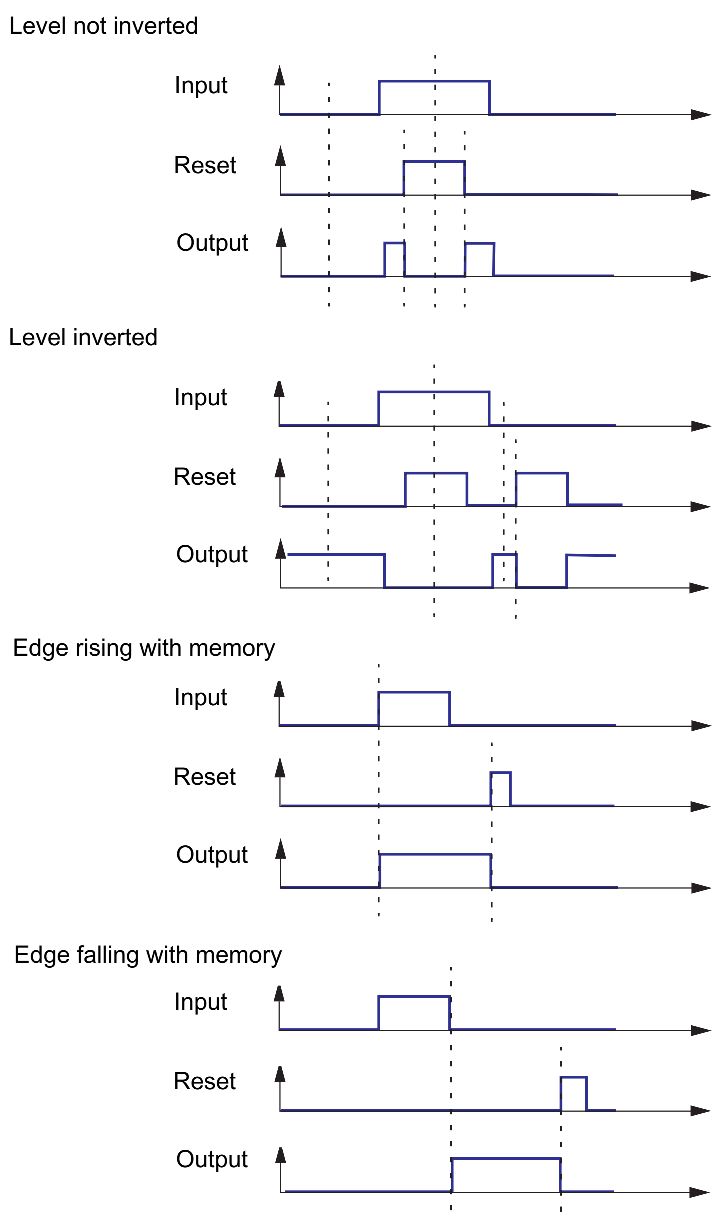
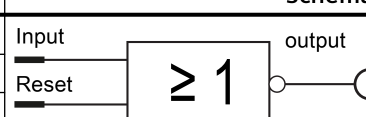


Figure 4-102 Types of signals/output responses of the signal conditioning

NOR function

You can implement a NOR function with the "inverting" type of signal:

Input	Reset	Output	Schematic
0	0	1	
1	0	0	
0	1	0	
1	1	0	

Settings

Table 4-90 Signal conditioning settings

Signal conditioning 1 to 6	Description
Input	Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Reset	Resetting the signal conditioning to 0. Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Type	Different output responses. Range: Level Non-inverting (default), level inverting, edge rising with memory, edge falling with memory

4.9.8 Non-volatile elements

Description

Non-volatile elements behave like signal conditioning. However, these output signals are retained after a power supply failure.

If an input signal is pending, the non-volatile element issues an output signal according to the selected type:

- Non-inverting
- Inverting
- Edge rising with memory
- Edge falling with memory

You can set the output response.

The non-volatile element consists of

- two plugs (input and reset)
- one logic component
- one socket

The following are available:

- two non-volatile elements (1 to 2) for the SIMOCODE pro C and SIMOCODE pro S basic units
- four non-volatile elements 1 to 4 for the SIMOCODE pro V basic units

Schematic

The following schematic shows the "Non-volatile element" logic modules:

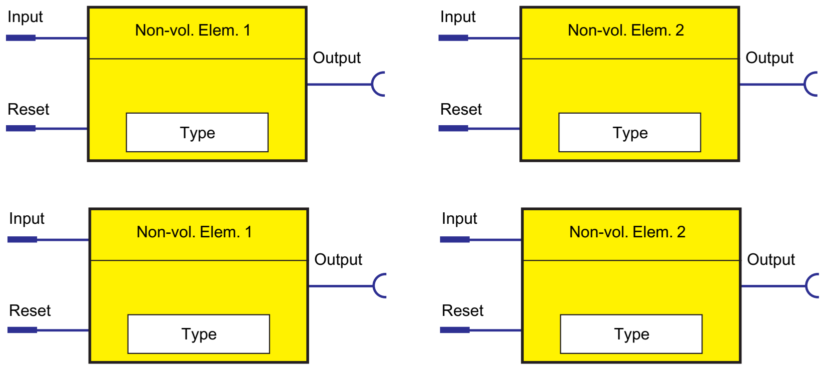
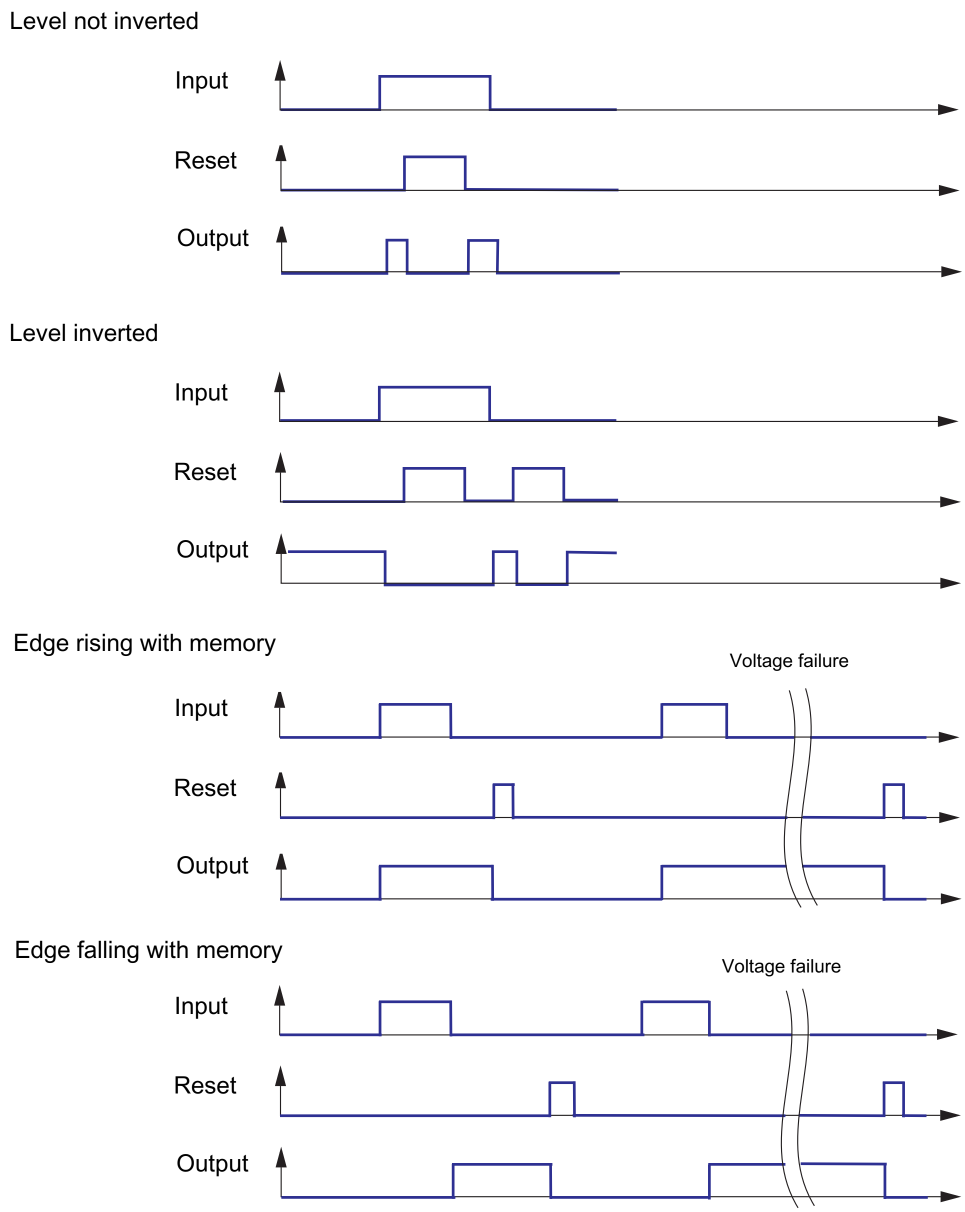


Figure 4-103 "Non-volatile Element" logic modules

Note

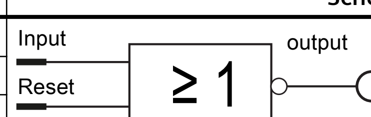
The output is always 0 if a reset is pending.

Types of signals / output responses



NOR function

You can implement a NOR function with the "inverting" type of signal:

Input	Reset	Output	Schematic
0	0	1	
1	0	0	
0	1	0	
1	1	0	

Settings

Table 4-91 Non-volatile element settings

Non-volatile elements 1 to 4	Description
Input	Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Reset	Resetting the signal conditioning to 0. Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Type	Different output responses Range: Non-inverting (default), inverting, edge rising with memory, edge falling with memory

4.9.9 Flashing

Description

If an input signal is pending at its plug, the "Flashing" logic module issues a signal to its socket, which alternates between binary 0 and 1 at a fixed frequency of 1 Hz. You can use this to make the LEDs on the operator panel flash, for example. The logic module consists of:

- one plug
- one logic component
- one socket

In total, 3 "Flashing" logic modules (1 to 3), are available.

Schematic

The following schematic shows the "Flashing" logic modules:

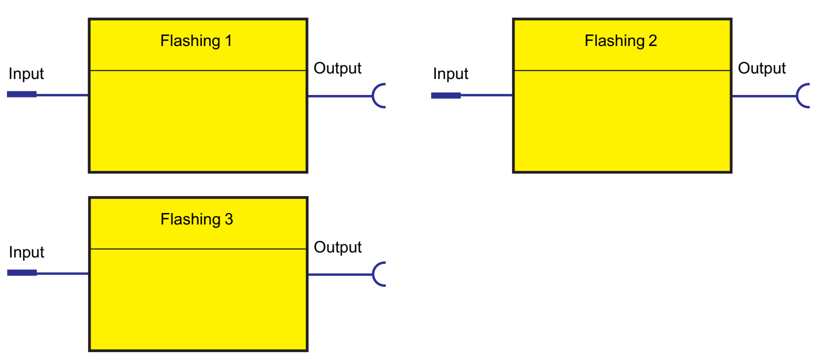


Figure 4-104 "Flashing" logic modules

Settings

Table 4-92 Flashing settings

Flashing 1 to 3	Description
Input	Activation by any signal (any sockets, e.g. device inputs, events, status, etc.)

4.9.10 Flickering

Description

You can use the "Flicker" logic modules to assign the "Flicker" function to the operator-panel LEDs, for example.

The "Flicker" function block provides an output signal with a frequency of 4 Hz when an input signal is present.

The function block consists of:

- one plug
- one logic component
- one socket

A total of three logic modules, "Flicker" (1 to 3), are available.

Schematic

The following schematic shows the "Flicker" logic modules:

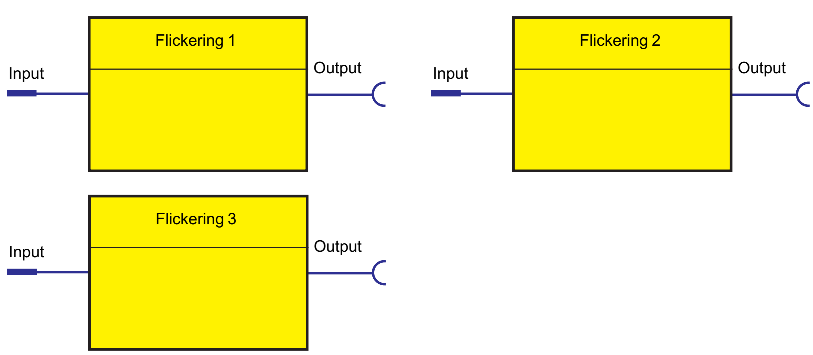


Figure 4-105 "Flicker" function blocks

Settings

Table 4-93 Flicker settings

Flicker 1 to 3	Description
Input	Activation by any signal (any sockets, e.g. events, etc.)

4.9.11 Limit monitor

Description

With the limit monitor, any analog values (2 bytes / 1 word) can be monitored for limit overshooting or limit undershooting The limit monitor issues the "Limit" signal at its socket. In addition, limit monitors can be "marked" according to their function.

Example: Monitoring the individual sensor measuring circuits of the temperature module (Temperature 1 to 3) for overtemperature.

The limit monitor consists of:

- one analog plug
- one logic component
- one socket

The following are available:

- four limit monitors (1 to 4) for the SIMOCODE pro V PB and pro V MR basic units
- six limit monitors (1 to 6) for the SIMOCODE pro V PN (GP) and pro V EIP basic units

Schematic

The following schematic shows the "Limit monitor" logic modules:

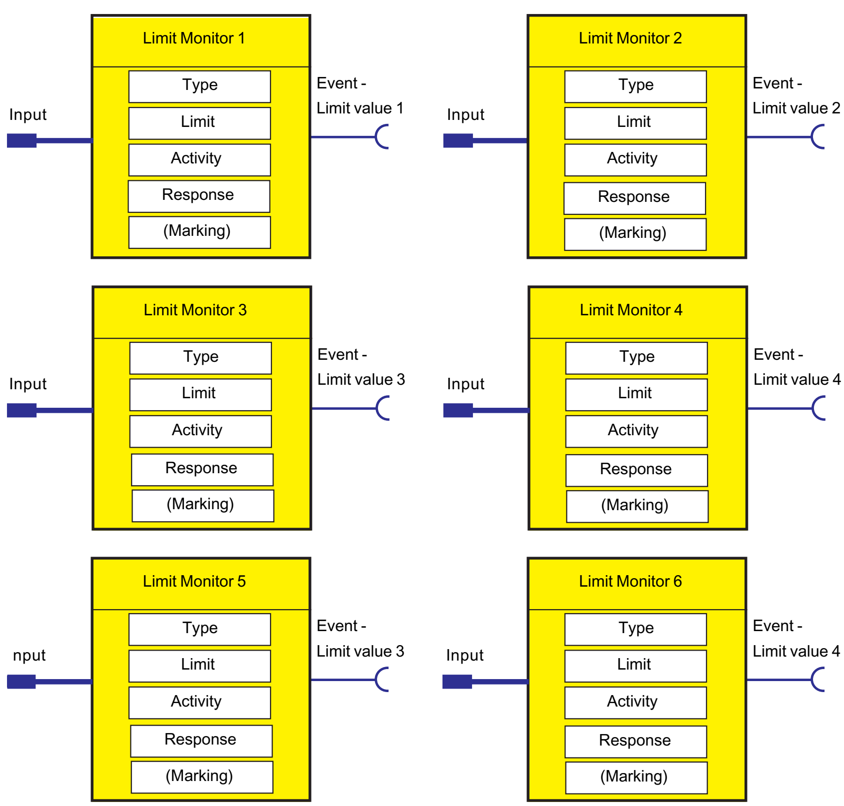


Figure 4-106 "Limit Monitor" logic modules

Response

Table 4-94 Limit monitor response

Response	Limits 1 to 6
trip	—
warn	—
signal	X (d)
deactivated	—
delay	0 to 25.5 s (default: 0.5 s)

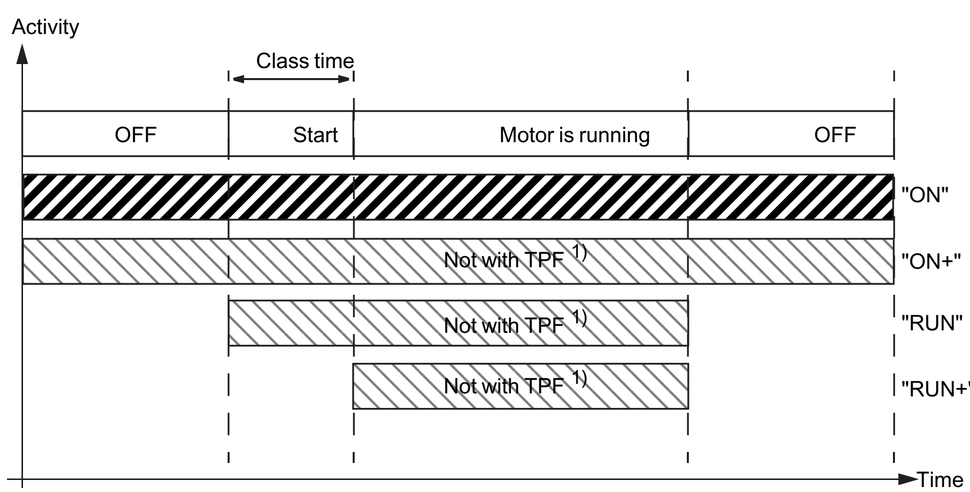
See also "Tables of responses of SIMOCODE pro" in Chapter Important notes (Page 7).

Functional principle

The limit signal issued depends on:

- the operating state of the motor
- the TPF function
- the parameterized "active status":
  - ON
  - ON+
  - RUN
  - RUN+

The following display shows a flow chart with the different "active status" parameters.



1) TPF: There is test position feedback, the motor feeder is in the test position, i.e. its main circuit is isolated from the network. However, the control voltage is connected.

Figure 4-107 Active status of limit monitor

Settings

Table 4-95 Limit monitor settings

Limit monitor	Description
Input	Analog plug of the limit monitor for linking to the analog value to be monitored (2 bytes), e.g. maximum current I_max, remaining cooling down period, actual value of timers, etc.
Type	Specifies if the limit has to be monitored for overshooting (default) or undershooting.
Active status	Determines in which motor operating state the limit monitor is to be evaluated: • ON, i.e. always (default) evaluate, regardless of whether or not the motor is running • ON+, i.e. always evaluate, regardless of whether or not the motor is running Exception: "TPF", i.e. motor feeder is in test position • RUN, i.e. evaluate only if the motor is in the ON state and not in the test position (TPF). • RUN+, i.e. evaluate only if the motor is running and the startup procedure is finished (i.e. the "Start active" message is no longer active) and there is no test position feedback (TPF); example: Cos phi monitoring
Limit	Monitor response value. The return value is always determined by the "Limit monitor - Delay" parameter. Range: 0 to 65535 (default: 0)
delay	Specifies the time period for which the limit must be constantly overshot before the "Event - Limit" output is set. Range: 0 to 25.5 s (default: 0.5 s)
Marking [1)]	No parameters. Optional marking for identifying the message, e.g. "Limit>"; range: max. 10 characters.

NOTICE

Changing the marking (PROFINET)

Each change to the marking requires that the communication interface be restarted when the web server is active. A new start interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Note

When using limit monitors, always ensure that the correct range and unit are used for the analog values connected to the limit input. These always have a direct influence on the unit of the limit value to be set. The units and ranges of all relevant analog values can be found in chapters "Data record 94 - Measured values" and "Data record 95 - Service data/statistical data" in the manual SIMOCODE pro - Communication (https://support.industry.siemens.com/cs/ww/en/view/109743960).

Table 4-96 Examples of typical units and ranges in SIMOCODE pro

	Unit	Range
Temperatures (e.g. max. temperature)	1 K	0 - 65535
Operating hours	1 s	0 - 4294967295
Motor stop time	1 h	0 - 65535

	Unit	Range
Active power	1 W	0 - 4294967295
Apparent power	1 VA	0 - 4294967295
Timer actual value	100 ms	0 - 65535
Currents (e.g. max. current I_max)	1 % of I_s	0 - 65535
Analog module inputs	—	0 to 27648 (S7 format)

Thus, for example, a limit of 473 (K) must be parameterized for a limit monitor to monitor a maximum temperature of 200 °C.

4.9.12 Calculators (calculation modules) 1, 2

Description

The two logic modules "Calculator 1" and "Calculator 2" integrated in SIMOCODE pro V basic units are capable of the standard calculation modes and enable all analog values featured in SIMOCODE pro to be adapted, calculated, and converted, for example:

- Conversion of the measured temperatures from K (Kelvin) to °F or °C
- Conversion of the motor current from [%] to [A]
- Conversion of the 0/4 to 20mA signals of the analog module directly into fill levels, pressures, and flow rates.

The analog value (2 bytes / 1 word) present at the analog sockets is calculated using a defined formula and using freely-selectable parameters (numerators, denominators, operators, offsets). The result of the calculation is output as an analog value (2 bytes/1 word) at the analog socket of the logic module for further processing.

Each calculator consists of:

- one analog plug (Calculator 1) or two analog plugs (Calculator 2)
- one logic component
- one analog socket

Schematic

The following schematic shows the "Calculators" logic modules:

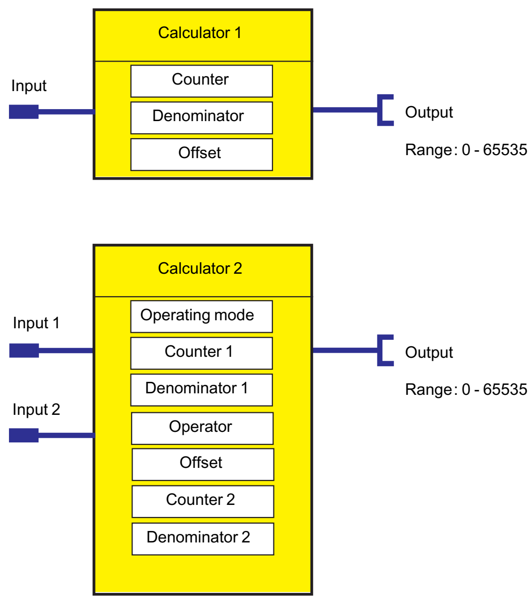


Figure 4-108 "Calculators" logic modules

Modes for calculator 2

The mode of the "Calculator 2" logic module can be changed via the "Operation mode" parameter:

- Operating mode 1: The analog value at input 1 is combined with the analog value at input 2 using a predefined formula and taking into account the specified parameters (numerators, denominators, offsets, operators). The result is available as an analog value (1 word / 2 bytes) at the output of the function block for further processing.
- Operating mode 2: The analog values at input 1 and input 2 are processed together as a double word. Input 1 represents the high word and input 2 the low word. The result is calculated by means of the formula defined for this operating mode using the specified parameters (numerators, denominators, offsets) and is output by the function block as 1 word /2 bytes. In mode 2, it is also possible to process double words (e.g. active power, apparent power) and to display them (2 bytes / 1 word).

Settings

Table 4-97 Calculator settings

Calculator	Description
Calculator 1 - Input	Any value (2 bytes / 1 word)°; Range: 0 - 65535
Calculator 1 - Output	Calculated value (2 bytes/1 word); range: 0 - 65535
Calculator 1 - Numerator	Range: -32766 to +32767, increment 1
Calculator 1 - Denominator	Range: 0 - 255, increment 1

Calculator	Description
Calculator 1 - Offset	Range: -32766 to +32767, increment 1
Calculator 2 - Input 1	Any value (2 bytes / 1 word); Range: 0 - 65535
Calculator 2 - Input 2	Any value (2 bytes / 1 word); Range: 0 - 65535
Calculator 2 - Output	Calculated value (2 bytes / 1 word); Range: 0 - 65535
Calculator 2 - Numerator 1	Range: -128 to +127, increment 1
Calculator 2 - Denominator 1	Range: 0 - 255, increment 1
Calculator 2 - Numerator 2 1)	Range: 0 - 255, increment 1
Calculator 2 - Denominator 2 1)	Range: -128 to +127, increment 1
Calculator 2 - Offset	Range: -2147483648 to +2147483647, increment 1
Calculator 2 - Operation mode	1 or 2
Calculator 2 - Operator1)	+, -, *, /
1) Only relevant for operating mode = 1	

Note

Special aspect

If the numerator and/or the denominator have the value "0", these values are treated as "1" inside the device.

Calculator formulas

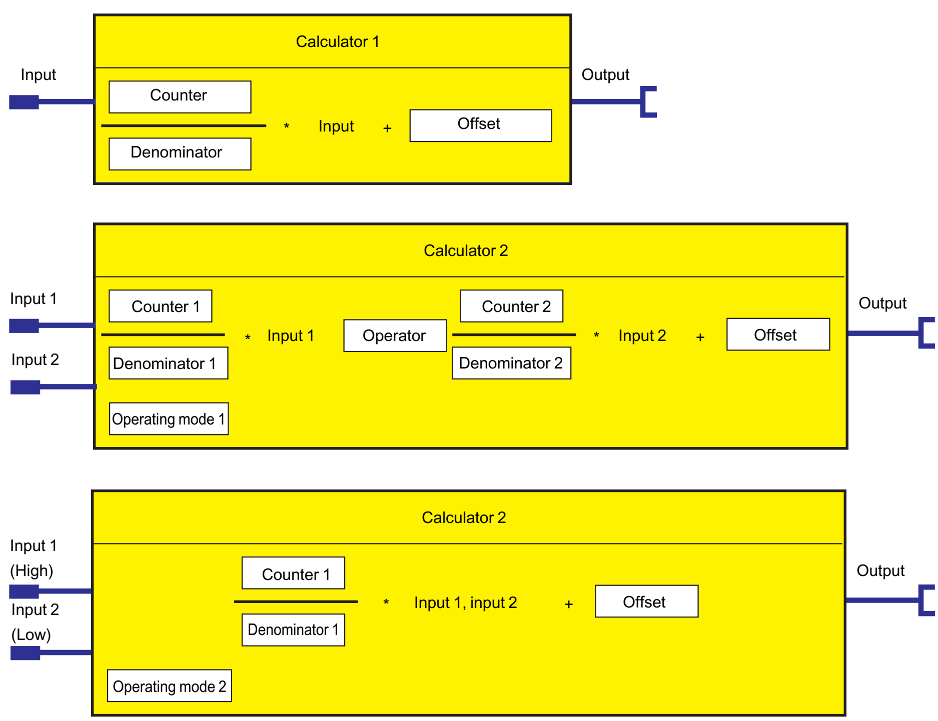


Figure 4-109 Calculator formulas

Examples of calculators

Example 1 - Calculator

Conversion of the maximum temperature of the temperature module from K to °C

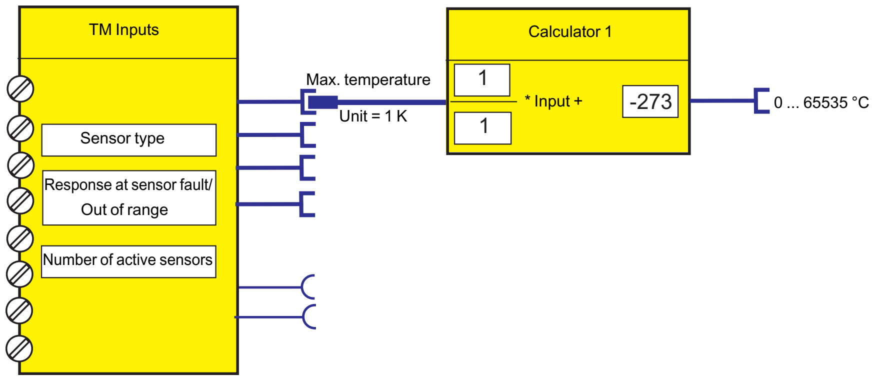


Figure 4-110 Example 1 - Calculator

Example 2 - Calculator

Conversion of the maximum temperature of the temperature module from K to °F

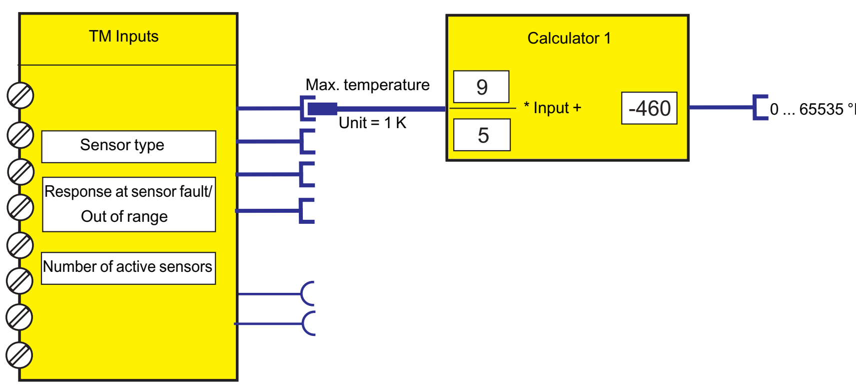


Figure 4-111 Example 2 - Calculator

Example 3 - Calculator

Conversion of motor current I_max from % to A (e.g. current setting I_s = 3.36 A) (only possible for motors with one rotational speed)

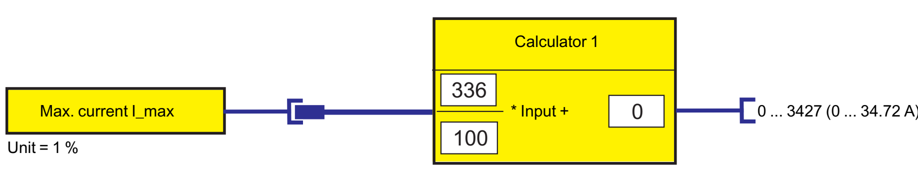


Figure 4-112 Example 3 - Calculator

4.9.13 Calculators (calculation modules) 3, 4

Description

Using the "Calculator 3" and "Calculator 4" function blocks (for SIMOCODE pro V PN (GP) and pro V EIP basic units only), analog values can be processed according to the following arithmetic:

Output = Input 1 [Operator 1] Input 2 [Operator 2] Input 3 [Operator 3] Input 4.

You can connect the corresponding analog signals to the 4 inputs "Calculator 3/4 - Inputs 1 to 4". As operators "Calculator 3/4 - Operator 1 to 3," you can choose one of the four standard operators ("+", "-", "*," or "/").

With "Calculator 3/4 - Priority 1 to 3," you can specify the processing sequence (high, medium, low). You must clearly define a priority for each operator. The priority determines the processing sequence comparable to the placement of a term inside parentheses.

Example:

Output = I1 OP1 I2 OP2 I3 OP3 I4, where

- OP1 = "*"; Medium,
- OP2 = "+"; High,
- OP3 = "-"; Low

Associated equation: Output = (I1 * (I2 + I3)) - I4.

If you interconnect the input to the device-internal analog output data element "Output 1 - Fixed level", the input is assigned the constant "Const x" (x = 1 - 4). In this case, the respective edit field for the constant is activated. You can enter a value between 0 and 65535.

The "Calculator 3" and "Calculator 4" function blocks each consist of:

- Four analog plugs
- One analog socket
- Logic.

Schematic

The following schematic shows the "Calculator 3" and "Calculator 4" logic modules:

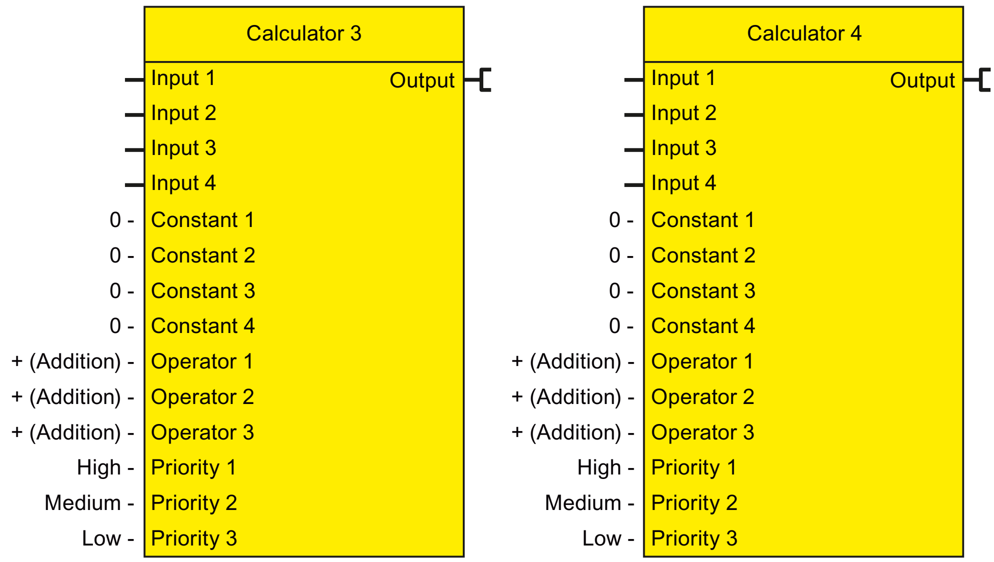


Figure 4-113 "Calculator 3" and "Calculator 4" function blocks

Settings Calculator 3, 4

Table 4-98 Settings Calculator 3, 4

Calculators 3, 4	Description
Input	Any analog value
Output	Calculated analog value
Constant 1 to 4	Any analog value; range: 0 to 65535 (default: 0)
Operator 1 to 3	• "+": Addition • "-": Subtraction • "*": Multiplication • "/": Subtraction
Priority 1 to 3	• Priority 1: high (default), medium, low • Priority 2: medium (default), low • Priority 3: Low

Note

Special aspect

If the numerator and/or the denominator have the value "0", these values are treated as "1" inside the device.

Formula Calculators 3, 4

Input 1 [Operator 1] Input 2 [Operator 2] Input 3 [Operator 3] Input 4 = Output

4.9.14 Analog multiplexer

Description

The analog multiplexer (for SIMOCODE pro V PN (GP) /pro V EIP basic units only) outputs one of 4 possible analog values at the inputs 1 to 4, depending on control signals S1 and S2.

If you interconnect the input to "Fixed level," the input is assigned the constant "Const x" (x = 1 ... 4). In this case, the respective edit field for the constant is activated. You can enter a value between 0 and 65535.

The "Analog Multiplexer" function block consists of:

- two digital plugs (control signal 1 and 2)
- Four analog plugs (Input 1 to 4)
- One analog socket
- Logic.

Schematic

The following schematic shows the Analog Multiplexer logic module:

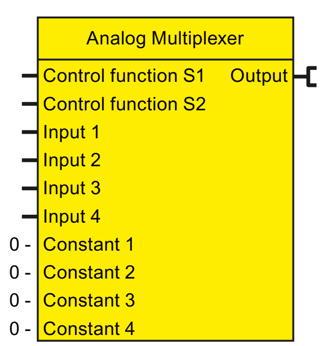


Figure 4-114 Analog multiplexer function block

Settings Analog Multiplexer

Table 4-99 Settings Analog Multiplexer

Analog multiplexer	Description
Control signal S1 to S4	Activation by any signal (any sockets, e.g. device inputs, control bits from the communication bus, etc.)
Input 1 to 4	Any analog value or "Fixed level"

Analog multiplexer	Description
Output	Output value according to panel (see below)
Constant 1 to 4	Any analog value; range: 0 to 65535

Table 4-100 Analog multiplexer panel

S1	S2	Output
0	0	= Input 1
0	1	= Input 2
1	0	= Input 3
1	1	= Input 4

Analog multiplexer example

Pressing an operator panel button multiple times will output the maximum motor current and the three phase currents one after the other (e.g., via the output of the analog module):

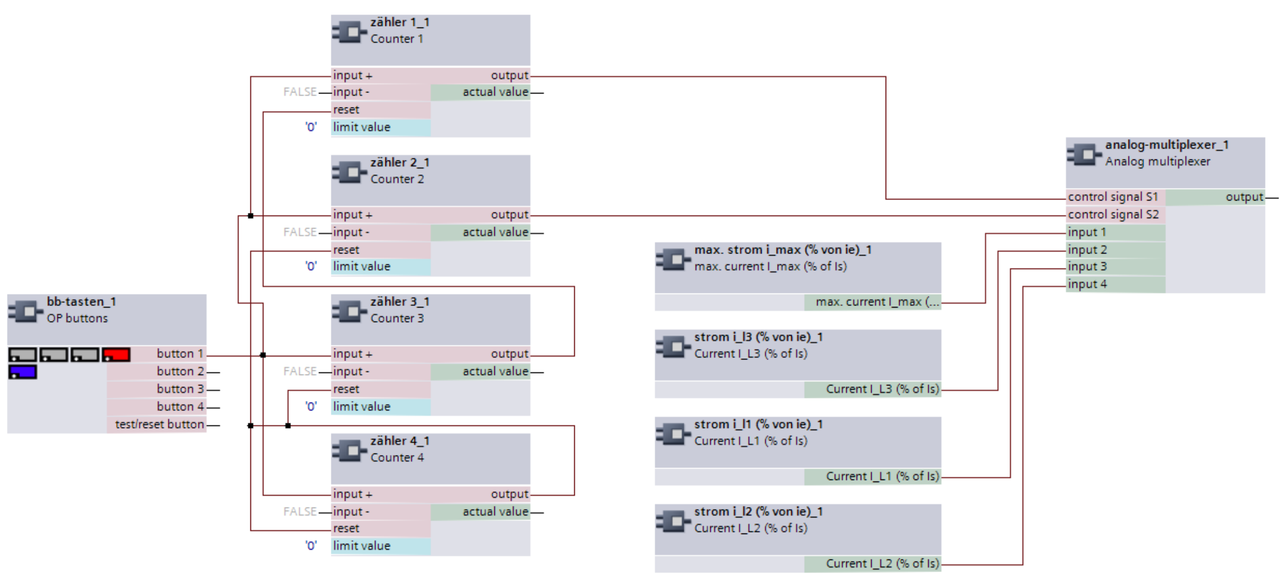


Figure 4-115 Analog multiplexer example

- Pressing the OP button 1x: Phase current IL1
- Pressing the OP button 2x: Phase current IL2
- Pressing the OP button 3x: Phase current IL3
- Pressing the OP button 4x: Maximum motor current I_max.

4.9.15 Pulse width modulator

Description

The pulse width modulator (PWM) (for SIMOCODE pro V PN (GP) /pro V EIP basic units only) modulates the analog input value into a digital output signal "PWM Output" with a variable duty factor that is proportional to the analog input value.

If you interconnect the input to "Fixed value," the input is assigned the parameterized constant "Input (const)." In this case, the edit field for the constant is activated. You can enter a value between 0 and 65535.

The "Pulse Width Modulator" function block consists of:

- one analog plug (input)
- One digital socket (PWM output)
- Logic.

Schematic

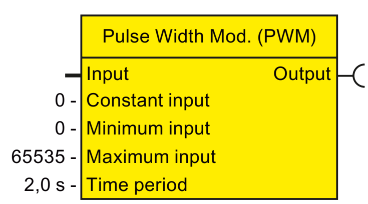


Figure 4-116 "Pulse width modulator" function block

Settings Pulse Width Modulator

Pulse width modulator	Description
Input	Activation by any analog signal or "Fixed value"
Constant input	Any constant; range: 0 to 65535 (default: 0)
Input Minimum	Any constant; range 0 to 65535 (default: 0)
Input Maximum	Any constant; range 1 to 65535 (default: 65535)
PWM duration	0.2 - 6553.5 s (default: 2)

Pulse width modulator formulas

- Length of 1-signal = PWM period * (PWM Input - PWM Input Minimum)/(PWM Input Maximum - PWM Input Minimum)
- Length of 0-signal = PWM period - Length of 1-signal.

Note

Signal duration

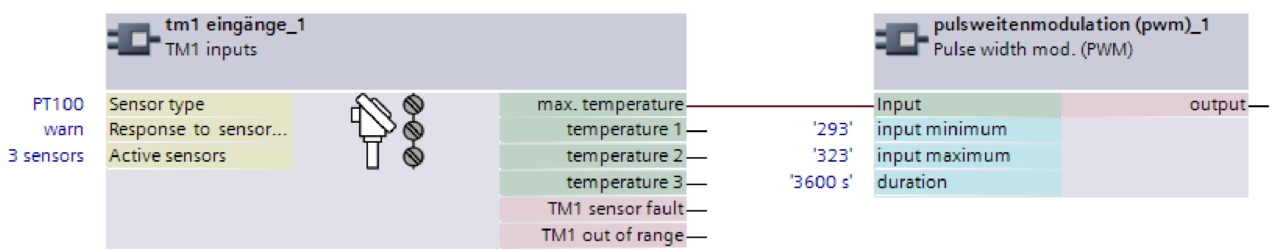
The shortest signal duration for 0 and 1 is 0.1 s in each case.

If a duration for the 1 signal that is shorter than 0.1 s results from calculation, the output will remain permanently 0, while for a duration for the 0 signal shorter than 0.1 s the output remains permanently 1.

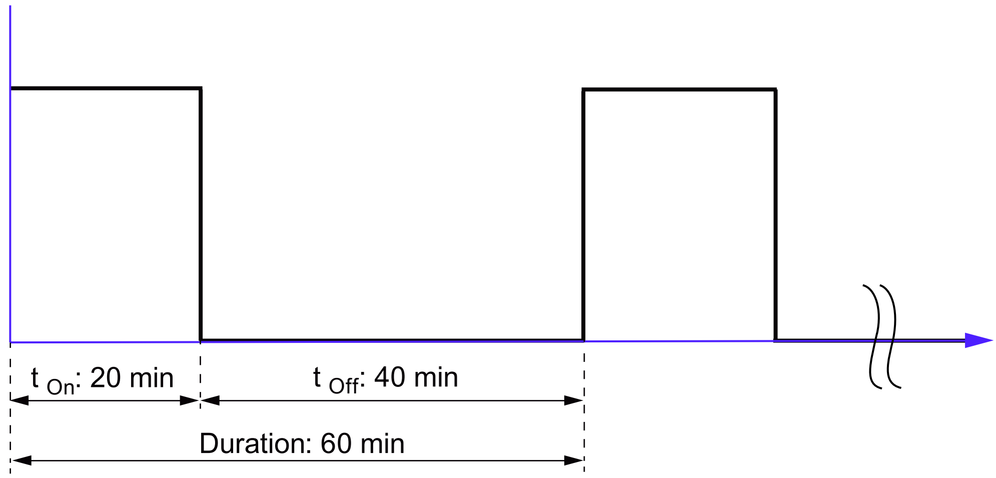
Example - Pulse width modulator

A load will be switched on and off with a duration of 60 minutes, dependent on a measured value (e.g., temperature).

- If the measured value exceeds a maximum value of 50 °C (323°K), the load will be switched on permanently, and if it falls below 20 °C (293°K), it will be switched off permanently.
- If the measured value falls within the range between the minimum and maximum value, the On duration will be proportional to the measured value.



- Duration: 60 min (3600 s)
- Lower limit: 20°C (293 K)
- Hi limit: 50°C (323 K).



- At 20°C (293 K): OFF
- At 30°C (303 K): 20 min ON and 40 min OFF
- At 40°C (313 K): 40 min ON and 20 min OFF
- At 50°C (323 K): ON.

List of abbreviations

A

A.1 List of abbreviations

See SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

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SIEMENS

Industrial Controls

Motor management and control devices
SIMOCODE pro - Application examples

Application Manual

10/2022
A5E40508055002A/RS-AF/006

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Table of contents

Introduction

1

1.1 Important notes

Scope of application

This manual is applicable to the listed SIMOCODE pro system components. It contains a description of the components applicable at the time of printing the manual. SIEMENS reserves the right to include updated information about new components or new versions of components in a Product Information.

Manual Collection

A Manual Collection (https://support.industry.siemens.com/cs/ww/en/view/109743951), a collection of the following five SIMOCODE pro manuals is at your disposal in Industry Online Support:

- SIMOCODE pro - 1 Getting Started
- SIMOCODE pro - 2 System Manual
- SIMOCODE pro - 3 Parameterization
- SIMOCODE pro - 4 Applications
- SIMOCODE pro - 5 Communication

SIMOCODE pro response tables

Specific responses (deactivated, signaling, warning, tripping) can be parameterized for various SIMOCODE pro functions, such as overload. These are always displayed in tabular form:

- "X" = Applicable
- "—" = Not applicable
- Default values are marked "d" for "default" in parentheses.

Response	Function 1	Function 2	Function 3
Tripping	—	X (d)	X
Warning	X (d)	X	—
Signaling	X	X	—
Deactivated	X	X	X (d)
Delay	0 ... 25.5 s (default: 0)	—	—

Brief description of the responses:

- Tripping: The contactor controls QE* are tripped. A fault message is generated which is available as a diagnosis via PROFIBUS DP. The fault message and the device-internal signal remain on until the appropriate length of time has elapsed or the cause of the fault has been eliminated and acknowledged.
- Warning: In addition to the device-internal signal, a warning signal is generated that is available as diagnostics via the communication bus.
- Signaling: Only a device-internal signal is generated, which can be further processed as required.
- Deactivated: The appropriate function is switched off, no signals are generated.

A delay time can also be set for specific responses.

Further information

Please read the operating instructions of the respective components. You can find the operating instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man).

You can find further information on the Internet:

- SIMOCODE pro (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Siemens Industry Online Support (SIOS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

Disclaimer of liability

The products described here have been developed to carry out safety-related functions as part of a complete plant or machine. In general, a complete safety system consists of sensors, evaluation units, signaling devices and methods for safe tripping. The manufacturer is responsible for ensuring safe functioning of the complete plant or machine. Siemens AG, its subsidiaries, and associated companies (hereinafter referred to as "Siemens") are not in a position to guarantee every characteristic of a complete plant or machine not designed by Siemens.

Siemens also denies all responsibility for any recommendations that are made or implied in the following description. No new guarantee, warranty, or liability claims above those beyond the scope of the Siemens general terms of delivery can be derived from the following description.

1.2 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

Link: Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en)

Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**
  Answers to frequently asked questions
- **Manuals/operating instructions**
  Read online or download, available as PDF or individually configurable.
- **Certificates**
  Clearly sorted according to approving authority, type and country.
- **Characteristics**
  For support in planning and configuring your system.
- **Product announcements**
  The latest information and news concerning our products.
- **Downloads**
  Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
  Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**
  Technical product data for support in planning and implementing your project

Link: Product support (https://support.industry.siemens.com/cs/ww/en/ps)

mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**
  Search for request number, product or subject
- **My filters**
  With filters, you limit the content of the online support to different focal points.

- **My favorites**
  With favorites you bookmark articles and products that you need frequently.
- **My notifications**
  Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.
- **My products**
  With product lists you can virtually map your control cabinet, your system or your entire automation project.
- **My documentation**
  Configure your individual documentation from different manuals.
- **CAx data**
  Easy access to CAx data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams
- **My IBase registrations**
  Register your Siemens products, systems and software.

1.3 Siemens Industry Online Support app

Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:

Android

iOS

1.4 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

1.5 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert.

1.6 Current information about operational safety

Important note for maintaining operational safety of your system

DANGER

Hazardous Voltage

Can Cause Death, Serious Injury or Risk of Property Damage

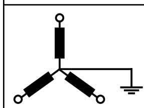
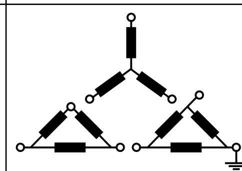
Please take note of our latest information!

Systems with safety-related characteristics are subject to special operational safety requirements on the part of the operator. The supplier is also obliged to comply with special product monitoring measures. We therefore also provide information in the newsletters Industrial controls (https://new.siemens.com/global/en/products/automation/industrial-controls/forms/newsletter.html) and Safety Integrated (https://new.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/newsletter.html) about new products, further technical developments as well as standards and guidelines.

1.7 Notes for SIMOCODE pro regarding IEC60947-4-1:2018

1.7.1 Line system configurations

The voltage information regarding the SIMOCODE pro current and current/voltage measuring modules is valid for the following line system configurations according to IEC 60947-4-1:

Three-phase four-wire systems	**Three-phase three-wire systems**
	
[V]	[V]
--	230
230 / 400	400
260 / 440	440
--	500
400 / 690	600

The nameplates of the current/voltage measuring modules state a maximum line voltage of 400/690 V.

1.7.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

1.7.3 Touch current

A protective impedance is present in each of the 3UF711x-1xA01-0 / 3UF712x-1xA01-0 current/voltage measuring modules. This protective impedance is 7.2 MΩ per phase (product version E04 and higher).

DANGER

Hazardous touch current

When connecting multiple SIMOCODE systems in parallel, make sure that no hazardous touch current occurs.

The SIMOCODE basic units in the 110-240 V AC/DC version include galvanic isolation. This avoids the effect of parallel connection via a central supply voltage for multiple systems when these basic units are used.

The SIMOCODE basic units in the 24 V DC version do not include galvanic isolation.

NOTICE

PELV power supply required

When using numerous current/voltage measuring modules with these basic devices, deploy a PELV power supply, for example, to prevent a potential touch current.

NOTICE

Ground leakage current

Pay attention to any resulting ground leakage current that may occur.

1.8 Recycling and disposal

For environmentally-friendly recycling and disposal of your old device, contact a company certified for the disposal of used electrical and electronic equipment, and dispose of the device as specified in the regulations for your particular country.

Application examples 2

2.1 Level monitoring

Description

The fill level of a liquid container is being monitored. A pump keeps the liquid level (reference value) almost constant by pumping more liquid into the container. The fill level (actual value) is measured by the fill level indicator and output as an analog signal. When the fill level sinks below a specific level, the pump is switched on by SIMOCODE pro. Liquid is pumped in until the reference value is re-attained. The pump is then switched off.

Controlling the pump

The pump can be controlled as follows:

- Locally: Local control [LC] station for manual switching on and off (by visual contact)
- in the switchboard, cabinet door: Control station operator panel [OP] for manual switching on and off
- At automation level: Control station PLC / PCS (DP) for remote-controlled switching on and off (automatic operation) via PROFIBUS DP
- Via SIMOCODE pro, by means of internal fill-level or limit value monitoring

Schematic

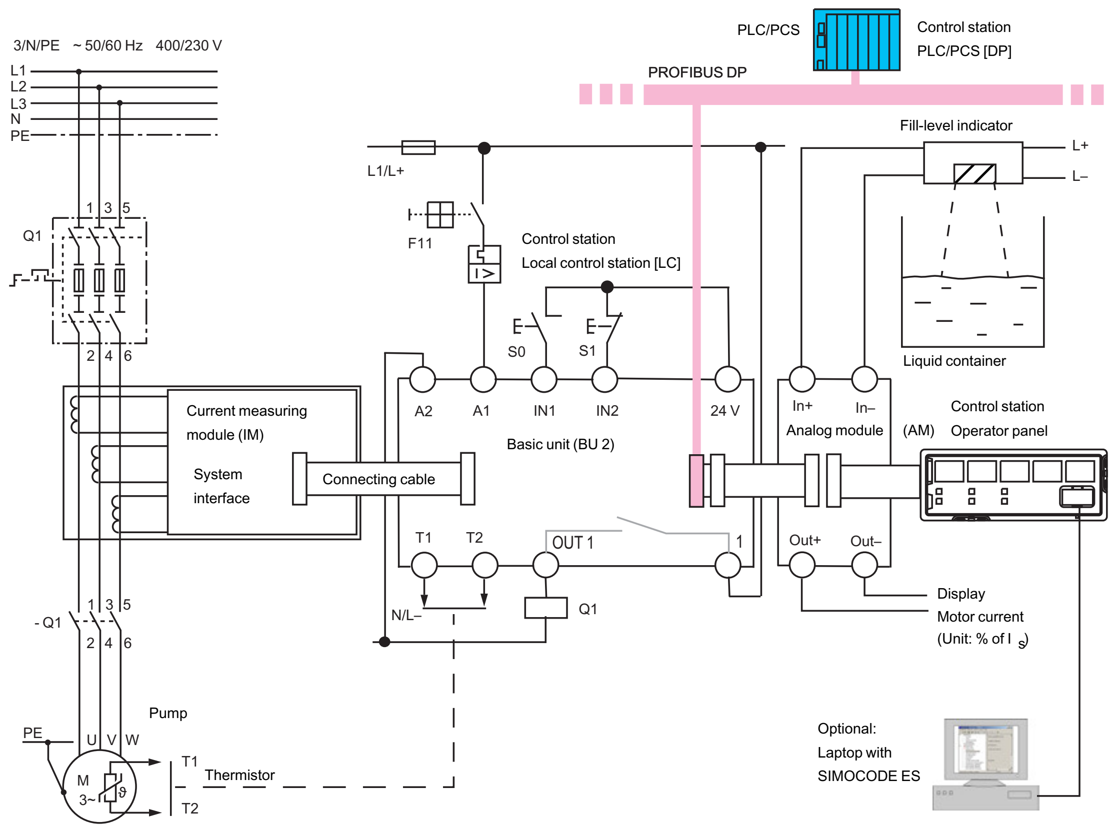


Figure 2-1 Schematic of a typical application example

Recording, displaying and evaluating measured values

The following measured values are required for monitoring the process:

- Motor current of the pump is measured by the current measuring module.
- Analog value of the fill-level sensor is acquired by the analog modules.

The measured values are evaluated directly by SIMOCODE pro and /or transferred via PROFIBUS DP to the PLC / PCS.

Any measured value can be output via the analog module, e.g. the actual motor current to a connected pointer instrument.

Optionally, a laptop with the SIMOCODE ES software, for example, can be connected to the operator panel so that further process data can be locally evaluated.

2.2 Dry-running of pumps

Description

A centrifugal pump in radial design that conveys a flammable pumping medium and/or is located in a hazardous area (Ex zone) is monitored for dry running and is switched off if dry running is about to begin. Conclusions can be drawn about the delivery flow rate by recording and monitoring the active power of the pump motor for undershoot. It is important in this case that the pump has a sufficiently progressive, i.e. rising characteristic curve. This means that the ratio from active power at minimum flow rate and optimum flow rate P_{MIN} / P_{OPT} must be < 0.8, which applies to the majority of centrifugal pumps used in the chemicals industry.

The SIMOCODE pro-basic unit itself is located in a switchboard/control panel outside the Ex zone.

The integrated monitoring device in SIMOCODE pro V prevents hazardous states that may arise from dry running of the pump. In this case, the explosion protection conforms with type of protection b by "control of ignition sources", ignition protection system type b1, e.g. acc. to DIN EN 80079-37

Configuration

The following SIMOCODE pro components are required as a minimum:

- One of the following basic units with PTB 18 ATEX 5003 X / ITS 21 UKEX 0455 X:
  - 3UF7010-1A.00-0 from *E16*
  - 3UF7011-1A.00-0 from *E13*
  - 3UF7013-1A.00-0 from *E04*
- One of the following current/voltage measuring modules for dry-running protection:
  - 3UF7120-1AA01-0 (DRP)
  - 3UF7121-1AA01-0 (DRP)
  - 3UF7122-1AA01-0 (DRP)
  - 3UF7123-1AA01-0 (DRP)
  - 3UF7123-1BA01-0 (DRP)
  - 3UF7124-1BA01-0 (DRP)

The measuring range must include the currents both at the minimum delivery flow rate Q_{MIN} / P_{MIN} / I_{MIN} and at the operating point Q_{OPT} / P_{OPT} / I_{OPT} (as well as the rated motor current I_N).

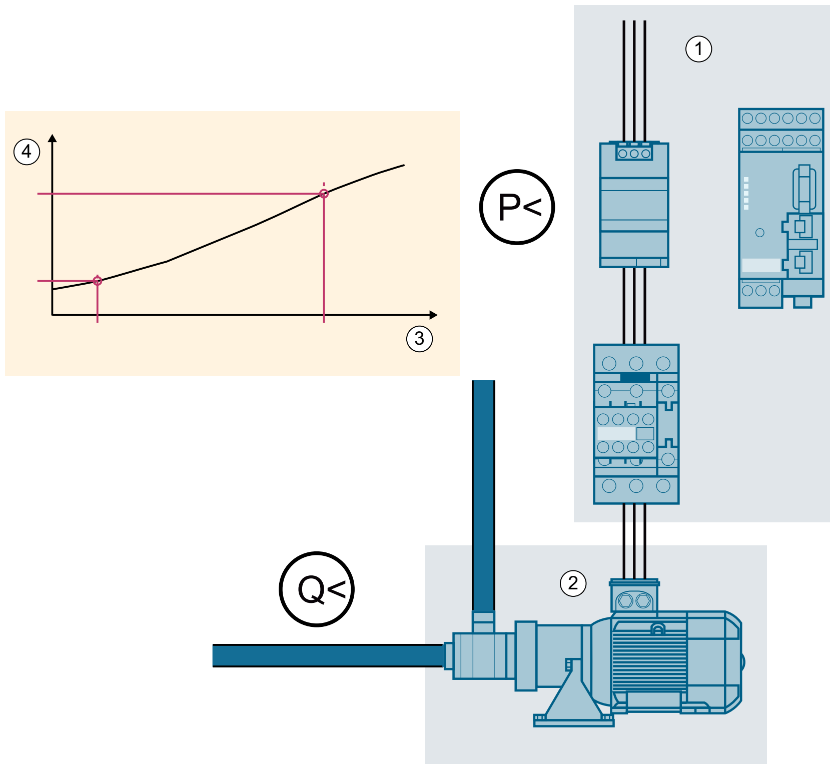


Figure 2-2 Schematic diagram

① Motor feeder with SIMOCODE pro

② Pump with motor

③ Flow rate Q [m^3/h]

④ Active power P [kW]

Settings in SIMOCODE ES:

The following settings must be made in SIMOCODE ES:

- The "direct starter" (direct-on-line starter) control function must be set under "Device configuration"
- The commissioning editor must have been switched to online mode
- Under "Motor protection → Overload protection", the load type must be switched to "three phase"
- Under "Motor protection → Overload protection", the transformation ratios must be set as follows when check box "Transformation ratio - active" is selected:
  - Transformation ratio - primary: 1
  - Transformation ratio - secondary: >0
- Password protection must be deactivated. If password protection is activated, you must deactivate it.
- The startup parameter block under "PROFINET parameters" in the parameter editor must be activated

Other requirement:

If you are using an initialization module, it must not be write-protected.

Configuring

Configuring of the "Direct starter" control function and of overload protection for the direct starter are carried out as described under Direct starter (Page 30).

NOTICE
It may be necessary to loop the cables twice through the current/module measuring module
If the rated motor current of the pump motor is in the lower range of the smallest current/ voltage measuring module 3UF7120-1AA01-0, you have to loop the cables twice through the current/voltage measuring module and set the transmission ratios as follows:
Transformation ratio primary: 1
Transformation ratio secondary: 2
Example:
Settings for rated motor current 0.3 A and cables looped-through twice: • Set current: 0.3 A • Transformation ratio active • Transformation ratio primary: 1 • Transformation ratio secondary: 2

The following procedures are possible for configuration of the dry-running protection:

1. Determine and set the parameters of the dry-running protection function using the SIMOCODE ES Dry-Running Protection Wizard:

A teach-in to establish P_{MIN} can be carried out to determine the ratios at the operating point (Q_{OPT} / P_{OPT}) and at the minimum flow rate (Q_{MIN} / P_{MIN}) specified by the pump manufacturer. This is supported by SIMOCODE ES in commissioning mode by means of the Dry-Running Protection Wizard. For this, you need the operating points for the optimum and minimum flow rate from the pump characteristic curve or in accordance with the specifications of the pump manufacturer. These operating points are approached during teach-in by activating a control device and the active power absorbed by the pump motor during the process is measured and recorded by SIMOCODE.

The steps to be carried out for setting the trip level and the bridging time for startup and the delay during ongoing operation are described in detail in the chapter "Dry-running protection of centrifugal pumps by active-power monitoring" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

NOTICE
Basic protection for dry running required
Provide basic protection for dry running for the period of teach-in.
You can create this basic protection by activating the dry-running protection function with temporary parameters for trip level, delay and start-up bridging time by directly entering the parameters.

2. Directly enter the parameters of the dry-running protection function with SIMOCODE ES

Alternatively you can also determine the necessary parameters without using the Dry-Running Protection Wizard and directly set them in SIMOCODE ES:

In this case it is important that you determine the active power of the pump motor at minimum flow rate for the trip level P_{MIN} with the same SIMOCODE device that also performs the dry-running protection function.

Direct entry of the parameters is also used to specify temporary parameters that already enable basic protection during the teach-in sequence for dry-running protection.

Operation

- Starting the pump with pump dry-running protection function active:
  - The requirements for starting the pump must be fulfilled beforehand
  - Monitoring of the active power for undershooting the trip level is active after expiry of the set start-up bridging time.
- Operation of the pump with pump dry-running protection function active:
  - During operation of the pump, continuous monitoring of the active power is carried out with the set trip level.
  - Undershooting this level causes the pump to be switched off with "Fault - Dry running pump" after expiry of the set delay
- Switching off the pump with pump dry-running protection function active:
  - The requirements for switching off the pump must be fulfilled.
  - When the pump is switched off, undershoot of the trip level is not monitored.
- Checking the pump dry-running protection function:
  - To check the function for dry-running protection of the pump you have to approach the operating point that corresponds to the minimum flow rate.
  - Undershooting this level must cause the pump to be switched off with "Fault - Dry running pump" after expiry of the set delay

Further possible application cases for using the "dry-running protection" function:

- Operation of the pump at flow rate equal to zero (e.g. with closed valve on discharge side) In this state, the trip level of active power is also undershot and the pump is switched off.
- Conveying of gas bubbles and cavitation: Cause reduction in flow rate and active power. If the trip level of active power is undershot in the process this causes the pump to be switched off.

Example circuits control functions 3

3.1 Purpose, steps, preconditions

Purpose of example circuits

The example circuits should:

- Show you how to implement a circuit for a specific control function using SIMOCODE pro.
- Help you modify these examples for your respective application.
- Help you implement other applications easily.

Fundamental steps

- Implementation of external wiring (for control and feedback of main current switching devices and control and signaling devices)
- Implementation / activation of internal SIMOCODE pro functions, with control and evaluation of the SIMOCODE pro inputs / outputs (internal SIMOCODE pro wiring).
- Setting up the cyclic receive and send data for the communication of SIMOCODE pro with a PLC: see function circuit diagrams and the "Assignment of cyclic receive and send data for predefined control functions" tables in the SIMOCODE pro system manual.

Prerequisites

- Load feeder / Motor is present
- PLC / PCS with bus interface is present
- The main circuit is already connected
- PC / PG is present
- SIMOCODE ES software is installed
- The basic unit has the factory settings. You can find out how to restore the basic factory settings in Section "Restoring factory settings" in the SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957)

3.2 Control functions

Depending on the device series, the following parameterizable control functions are available:

Table 3-1 Control functions

Control function	SIMOCODE pro			
	BP	GP		HP
	C	S	V PN GP	V PB, V MR, V PN, V EIP
Overload relay	✓	✓	✓	✓
Direct starter (direct-on-line starter)	✓	✓	✓	✓
Reversing starter	✓	✓	✓	✓
Molded case circuit breaker (MCCB)	✓	✓	✓	✓
Star-delta starter	—	✓	✓	✓
Star-delta reversing starter	—	—	—	✓
Dahlander starter, combinable with reversing starter	—	—	—	✓
Pole-changing starter, combinable with reversing starter	—	—	—	✓
Solenoid valve	—	—	—	✓
Positioner	—	—	—	✓
Soft starter	—	✓	✓	✓
Soft starter with reversing contactor	—	—	—	✓

All the necessary protection functions and interlocks are already available and can be flexibly adapted and expanded.

For a detailed description of the individual control functions: See Chapter "Motor control" in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

3.3 Overload relay

3.3.1 "Overload relay" circuit diagram - SIMOCODE pro C, pro V PB, pro V MR

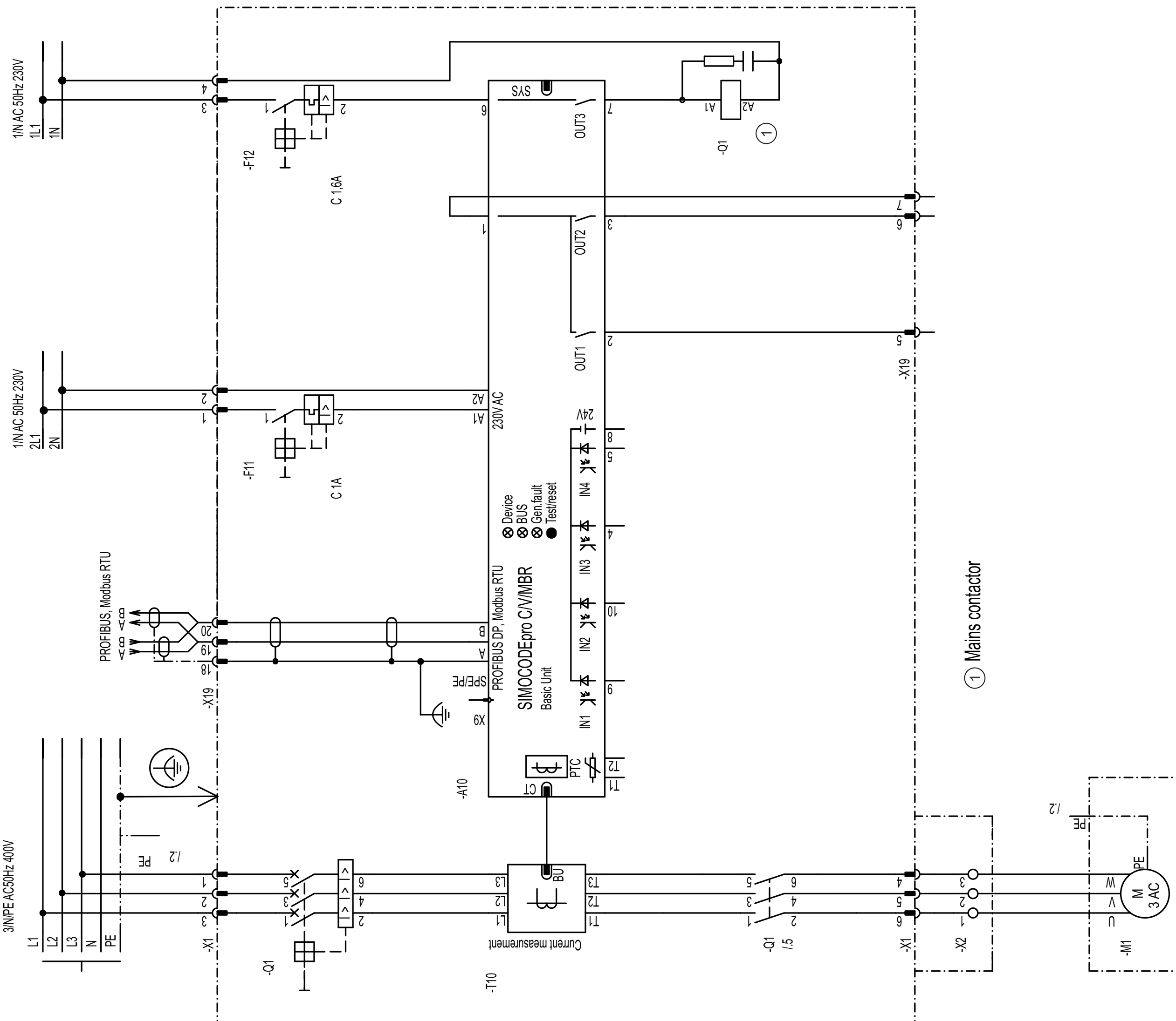


Figure 3-1 "Overload relay" circuit diagram, SIMOCODE pro C, pro V PB, pro V MR

3.3.2 "Overload relay" circuit diagram - SIMOCODE pro V PN, pro V EIP

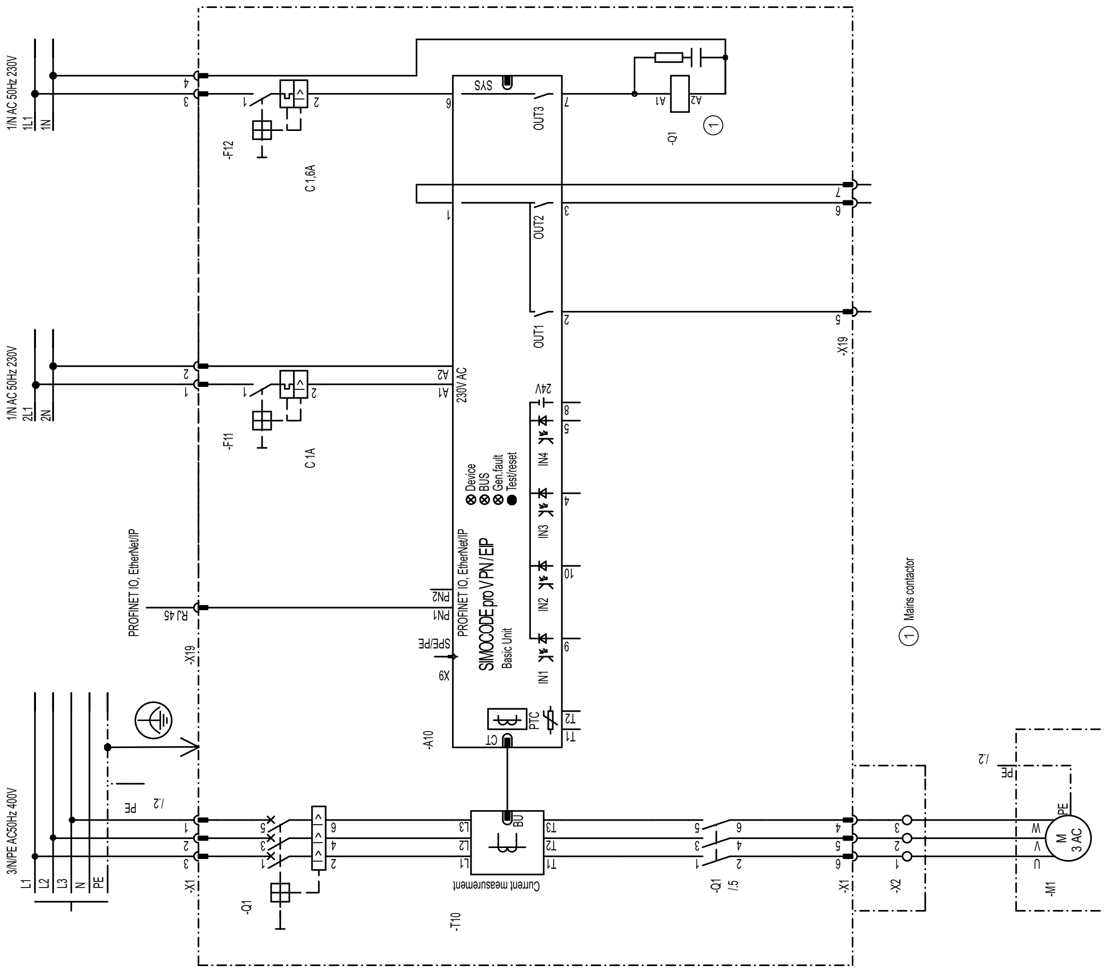


Figure 3-2 "Overload relay" circuit diagram, SIMOCODE pro V PN, pro EIP

3.3.3 "Overload relay" plan - SIMOCODE pro C, pro V PB, pro V MR

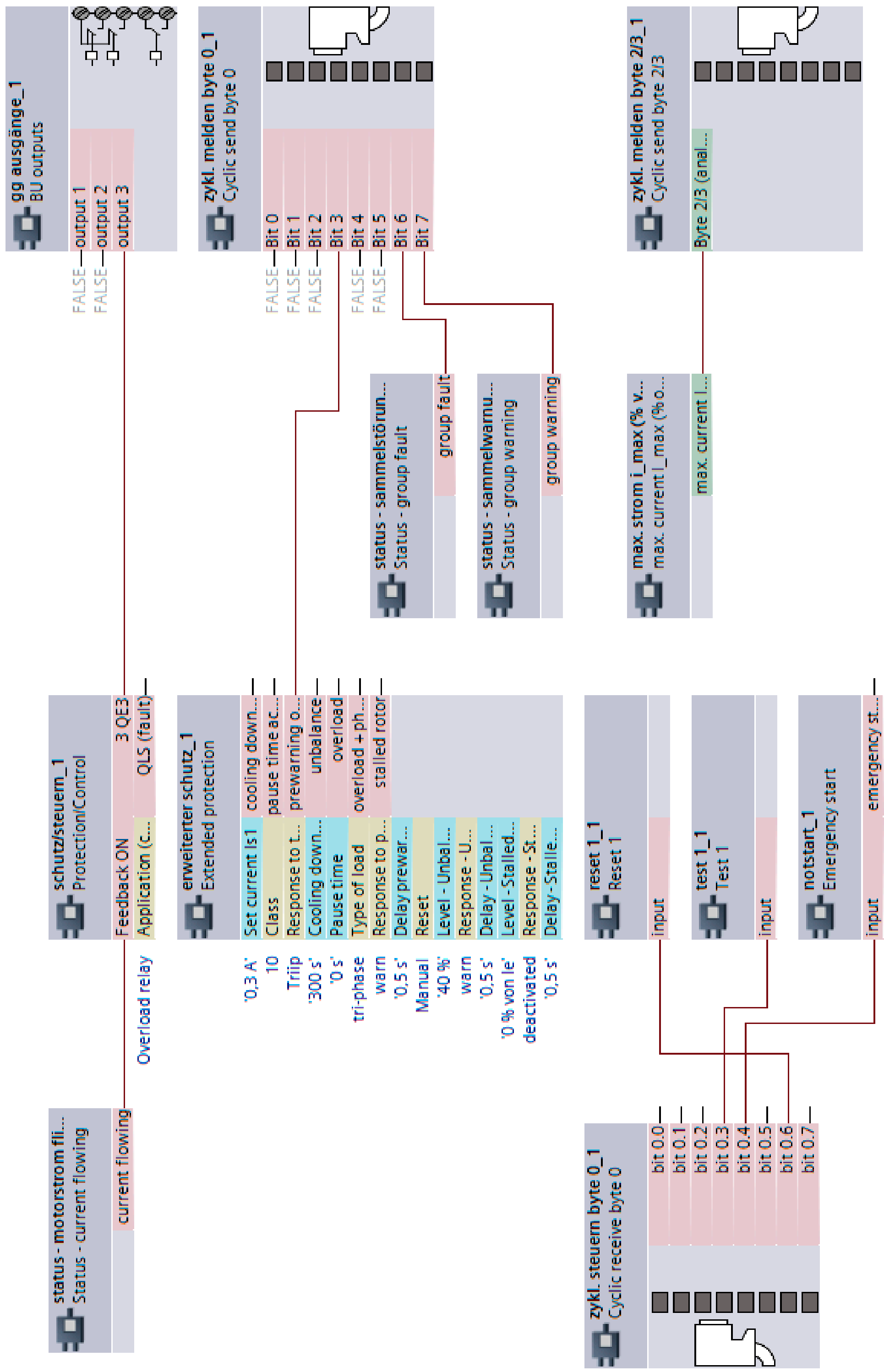


Figure 3-3 "Overload relay" plan, SIMOCODE pro C, pro V PB, pro V MR

3.3.4 "Overload relay" circuit diagram - SIMOCODE pro S

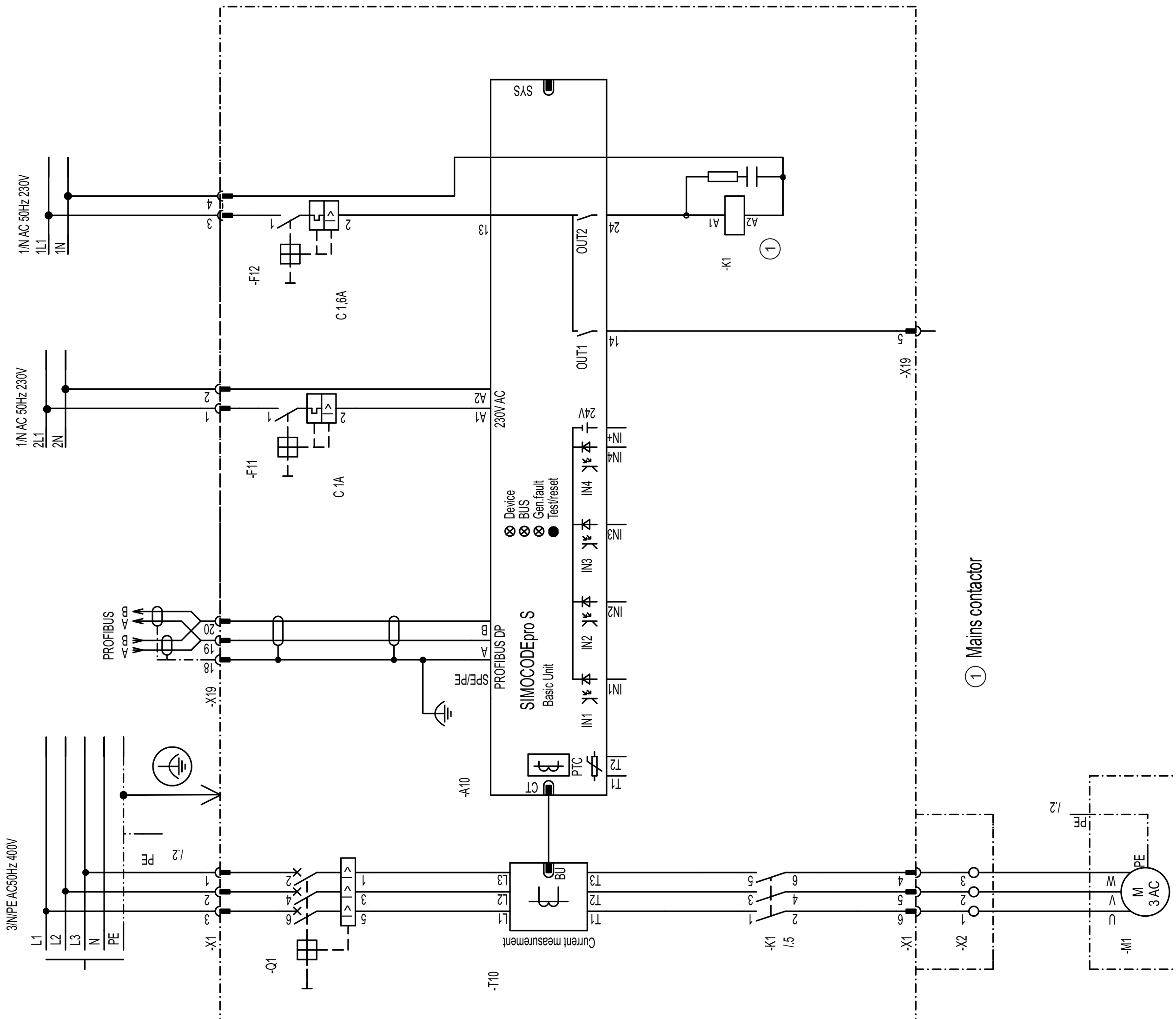


Figure 3-4 "Overload relay" circuit diagram, SIMOCODE pro S

3.3.5 "Overload relay" plan - SIMOCODE pro S

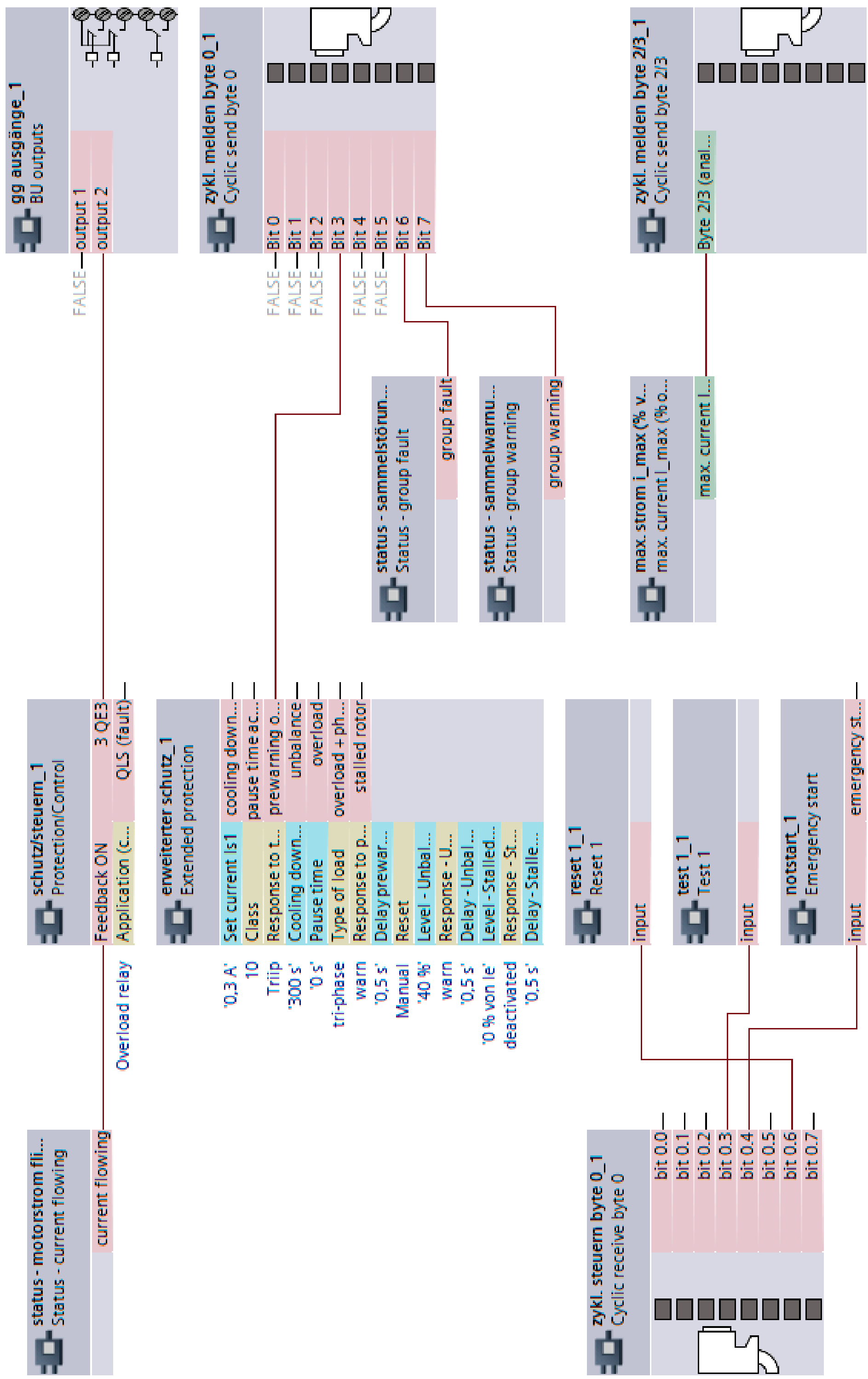


Figure 3-5 "Overload relay" plan, SIMOCODE pro S

3.4 Direct starter

3.4.1 "Direct starter" circuit diagram - SIMOCODE pro C, pro V PB, pro V MR

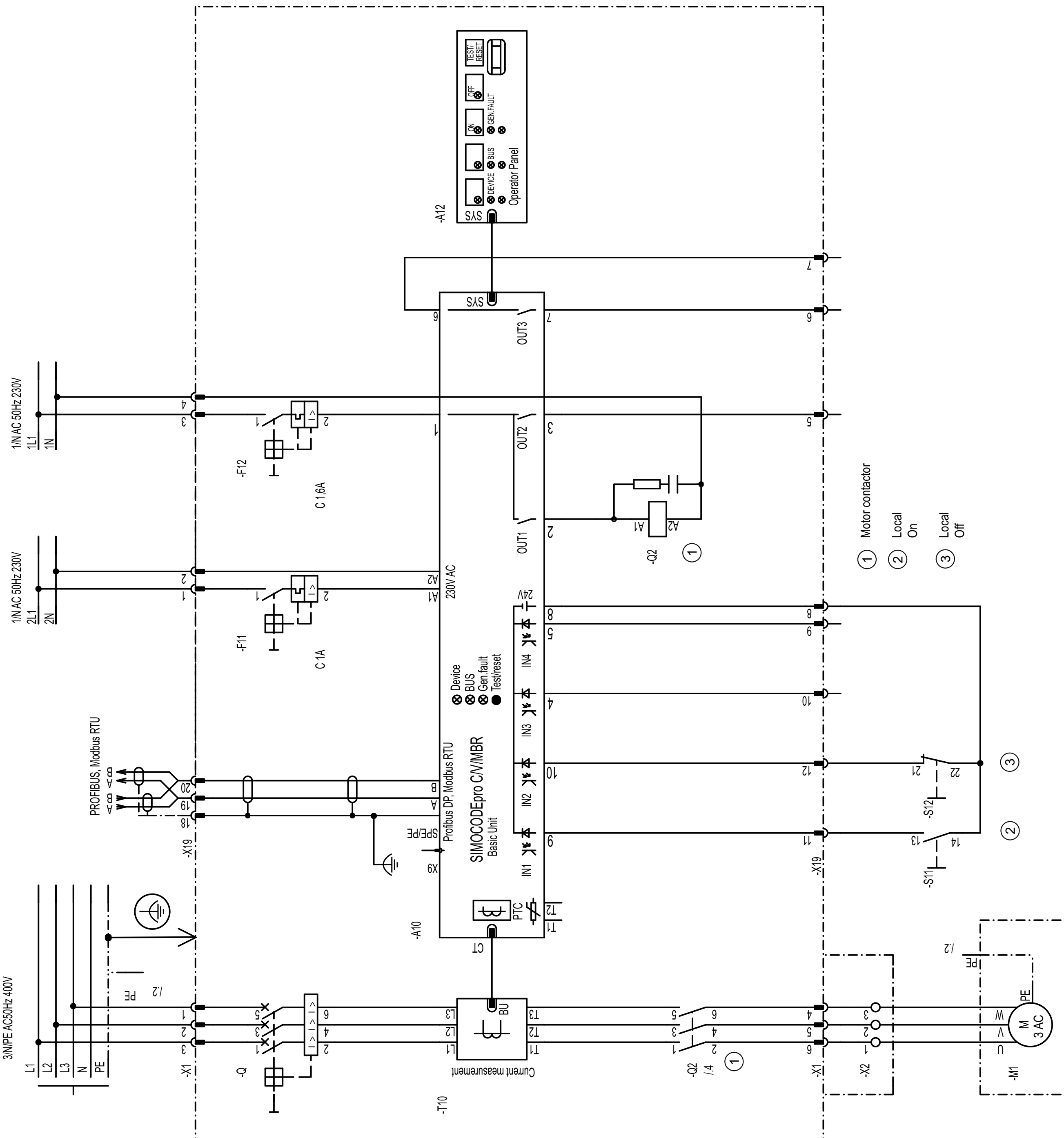


Figure 3-6 "Direct starter" circuit diagram, SIMOCODE pro C, pro V PB, pro V MR

3.4.2 "Direct starter" circuit diagram - SIMOCODE pro V PN, pro V EIP

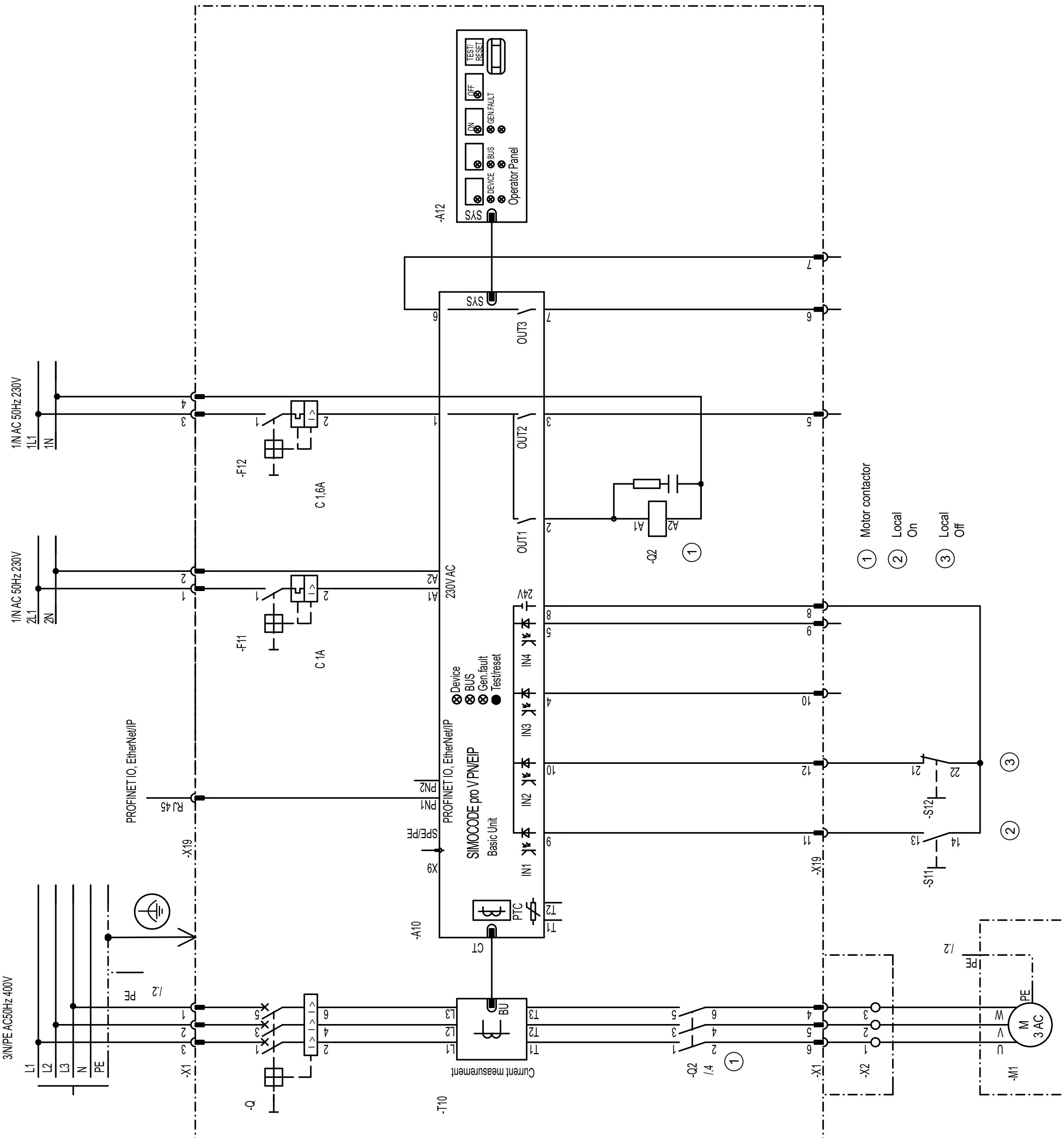


Figure 3-7 "Direct starter" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.4.3 "Direct starter" plan - SIMOCODE pro C, pro V PB, pro V MR

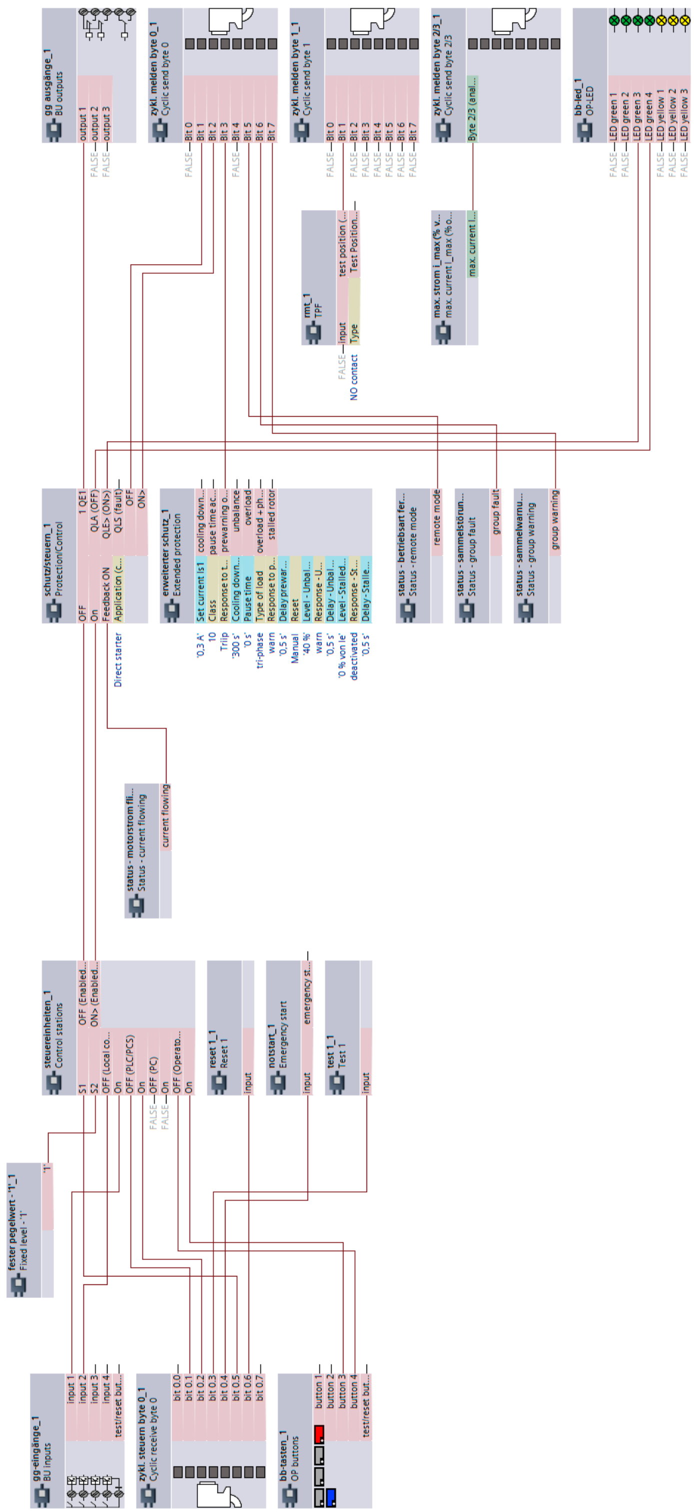


Figure 3-8 "Direct starter" plan, SIMOCODE pro C, pro V PB, pro V MR

3.4.4 "Direct-on-line starter" circuit diagram - SIMOCODE pro S

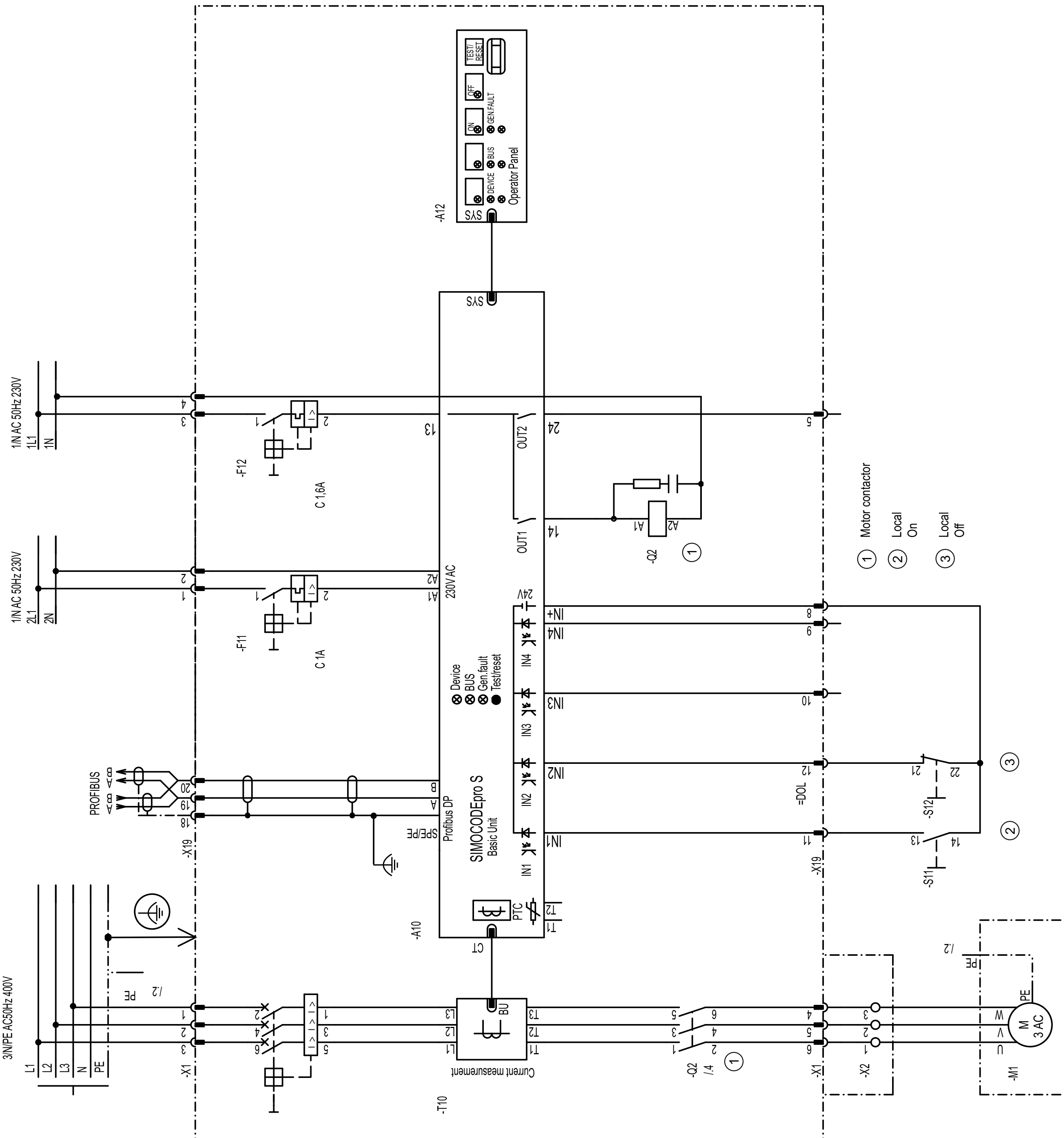


Figure 3-9 "Direct starter" circuit diagram, SIMOCODE pro S

3.4.5 "Direct-on-line starter" plan - SIMOCODE pro S

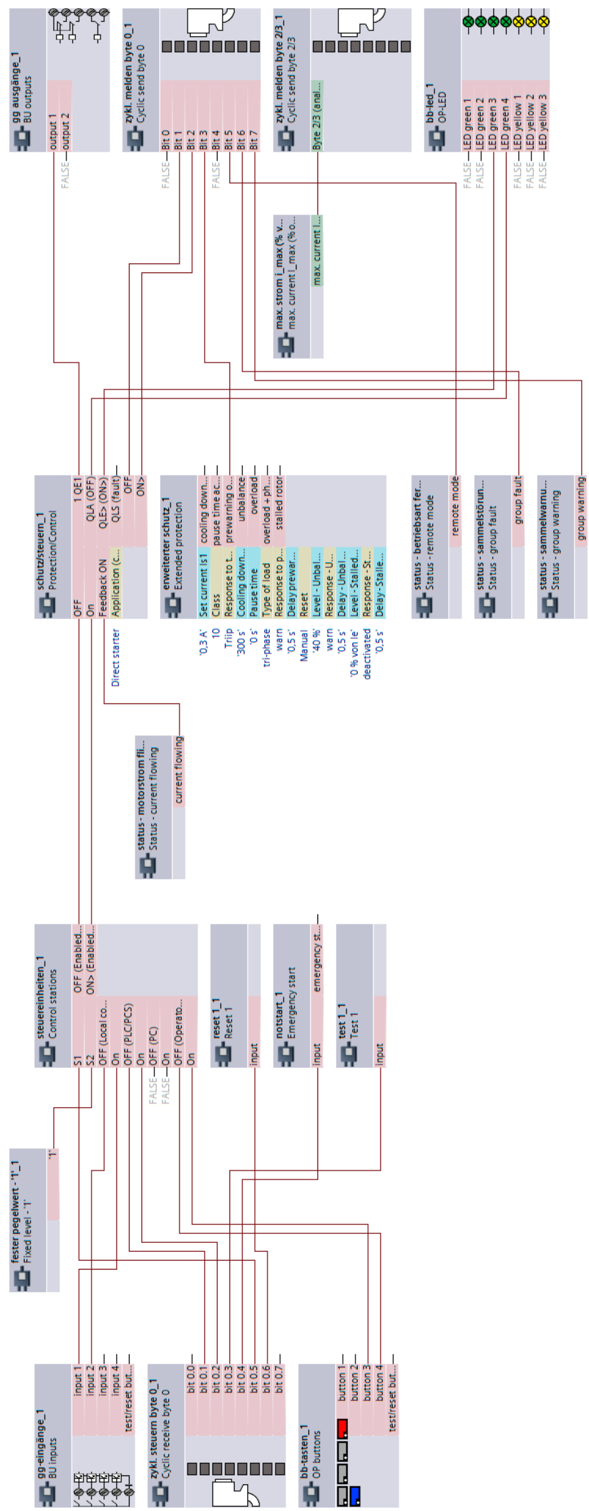


Figure 3-10 "Direct starter" plan, SIMOCODE pro S

3.5 Reversing starter

3.5.1 "Reversing starter" circuit diagram - SIMOCODE pro C, pro V PB, pro V MR

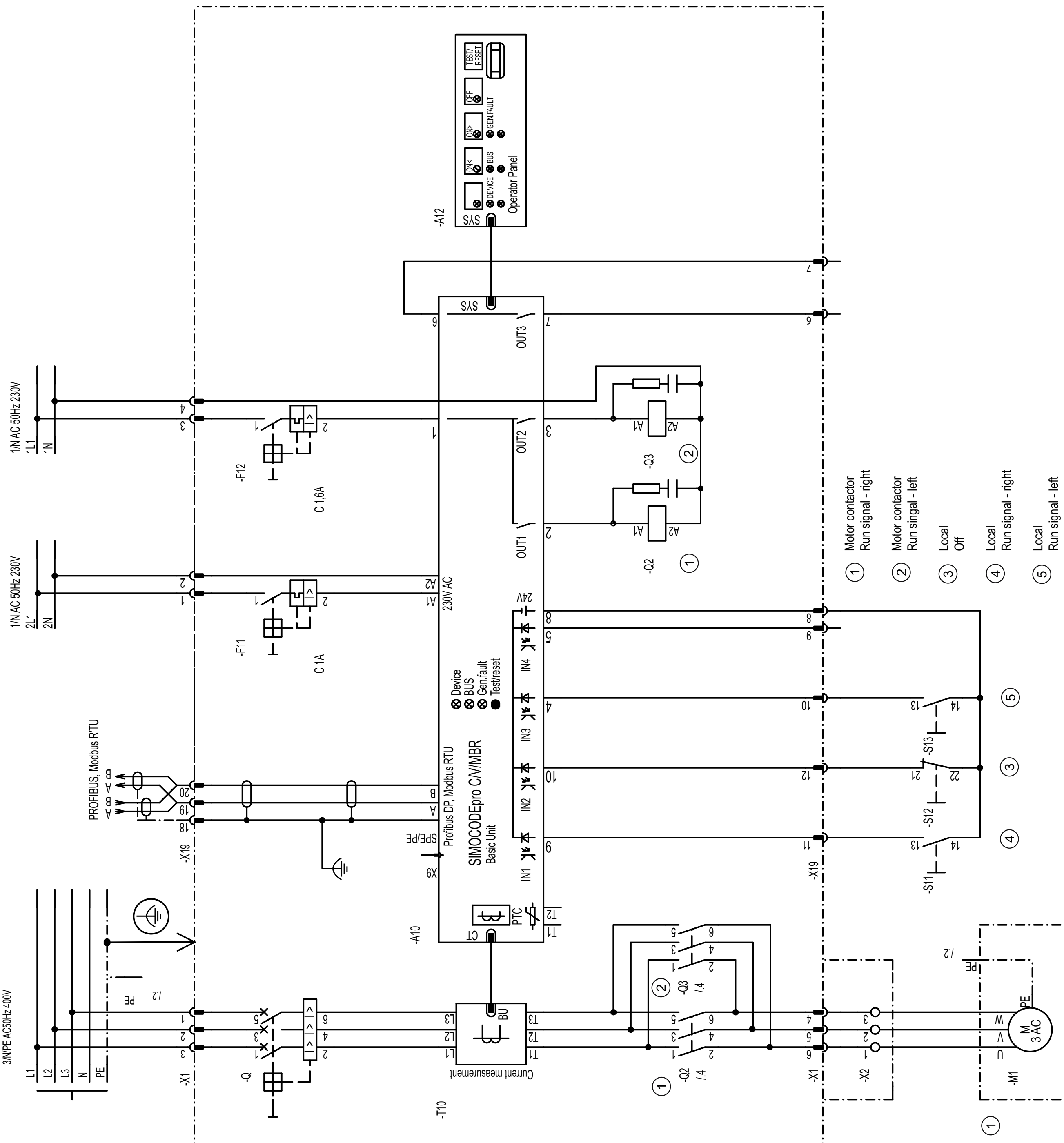


Figure 3-11 "Reversing starter" circuit diagram, SIMOCODE pro C, pro V PB, pro V MR

3.5.2 "Reversing starter" circuit diagram - SIMOCODE pro V PN, pro V EIP

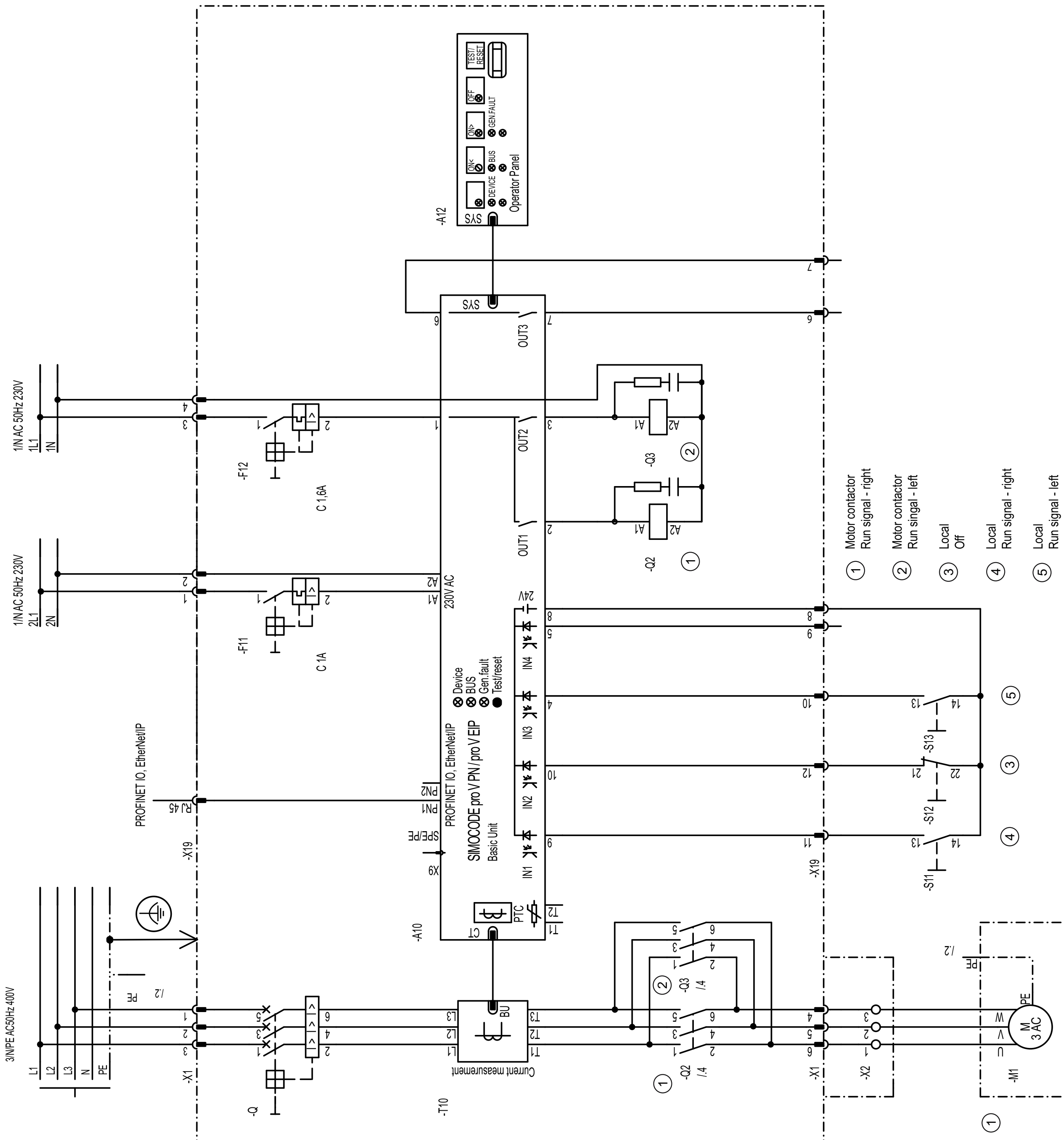


Figure 3-12 "Reversing starter" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.5.3 "Reversing starter" plan - SIMOCODE pro C, pro V

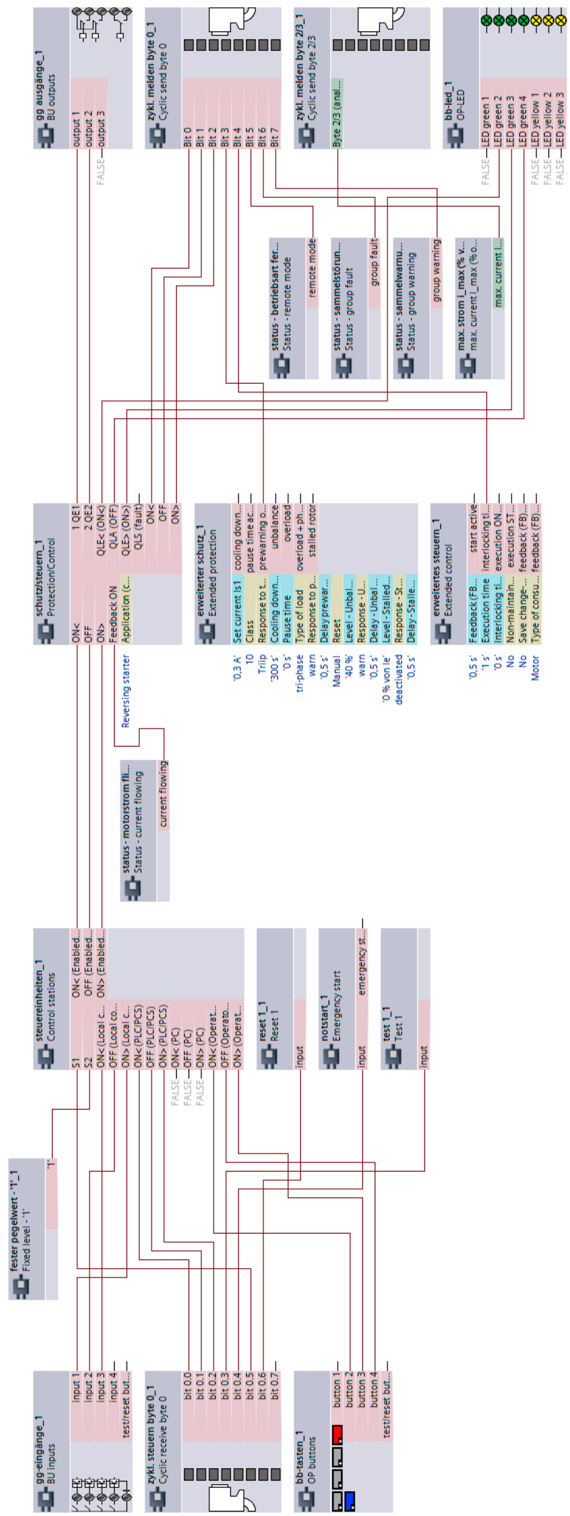


Figure 3-13 "Reversing starter" plan, SIMOCODE pro C, pro V

3.5.4 "Reversing starter" circuit diagram - SIMOCODE pro S

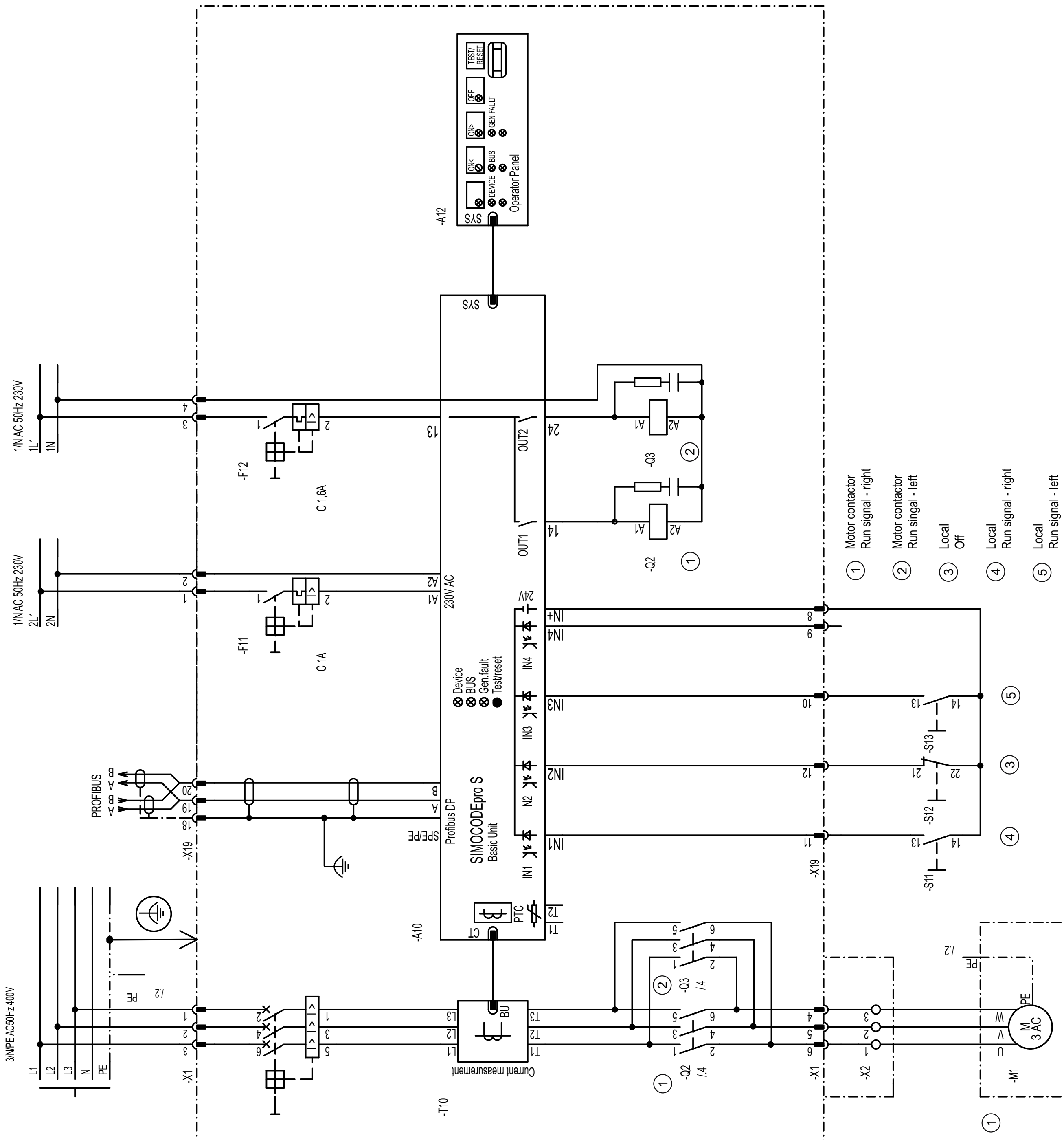


Figure 3-14 "Reversing starter" circuit diagram, SIMOCODE pro S

3.5.5 "Reversing starter" plan - SIMOCODE pro S

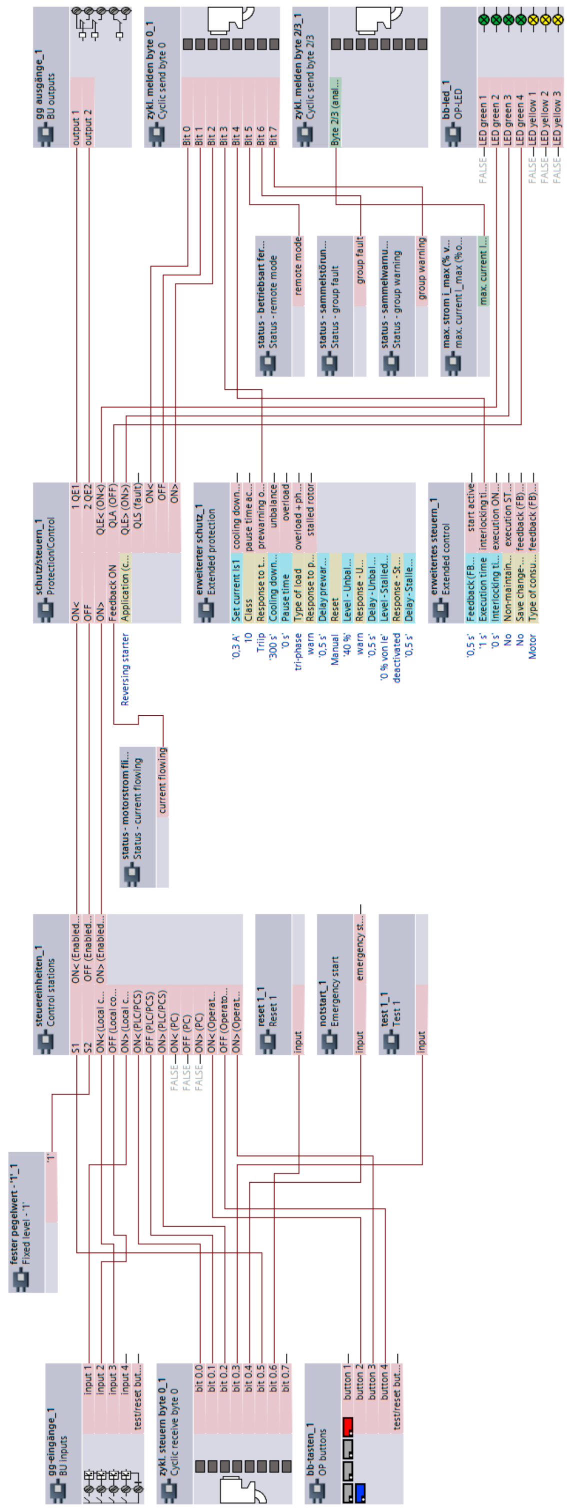


Figure 3-15 "Reversing starter" plan, SIMOCODE pro S

3.6 3VA molded case circuit breaker (MCCB)

3.6.1 "3VA molded case circuit breaker (MCCB)" circuit diagram - SIMOCODE pro C, pro V PB, pro V MR

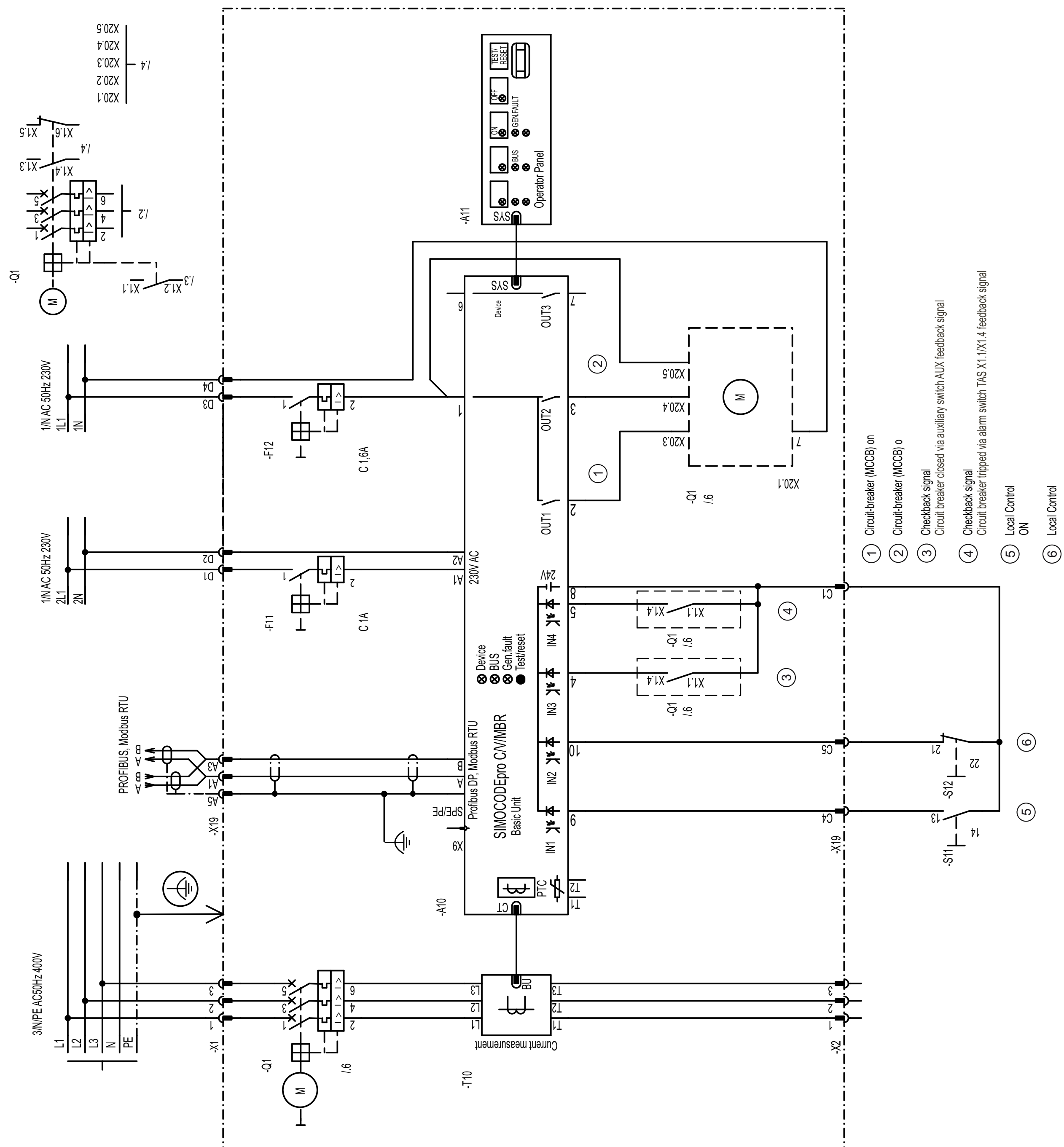


Figure 3-16 "3VA molded case circuit breaker (MCCB)" circuit diagram, SIMOCODE pro C, pro V PB, pro V MR

3.6.2 "3VA molded case circuit breaker (MCCB)" circuit diagram - SIMOCODE pro V PN, pro V EIP

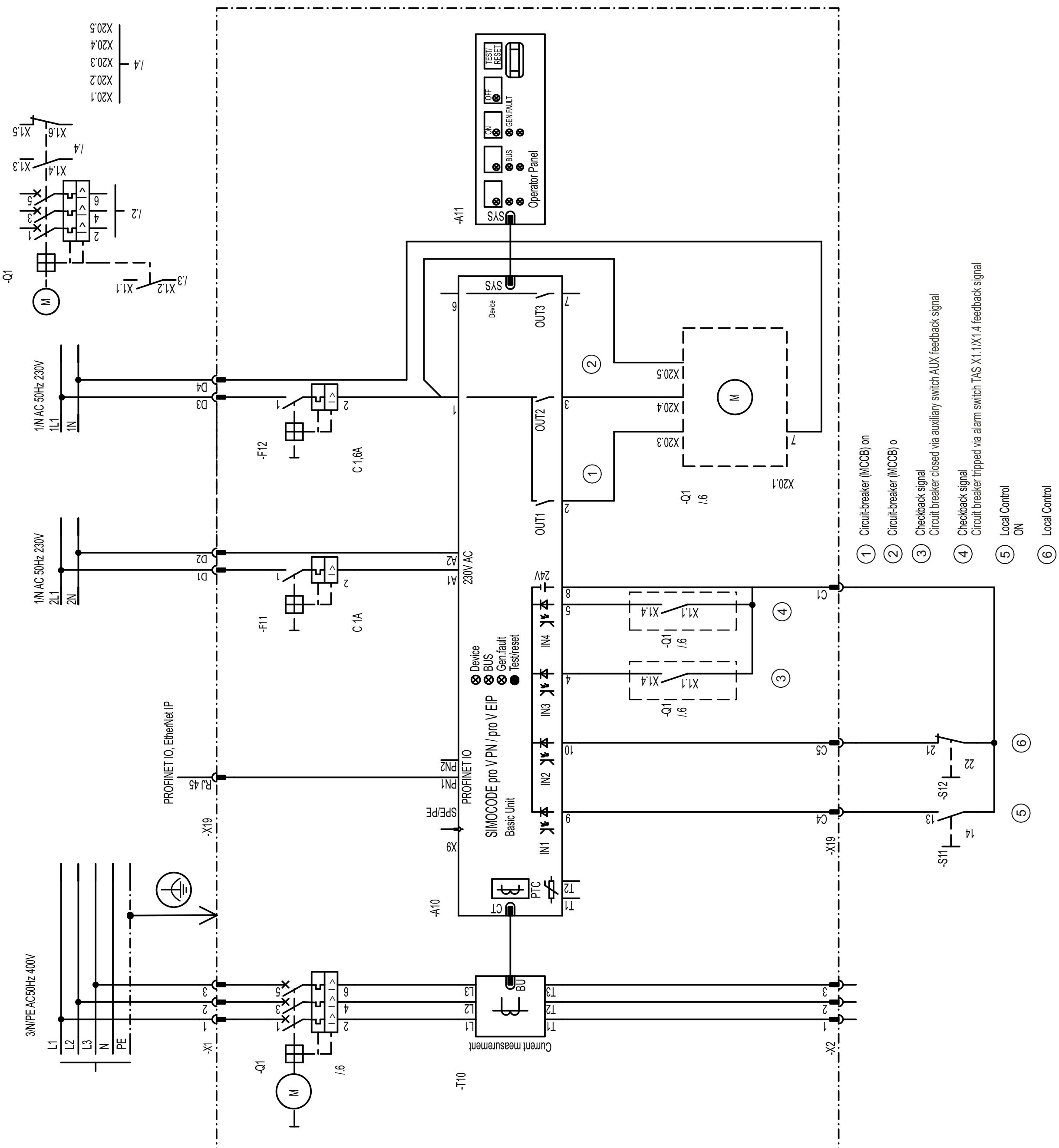


Figure 3-17 "3VA molded case circuit breaker (MCCB)" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.6.3 "3VA molded case circuit breaker (MCCB)" diagram - SIMOCODE pro C, pro V

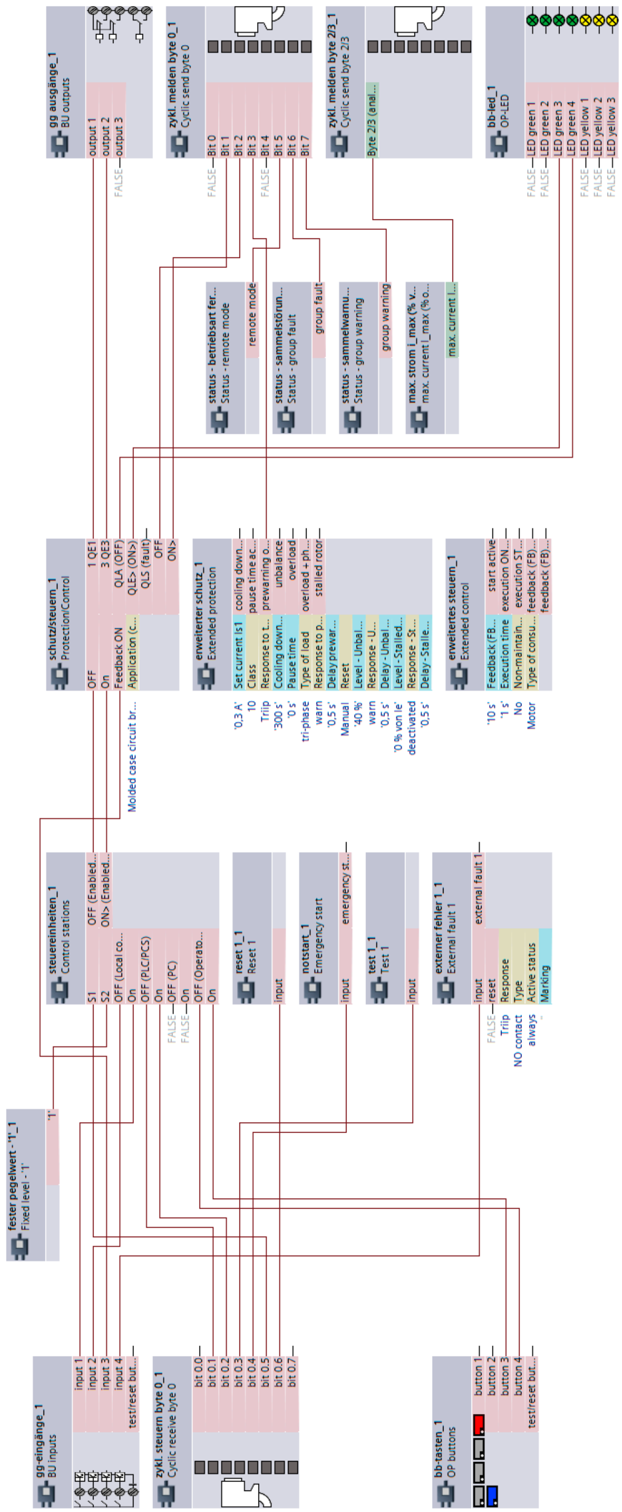


Figure 3-18 "3VA molded case circuit breaker (MCCB)" diagram, SIMOCODE pro C, pro V

3.6.4 "3VA molded case circuit breaker (MCCB)" circuit diagram - SIMOCODE pro S

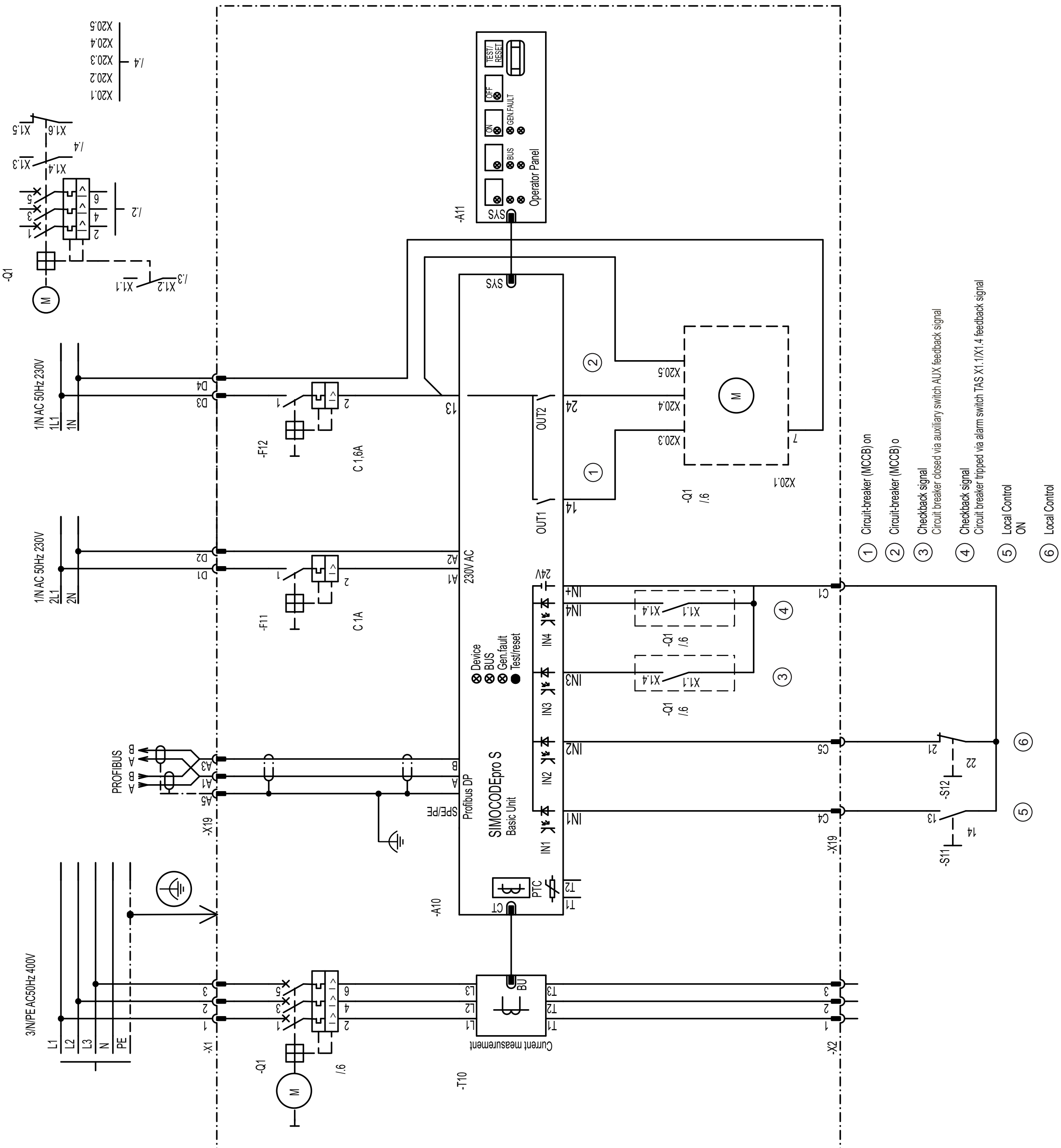


Figure 3-19 "3VA molded case circuit breaker (MCCB)" circuit diagram, SIMOCODE pro S

3.6.5 "3VA molded case circuit breaker (MCCB)" diagram - SIMOCODE pro S

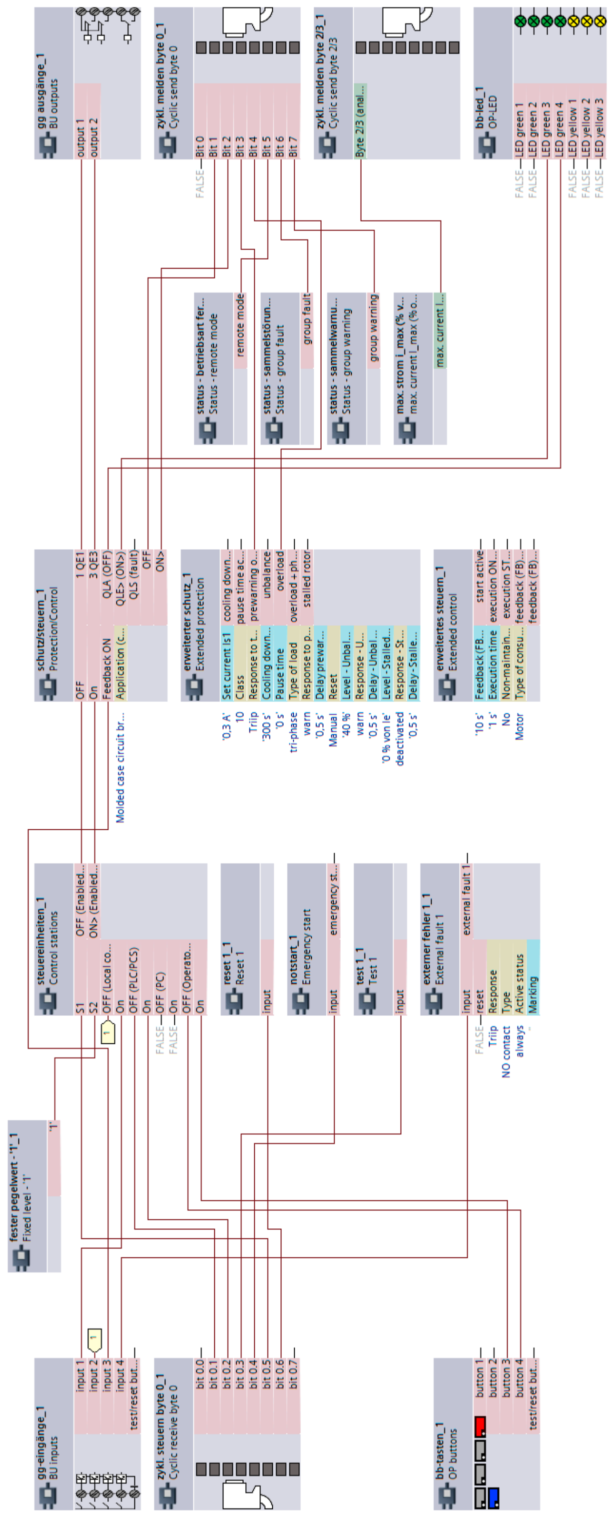


Figure 3-20 "3VA molded case circuit breaker (MCCB)" diagram, SIMOCODE pro S

3.7 Star-delta starter

3.7.1 "Star-delta starter" circuit diagram (current measuring in delta), SIMOCODE pro V PB, pro V MR

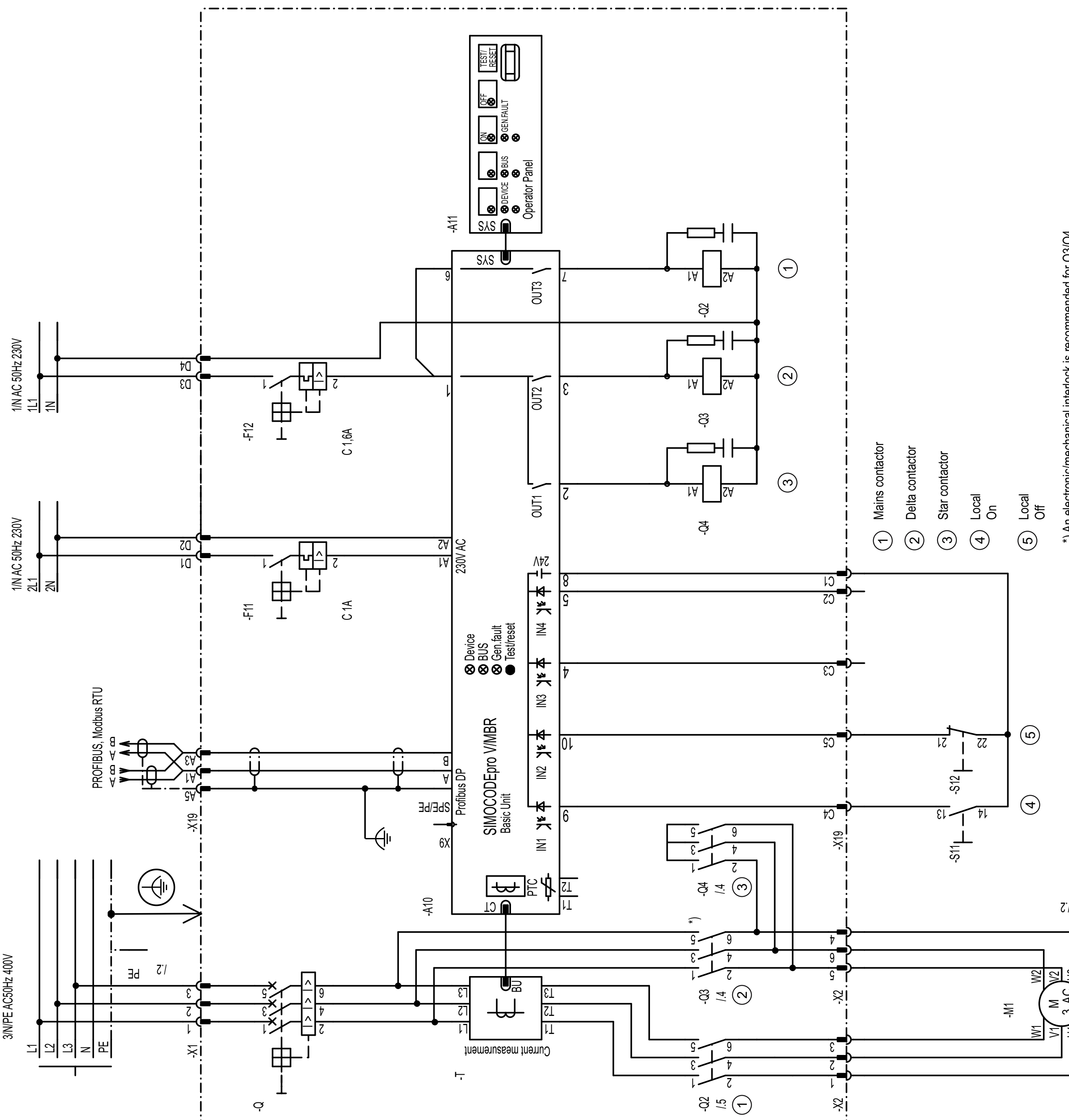


Figure 3-21 "Star-delta starter" circuit diagram (current measuring in delta), SIMOCODE pro V PB, pro V MR

3.7.2 "Star-delta starter" circuit diagram (current measuring in delta) - SIMOCODE pro V PN, pro V EIP

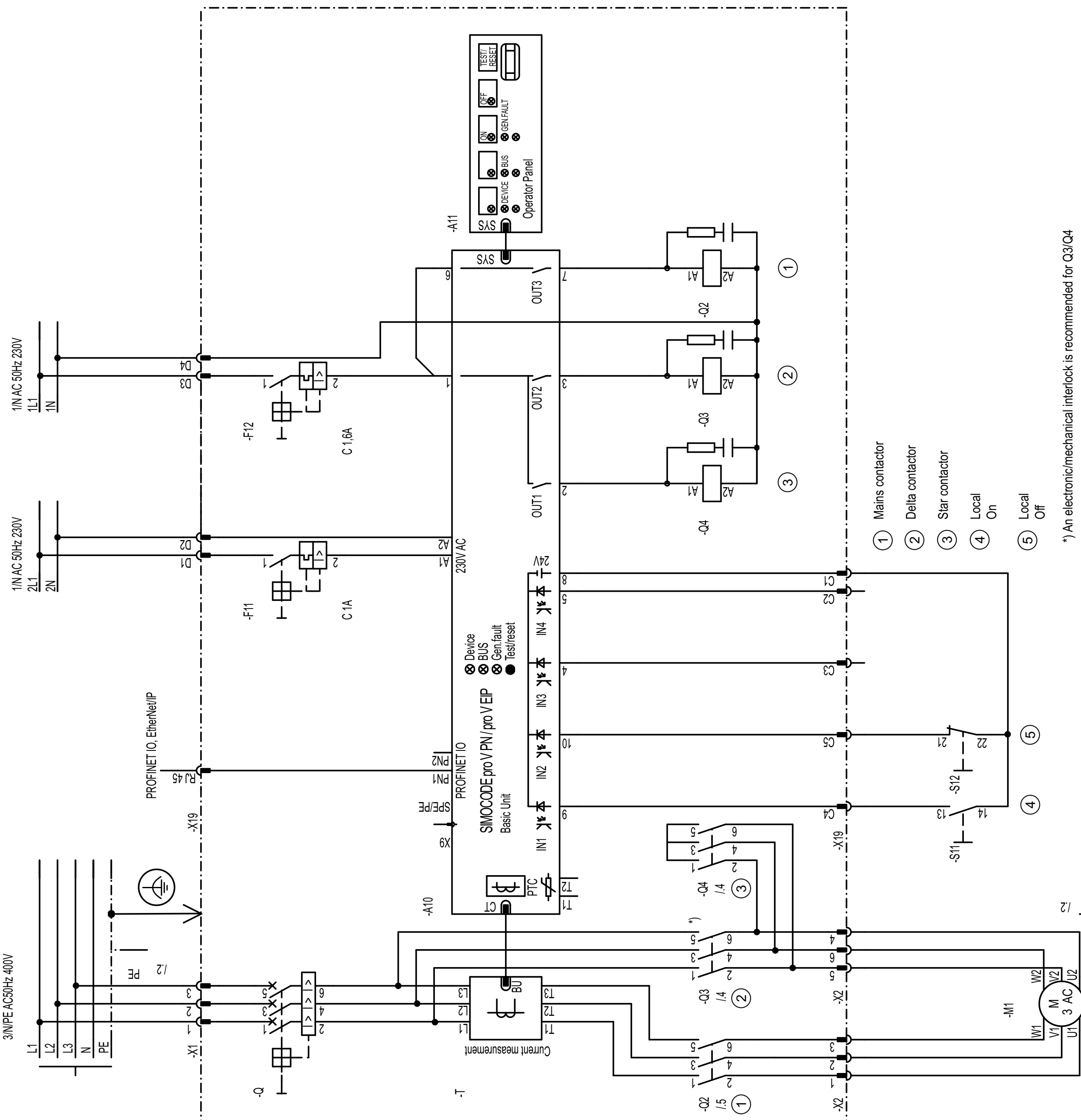


Figure 3-22 "Star-delta starter" circuit diagram (current measuring in delta), SIMOCODE pro V PN, pro V EIP

3.7.3 "Star-delta starter" plan (current measuring in delta) - SIMOCODE pro V

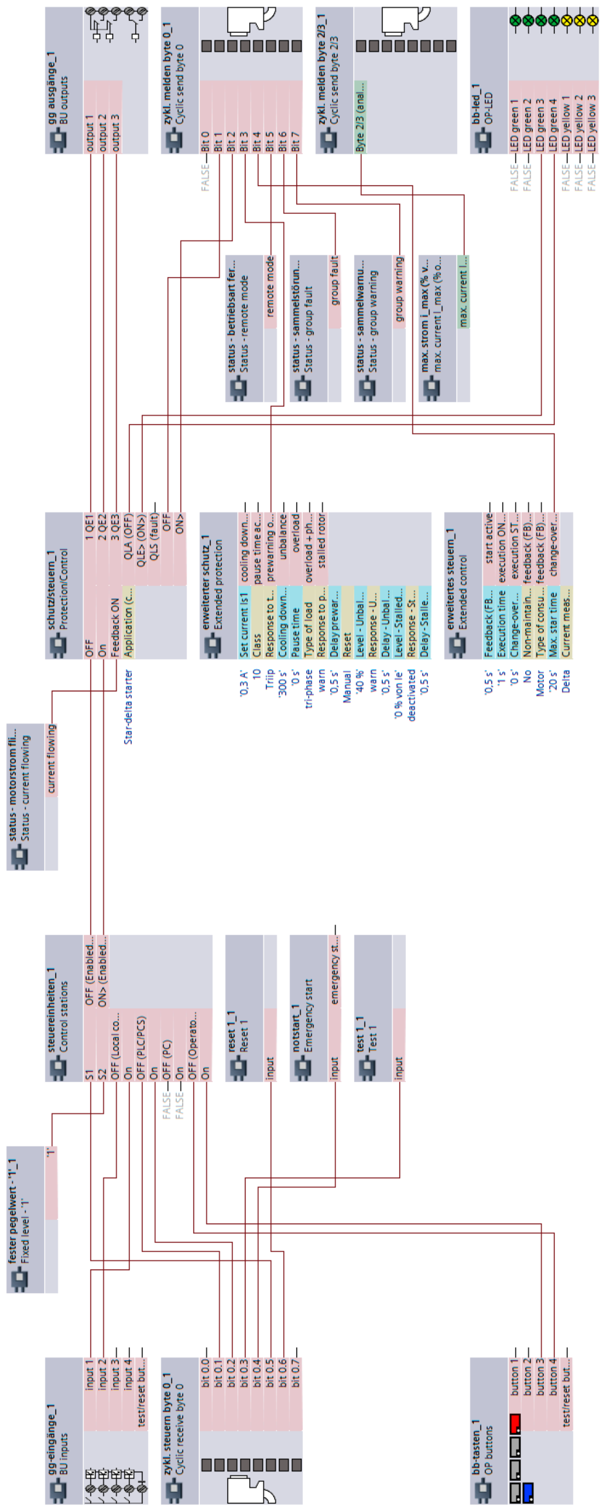


Figure 3-23 "Star-delta starter" plan (current measuring in delta), SIMOCODE pro V basic unit

3.7.4 Circuit diagram of star-delta starter (current measuring in delta) - SIMOCODE pro S

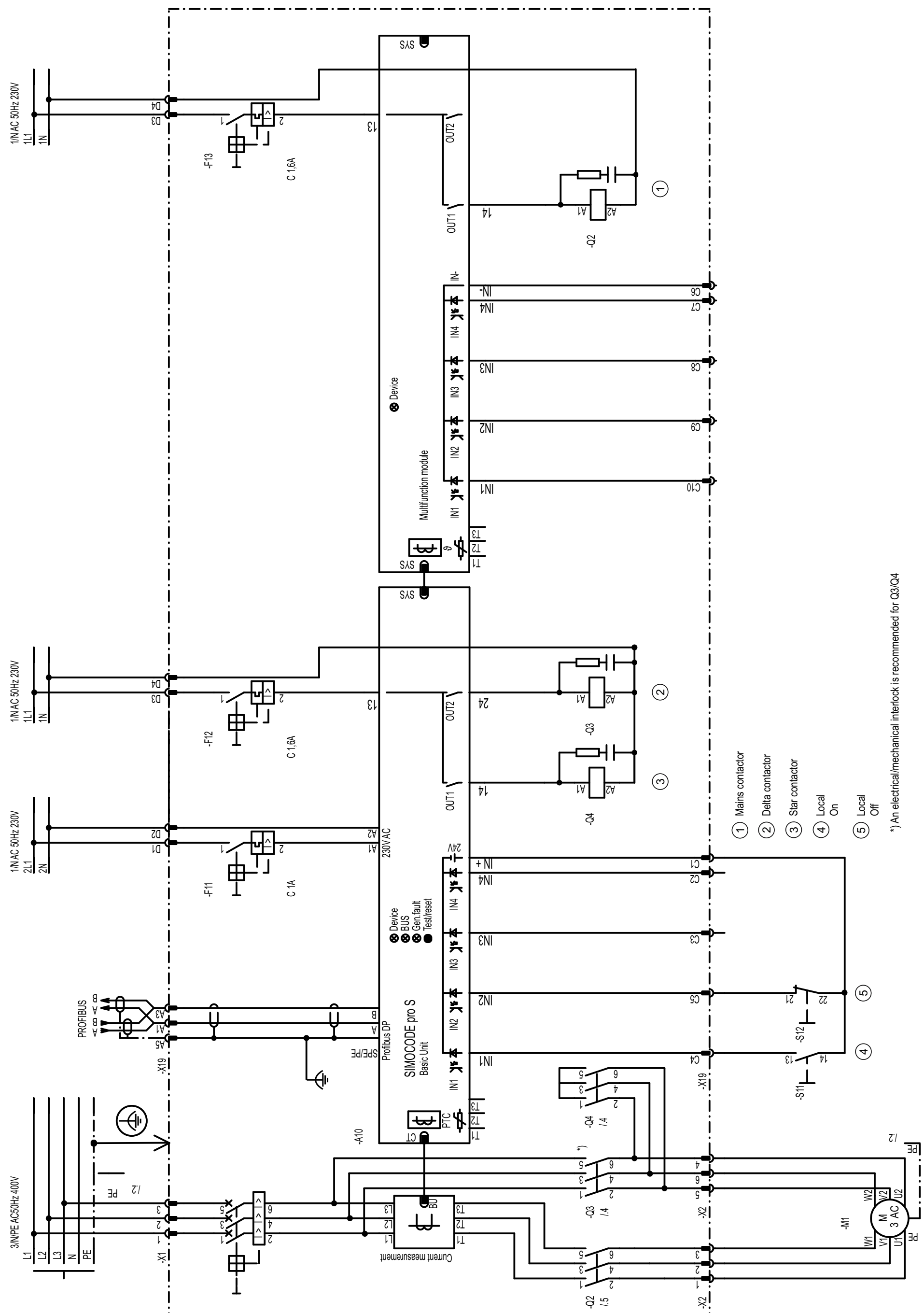


Figure 3-24 "Star-delta starter" circuit diagram (current measuring in delta), SIMOCODE pro S

3.7.5 "Star-delta starter" plan (current measuring in delta) - SIMOCODE pro S

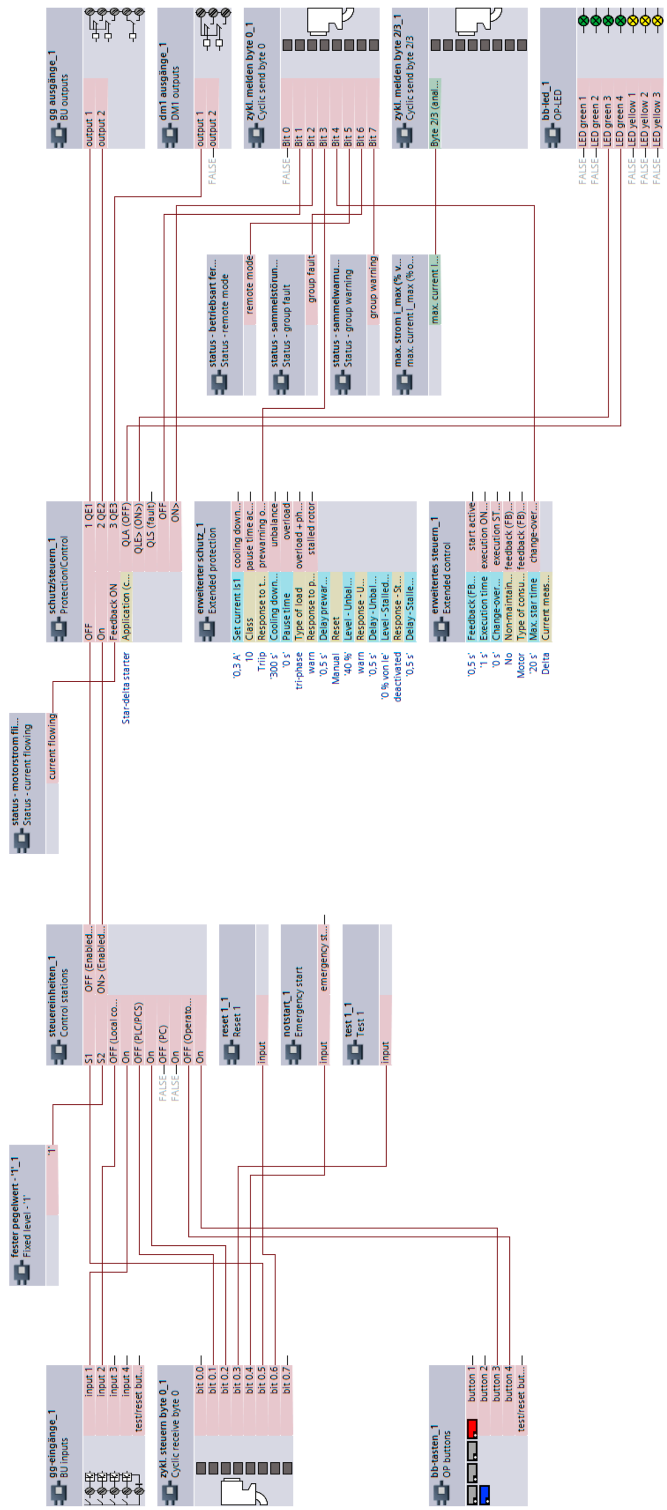


Figure 3-25 "Star-delta starter" plan (current measuring in delta), SIMOCODE pro S

3.7.6 "Star-delta starter" circuit diagram (current measuring in supply cable) - SIMOCODE pro V PB, pro V MR

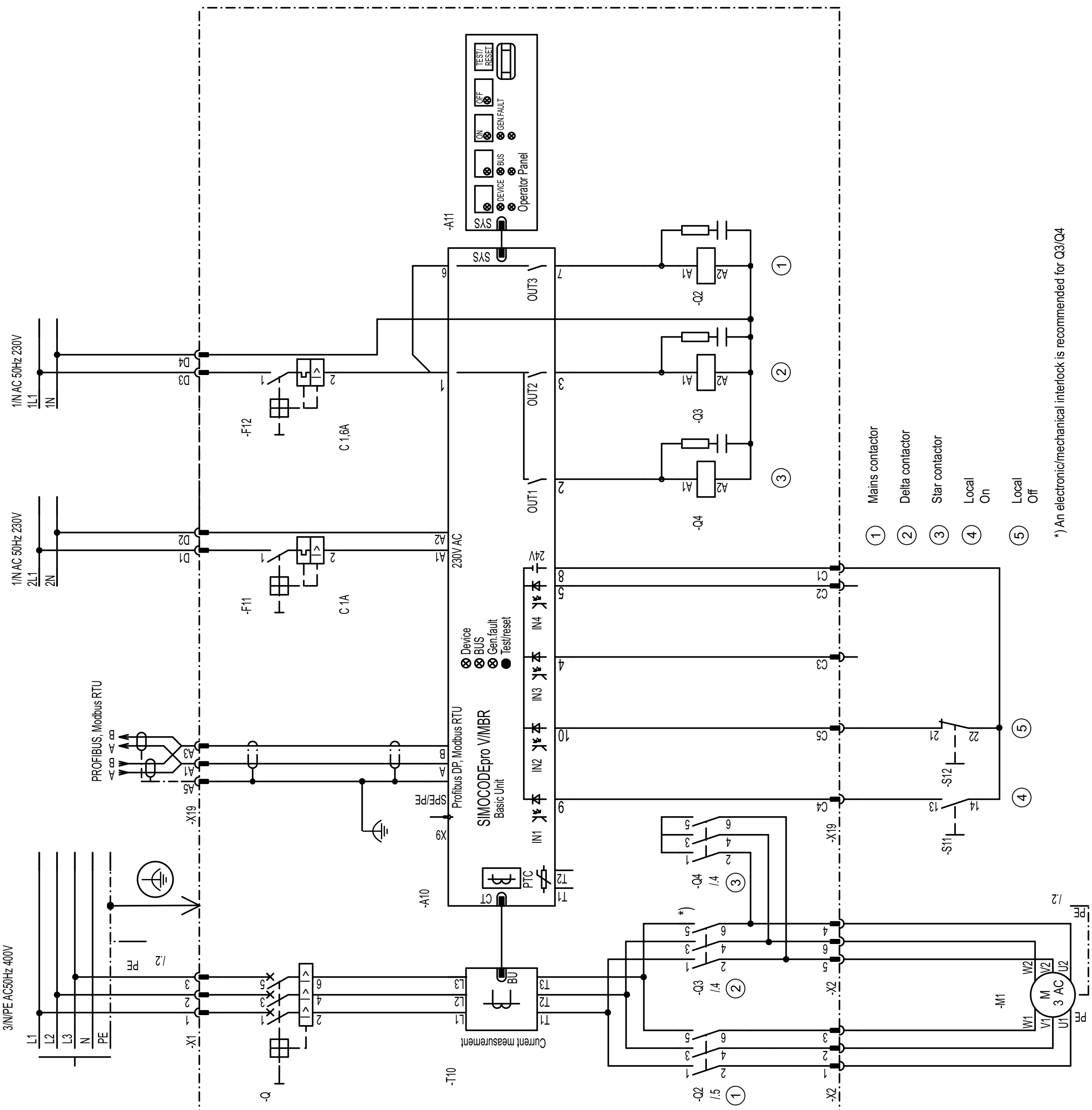


Figure 3-26 "Star-delta starter" circuit diagram (current measuring in supply cable), SIMOCODE pro V PB, pro V MR

3.7.7 "Star-delta starter" circuit diagram (current measuring in supply cable) - SIMOCODE pro V PN, pro V EIP

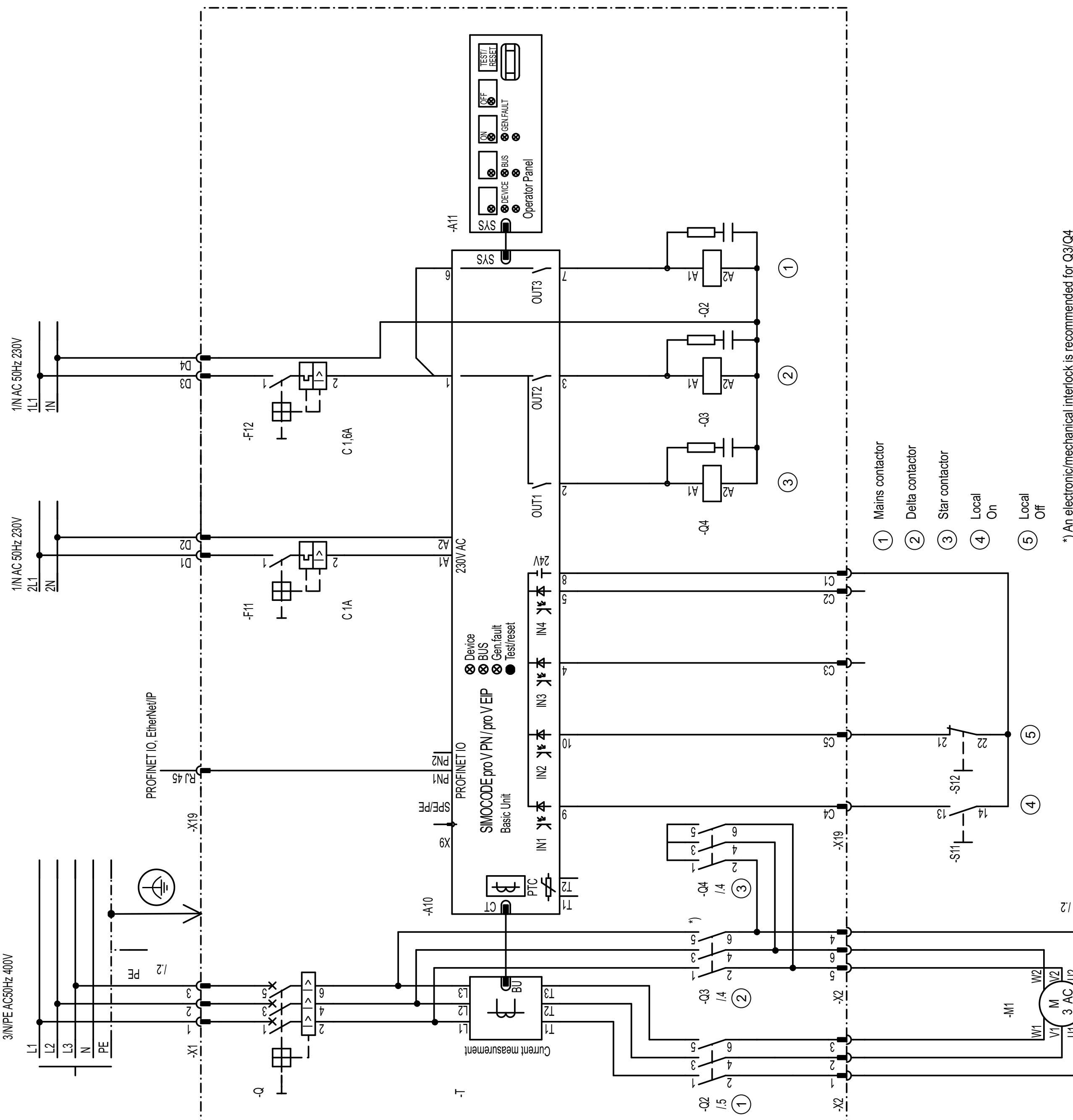


Figure 3-27 "Star-delta starter" circuit diagram (current measuring in supply cable), SIMOCODE pro V PN, pro V EIP

3.7.8 "Star-delta starter" plan (current measuring in supply cable) - SIMOCODE pro V

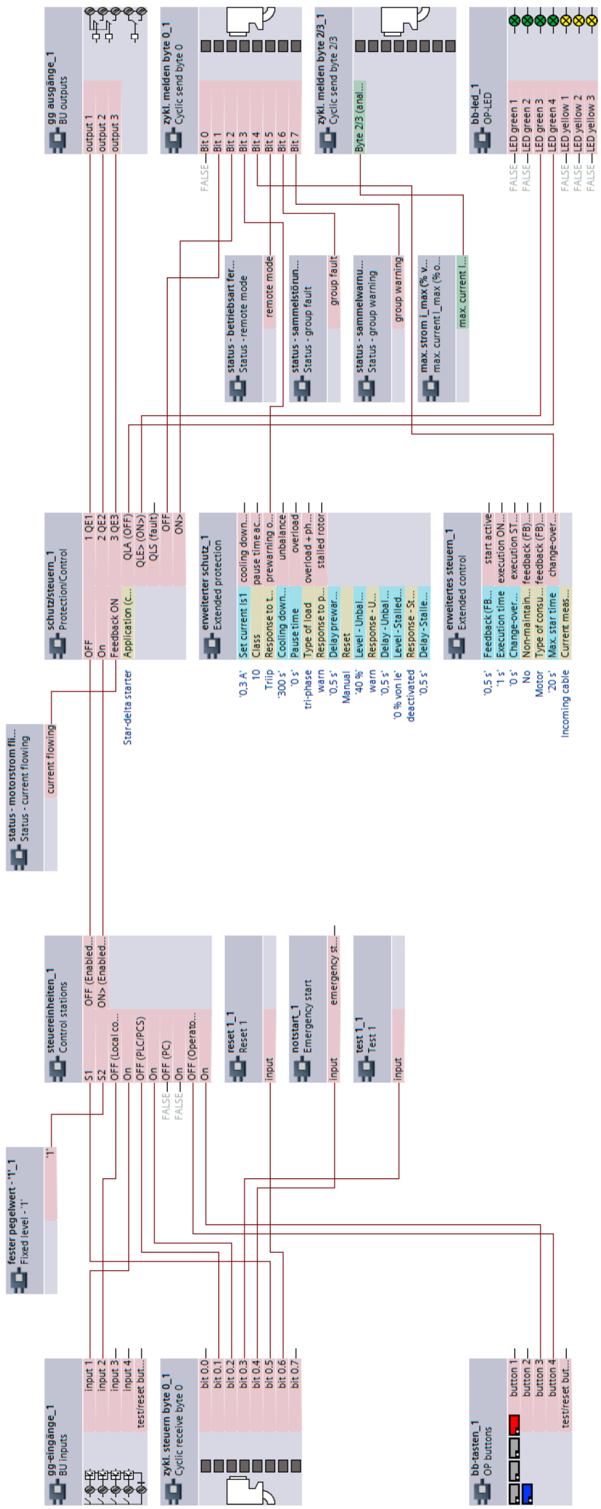


Figure 3-28 "Star-delta starter" plan (current measuring in supply cable), SIMOCODE pro V

3.7.9 "Star-delta starter" circuit diagram (current measuring in supply cable) - SIMOCODE pro S

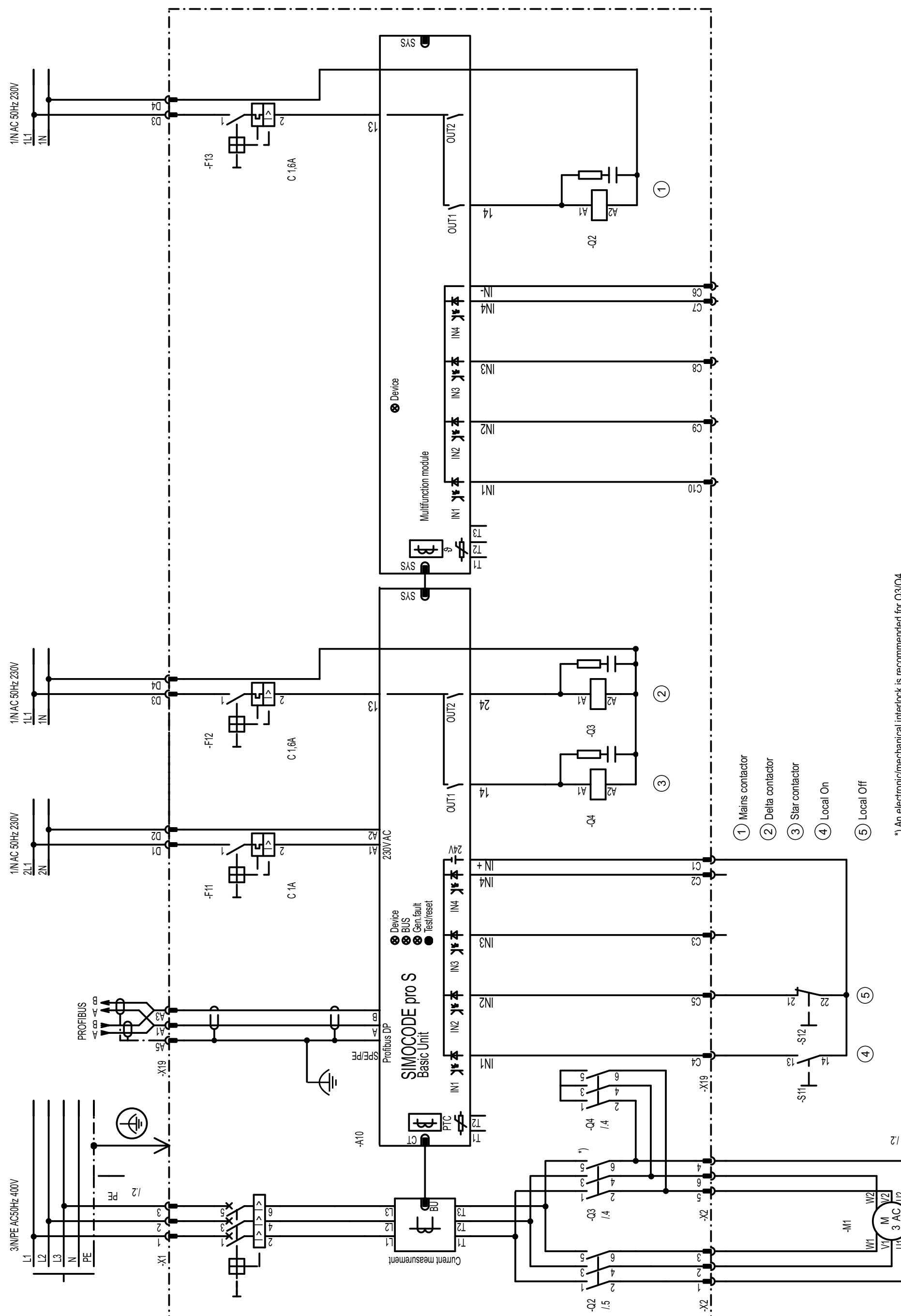


Figure 3-29 "Star-delta starter" circuit diagram (current measuring in supply cable), SIMOCODE pro S

3.7.10 "Star-delta starter" plan (current measuring in supply cable) - SIMOCODE pro S

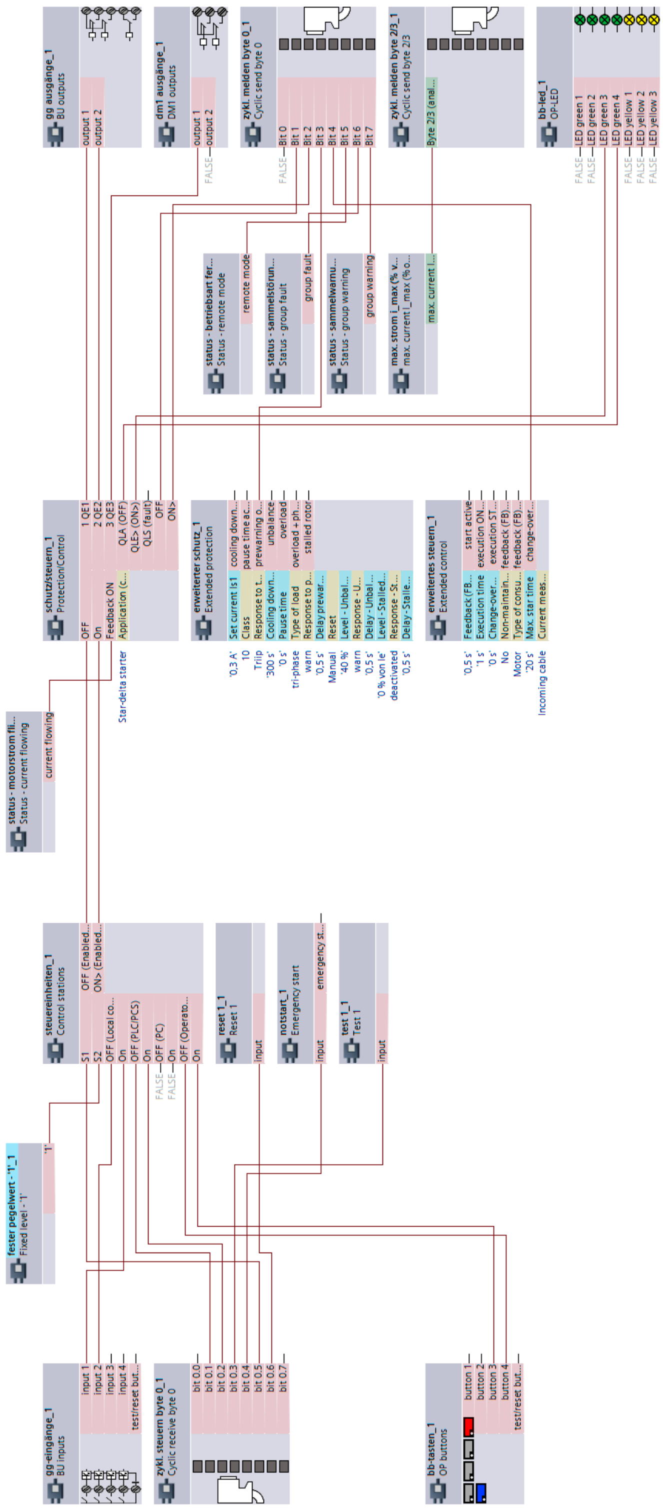


Figure 3-30 "Star-delta starter" plan (current measuring in supply cable), SIMOCODE pro S

3.8 Star-delta reversing starter

3.8.1 "Star-delta reversing starter" circuit diagram - SIMOCODE pro V PB, pro V MR

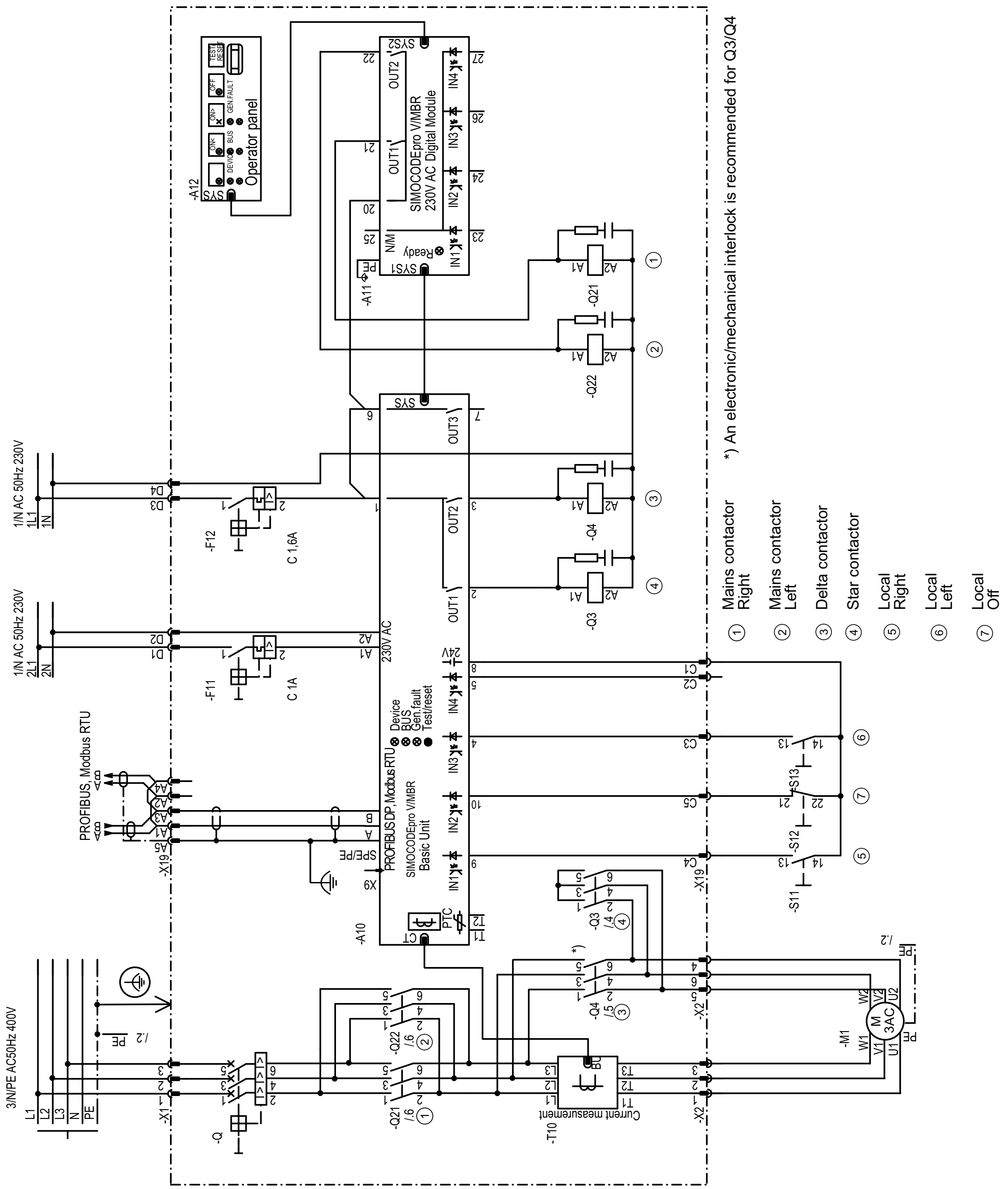


Figure 3-31 "Star-delta reversing starter" circuit diagram, SIMOCODE pro V PB, pro V MR

3.8.2 "Star-delta reversing starter" circuit diagram - SIMOCODE pro V PN, pro V EIP

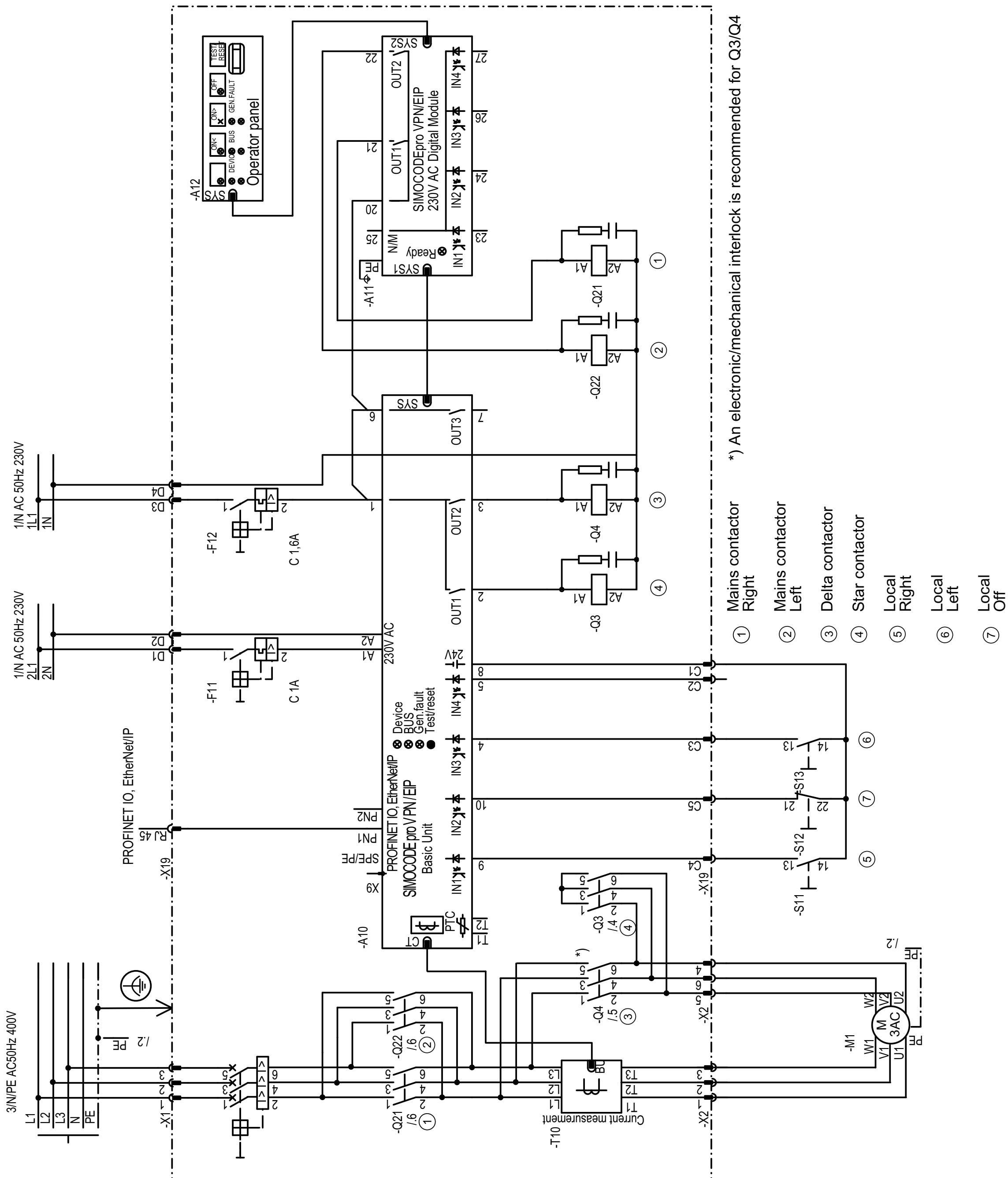


Figure 3-32 "Star-delta reversing starter" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.8.3 "Star-delta reversing starter" plan - SIMOCODE pro V

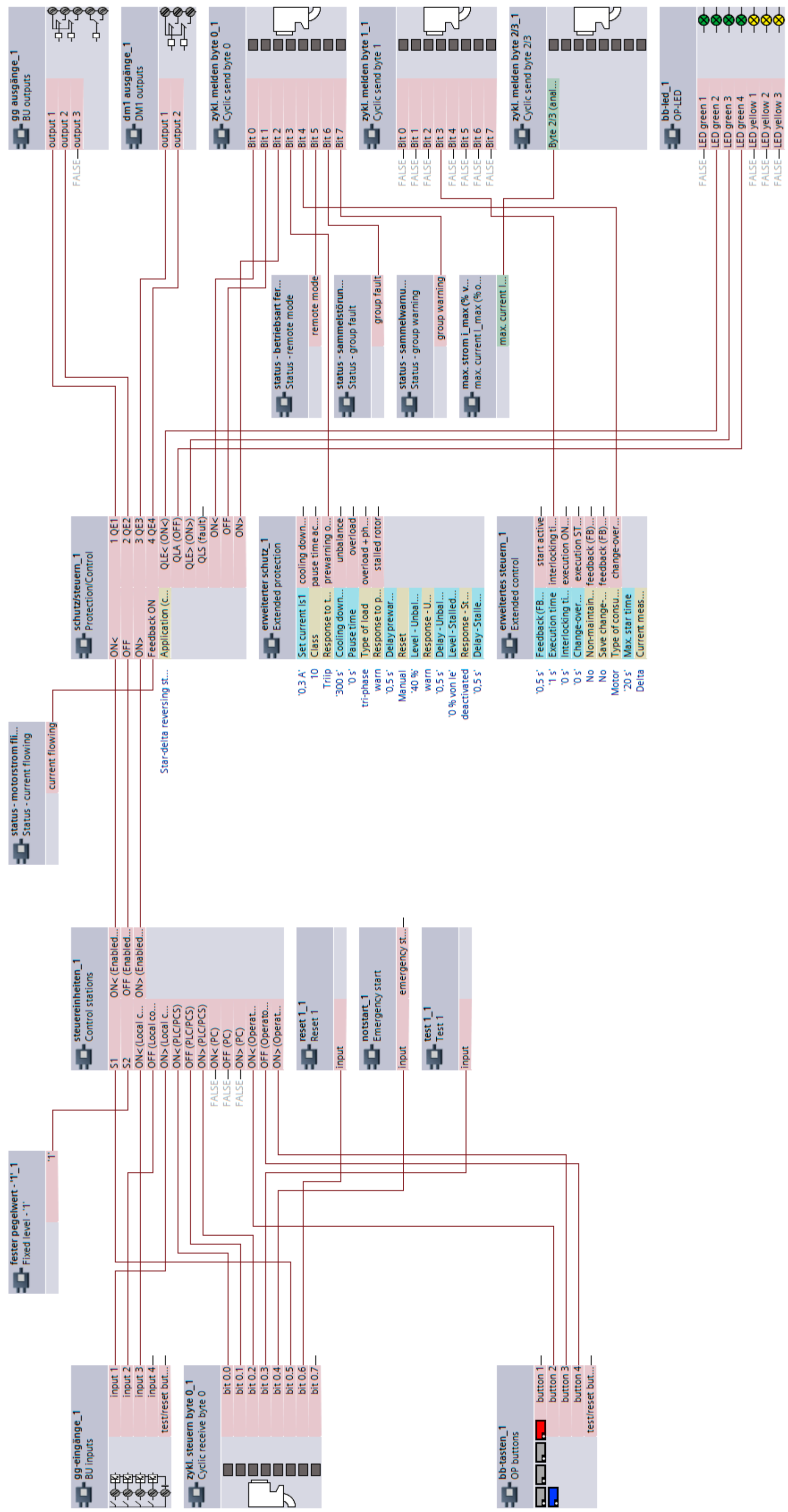


Figure 3-33 "Star-delta reversing starter" plan, SIMOCODE pro V

3.9 Dahlander starter

3.9.1 "Dahlander starter" circuit diagram – SIMOCODE pro V PB, pro V MR

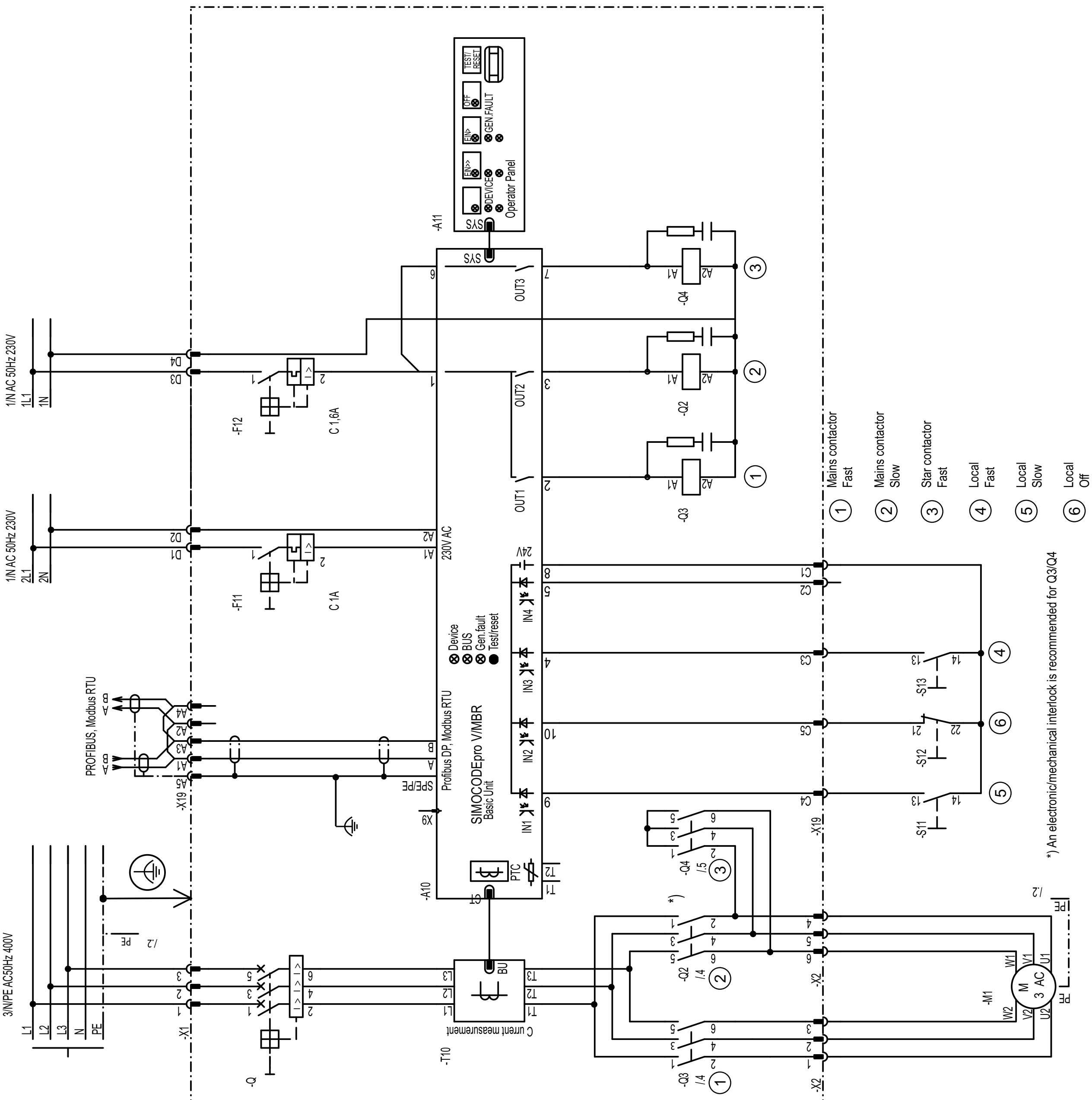


Figure 3-34 "Dahlander starter" circuit diagram, SIMOCODE pro V PB, pro V MR

3.9.2 "Dahlander starter" circuit diagram – SIMOCODE pro V PN, pro V EIP

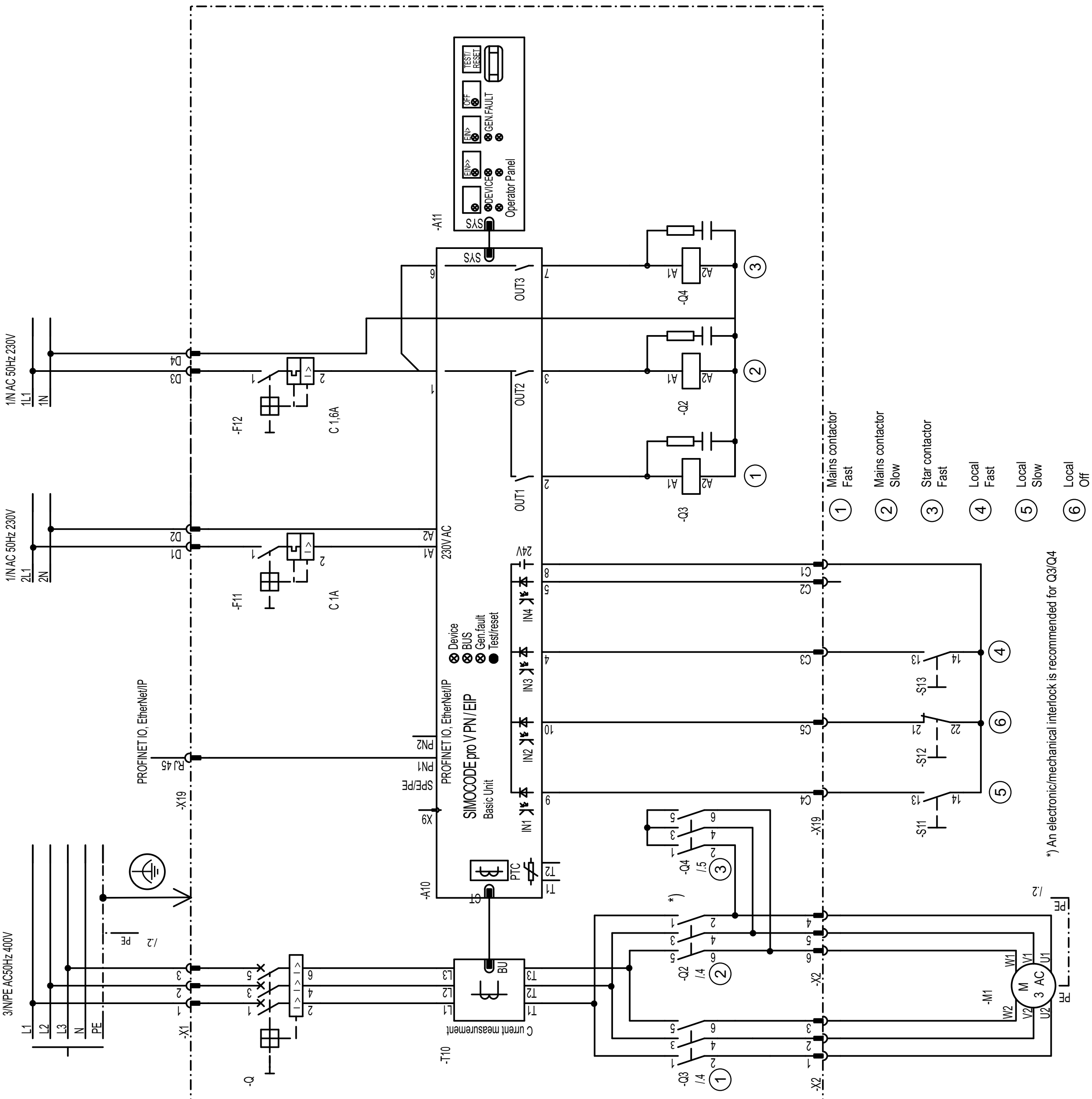


Figure 3-35 "Dahlander starter" circuit diagram, SIMOCODE pro PN, pro V EIP

3.9.3 "Dahlander starter" diagram – SIMOCODE pro V

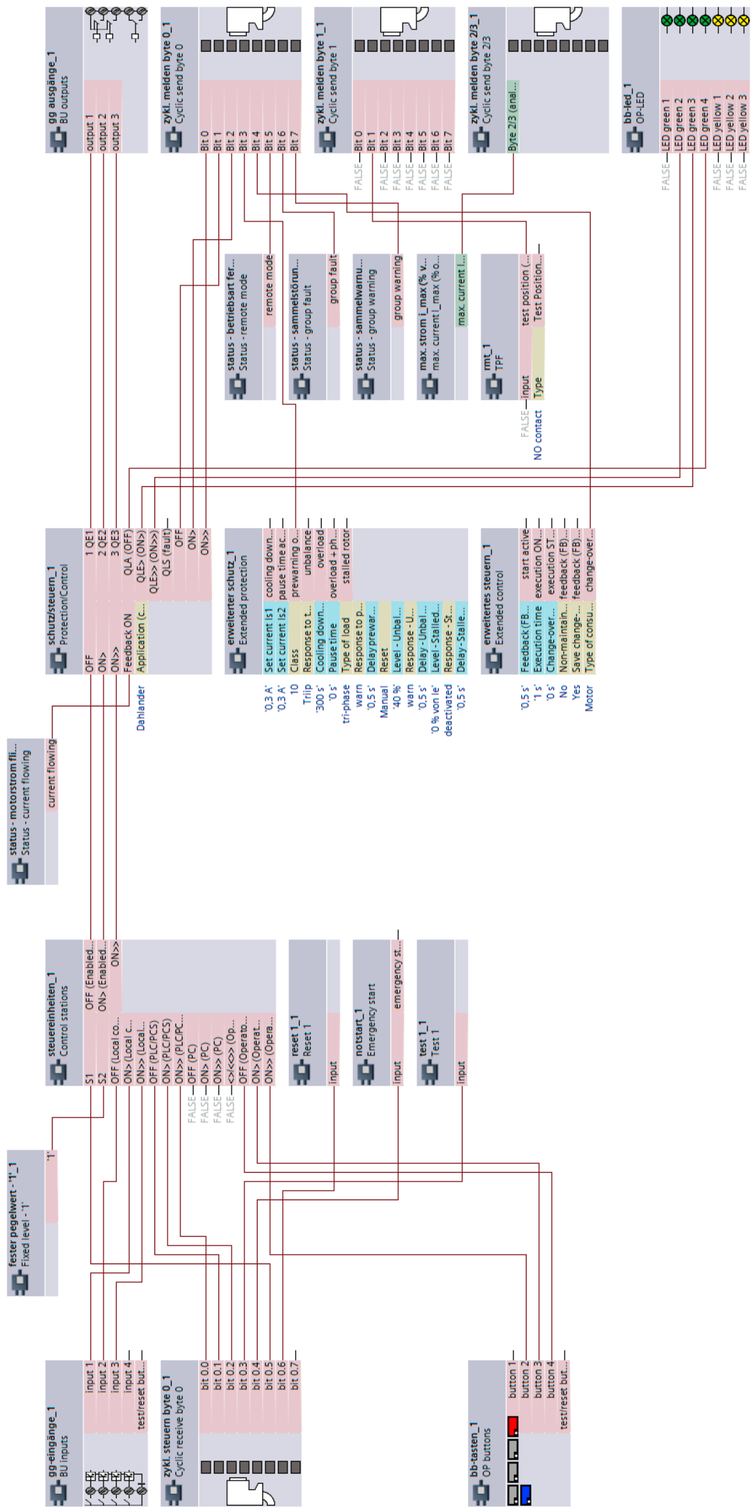


Figure 3-36 "Dahlander starter" diagram, SIMOCODE pro V

3.10 Dahlander reversing starter

3.10.1 "Dahlander reversing starter" circuit diagram – SIMOCODE pro V PB, pro V MR

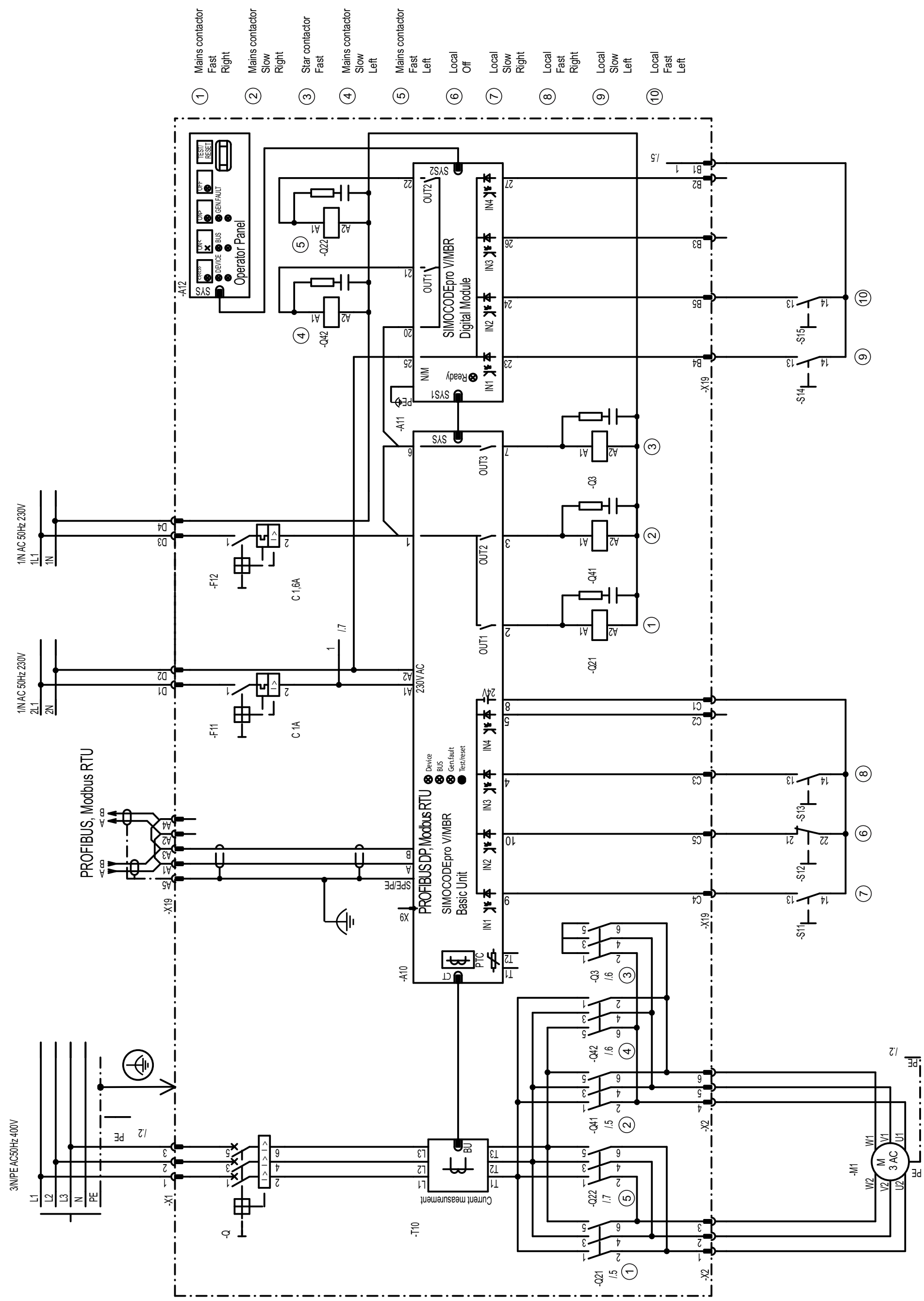


Figure 3-37 "Dahlander reversing starter" circuit diagram, SIMOCODE pro V PB, pro V MR

3.10.2 "Dahlander reversing starter" circuit diagram – SIMOCODE pro V PN, pro V EIP

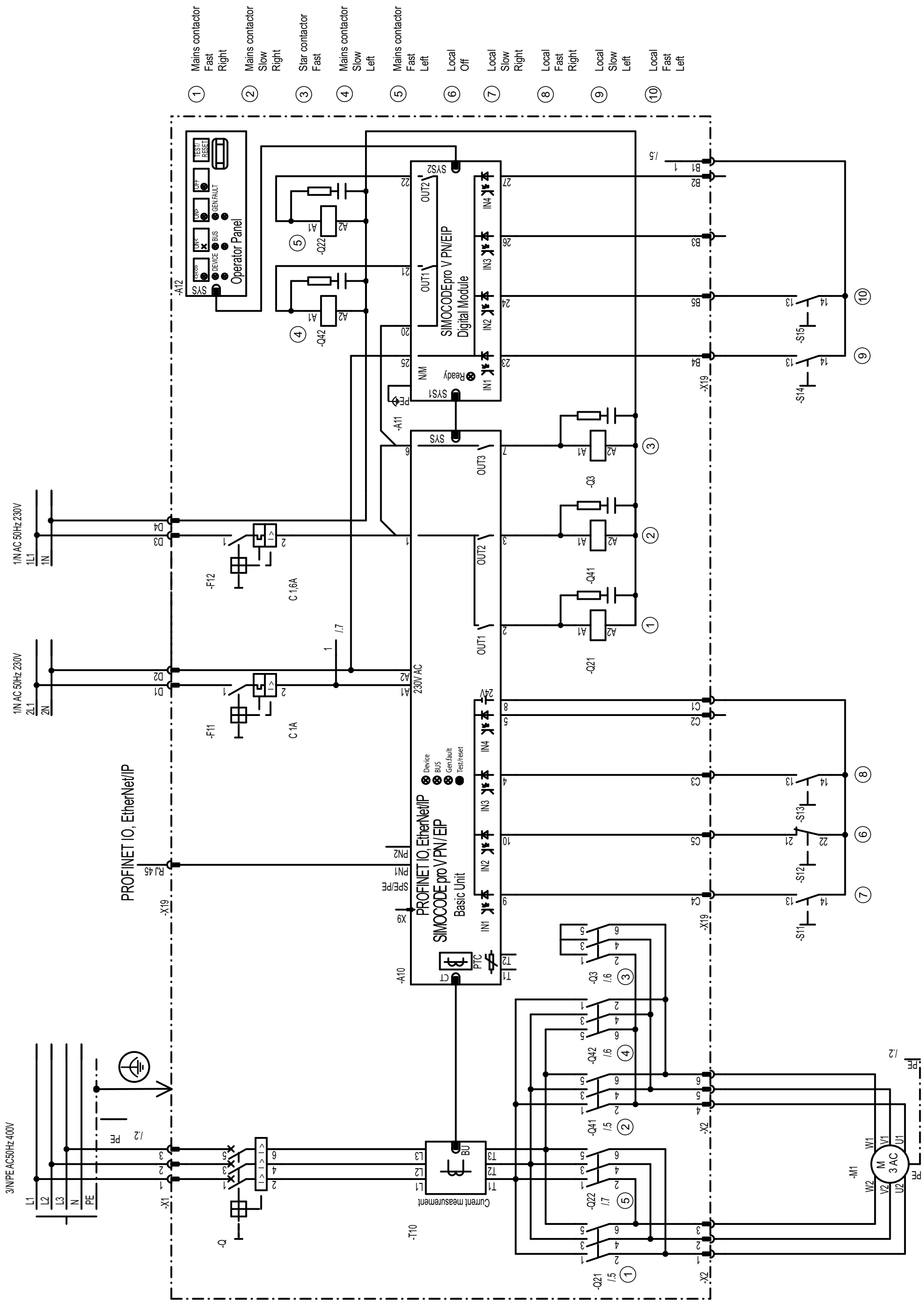


Figure 3-38 "Dahlander reversing starter" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.10.3 "Dahlander reversing starter" diagram – SIMOCODE pro V

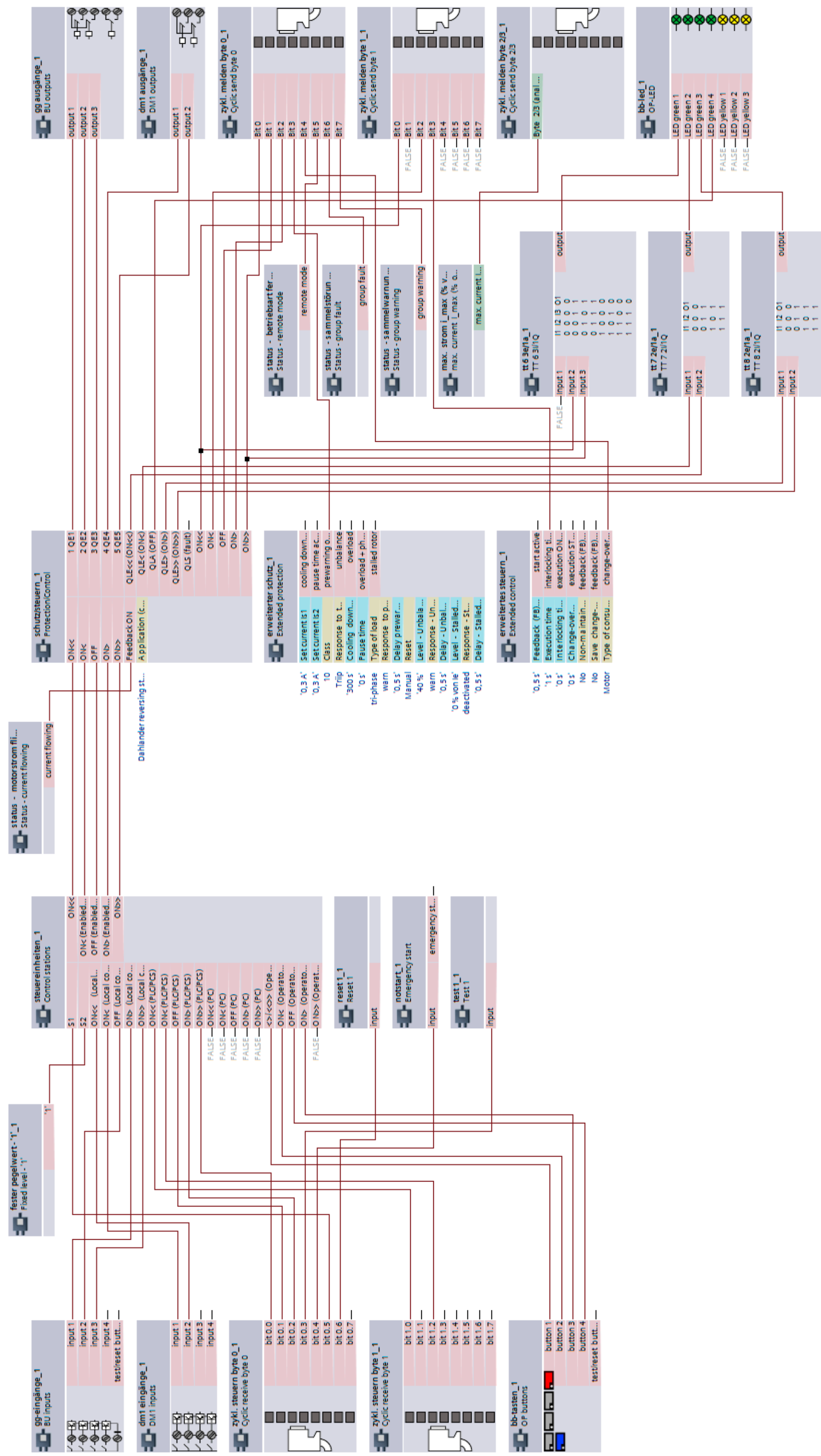


Figure 3-39 "Dahlander reversing starter" diagram, SIMOCODE pro V

3.11 Pole-changing starter

3.11.1 "Pole-changing starter" circuit diagram - SIMOCODE pro V PB, pro V MR

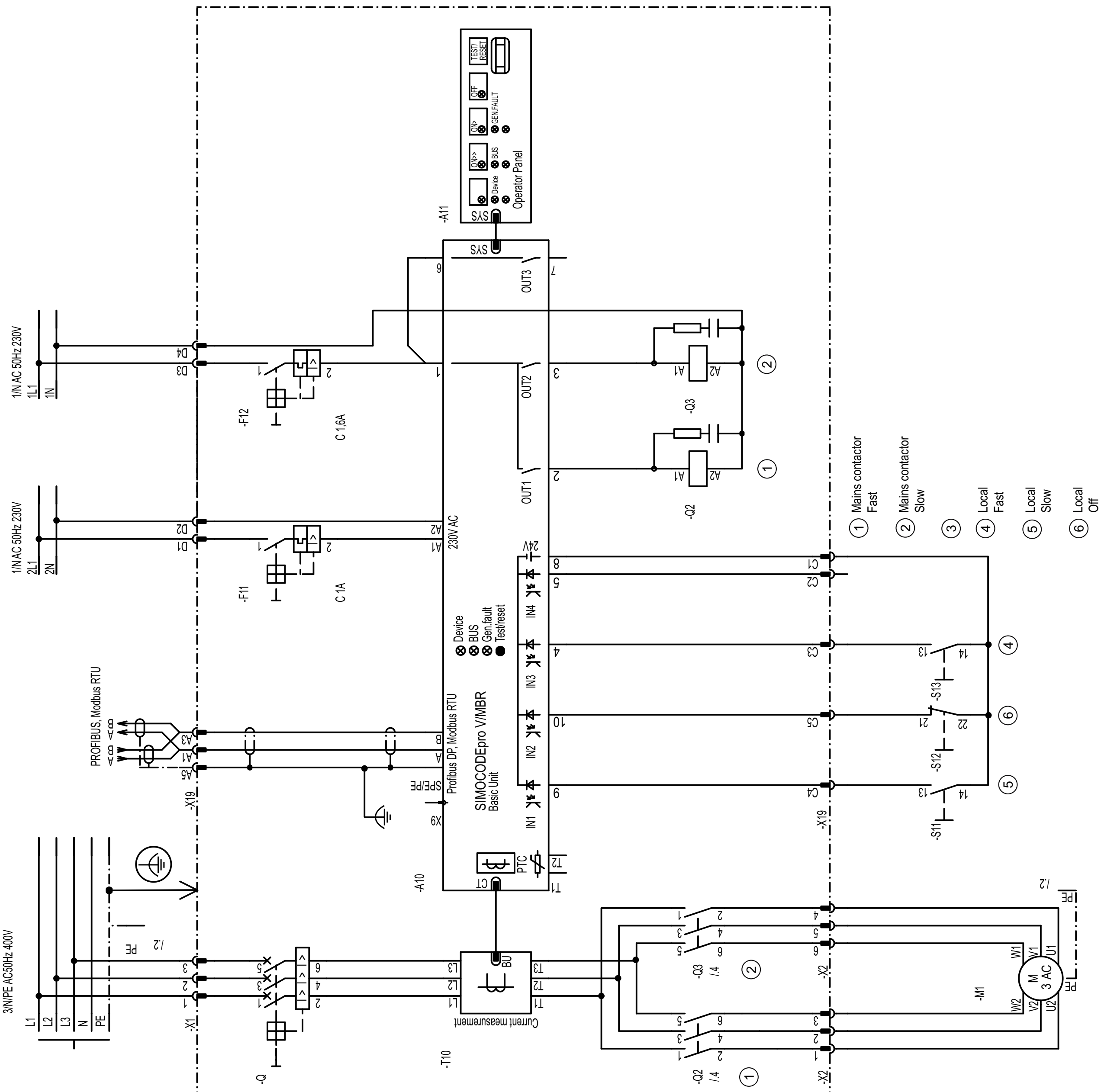


Figure 3-40 "Pole-changing starter" circuit diagram, SIMOCODE pro V PB, pro V MR

3.11.2 "Pole-changing starter" circuit diagram - SIMOCODE pro V PN, pro V EIP

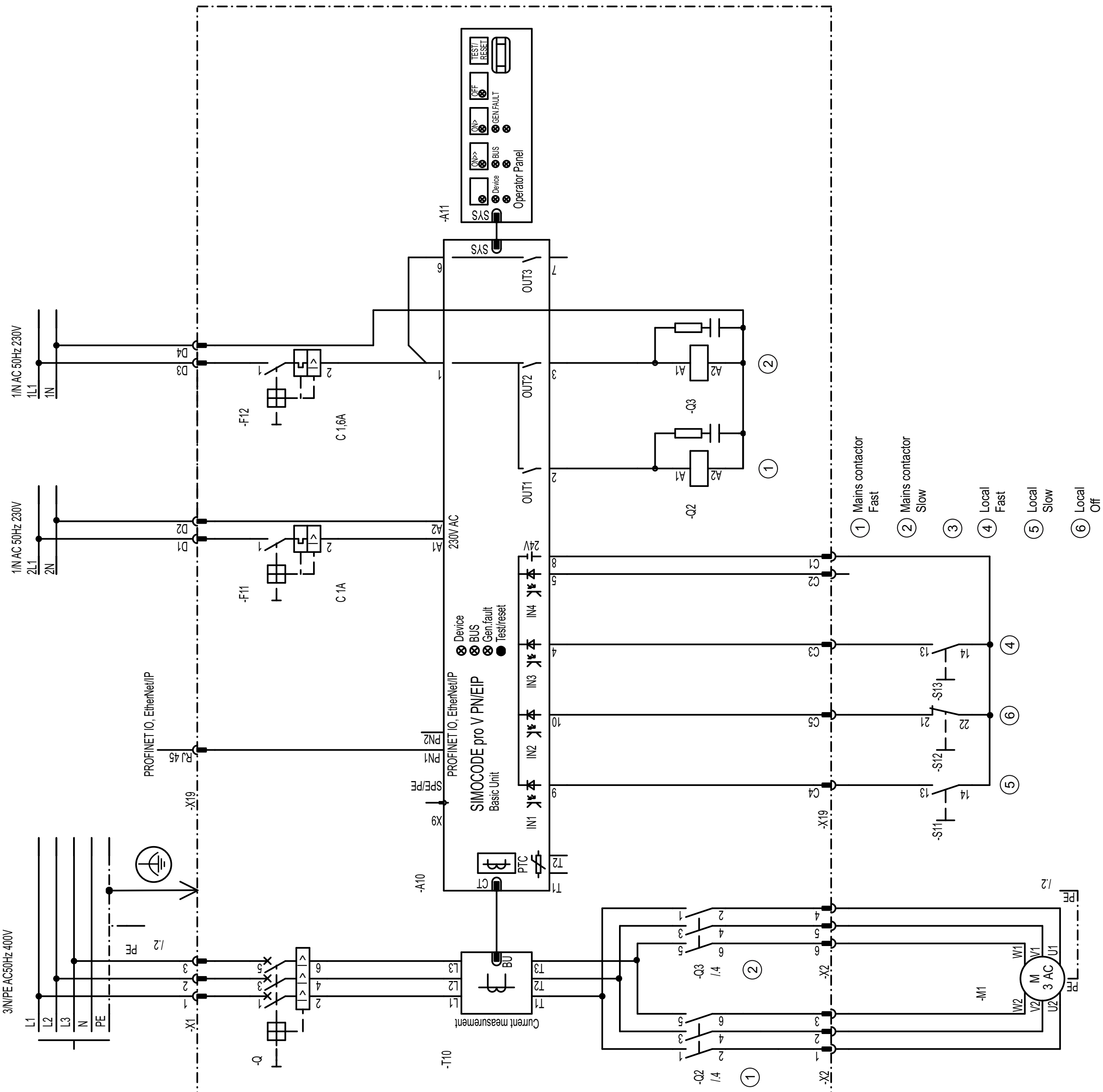


Figure 3-41 "Pole-changing starter" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.11.3 "Pole-changing starter" plan - SIMOCODE pro V

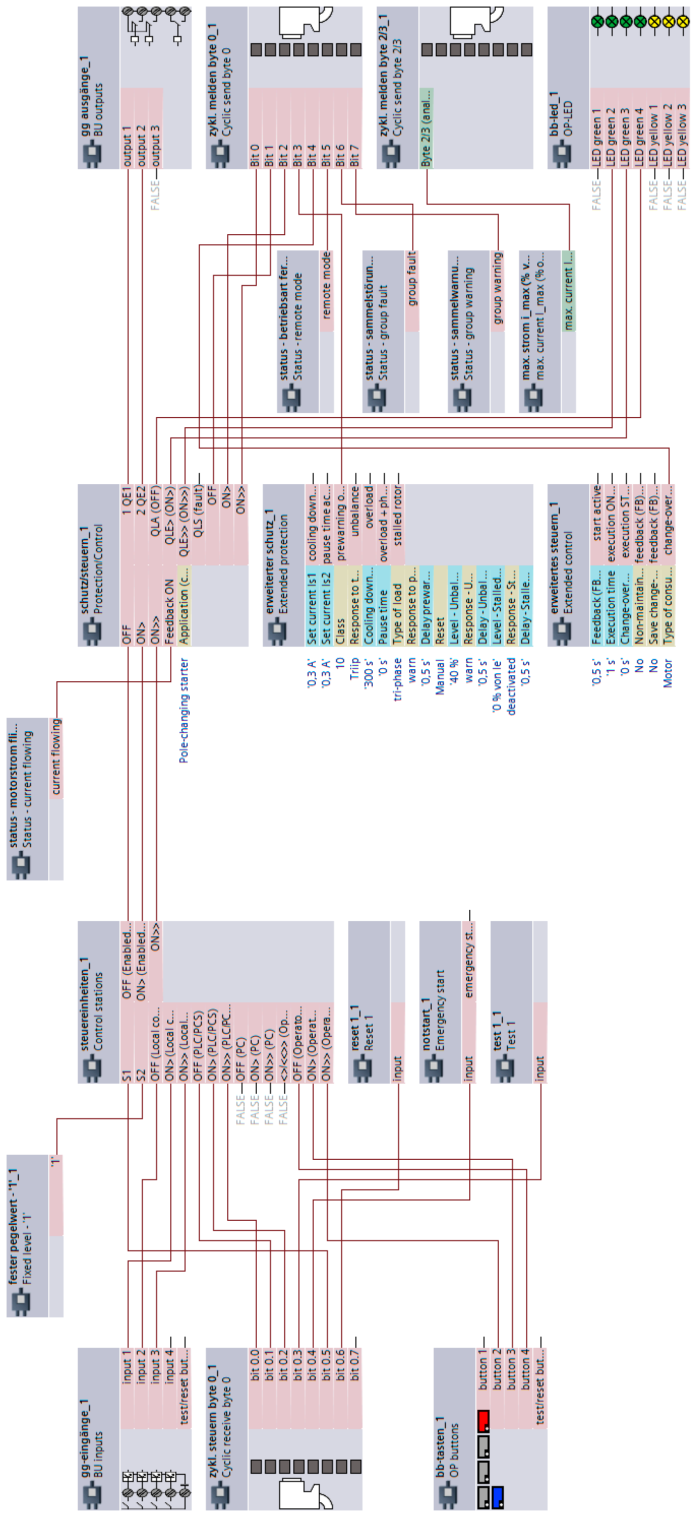


Figure 3-42 "Pole-changing starter" plan, SIMOCODE pro V

3.12 Pole-changing reversing starter

3.12.1 "Pole-changing reversing starter" circuit diagram - SIMOCODE pro V PB, pro V MR

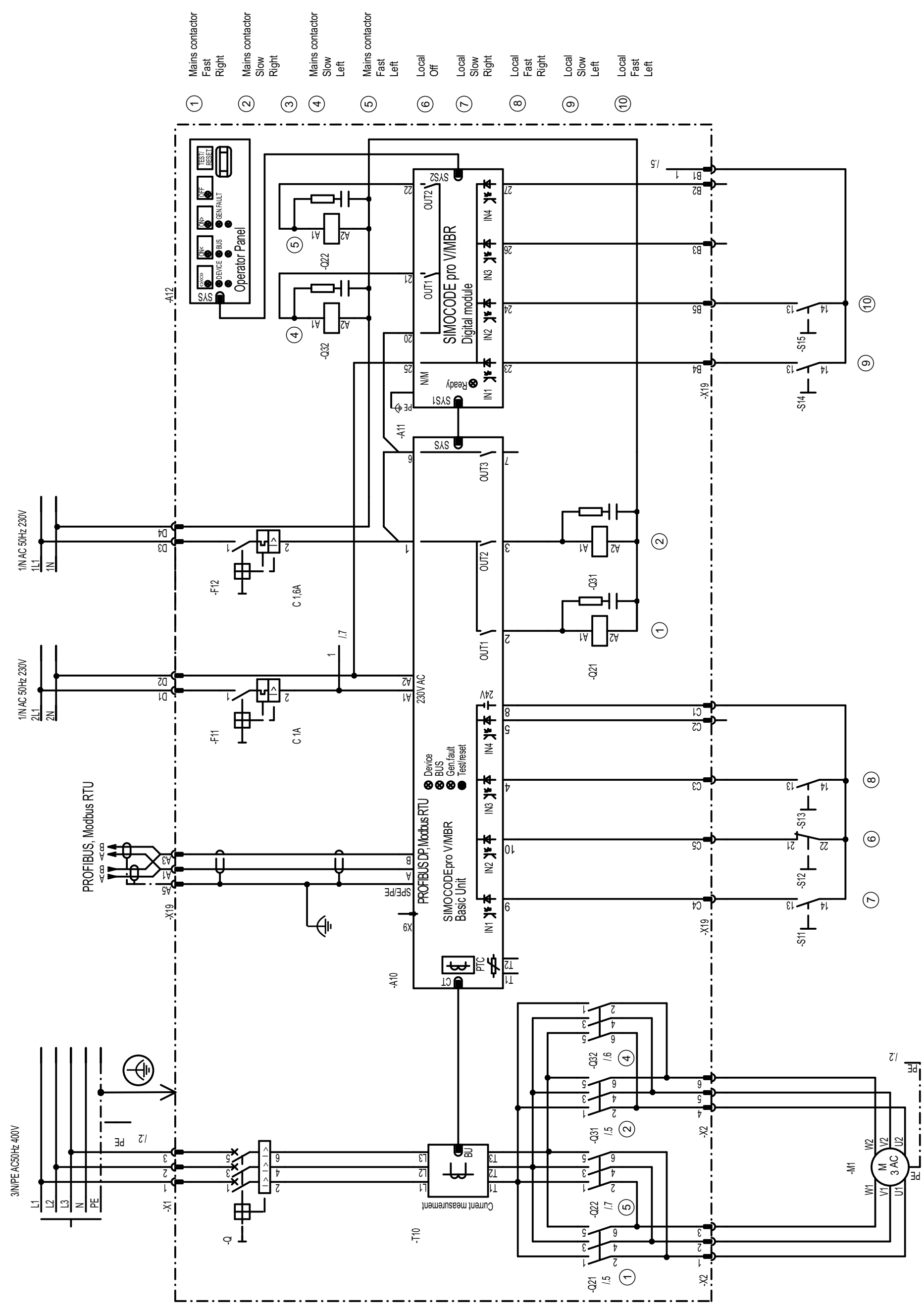


Figure 3-43 "Pole-changing reversing starter" circuit diagram, SIMOCODE pro V PB, pro V MR

3.12.2 "Pole-changing reversing starter" circuit diagram - SIMOCODE pro V PN, pro V EIP

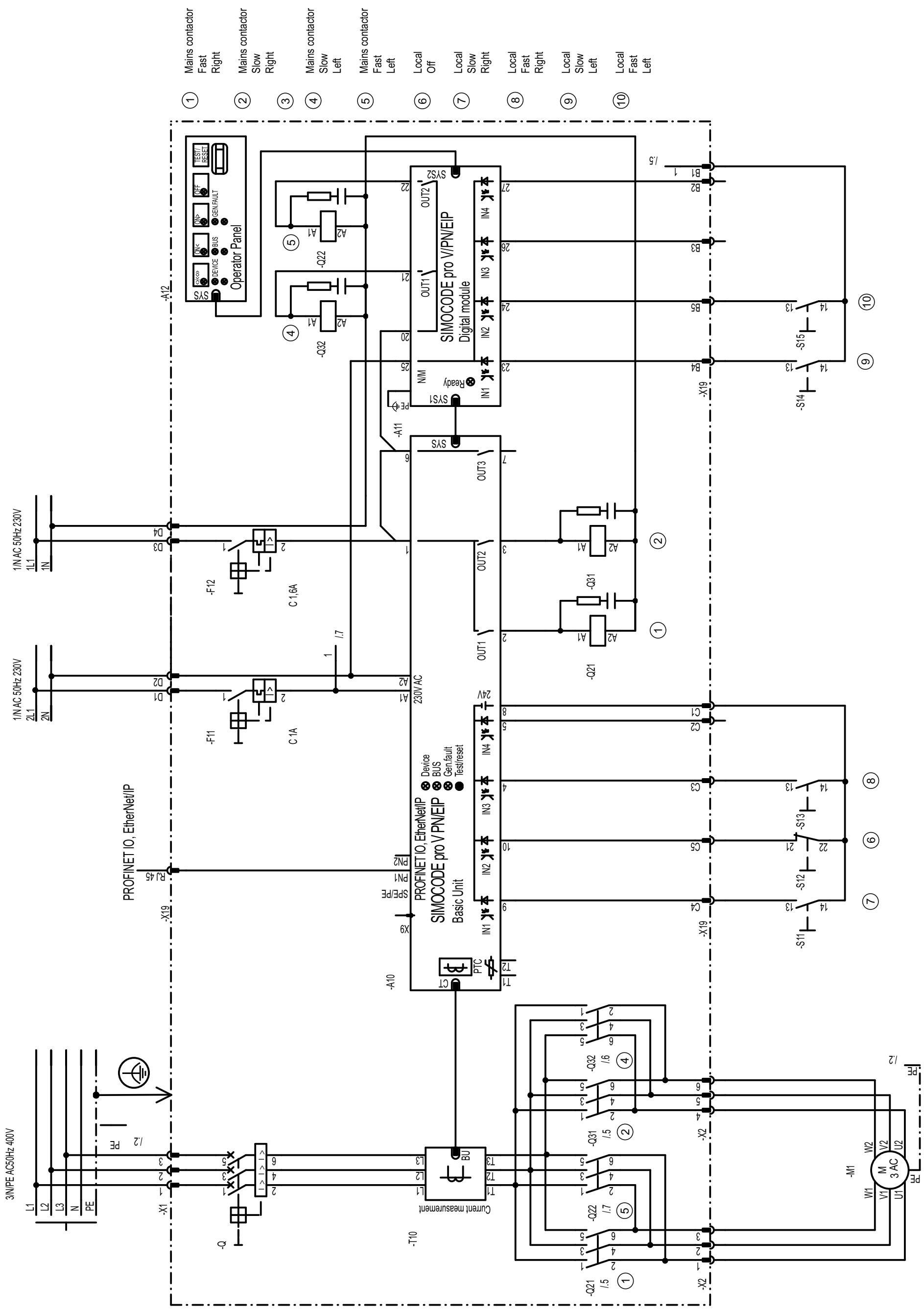


Figure 3-44 "Pole-changing reversing starter" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.12.3 "Pole-changing reversing starter" plan - SIMOCODE pro V

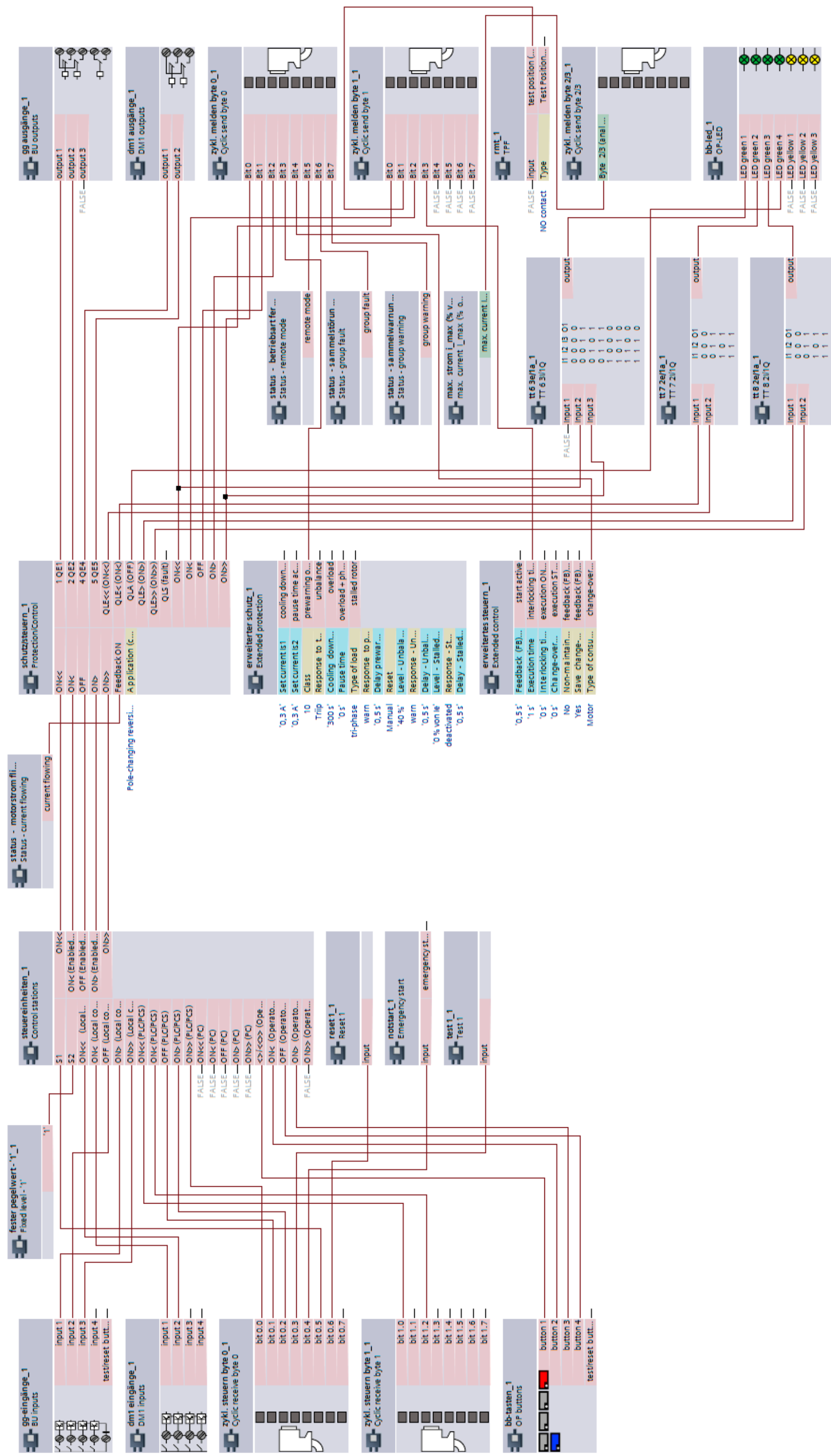


Figure 3-45 "Pole-changing reversing starter" plan, SIMOCODE pro V

3.13 Solenoid valve

3.13.1 "Solenoid valve" circuit diagram - SIMOCODE pro V PB, pro V MR

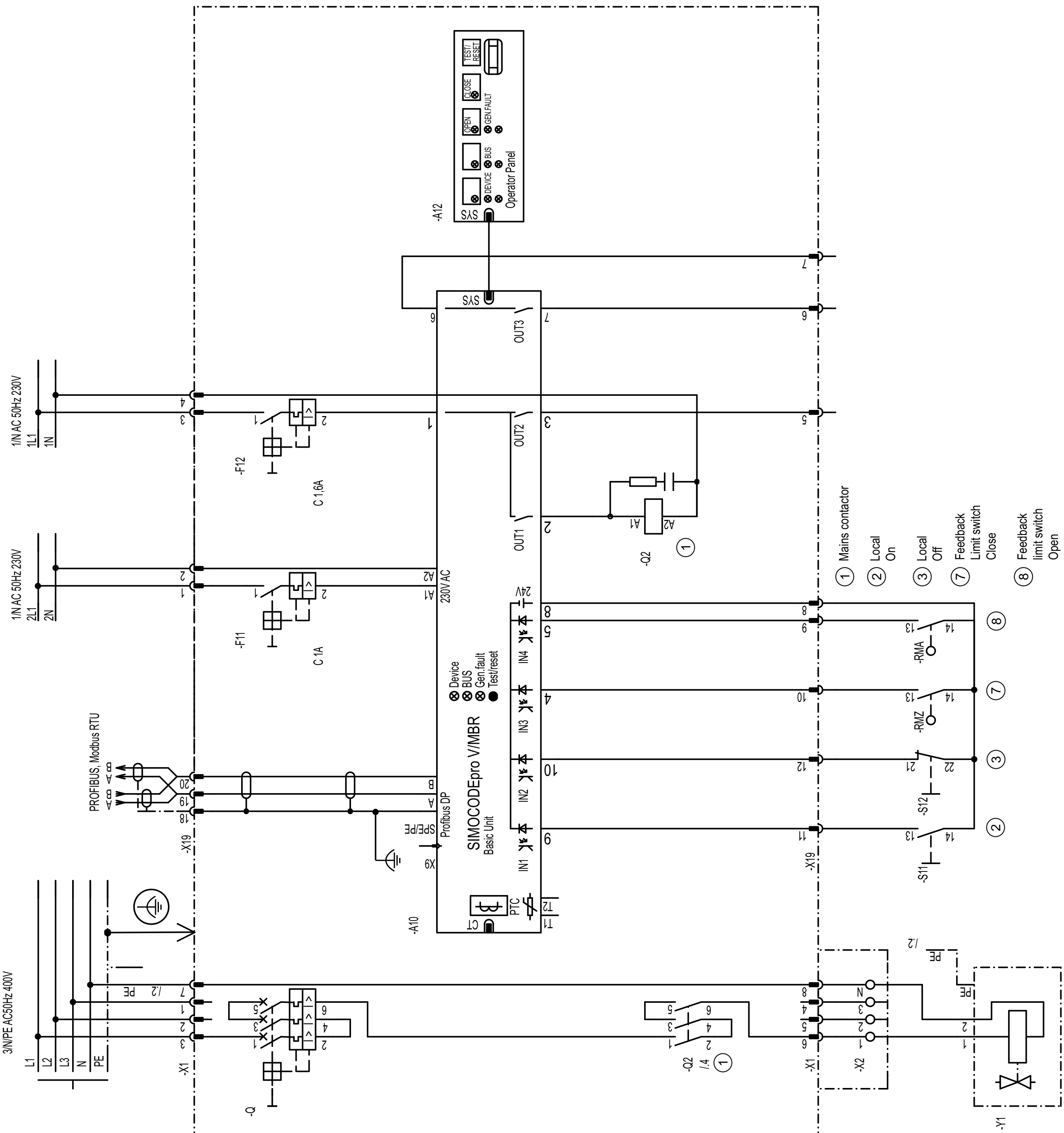


Figure 3-46 "Solenoid valve" circuit diagram, SIMOCODE pro V PB, pro V MR

3.13.2 "Solenoid valve" circuit diagram - SIMOCODE pro V PN, pro V EIP

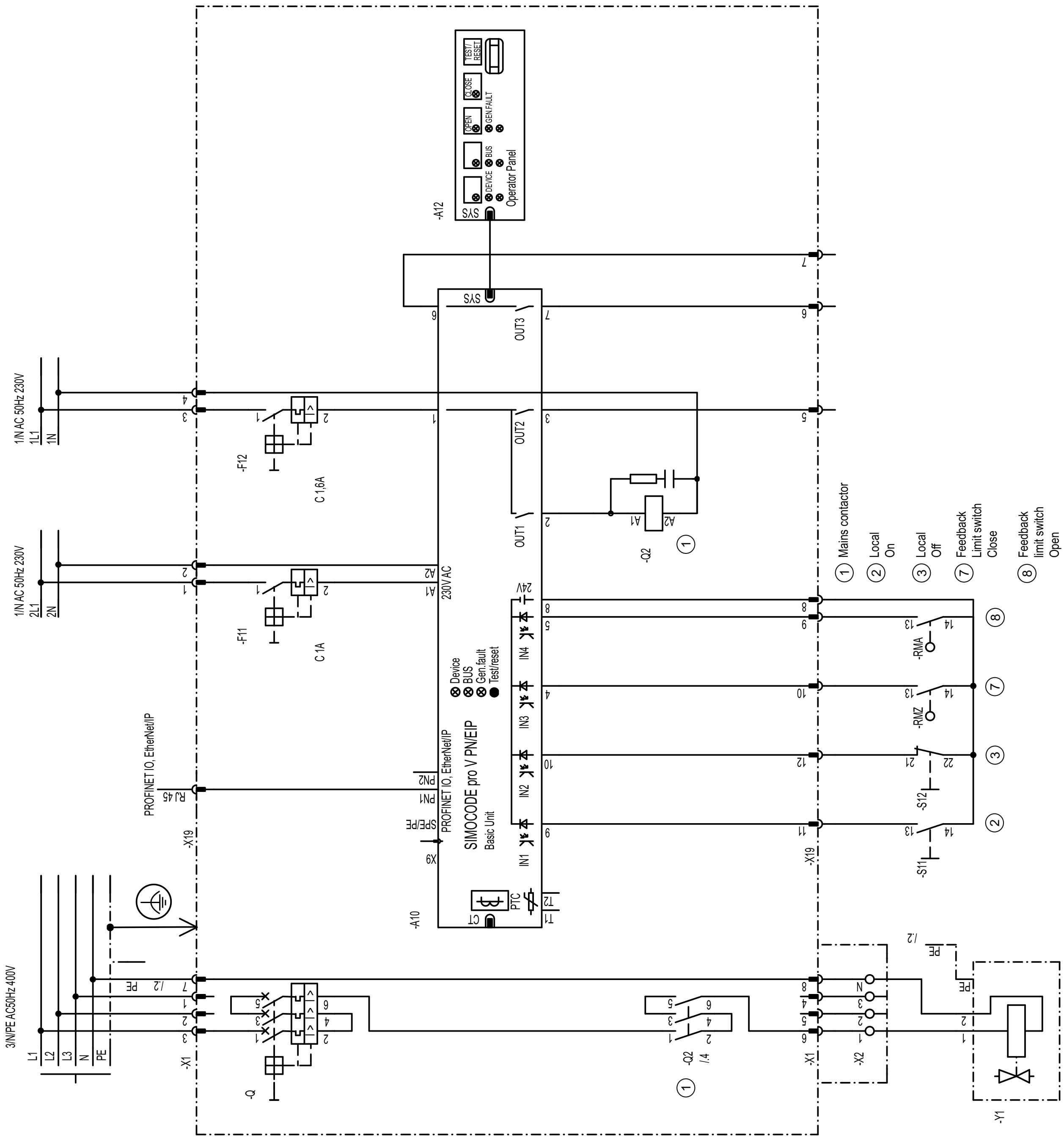


Figure 3-47 "Solenoid valve" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.13.3 "Solenoid valve" plan - SIMOCODE pro V

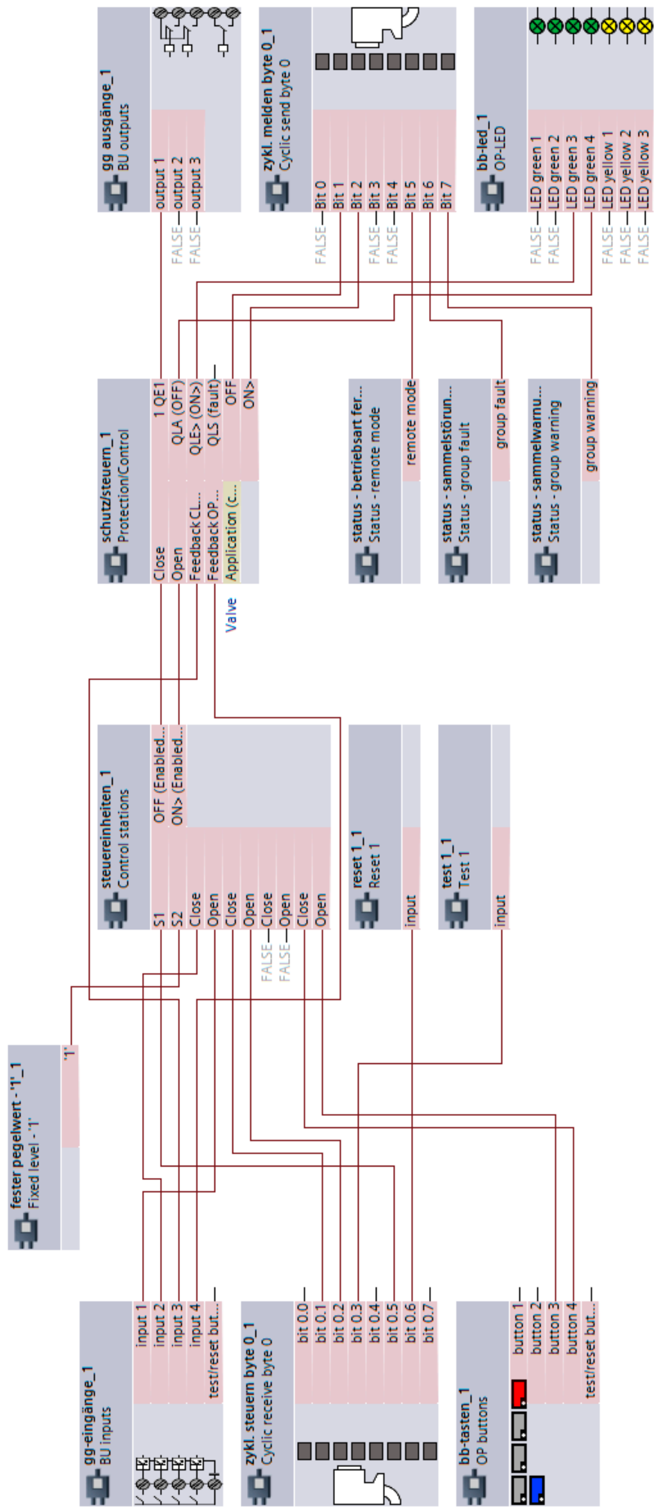


Figure 3-48 "Solenoid valve" plan, SIMOCODE pro V

3.14 Positioner

3.14.1 "Positioner 1" circuit diagram - SIMOCODE pro V PB, pro V MR

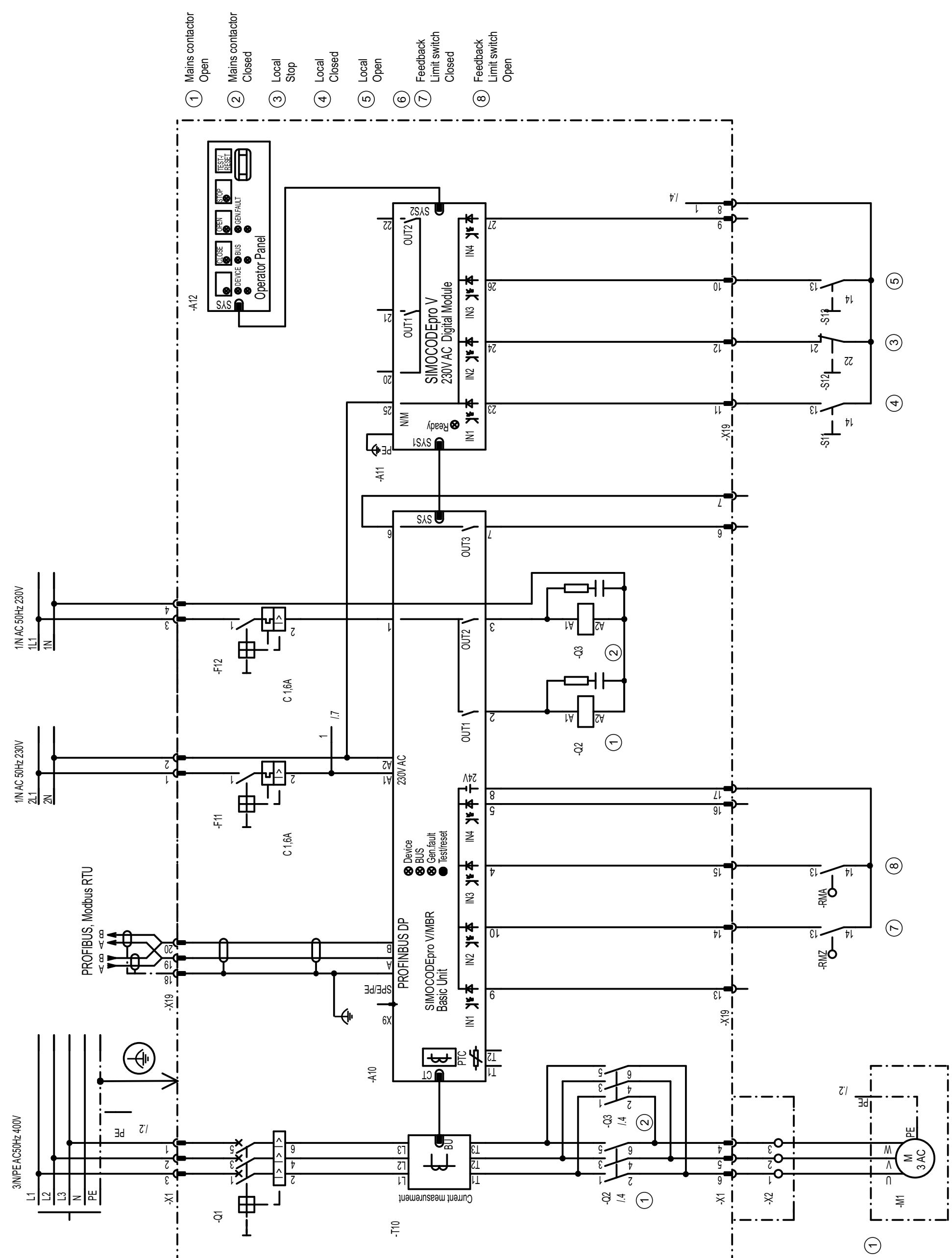


Figure 3-49 "Positioner 1" circuit diagram, SIMOCODE pro V PB, pro V MR

3.14.2 "Positioner 1" circuit diagram - SIMOCODE pro V PN, pro V EIP

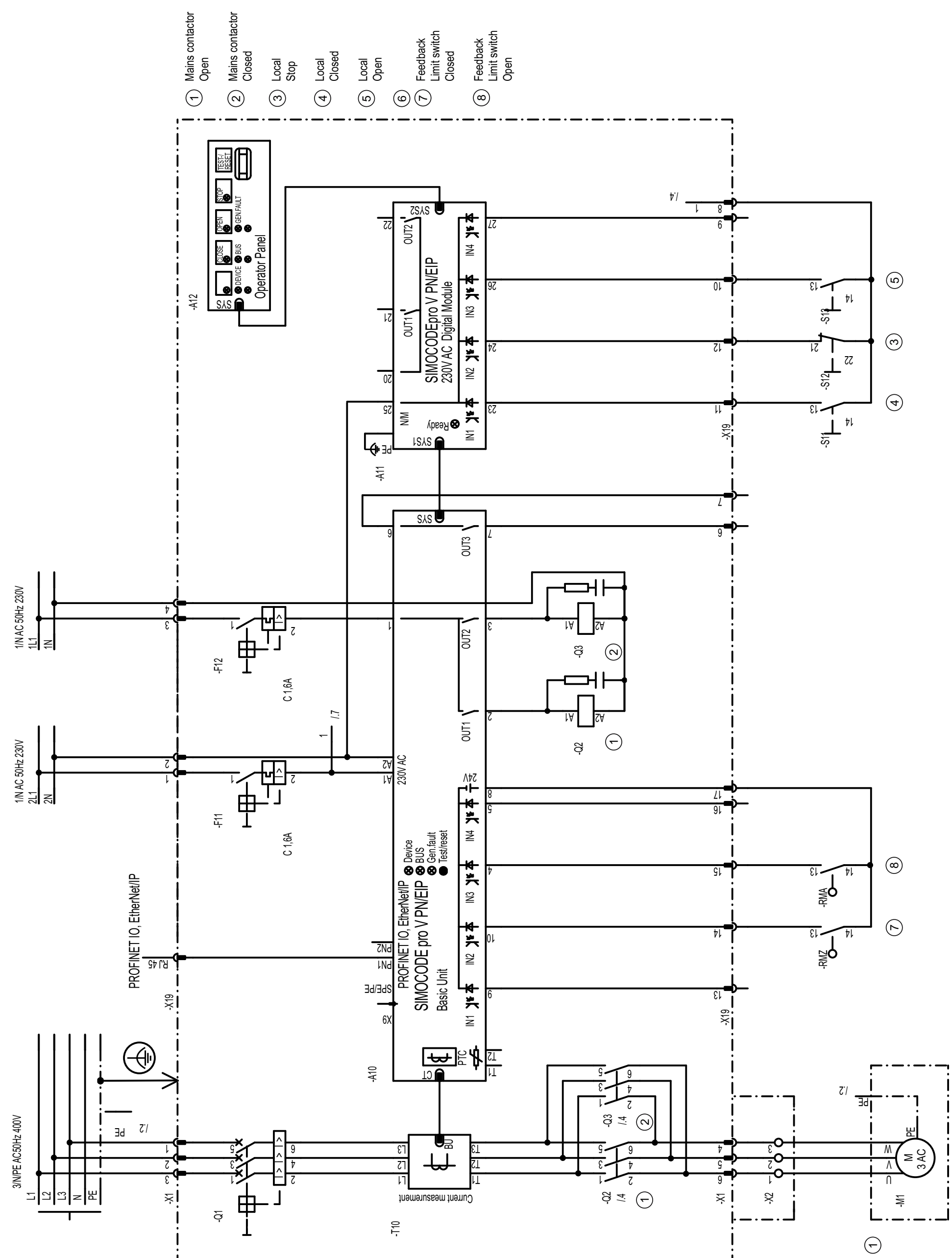


Figure 3-50 "Positioner 1" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.14.3 "Positioner 1" plan - SIMOCODE pro V

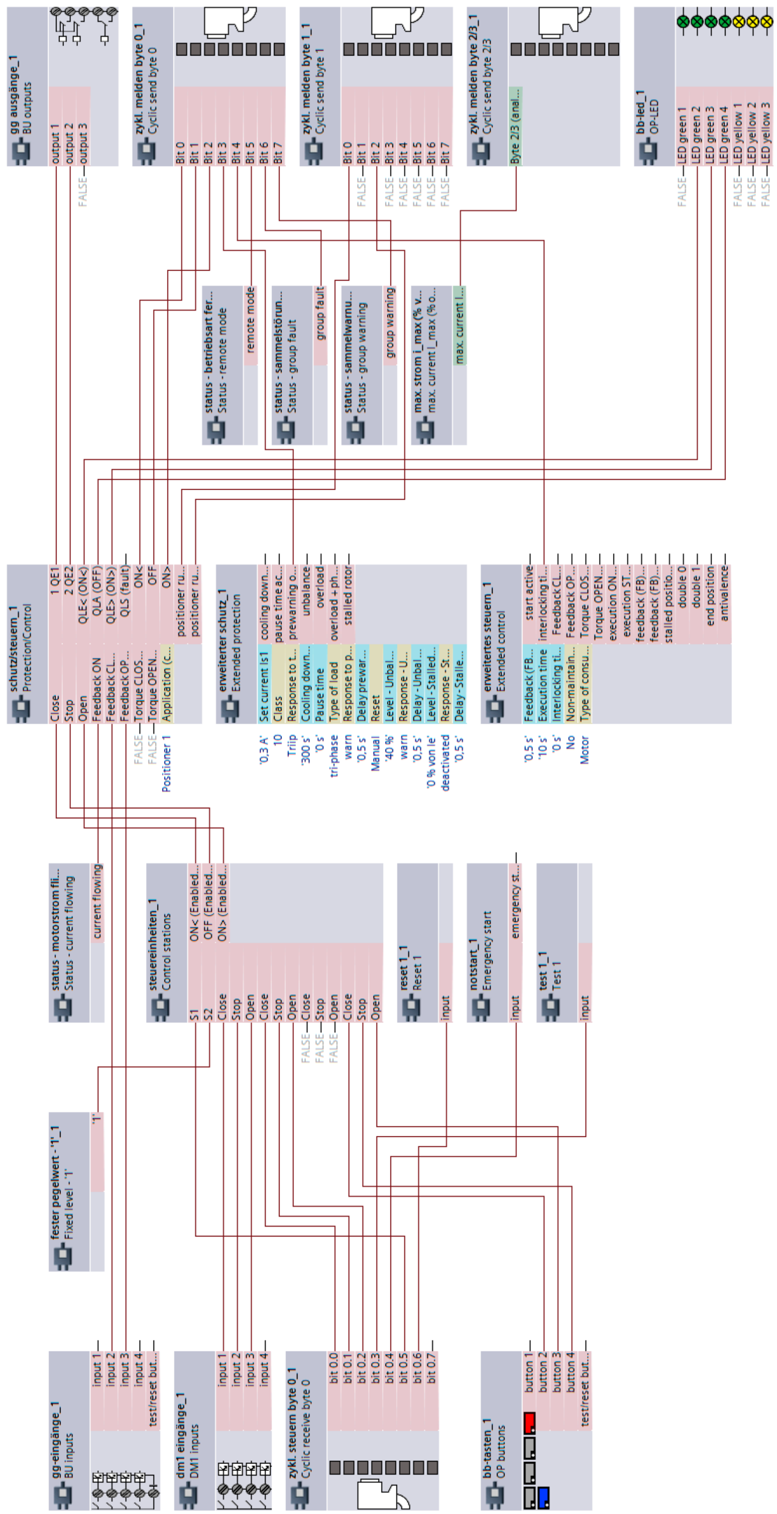


Figure 3-51 "Positioner 1" plan, SIMOCODE pro V

3.14.4 "Positioner 2" circuit diagram - SIMOCODE pro V PB, pro V MR

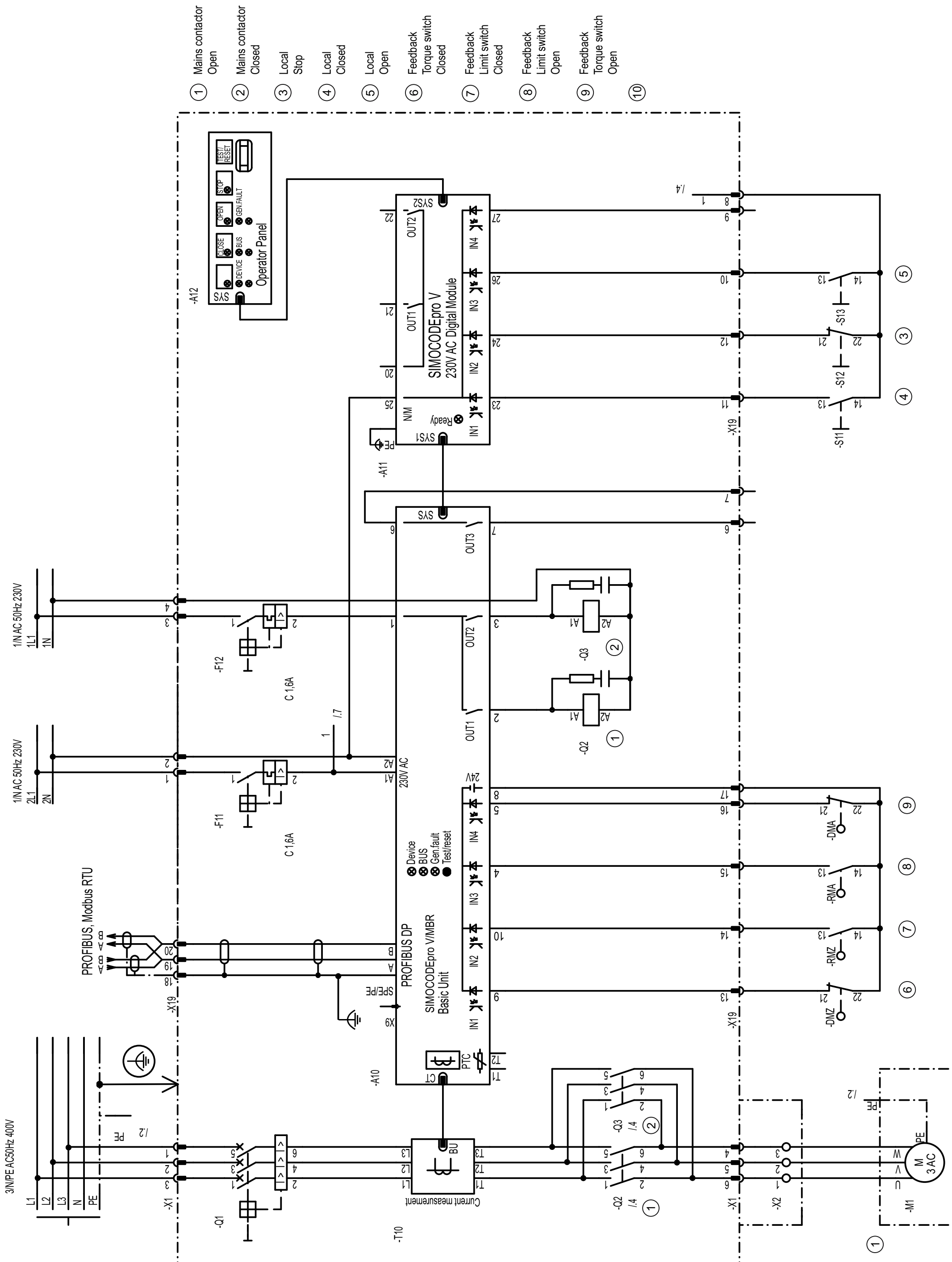


Figure 3-52 "Positioner 2" circuit diagram, SIMOCODE pro V PB, pro V MR

3.14.5 "Positioner 2" circuit diagram - SIMOCODE pro V PN, pro V EIP

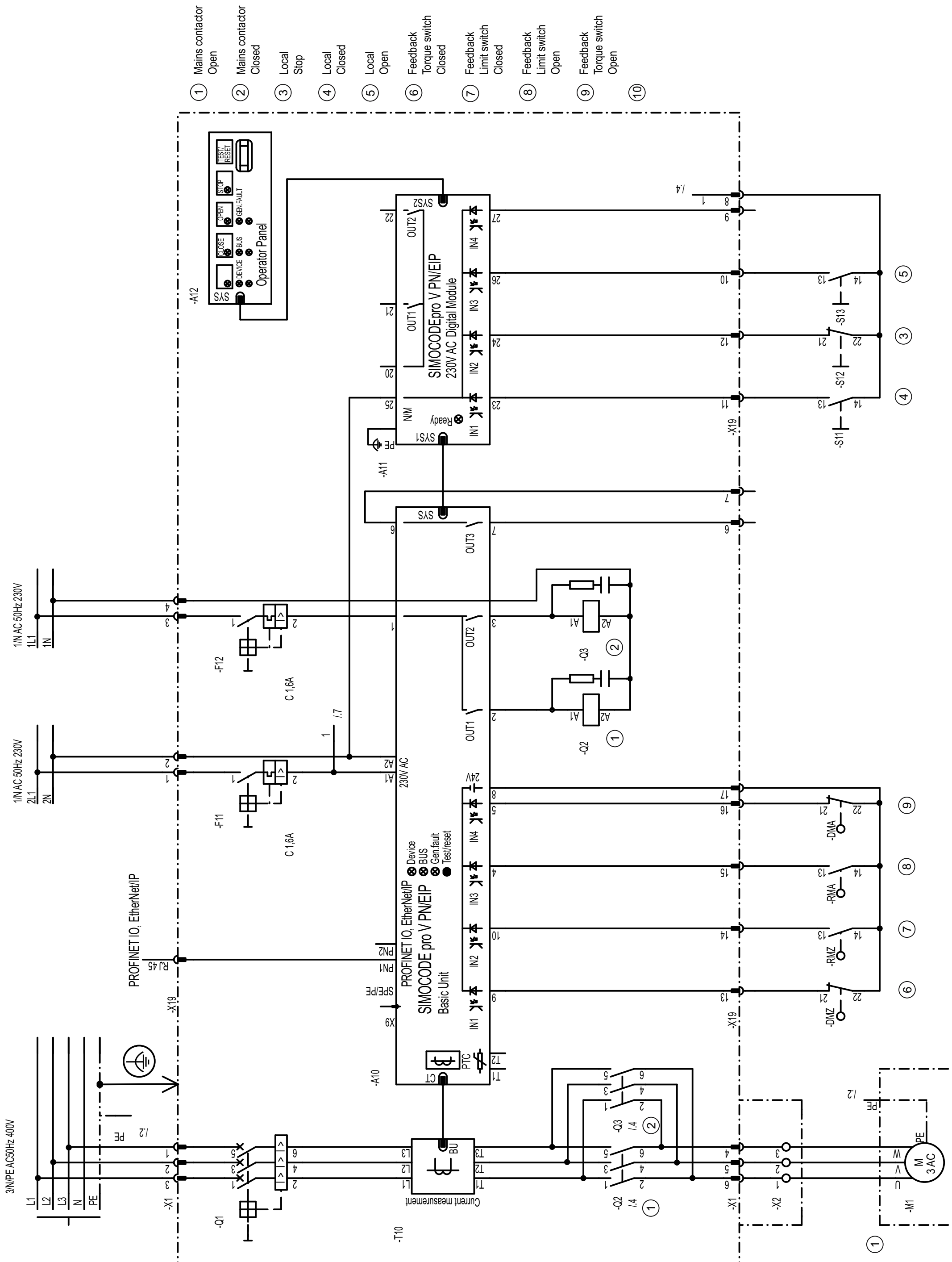


Figure 3-53 "Positioner 2" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.14.6 "Positioner 2" plan, SIMOCODE pro V

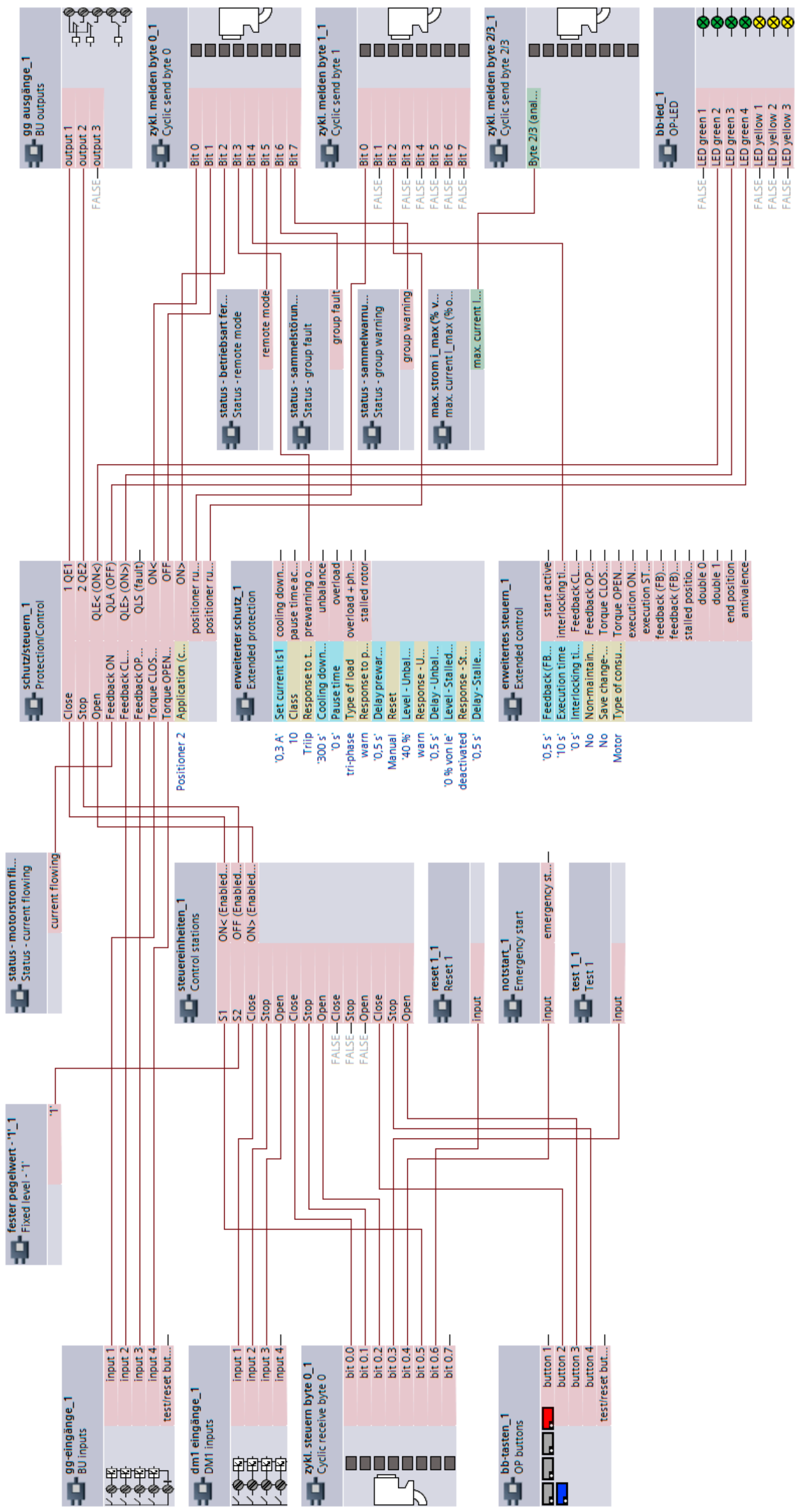


Figure 3-54 "Positioner 2" plan, SIMOCODE pro V

3.14.7 "Positioner 3" circuit diagram - SIMOCODE pro V PB, pro V MR

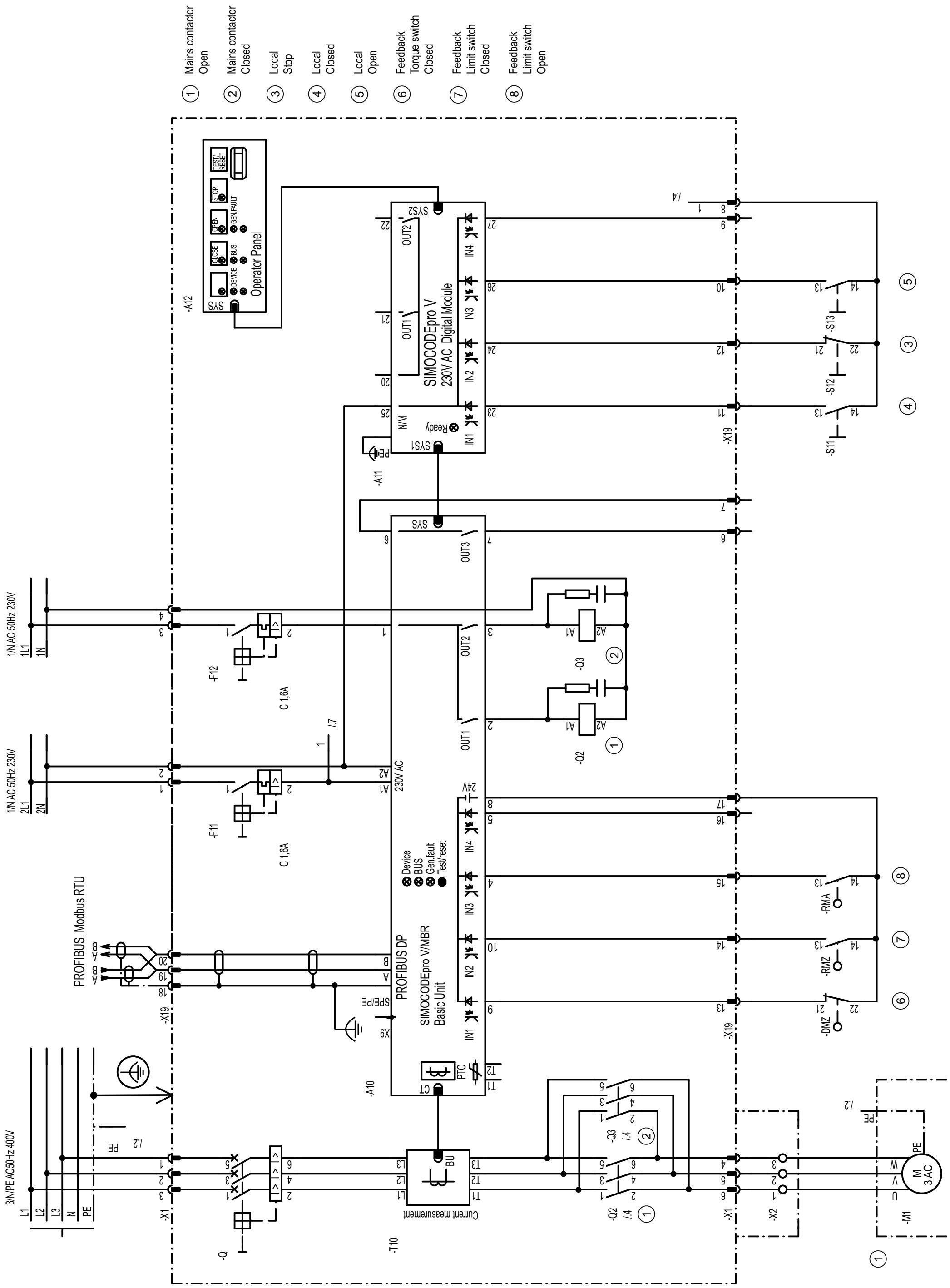


Figure 3-55 "Positioner 3" circuit diagram, SIMOCODE pro V PB, pro V MR

3.14.8 "Positioner 3" circuit diagram - SIMOCODE pro V PN, pro V EIP

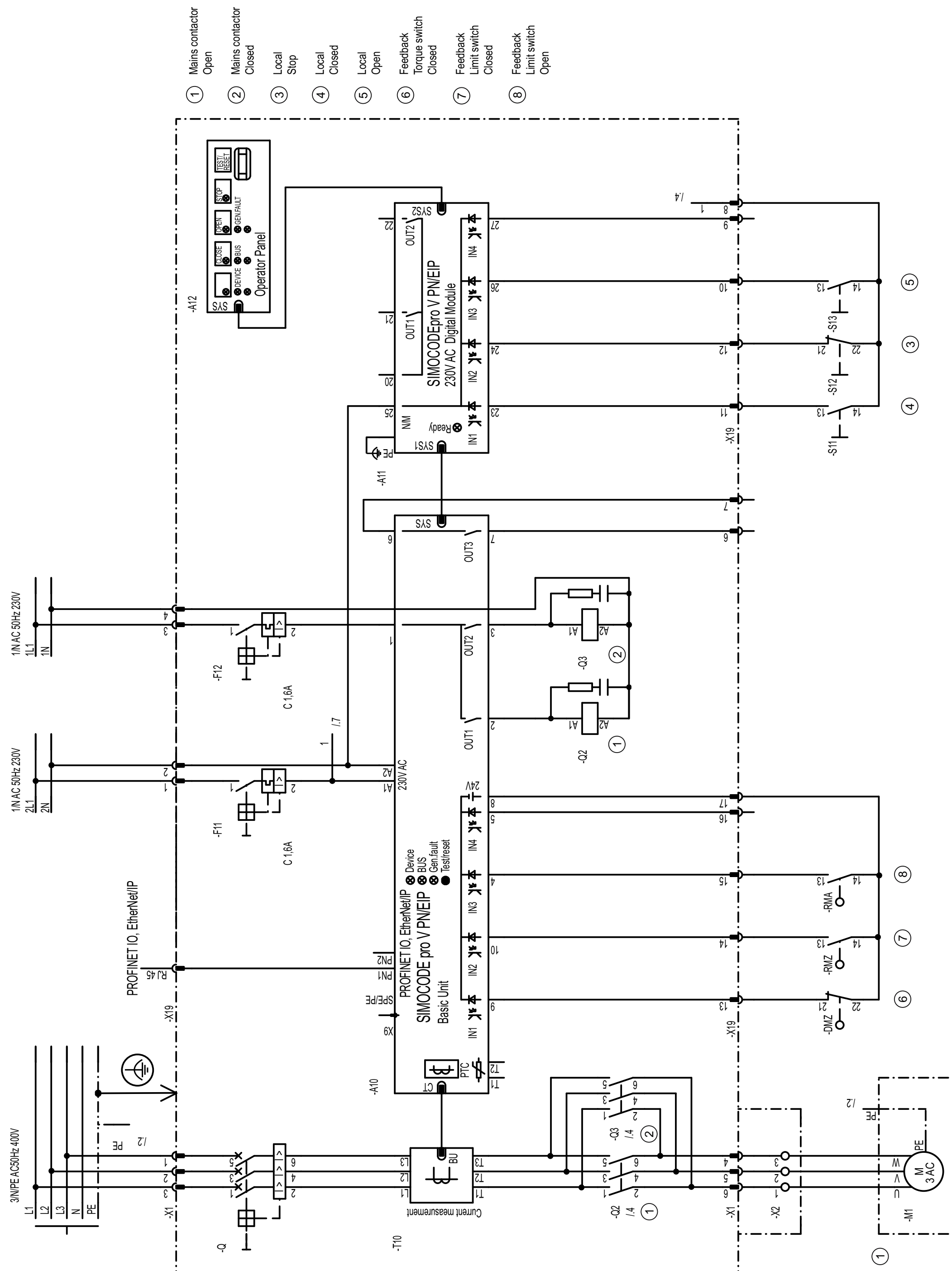


Figure 3-56 "Positioner 3" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.14.9 "Positioner 3" plan - SIMOCODE pro V

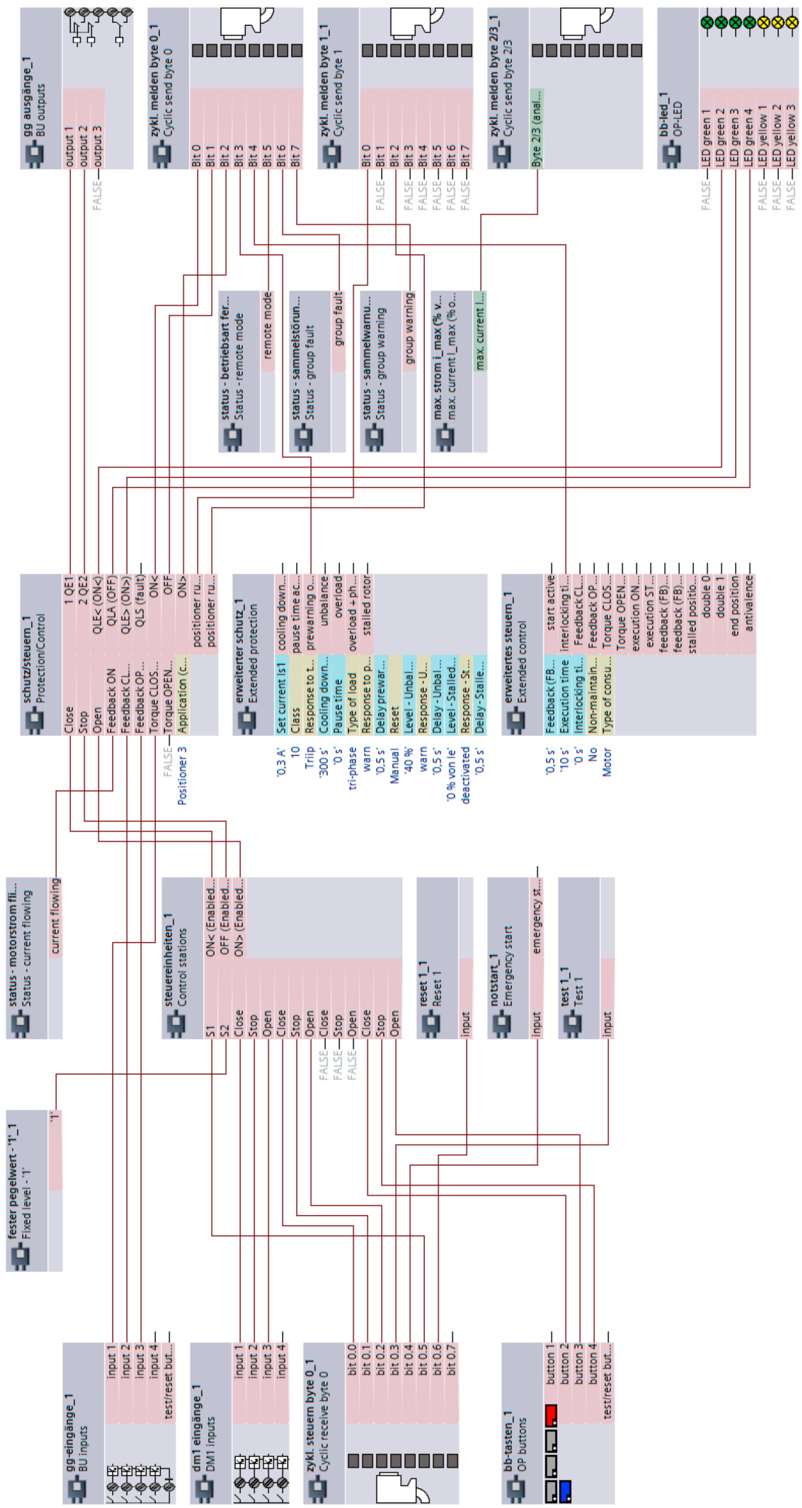


Figure 3-57 "Positioner 3" plan, SIMOCODE pro V

3.14.10 "Positioner 4" circuit diagram - SIMOCODE pro V PB, pro V MR

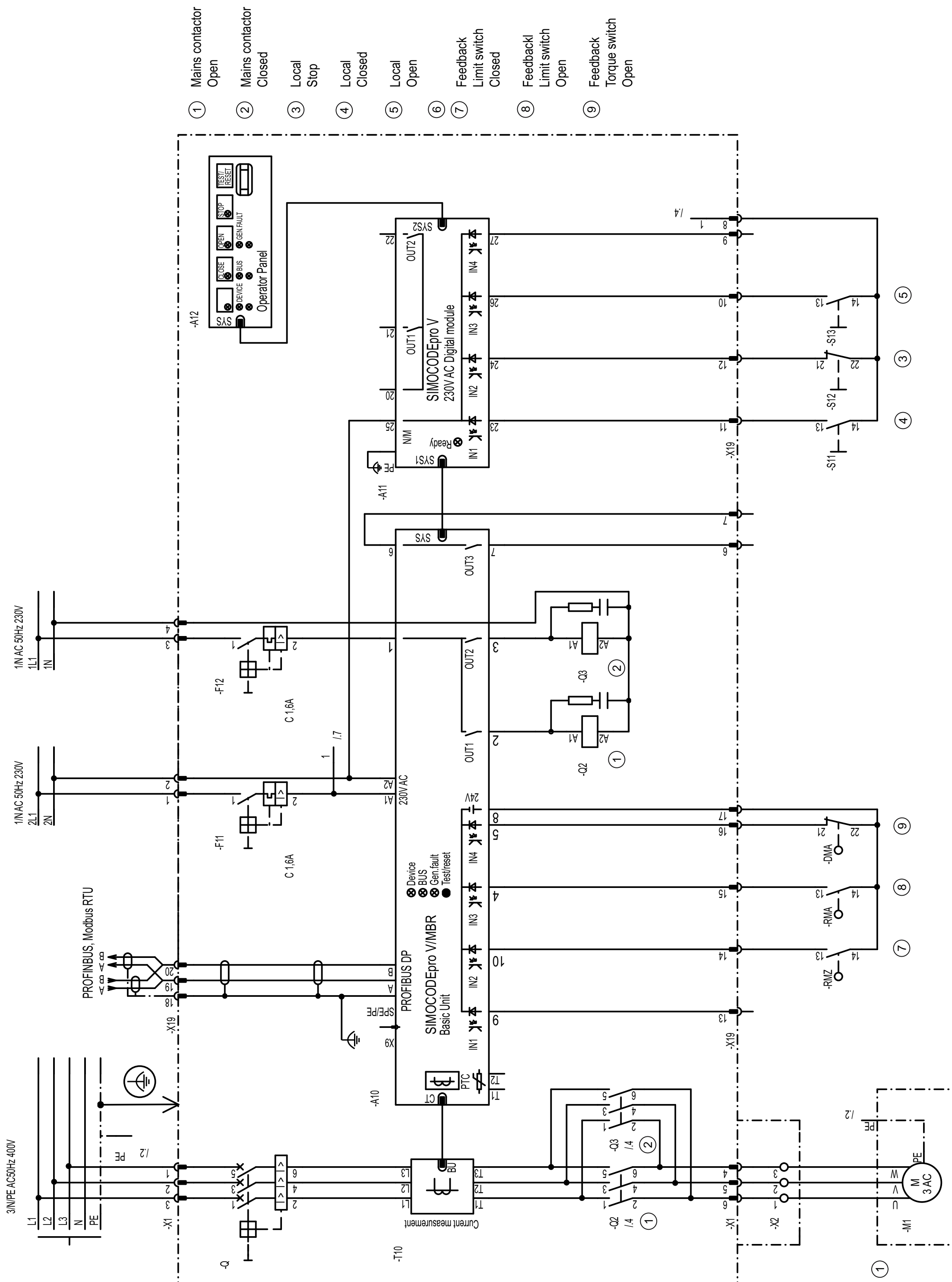


Figure 3-58 "Positioner 4" circuit diagram, SIMOCODE pro V PB, pro V MR

3.14.11 "Positioner 4" circuit diagram - SIMOCODE pro V PN, pro V EIP

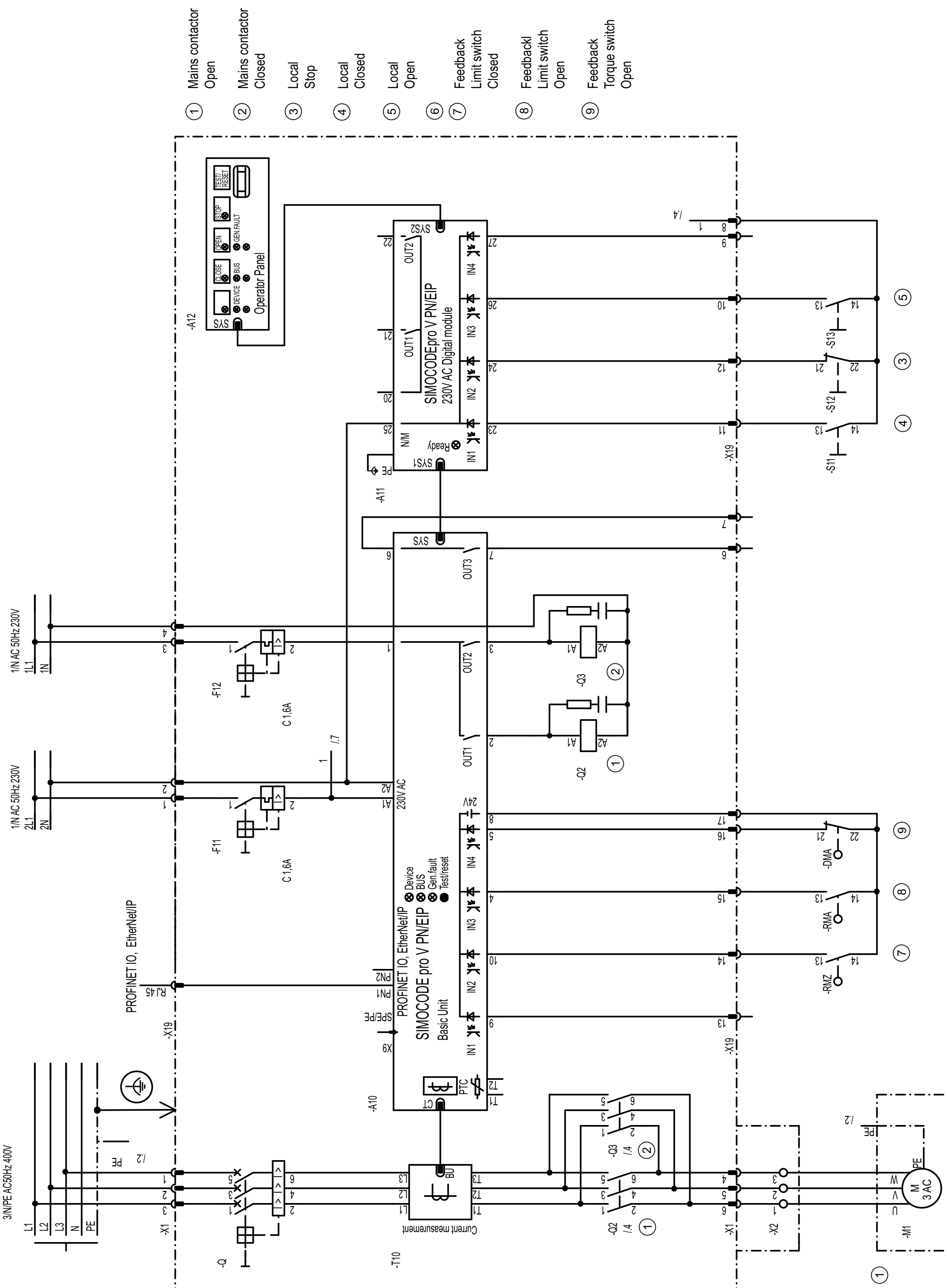


Figure 3-59 "Positioner 4" circuit diagram, SIMOCODE pro V PN, pro V EIP

3.14.12 "Positioner 4" plan - SIMOCODE pro V

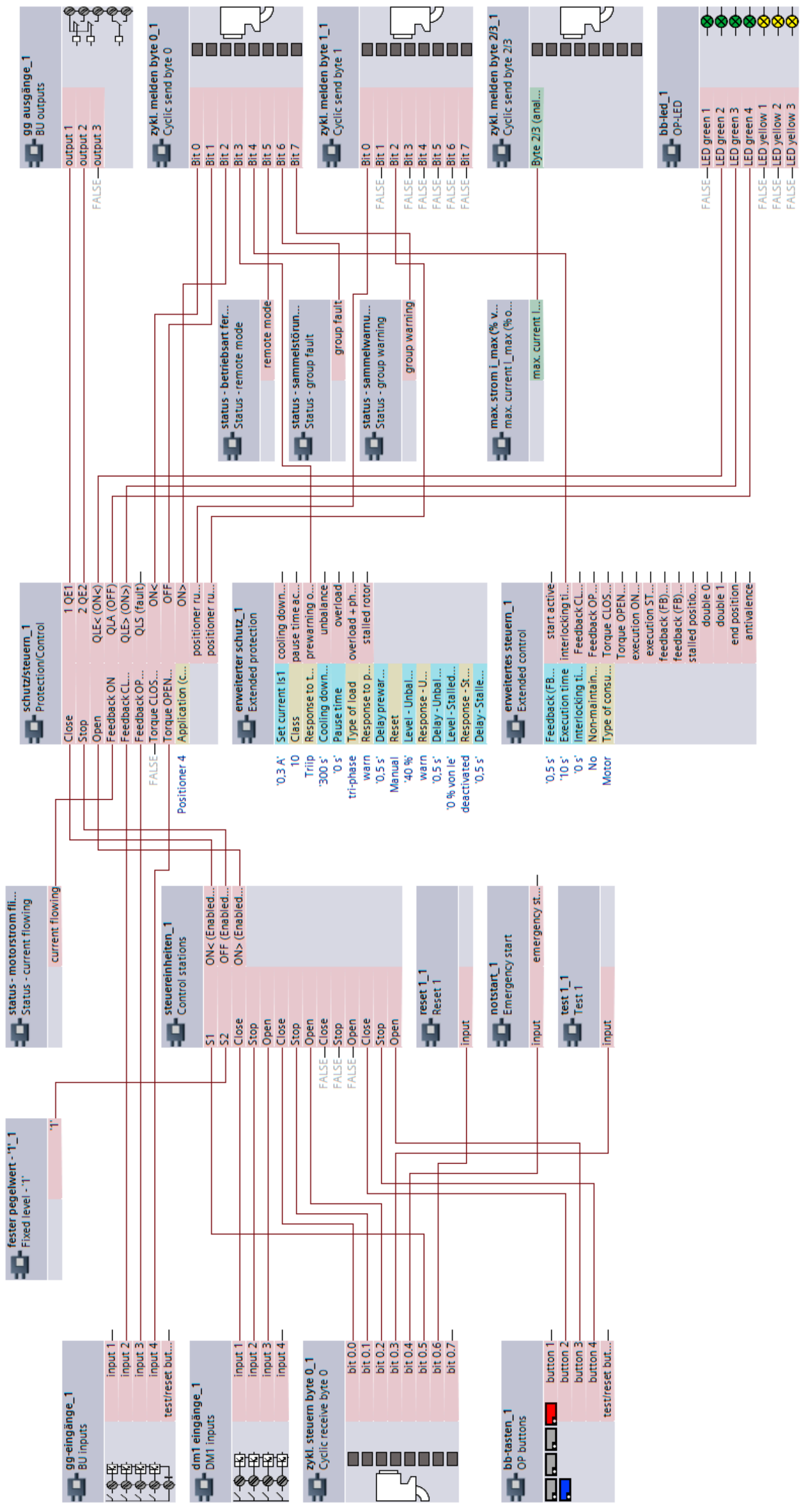


Figure 3-60 "Positioner 4" plan, SIMOCODE pro V

3.14.13 "Positioner 5" circuit diagram - SIMOCODE pro V PB, pro V MR

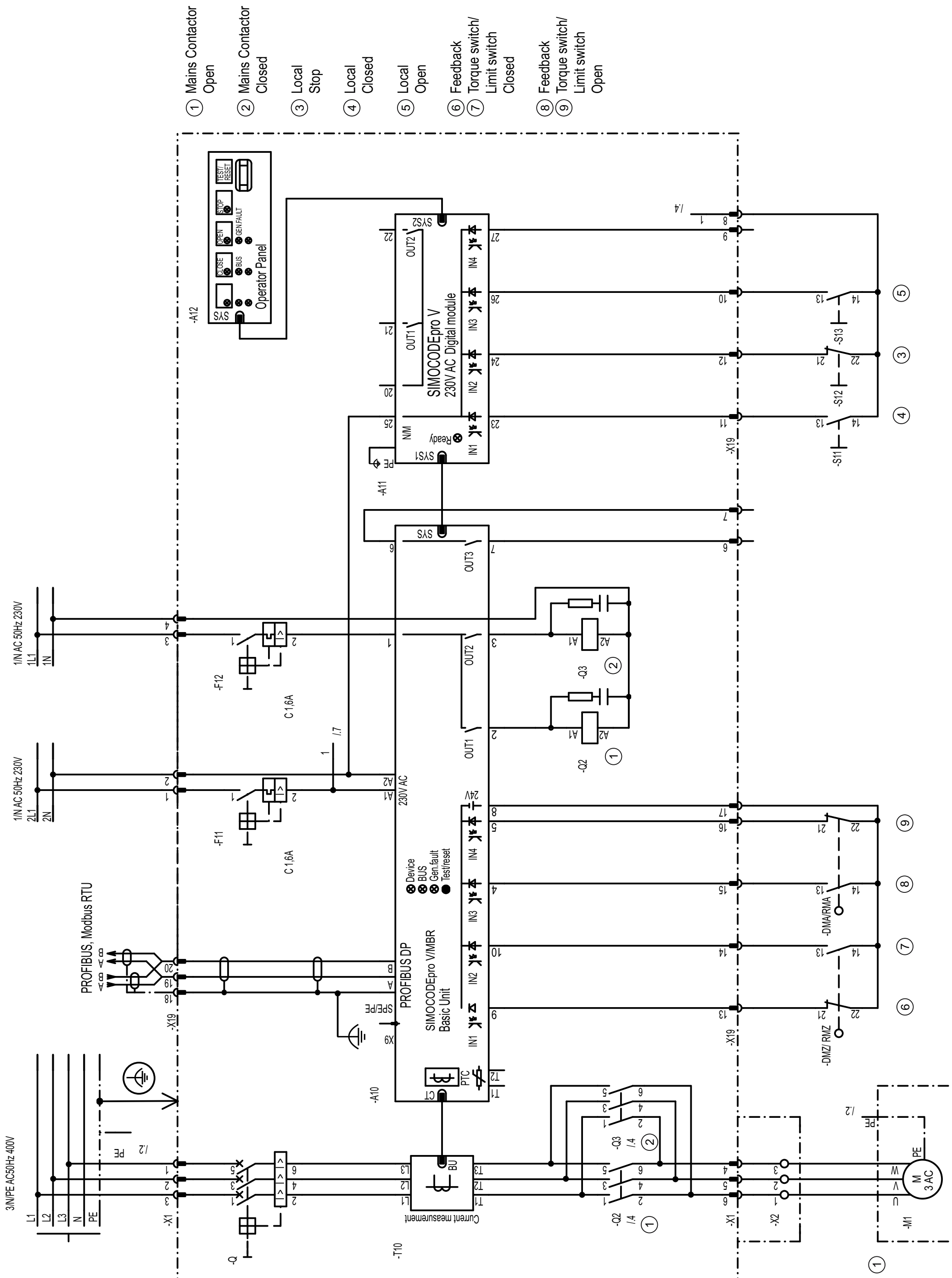


Figure 3-61 "Positioner 5" circuit diagram, SIMOCODE pro V PB, pro V MR

3.14.14 "Positioner 5" circuit diagram - SIMOCODE pro V PN, pro V EIP

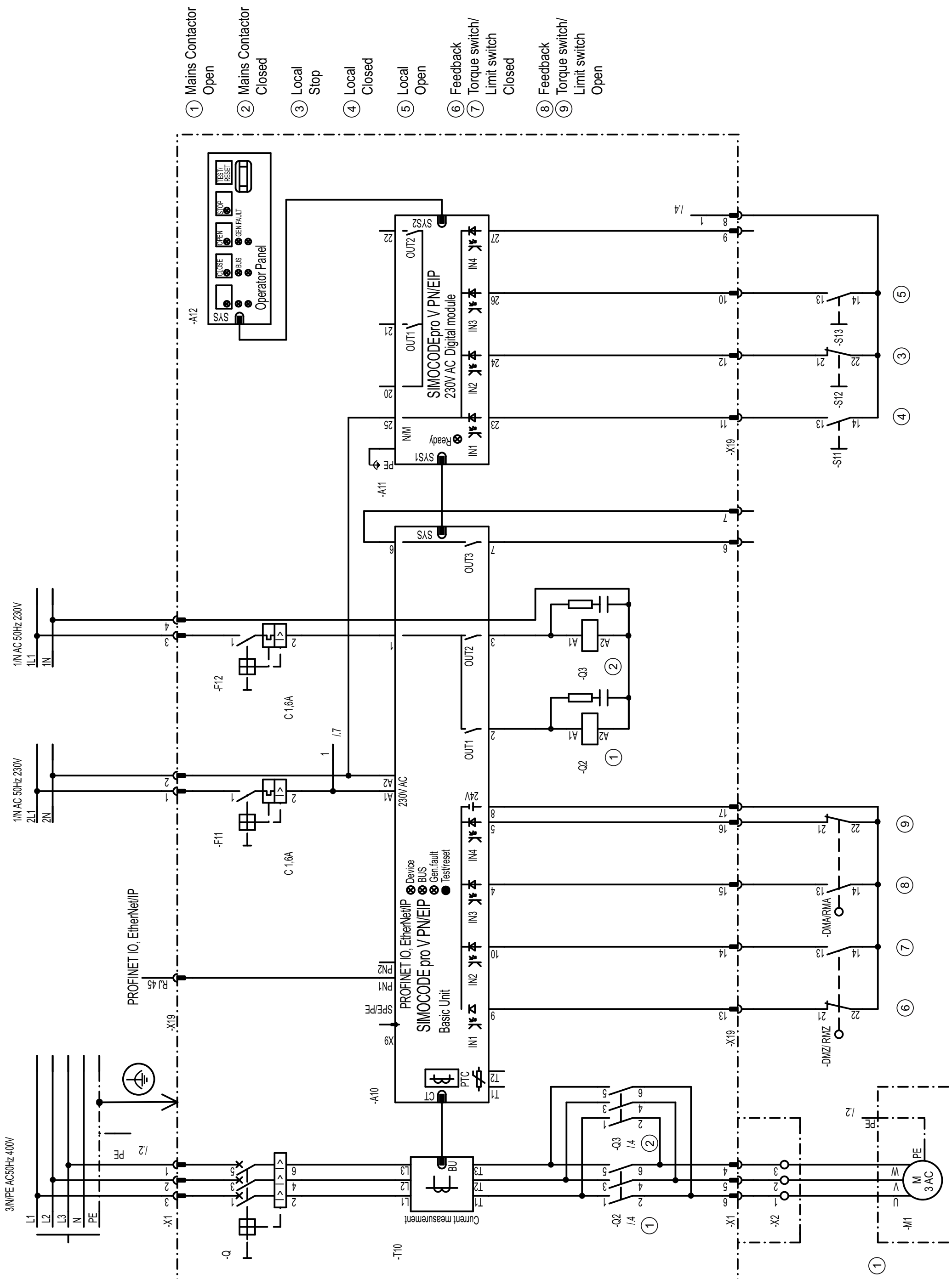


Figure 3-62 "Positioner 5" circuit diagram, SIMOCODE pro VP N, pro V EIP

3.14.15 "Positioner 5" plan - SIMOCODE pro V

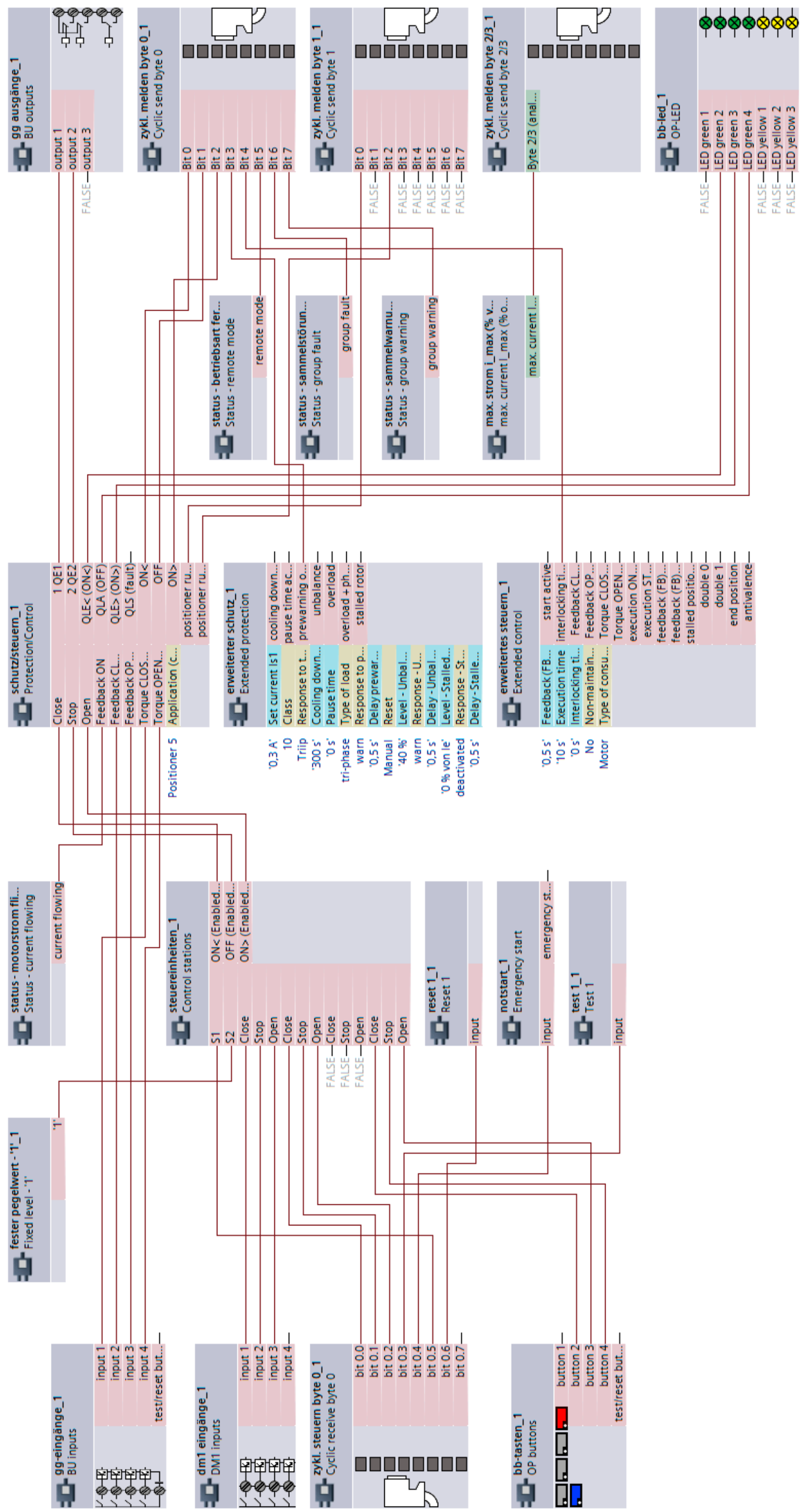


Figure 3-63 "Positioner 5" plan, SIMOCODE pro V

3.15 Soft starter (3RW402, 3RW403, 3RW404, 3RW52)

3.15.1 "Soft starter" circuit diagram (example 3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro V PB, pro V MR

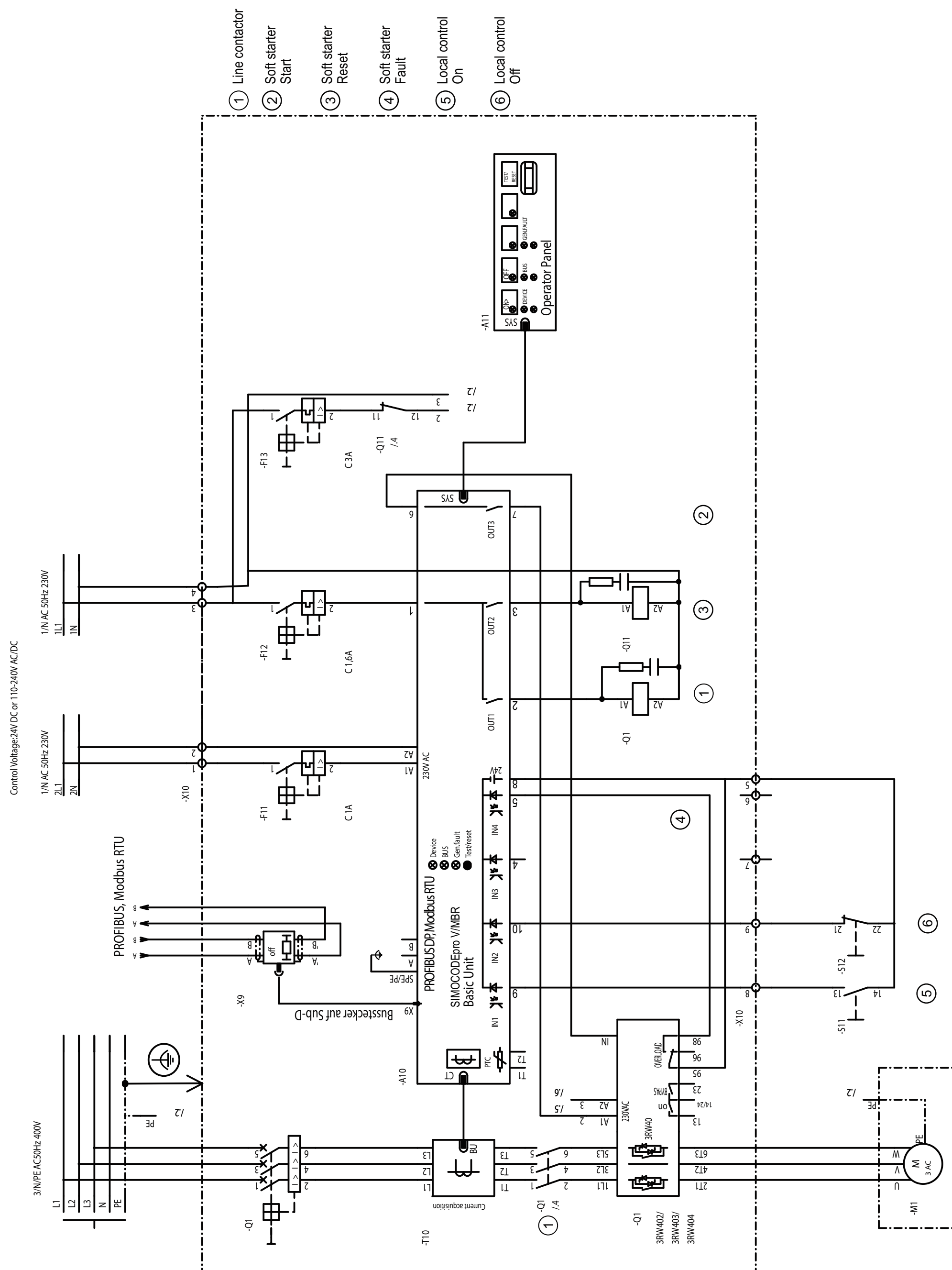


Figure 3-64 "Soft starter" circuit diagram (example 3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro V PB, pro V MR

3.15.2 "Soft starter" circuit diagram (example 3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro V PN, pro V EIP

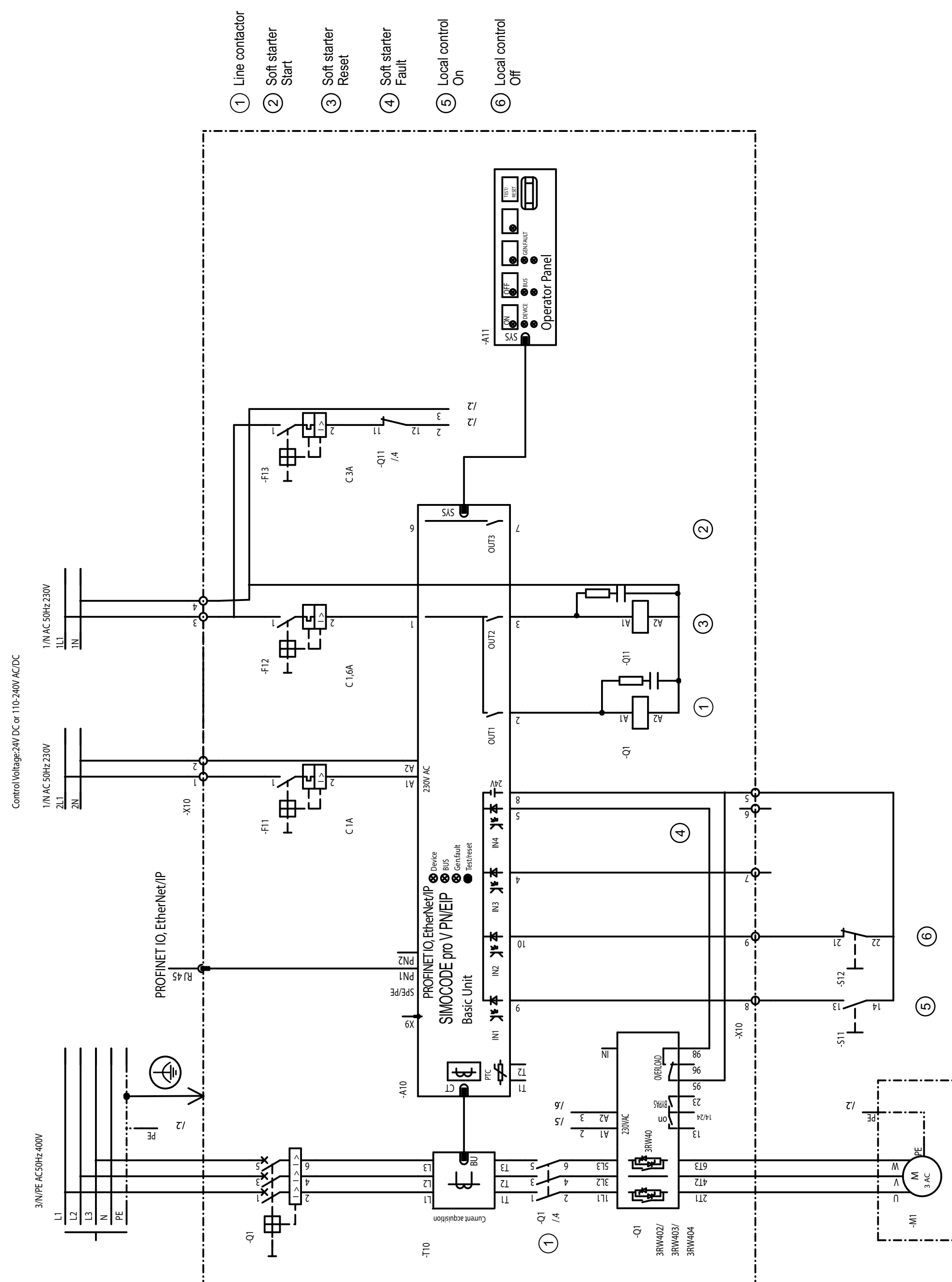


Figure 3-65 "Soft starter" circuit diagram (example 3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro V PN, pro V EIP

3.15.3 "Soft starter" diagram (example 3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro V

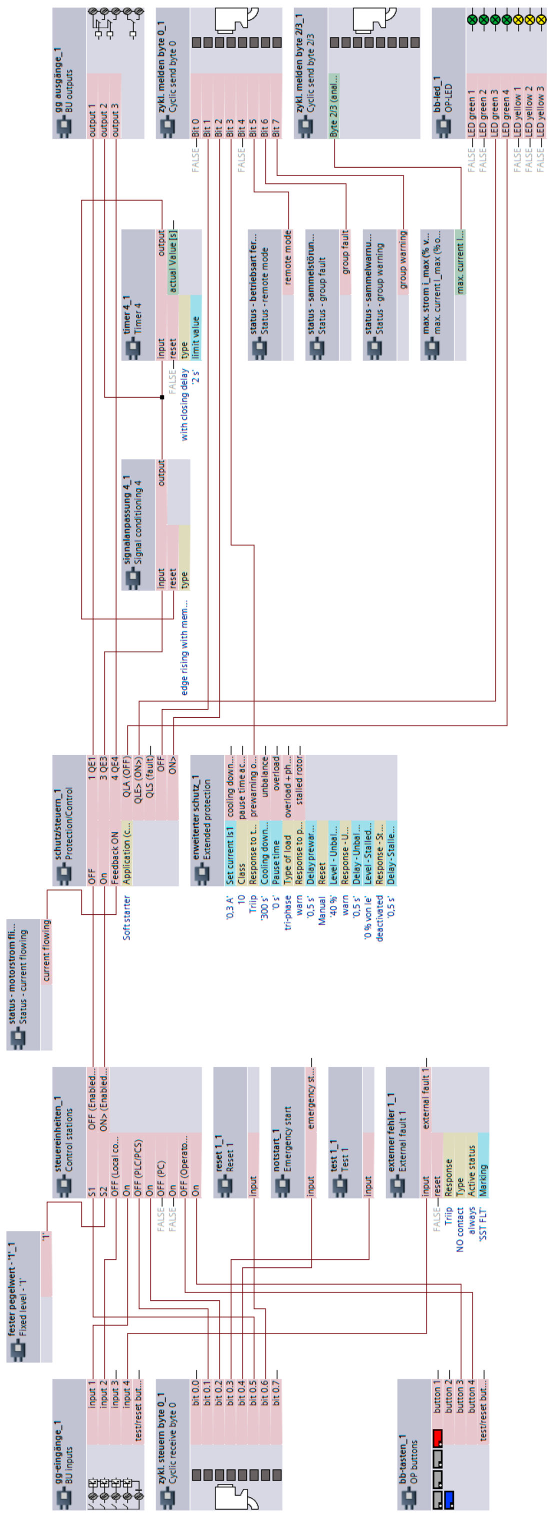


Figure 3-66 "Soft starter" diagram (example 3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro V

3.15.4 "Soft starter" circuit diagram (example 3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro S

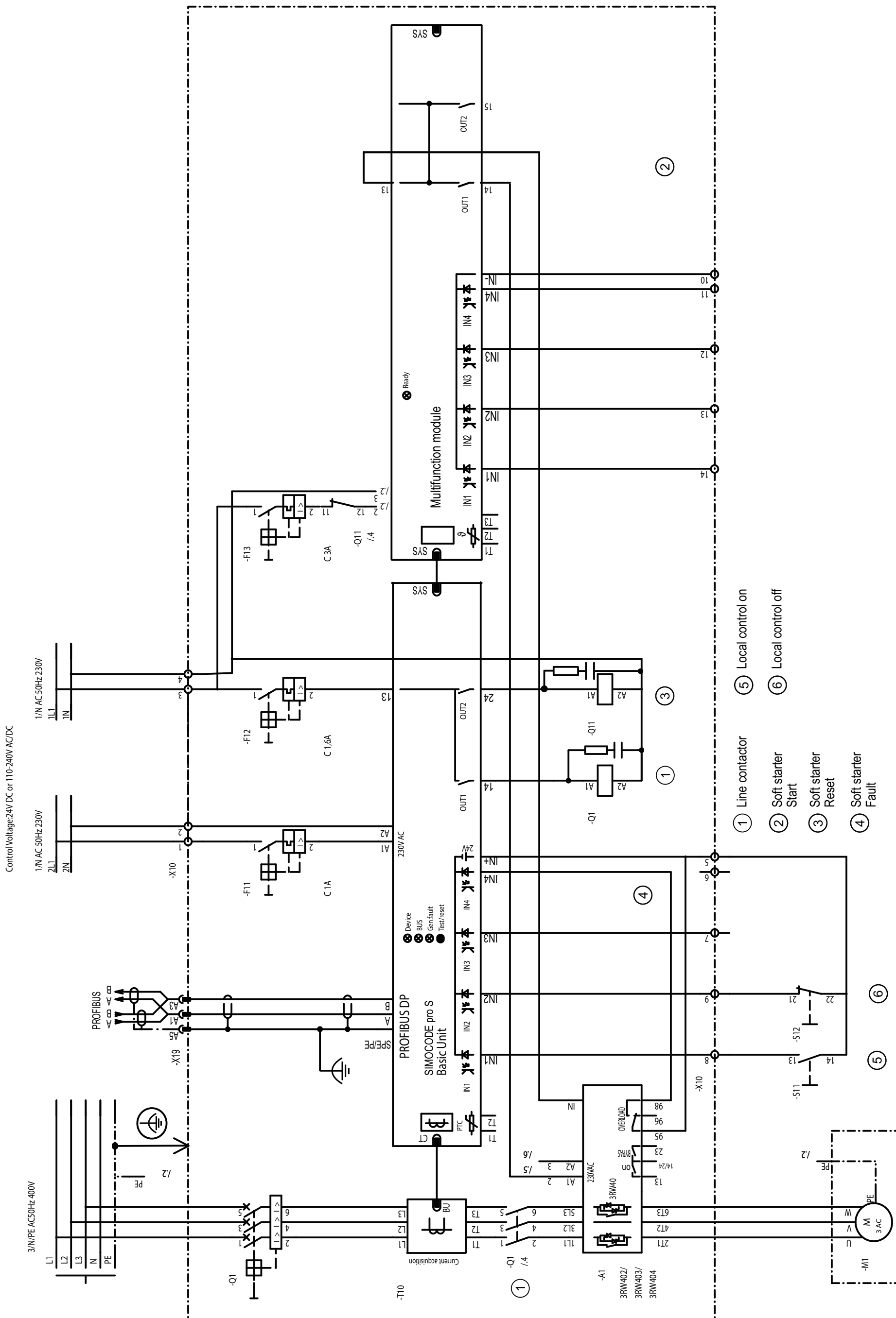


Figure 3-67 "Soft starter" circuit diagram (example 3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro S

3.15.5 "Soft starter" diagram (example 3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro S

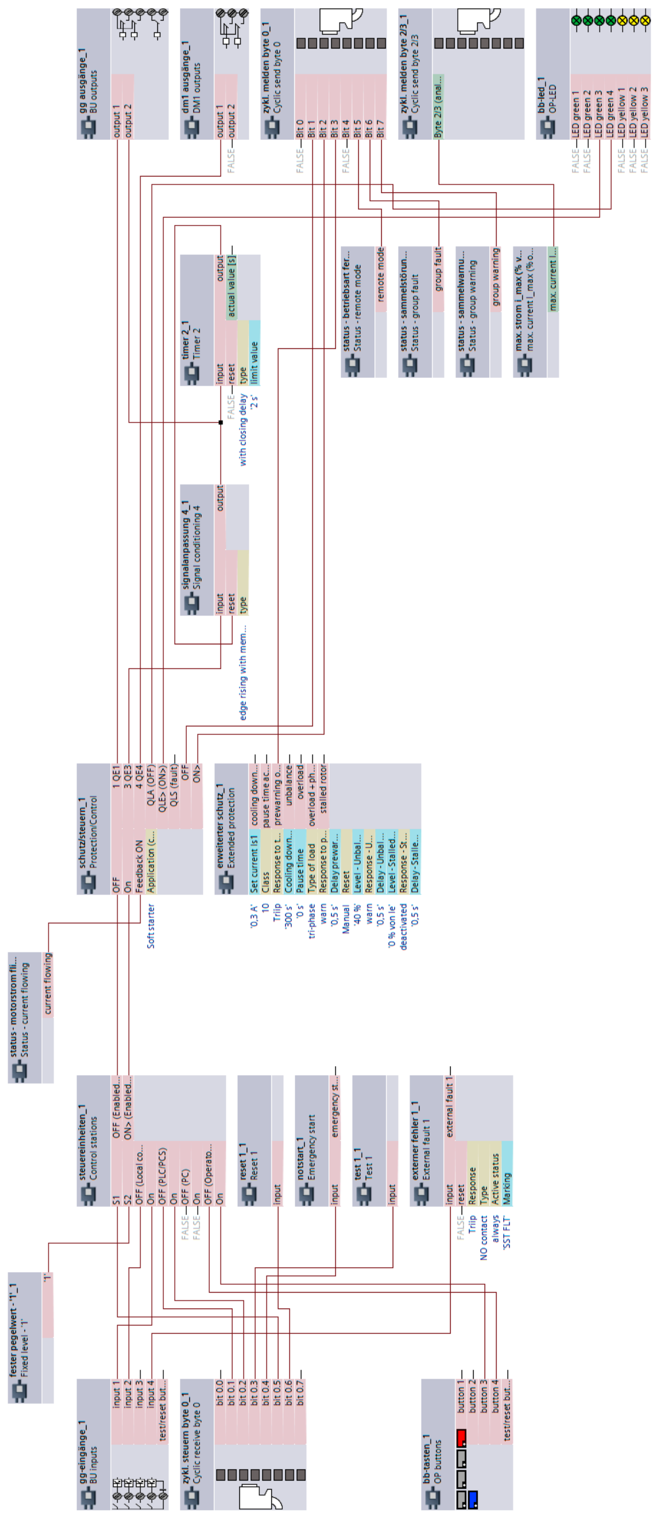


Figure 3-68 "Soft starter" diagram (example 3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro S

3.16 Soft starter (3RW405, 3RW407)

3.16.1 "Soft starter" circuit diagram (for example, 3RW405, 3RW407), SIMOCODE pro V PB, pro V MR

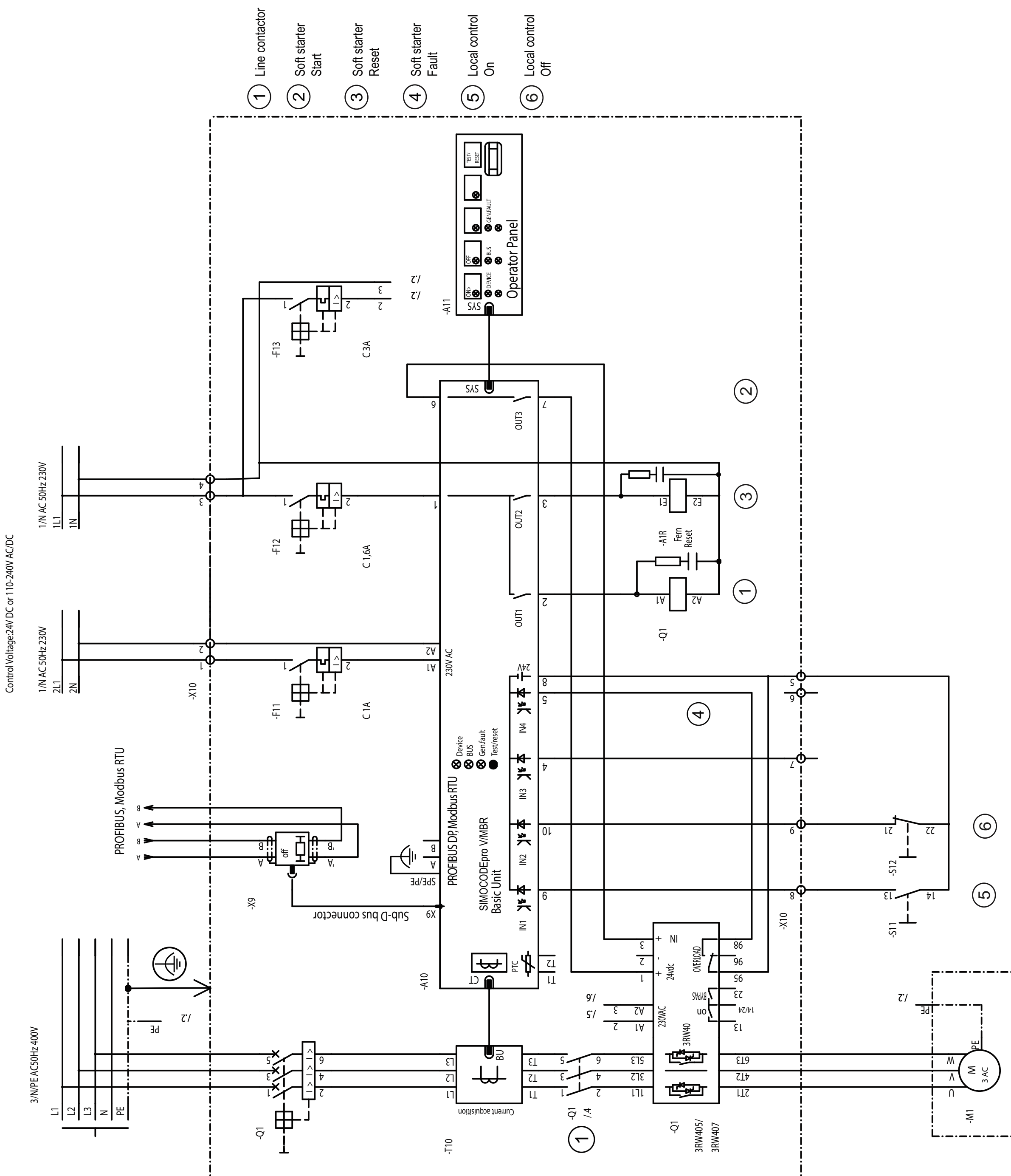


Figure 3-69 "Soft starter" circuit diagram (for example, 3RW405, 3RW407), SIMOCODE pro V PB, pro V MR

3.16.2 "Soft starter" circuit diagram (3RW405, 3RW407) - SIMOCODE pro V PN, pro V EIP

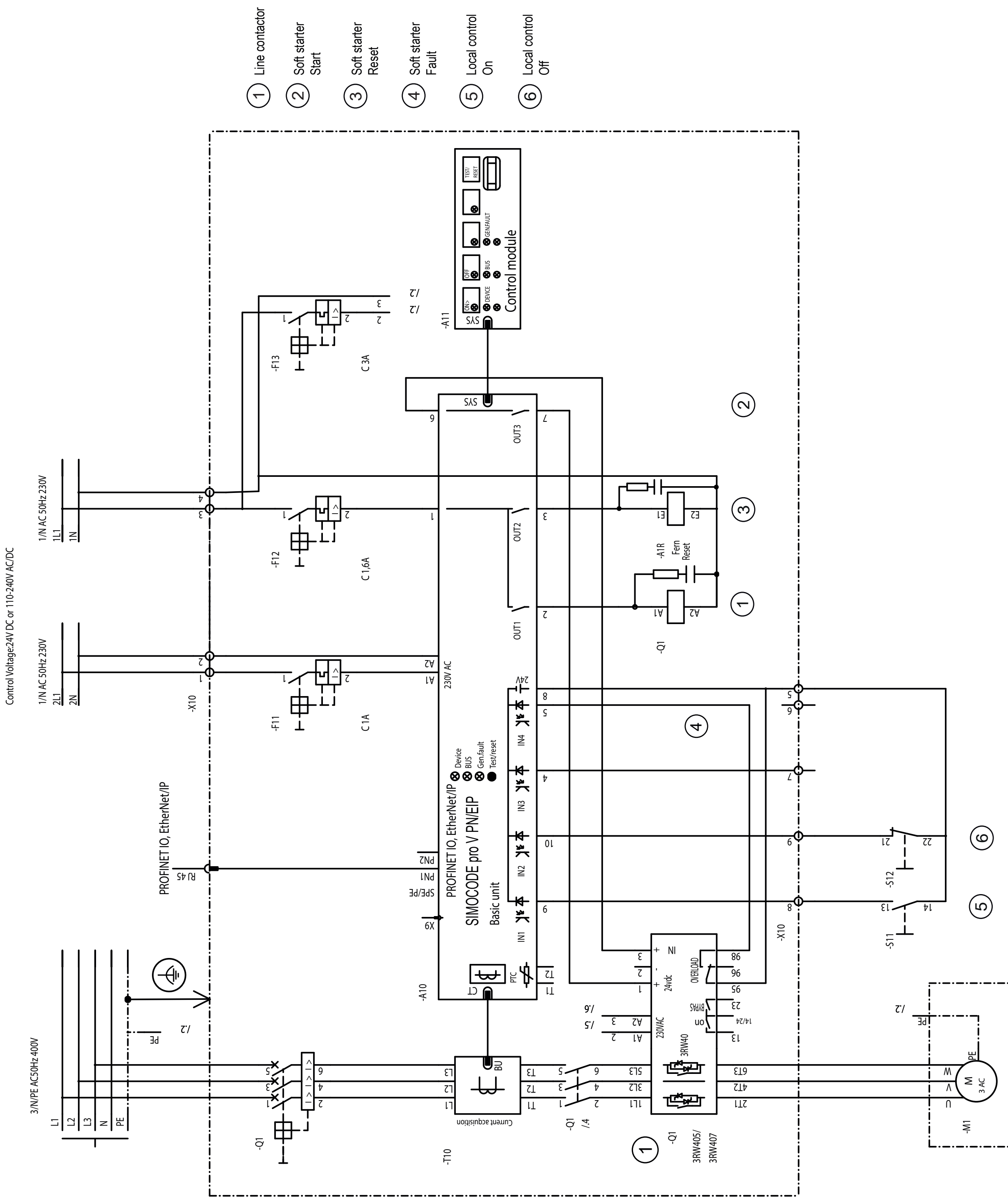


Figure 3-70 "Soft starter" circuit diagram (for example, 3RW405, 3RW407), SIMOCODE pro V PN, pro V EIP

3.16.3 "Soft starter" plan (for example, 3RW405, 3RW407) - SIMOCODE pro V

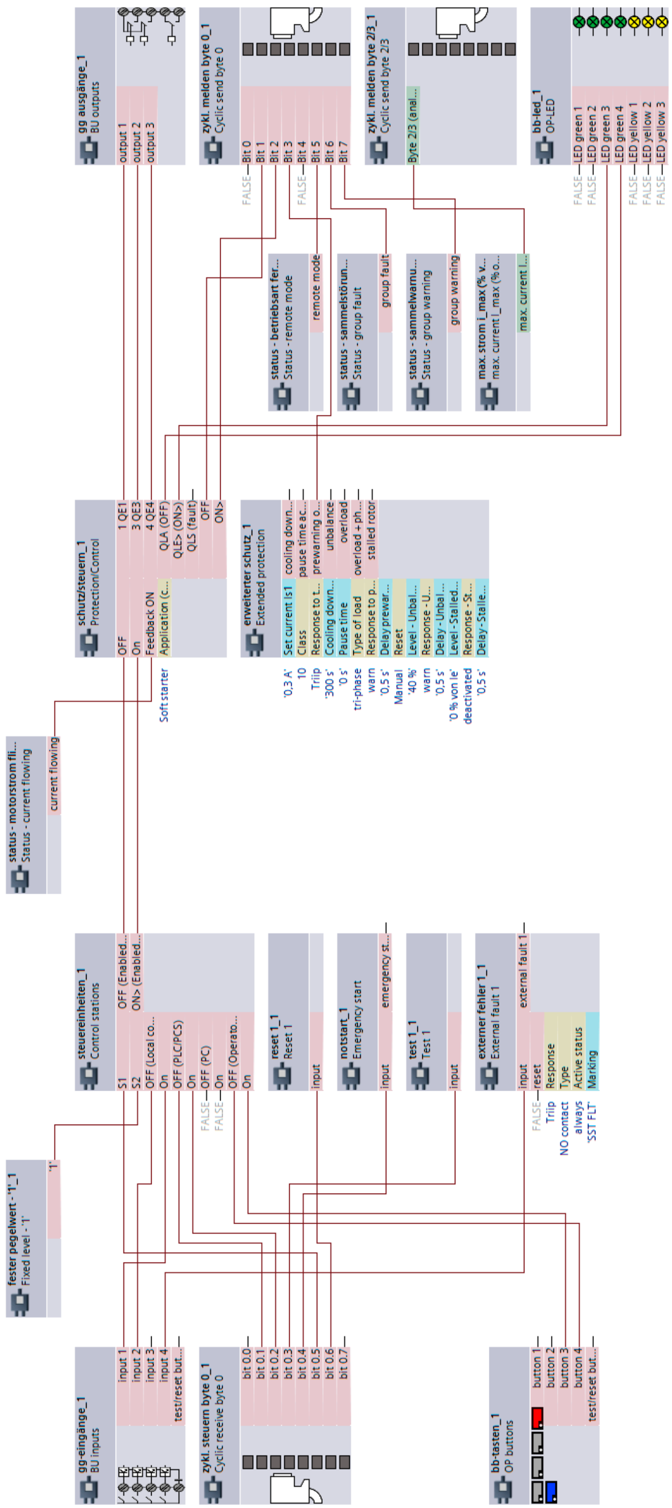


Figure 3-71 "Soft starter" plan (for example, 3RW405, 3RW407), SIMOCODE pro V

3.17 Soft starter with reversing contactor (3RW402, 3RW403, 3RW404, 3RW52)

3.17.1 "Soft starter with reversing contactor" circuit diagram (3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro V PB, pro V MR

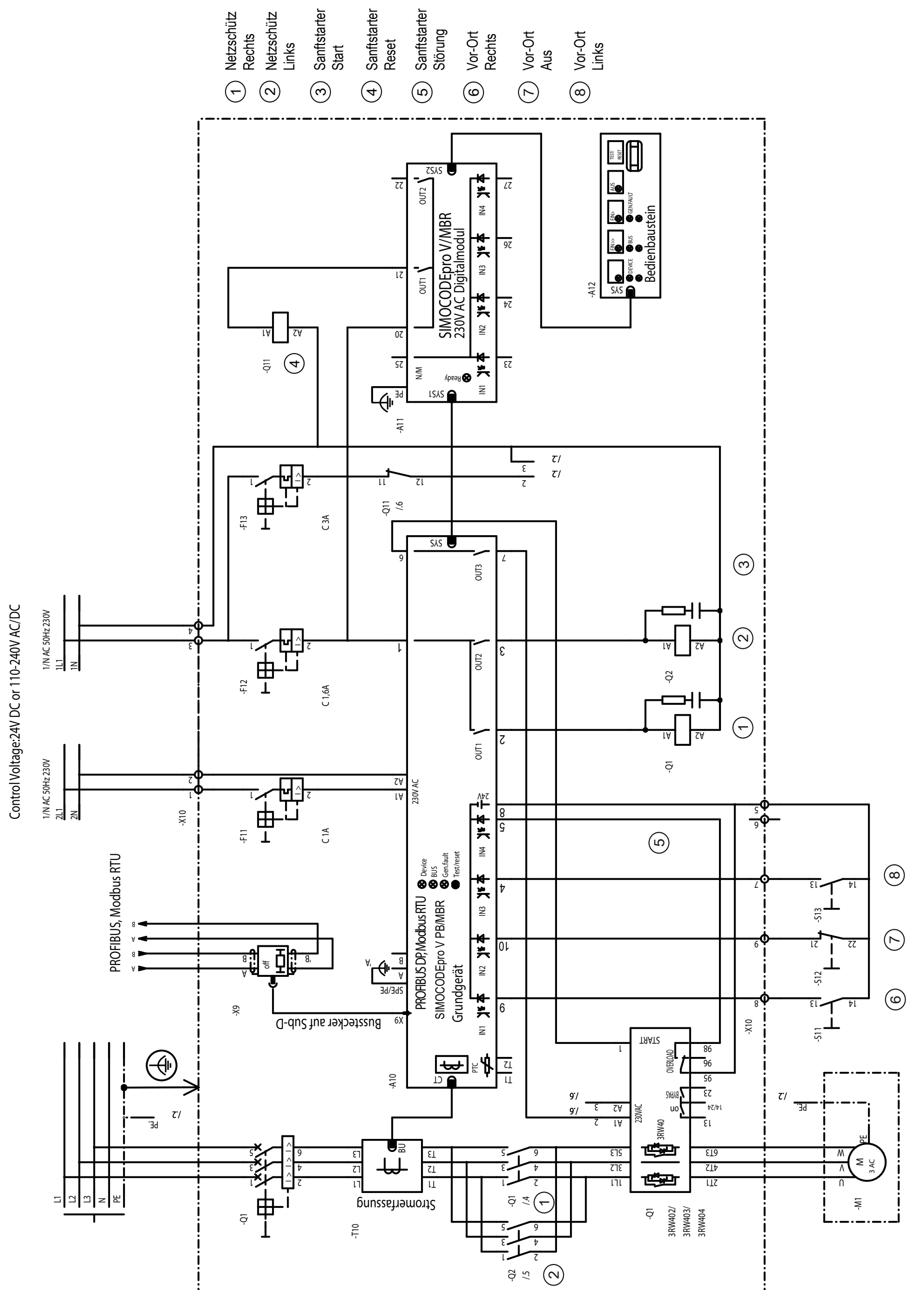


Figure 3-72 "Soft starter with reversing contactor" circuit diagram (3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro V PB, pro V MR

3.17.2 "Soft starter with reversing contactor" circuit diagram (3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro V PN, pro V EIP

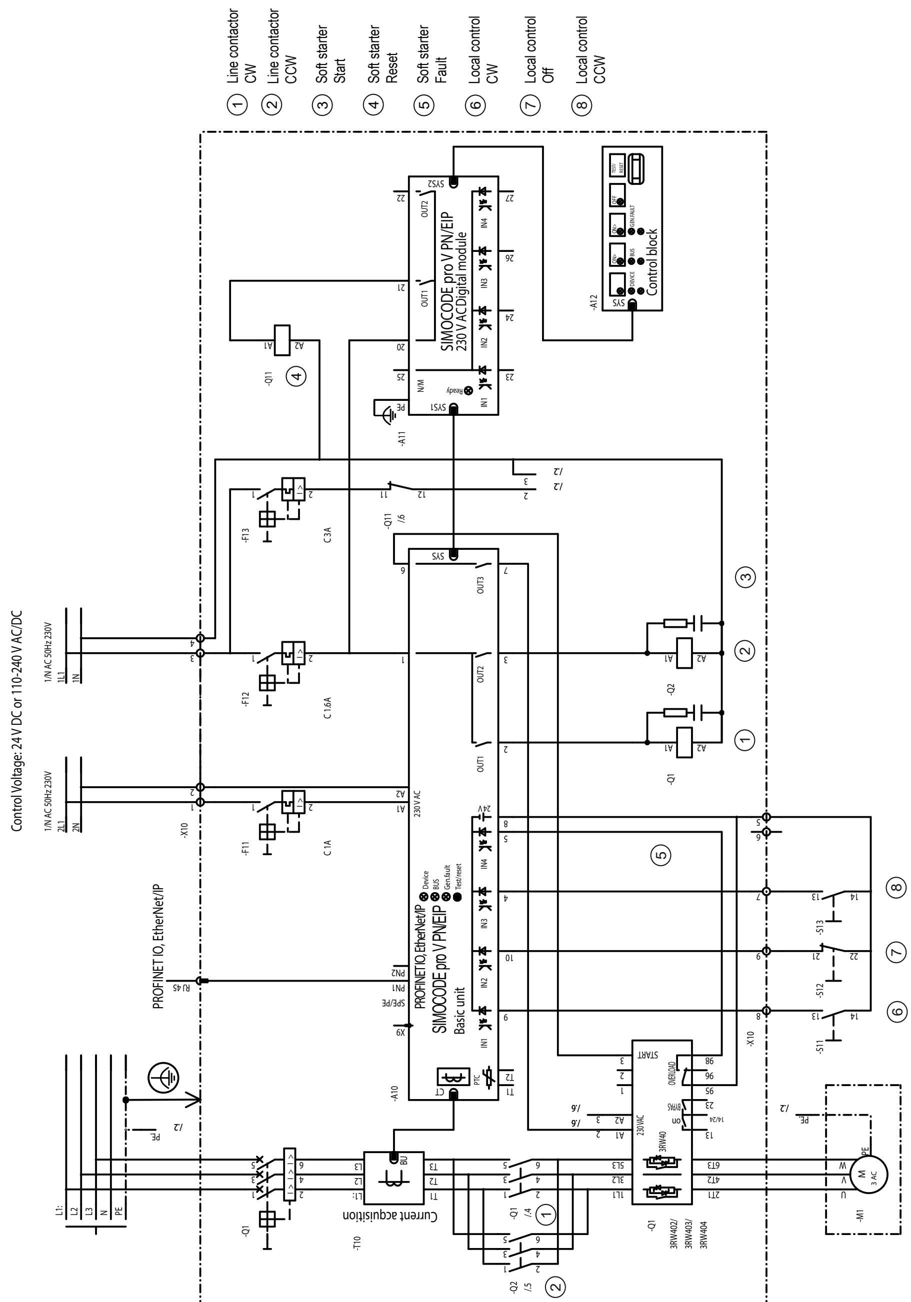


Figure 3-73 "Soft starter with reversing contactor" circuit diagram (3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro V PN, pro V EIP

3.17.3 "Soft starter with reversing contactor" diagram (3RW402, 3RW403, 3RW404, 3RW52) - SIMOCODE pro V

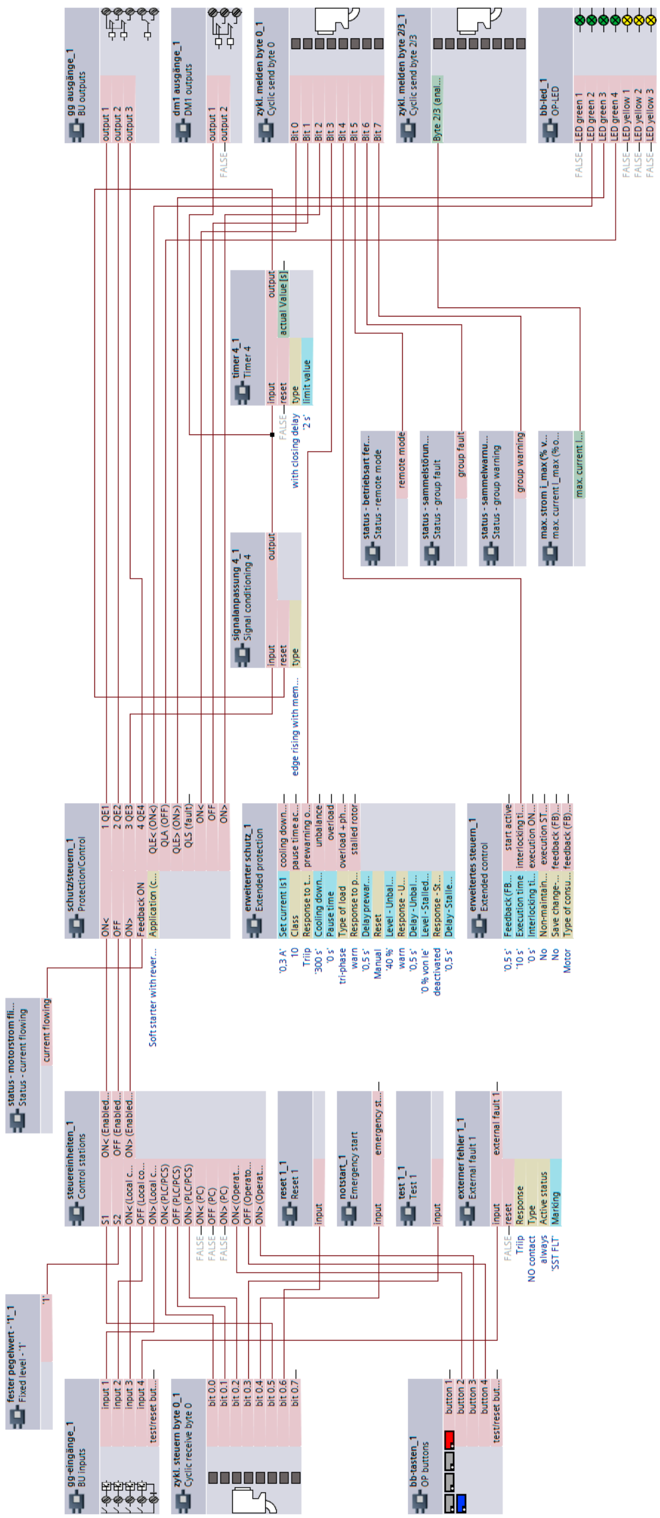


Figure 3-74 "Soft starter with reversing contactor" diagram (3RW402, 3RW403, 3RW404, 3RW52), SIMOCODE pro V

3.18 Soft starter with reversing contactor (3RW405, 3RW407)

3.18.1 "Soft starter with reversing contactor" circuit diagram (3RW405, 3RW407) - SIMOCODE pro V PB, pro V MR

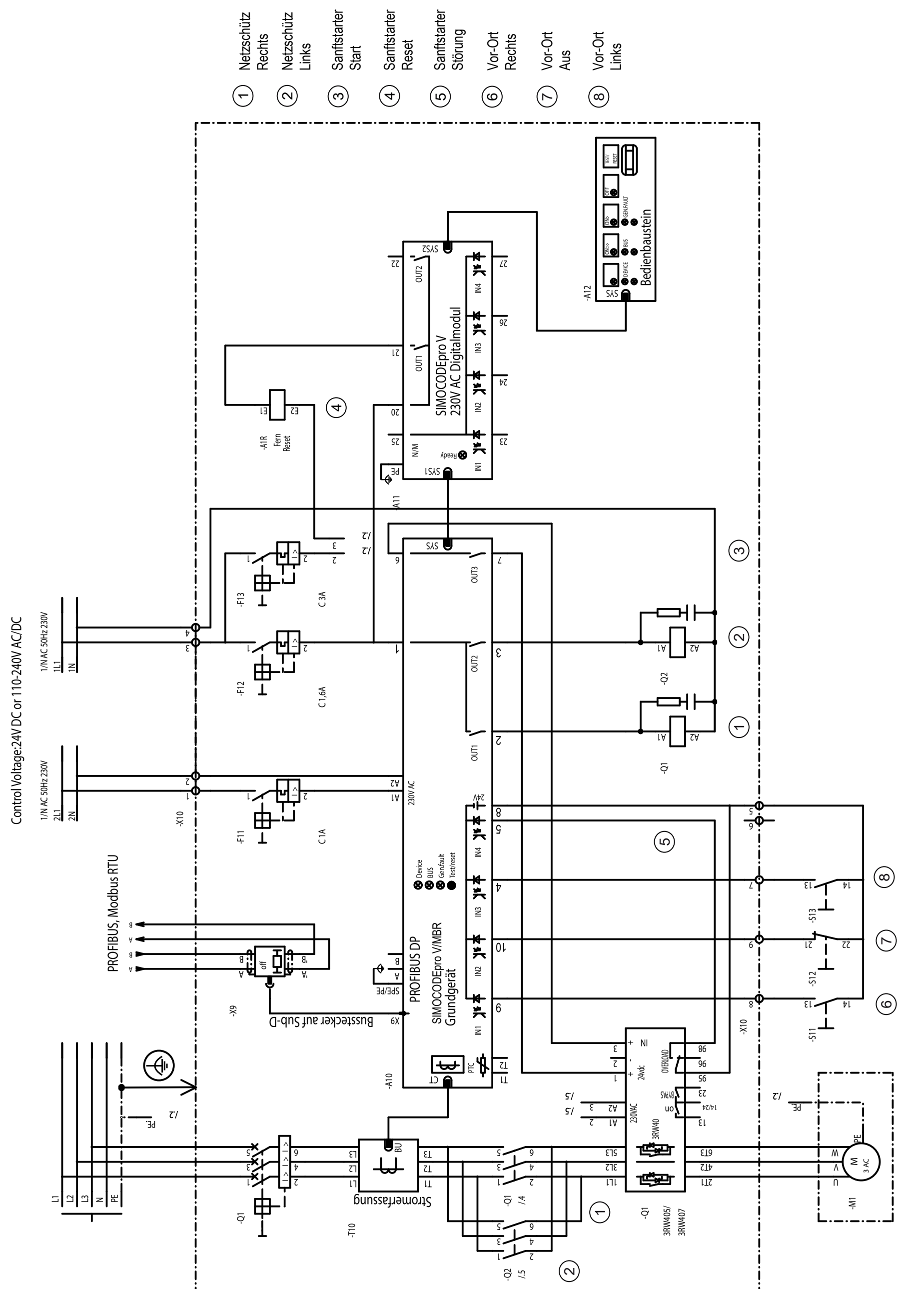


Figure 3-75 "Soft starter with reversing contactor" circuit diagram (for example, 3RW405, 3RW407), SIMOCODE pro V PB, pro V MR

3.18.2 "Soft starter with reversing contactor" circuit diagram (3RW405, 3RW407) - SIMOCODE pro V PN, pro V EIP

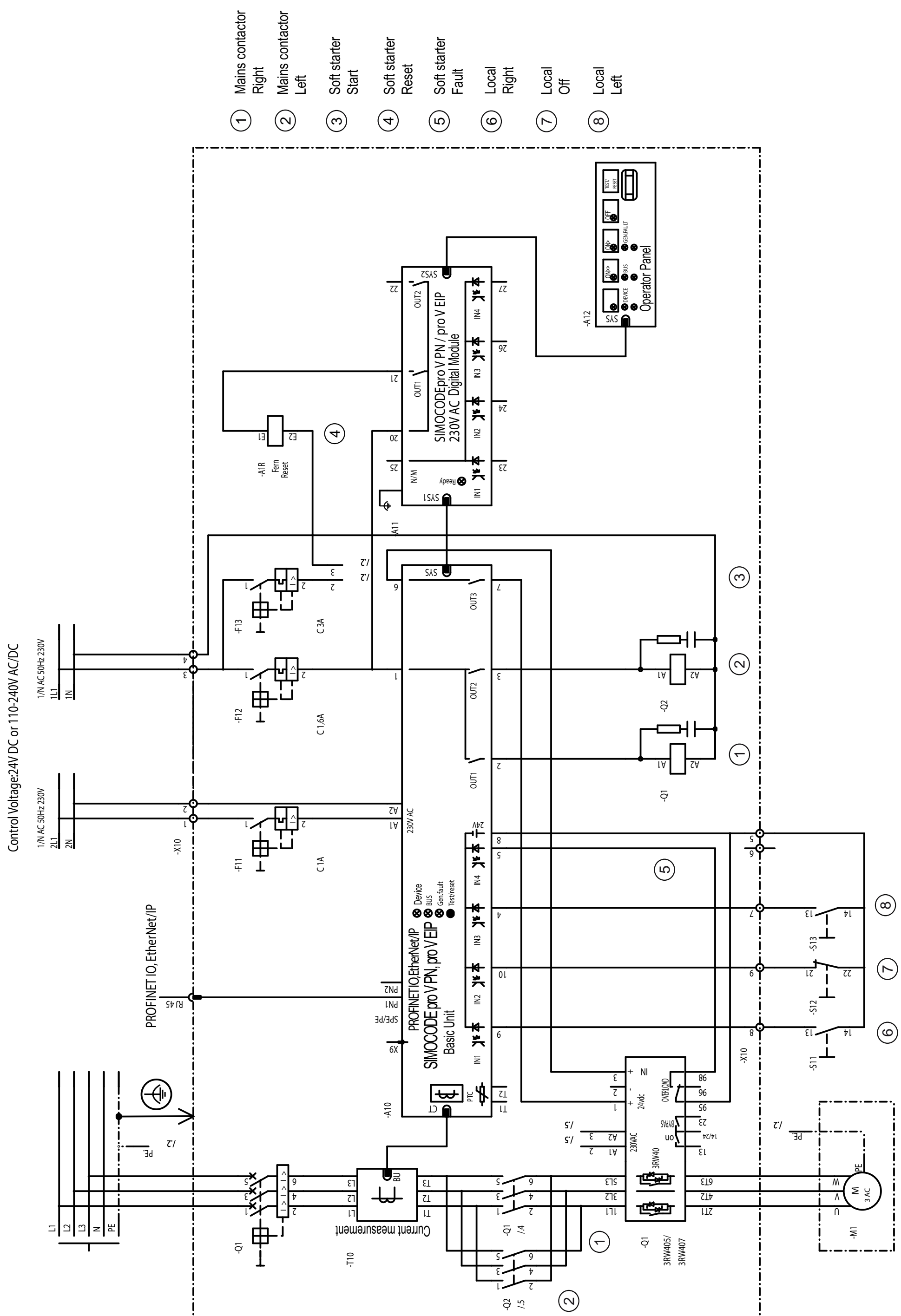


Figure 3-76 "Soft starter with reversing contactor" circuit diagram (3RW405, 3RW407), SIMOCODE pro V PN, pro V EIP

3.18.3 "Soft starter with reversing contactor" (3RW405, 3RW407) plan - SIMOCODE pro V

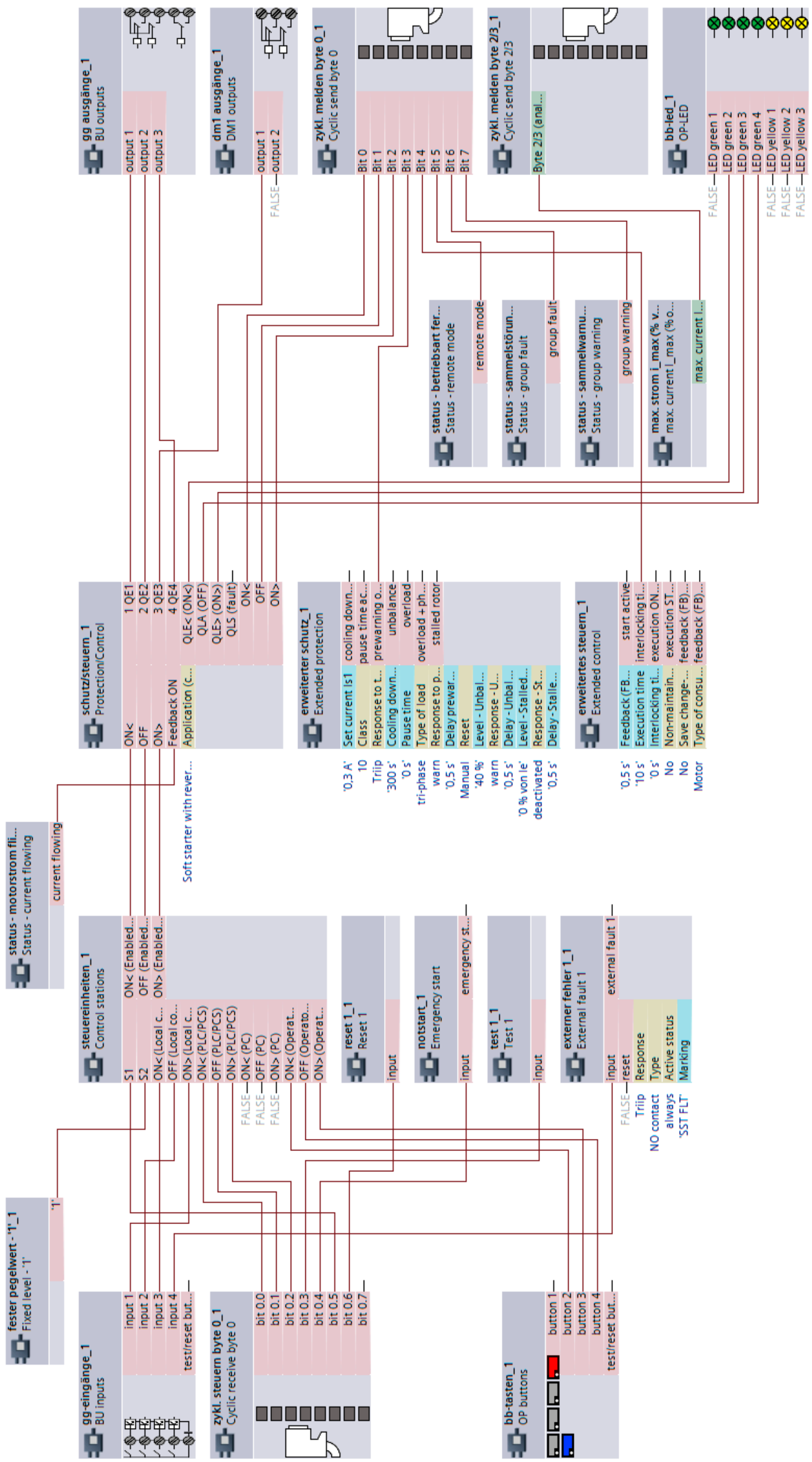


Figure 3-77 "Soft starter with reversing contactor" plan (3RW405, 3RW407), SIMOCODE pro V

3.19 Direct starter for 1-phase loads

3.19.1 "Direct starter for 1-phase loads" circuit diagram - SIMOCODE pro V PB, pro V MR

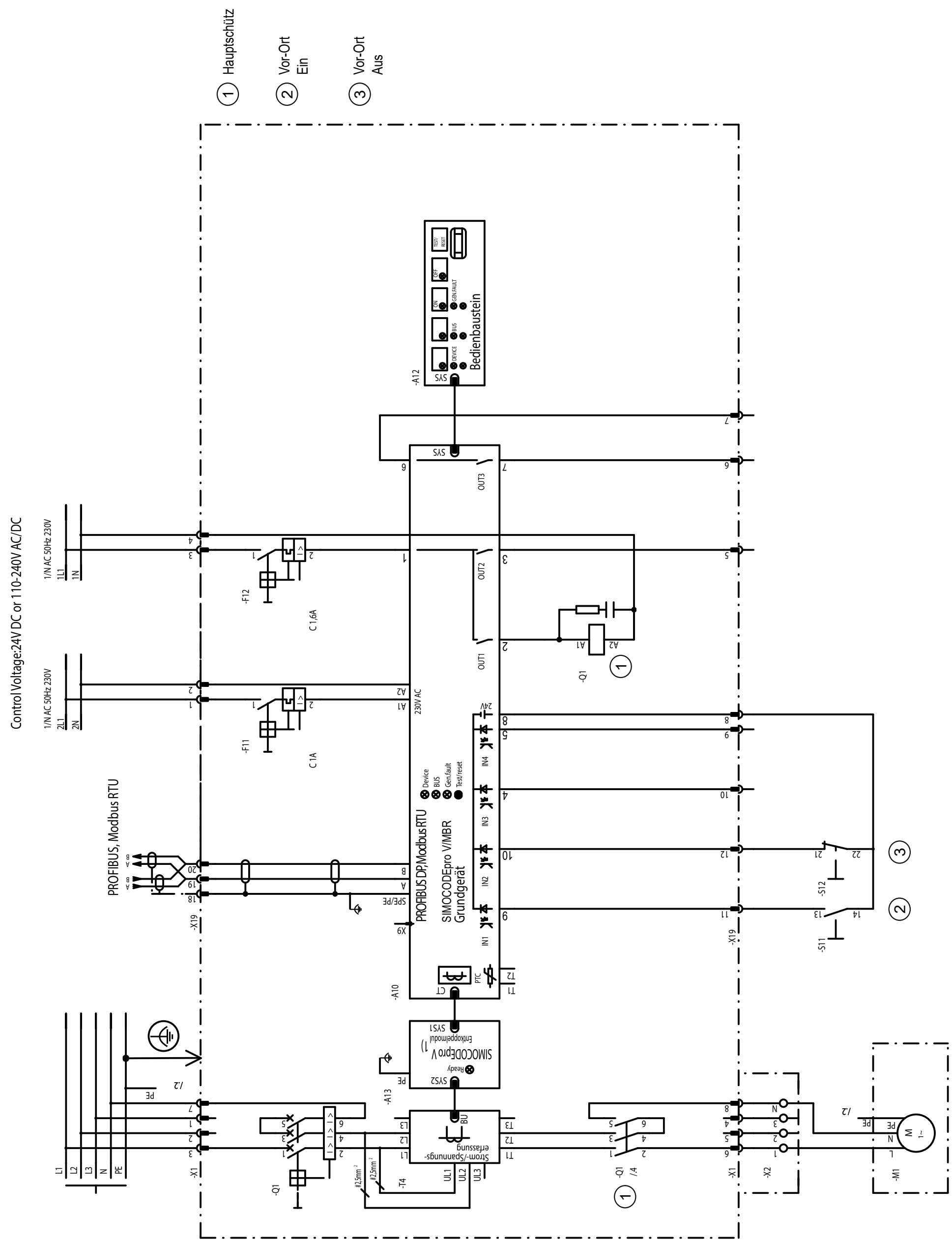


Figure 3-78 "Direct starter for 1-phase loads" circuit diagram, SIMOCODE pro V PB, pro V MR

1) A decoupling module is not necessary for 2nd generation current / voltage measuring modules

3.19.2 "Direct starter for 1-phase loads" circuit diagram - SIMOCODE pro V PN, pro V EIP

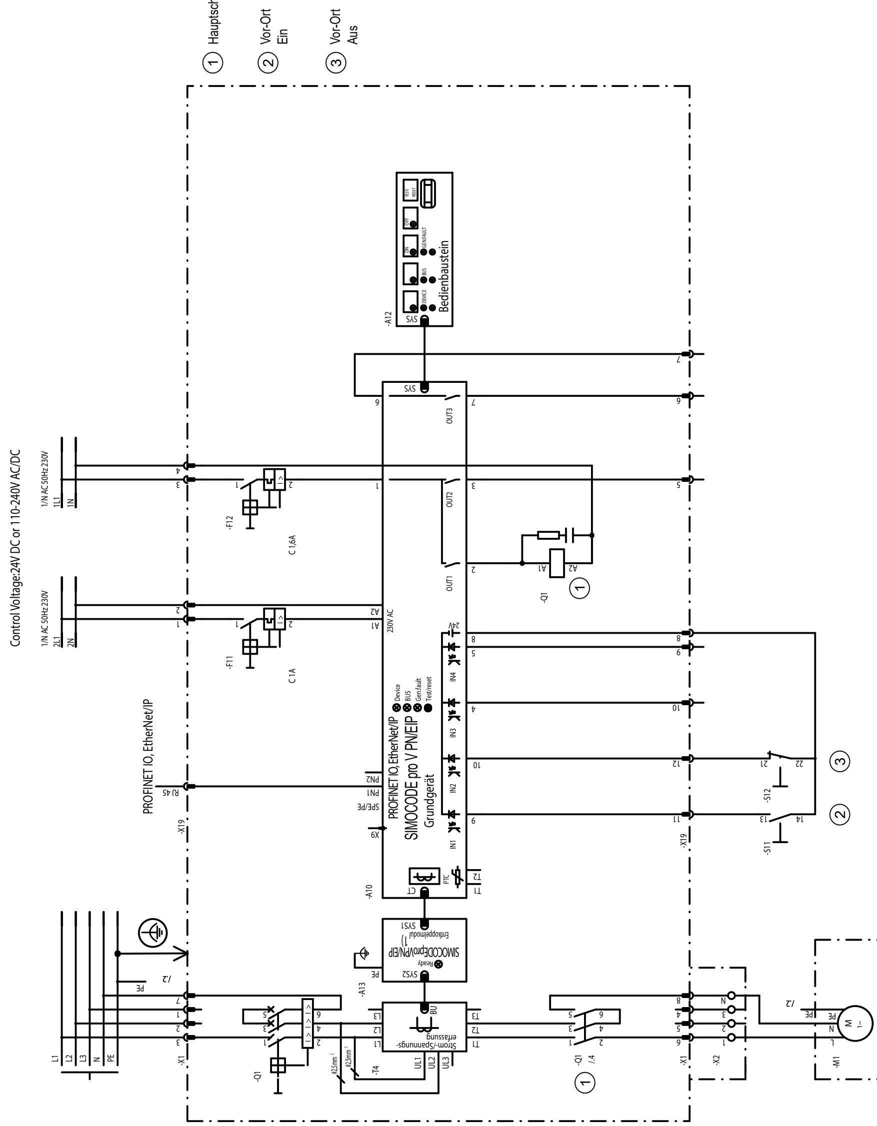


Figure 3-79 "Direct starter for 1-phase loads" circuit diagram, SIMOCODE pro V PN, pro V EIP

1) A decoupling module is not necessary for 2nd generation current / voltage measuring modules

3.19.3 "Direct-on-line starter for 1-phase loads" plan

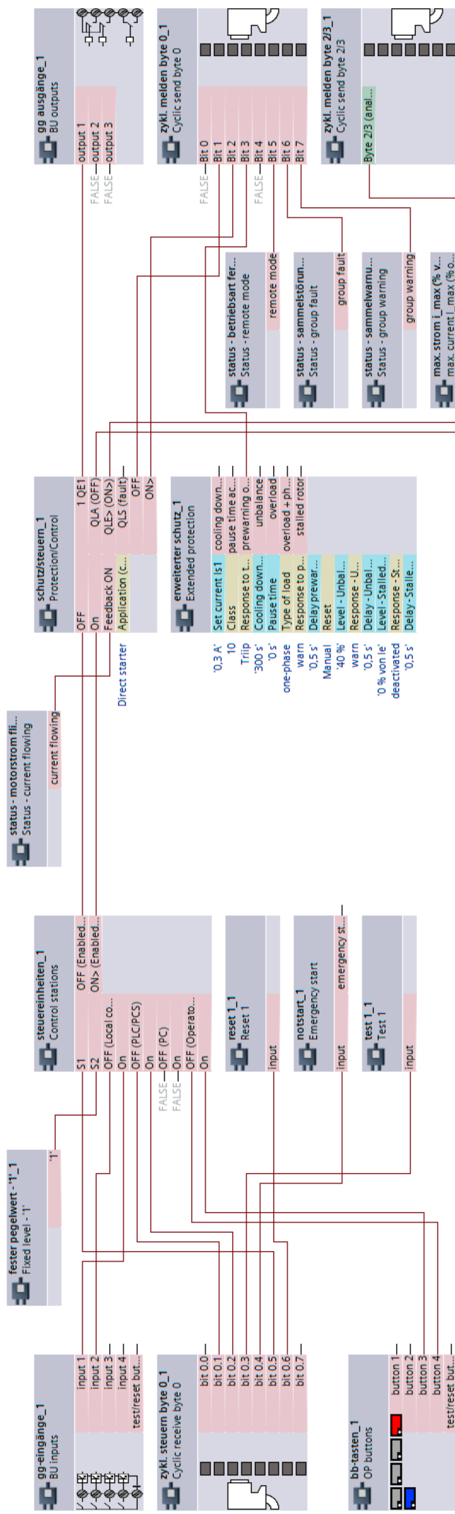
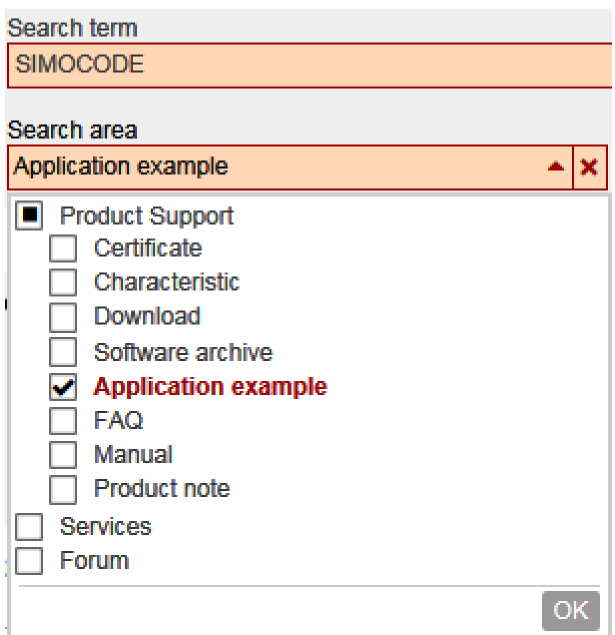


Figure 3-80 "Direct starter for 1-phase loads" plan, SIMOCODE pro V

Further application examples 4

Further application examples for the SIMOCODE pro motor management system are available in Service and Support (SIMOCODE pro application examples (https://support.industry.siemens.com/cs/search?search=SIMOCODE&type=ExampleOfUse&lc=en-WW)). To view them, check the box "Application example":



List of abbreviations

A

A.1 List of abbreviations

See SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

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SIEMENS

Industrial Controls

Motor management and control devices SIMOCODE pro - Communication

Function Manual

10/2022
A5E40508495002A/RS-AF/006

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Electrical Products
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93009 Regensburg
GERMANY

A5E40508495002A/RS-AF/006
Ⓟ 10/2022 Subject to change

Table of contents

Introduction

1

1.1 Important notes

Scope of application

This manual is applicable to the listed SIMOCODE pro system components. It contains a description of the components applicable at the time of printing the manual. SIEMENS reserves the right to include updated information about new components or new versions of components in a Product Information.

Manual Collection

A Manual Collection (https://support.industry.siemens.com/cs/ww/en/view/109743951), a collection of the following five SIMOCODE pro manuals is at your disposal in Industry Online Support:

- SIMOCODE pro - 1 Getting Started
- SIMOCODE pro - 2 System Manual
- SIMOCODE pro - 3 Parameterization
- SIMOCODE pro - 4 Applications
- SIMOCODE pro - 5 Communication

SIMOCODE pro response tables

Specific responses (deactivated, signaling, warning, tripping) can be parameterized for various SIMOCODE pro functions, such as overload. These are always displayed in tabular form:

- "X" = Applicable
- "—" = Not applicable
- Default values are marked "d" for "default" in parentheses.

Response	Function 1	Function 2	Function 3
Tripping	—	X (d)	X
Warning	X (d)	X	—
Signaling	X	X	—
Deactivated	X	X	X (d)
Delay	0 ... 25.5 s (default: 0)	—	—

Brief description of the responses:

- Tripping: The contactor controls QE* are tripped. A fault message is generated which is available as a diagnosis via PROFIBUS DP. The fault message and the device-internal signal remain on until the appropriate length of time has elapsed or the cause of the fault has been eliminated and acknowledged.
- Warning: In addition to the device-internal signal, a warning signal is generated that is available as diagnostics via the communication bus.
- Signaling: Only a device-internal signal is generated, which can be further processed as required.
- Deactivated: The appropriate function is switched off, no signals are generated.

A delay time can also be set for specific responses.

Further information

Please read the operating instructions of the respective components. You can find the operating instructions for SIMOCODE pro at Operating instructions (https://support.industry.siemens.com/cs/ww/en/ps/16027/man).

You can find further information on the Internet:

- SIMOCODE pro (https://www.siemens.com/simocode)
- Information and Download Center (https://support.industry.siemens.com/cs/ww/en/ps/16027/cat)
- Siemens Industry Online Support (SIOS) (https://support.industry.siemens.com/cs/ww/en/ps)
- Certificates (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert)

Disclaimer of liability

The products described here have been developed to carry out safety-related functions as part of a complete plant or machine. In general, a complete safety system consists of sensors, evaluation units, signaling devices and methods for safe tripping. The manufacturer is responsible for ensuring safe functioning of the complete plant or machine. Siemens AG, its subsidiaries, and associated companies (hereinafter referred to as "Siemens") are not in a position to guarantee every characteristic of a complete plant or machine not designed by Siemens.

Siemens also denies all responsibility for any recommendations that are made or implied in the following description. No new guarantee, warranty, or liability claims above those beyond the scope of the Siemens general terms of delivery can be derived from the following description.

1.2 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

Link: Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en)

Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**
  Answers to frequently asked questions
- **Manuals/operating instructions**
  Read online or download, available as PDF or individually configurable.
- **Certificates**
  Clearly sorted according to approving authority, type and country.
- **Characteristics**
  For support in planning and configuring your system.
- **Product announcements**
  The latest information and news concerning our products.
- **Downloads**
  Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
  Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**
  Technical product data for support in planning and implementing your project

Link: Product support (https://support.industry.siemens.com/cs/ww/en/ps)

mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**
  Search for request number, product or subject
- **My filters**
  With filters, you limit the content of the online support to different focal points.

- **My favorites**
  With favorites you bookmark articles and products that you need frequently.
- **My notifications**
  Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.
- **My products**
  With product lists you can virtually map your control cabinet, your system or your entire automation project.
- **My documentation**
  Configure your individual documentation from different manuals.
- **CAx data**
  Easy access to CAx data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams
- **My IBase registrations**
  Register your Siemens products, systems and software.

1.3 Siemens Industry Online Support app

Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:

Android

iOS

1.4 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

1.5 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert.

1.6 Current information about operational safety

Important note for maintaining operational safety of your system

DANGER

Hazardous Voltage

Can Cause Death, Serious Injury or Risk of Property Damage

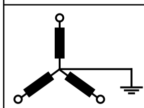
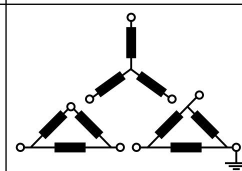
Please take note of our latest information!

Systems with safety-related characteristics are subject to special operational safety requirements on the part of the operator. The supplier is also obliged to comply with special product monitoring measures. We therefore also provide information in the newsletters Industrial controls (https://new.siemens.com/global/en/products/automation/industrial-controls/forms/newsletter.html) and Safety Integrated (https://new.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/newsletter.html) about new products, further technical developments as well as standards and guidelines.

1.7 Notes for SIMOCODE pro regarding IEC60947-4-1:2018

1.7.1 Line system configurations

The voltage information regarding the SIMOCODE pro current and current/voltage measuring modules is valid for the following line system configurations according to IEC 60947-4-1:

Three-phase four-wire systems	**Three-phase three-wire systems**
	
[V]	[V]
--	230
230 / 400	400
260 / 440	440
--	500
400 / 690	600

The nameplates of the current/voltage measuring modules state a maximum line voltage of 400/690 V.

1.7.2 Protection of inputs and outputs

The specifications for short-circuit protection (fuses or miniature circuit breakers) are available for the device connections of the main circuit and the auxiliary circuit.

In order to ensure a holistic view for the protection of the device connections, the manufacturer is obliged to provide all relevant information for short-circuit protection and overcurrent protection.

If, for example, device connections for the control supply voltage, the supply voltage, or digital inputs/digital outputs are not connected to self-limiting current sources or energy sources, you can find the relevant information in the section "Mounting, wiring, connecting" of the System Manual and the technical data sheets in Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/16337/td).

1.7.3 Touch current

A protective impedance is present in each of the 3UF711x-1xA01-0 / 3UF712x-1xA01-0 current/voltage measuring modules. This protective impedance is 7.2 MΩ per phase (product version E04 and higher).

DANGER

Hazardous touch current

When connecting multiple SIMOCODE systems in parallel, make sure that no hazardous touch current occurs.

The SIMOCODE basic units in the 110-240 V AC/DC version include galvanic isolation. This avoids the effect of parallel connection via a central supply voltage for multiple systems when these basic units are used.

The SIMOCODE basic units in the 24 V DC version do not include galvanic isolation.

NOTICE

PELV power supply required

When using numerous current/voltage measuring modules with these basic devices, deploy a PELV power supply, for example, to prevent a potential touch current.

NOTICE

Ground leakage current

Pay attention to any resulting ground leakage current that may occur.

1.8 Recycling and disposal

For environmentally-friendly recycling and disposal of your old device, contact a company certified for the disposal of used electrical and electronic equipment, and dispose of the device as specified in the regulations for your particular country.

Communication 2

2.1 PROFIBUS communication

2.1.1 Definitions

PROFIBUS DP

PROFIBUS bus system with the DP protocol (decentralized peripherals). The main task of PROFIBUS DP is to manage the fast, cyclic data exchange between the central DP master and the I/O devices.

PROFIBUS DPV1

PROFIBUS DPV1 is an extension of the DP protocol. It enables acyclic data exchange of parameter, diagnostic, receive and test data.

DP master

A master with characteristics to EN 50 170, Volume 2, PROFIBUS with the DP protocol is referred to as the DP master.

Class 1 master

A Class 1 master is an active station on PROFIBUS DP. It is characteristically used for cyclic data exchange with other stations. Typical Class 1 masters include PLCs with a PROFIBUS DP connection.

Class 2 master

A class 2 master is an optional station on the PROFIBUS DP.
Typical class 2 masters include:

- PC / PG devices with the SIMOCODE ES software
- SIMATIC PDM (PCS7)
- PC with SIMATIC powercontrol software (power management).

DPV1 slave

A slave operated on the PROFIBUS with the PROFIBUS DP protocol that behaves in accordance with EN 50 170, Volume 2, PROFIBUS is referred to as a DPV1 slave.

GSD

Device master data (GSD) contains DP slave descriptions in a standardized format. The use of device master data simplifies the configuration of the DP slave in a DP master system.

OM SIMOCODE pro

OM SIMOCODE pro (object manager) is used instead of GSD to integrate SIMOCODE pro into STEP7.
OM SIMOCODE pro enables the use of SIMOCODE ES (if it is installed) for parameterization within STEP7.

SIMATIC PDM

Software package for the configuration, parameterization, commissioning and maintenance of devices (e.g. transducers, controllers, SIMOCODE) and for configuring networks and PCs.

SIMOCODE pro S7 slave

A SIMOCODE pro S7 slave is a slave which is fully integrated into STEP7. It is connected via OM SIMOCODE pro. It supports the S7 model (diagnosis interrupts, hardware interrupts).

Writing data

Writing data means that data is transmitted to the SIMOCODE pro system.

Reading data

Reading data means that data is transmitted from the SIMOCODE pro system.

PROFIsafe

PROFIsafe is a safety profile developed and tested according to IEC 61508 for the widely used field bus protocols PROFIBUS and PROFINET. The PROFIsafe profile defines how failsafe protective devices (e.g. EMERGENCY OFF pushbutton) will be connected to programmable controllers by means of PROFIBUS.

2.1.2 Data transfer

Options for data transfer

The following figure shows the data transfer options:

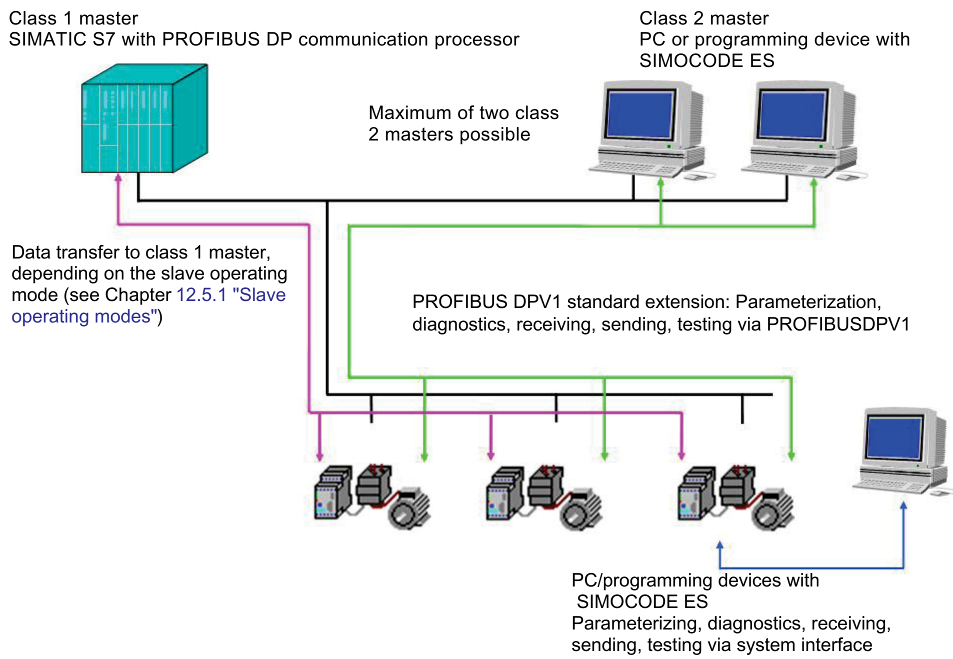


Figure 2-1 Options for data transfer

Communication principle

The following figure shows the communication principle and the way data is transmitted depending on the master and slave operating modes:

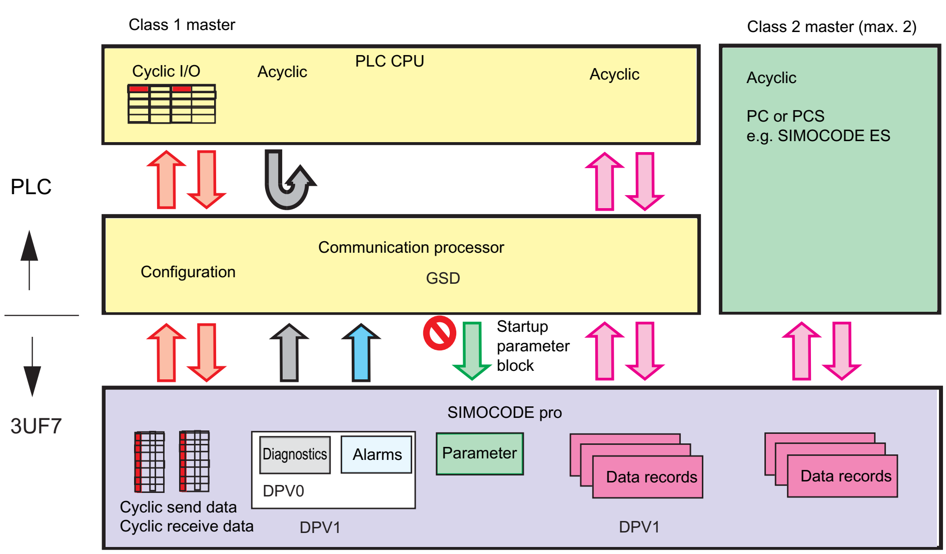


Figure 2-2 Communication principle

2.1.3 Fail-safe data transfer via PROFIBUS / PROFIsafe

SIMOCODE pro V as from version ***E07*** in conjunction with a fail-safe control (F-CPU) and the SIMOCODE pro expansion module DM-F PROFIsafe supports fail-safe shutdown of motors by means of data transmission via the PROFIsafe profile.

You will find more information on using this function in the manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

2.1.4 Telegram description and data access

2.1.4.1 Cyclic data

Cyclic data is exchanged between the PROFIBUS DP master and the DP slave once every DP cycle. The PROFIBUS DP master module sends the control data to SIMOCODE pro. SIMOCODE pro responds by sending the message data to the master module.

The program of the PLC accesses the following cyclically:

- send data at the inputs
- receive data at the outputs.

The length of the cyclic data which is to be transferred is set when SIMOCODE pro is integrated into the DP master system. This is achieved by selecting the basic type which in turn determines the structure and the length of the cyclic data.

The following basic types are available:

- Cyclic data from the PROFIBUS DP master to SIMOCODE pro
- Cyclic data from SIMOCODE pro to the PROFIBUS DP master.

Table 2-1 Cyclic data from the PROFIBUS DP master to SIMOCODE pro:

Designation	Length	Designation	Information
Basic type 1	4 bytes of receive data	Cyclic receive - bits 0.0 to 1.7	BU SIMOCODE pro S, pro V PB
		Cyclic receive - analog value	
Basic type 2	2 bytes of receive data	Cyclic receive - bits 0.0 to 1.7	BU SIMOCODE pro C, pro S and pro V
PROFIsafe	5 bytes of receive data	1 bit net data, assigned permanently to the relay enabling circuits	BU SIMOCODE pro V

Table 2-2 Cyclic data from SIMOCODE pro to the PROFIBUS DP master:

Designation	Length	Designation	Information
Basic type 1	10 bytes of send data	Cyclic send - bits 0.0 to 1.7	BU SIMOCODE pro S, pro V PB
		Cyclic send – analog input 1 to 4	
Basic type 2	4 bytes of send data	Cyclic send - bits 0.0 to 1.7	BU SIMOCODE pro C, pro S and pro V
		Cyclic Send – analog input 1	BU SIMOCODE pro V
PROFIsafe	4-byte inputs	No user data	

The cyclic data content (digital / analog information) is set by parameterization, e.g. with the SIMOCODE ES software.

The cyclic I/O data is already preset when the type of application (control function) is selected when the "SIMOCODE ES" parameterization software is launched (see Chapter Assignment of cyclic receive and send data for predefined control functions (Page 115)).

2.1.4.2 Diagnostics data and alarms

Diagnostics data and interrupts - overview

Diagnostics data contains important information about the status of SIMOCODE pro. This information simplifies troubleshooting.
Unlike cyclic data, the diagnostics data is only transmitted to the master module if it changes.
PROFIBUS DP differentiates between:

- Standard diagnostics
- Status information
- Channel-related diagnostics
- DPV1 process and diagnostic interrupts.

Configuring diagnostic response

In SIMOCODE pro, you can set which diagnostic events trigger the transmission of diagnostics data or interrupts to the PLC:

- Diagnostics for device faults, e.g. parameterization errors, hardware faults
- Diagnostics for process faults:
  In the case of events identified as "S" in the column headed "DP diagnostics" in the "Data record 92 - Diagnostics" table, the diagnostics data or interrupts are transferred to the PLC.
- Diagnostics for process warnings:
  In the case of events identified as "W" in the column headed "DP diagnostics" in the "Data record 92 - Diagnostics" table, the diagnostics data or interrupts are transferred to the PLC.
- Diagnostics for process events:
  In the case of events identified as "M" in the column headed "DP diagnostics" in the "Data record 92 - Diagnostics" table, the diagnostics data or interrupts are transferred to the PLC.

Setting with SIMOCODE ES

Set the response in dialog **Device Parameters > Bus Parameters >Diagnosis** .

2.1.4.3 Structure of the slave diagnostics

Standard diagnostics/extended diagnostics

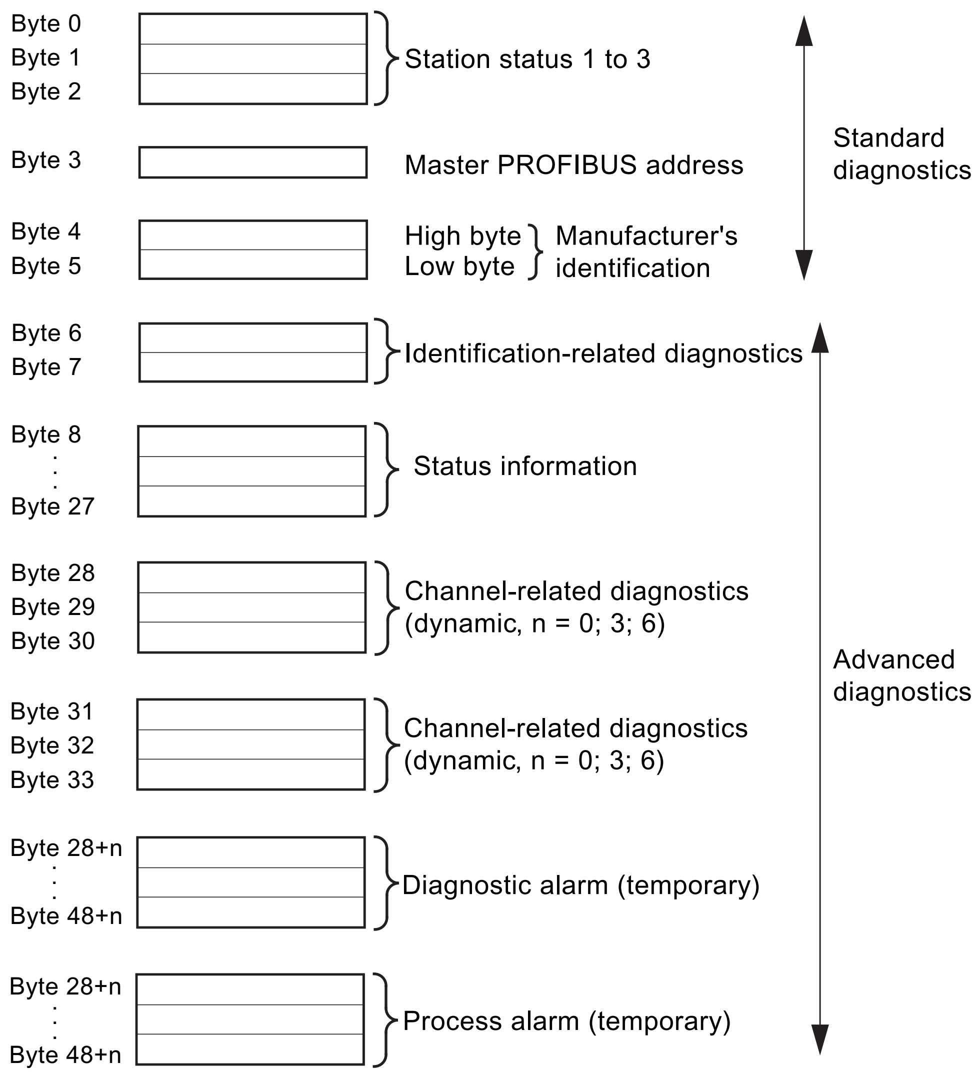


Figure 2-3 Structure of the slave diagnostics

The diagnostics telegram has a maximum length of 62 bytes.

Station status - definition

The station status provides an overview of the state of a DP slave.

Station status 1

Table 2-3 Structure of station status 1 (byte 0)

Bit	Meaning	Cause / corrective measure
0	The DP master cannot address the DP slave.	Check the following: • Is the correct PROFIBUS address set on the DP slave? • Is the bus connection plug connected? • Is the DP slave connected to the power supply? • Is the RS485 repeater correctly configured?
1	The DP slave is not yet ready for the data transfer.	The DP slave is still starting up. Wait until the startup is completed.
2	The configuration data transferred from the DP master to the DP slave does not match the DP slave configuration.	Check that the correct station type and the correct DP slave configuration have been entered in the configuring software.
3	External diagnostics data exists (group diagnostics indication).	Evaluate the identifier-related diagnostics, the status information and / or the channel-related diagnostics. Bit 3 is reset as soon as all faults have been rectified. The bit will be set again when there is a new diagnostics message in the bytes of the aforementioned diagnostics.
4	The function you requested is not supported by the DP slave.	Check the configuration.
5	The DP master cannot interpret the response from the DP slave.	Check the bus configuration.
6	The DP slave type does not match the software configuration.	Enter the correct station type in the configuring software.
7	The DP slave has been parameterized by another DP master (not by the DP master which has access to the DP slave at the moment).	The bit is always 1, for example, if you access the DP slave with the PG or another DP master. The "Master PROFIBUS address" diagnostic byte contains the PROFIBUS address of the DP master that assigned parameters to the DP slave.

Station status 2

Table 2-4 Structure of station status 2 (byte 1)

Bit	Meaning
0	The DP slave must be parameterized again.
1	A diagnostic message is pending. The DP slave will not operate until the fault is rectified (static diagnostics message).
2	The bit is always "1" when the DP slave with this PROFIBUS address is configured.
3	Response monitoring is enabled for this DP slave.

Bit	Meaning
4	The DP slave has received a "FREEZE" control command. 1)
5	The DP slave has received a "SYNC" control command. 1)
6	0: Bit is always "0".
7	The DP slave is deactivated, i.e. it is decoupled from the current processing.
1) Bit is updated only if another diagnostic message also changes.	

Station status 3

Station status 3 is not relevant for the slave diagnostics.

Table 2-5 Structure of station status3

Bit	Meaning
0 to 7	Bits are always "0".

Master PROFIBUS address - definition

The PROFIBUS address of this DP master (class 1 master) is stored in the "Master PROFIBUS address" diagnostic byte,

- that has parameterized the DP slave and
- that has read and write access to the DP slave

The master PROFIBUS address is stored in byte 3 of the slave diagnostics.

Manufacturer's ID - definition

A code is stored in the manufacturer's identification which describes the DP slave type.

Table 2-6 Structure of the manufacturer ID

Byte 4	Byte 5	Manufacturer ID for
80_H	FD_H	SIMOCODE pro

Identifier-related diagnostics - definition

Identifier-related diagnostics begins at byte 6 and is 2 bytes long.

Identifier-related diagnostics - configuration

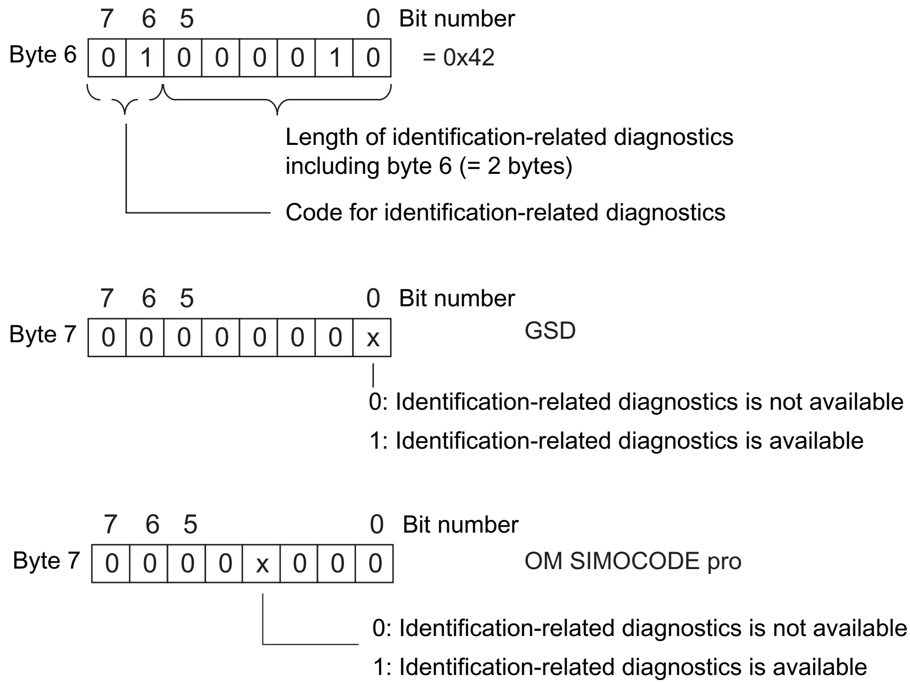


Figure 2-4 Configuration of identifier-related diagnostics

Status information - definition

The status information communicates the detailed status of SIMOCODE pro.

If SIMOCODE pro is operated downstream from a Y-Link (module for connecting single-channel DP slaves to S7-400H), the so-called H_STATUS is also signaled (see Fig. "Structure of H_STATUS").

Status information - configuration

The status information is configured as follows:

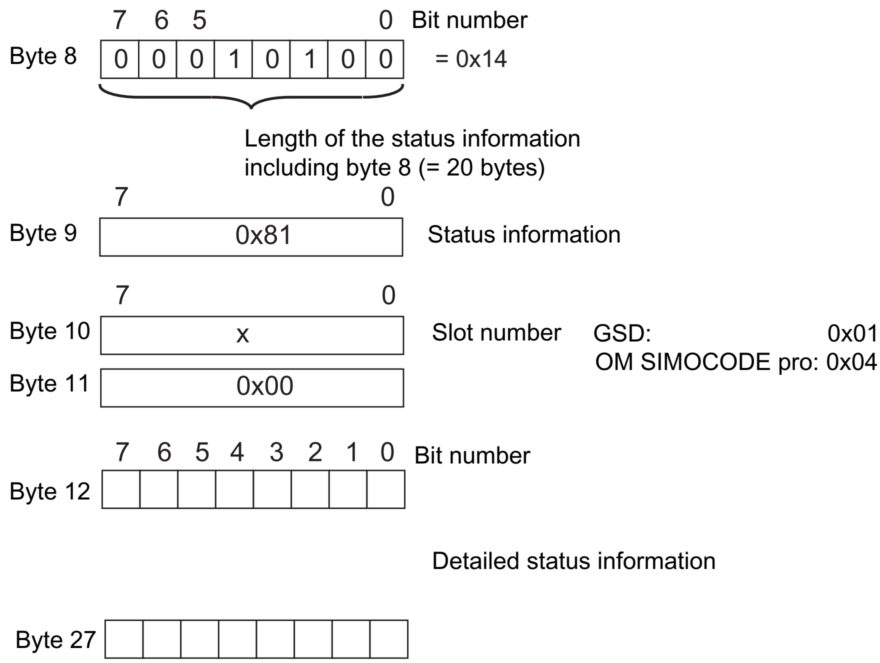


Figure 2-5 Configuration of status messages

You will find the detailed messages in Chapter Detailed messages of the slave diagnostics (Page 140).

The H_STATUS has the following structure:

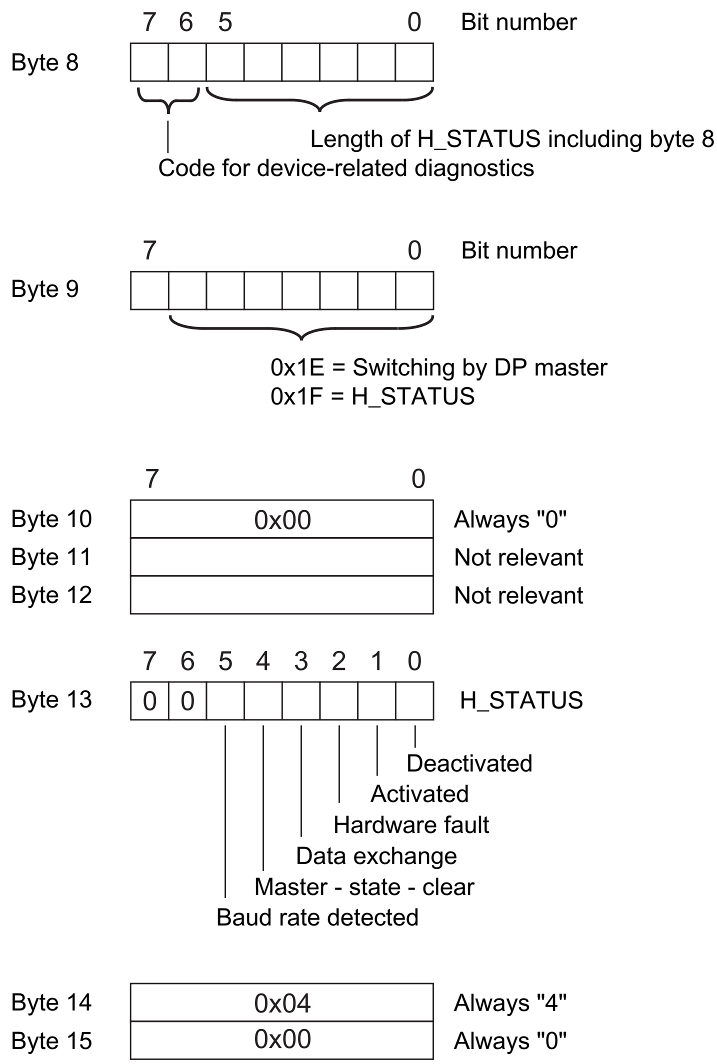


Figure 2-6 Structure of H_STATUS

Channel-related diagnostics - definition

Channel-related diagnostics is a detailed version of the identifier-related diagnostics. It supplies information about the device faults of SIMOCODE pro.

Channel-related diagnostics - configuration

Channel-related diagnostics is configured as follows:

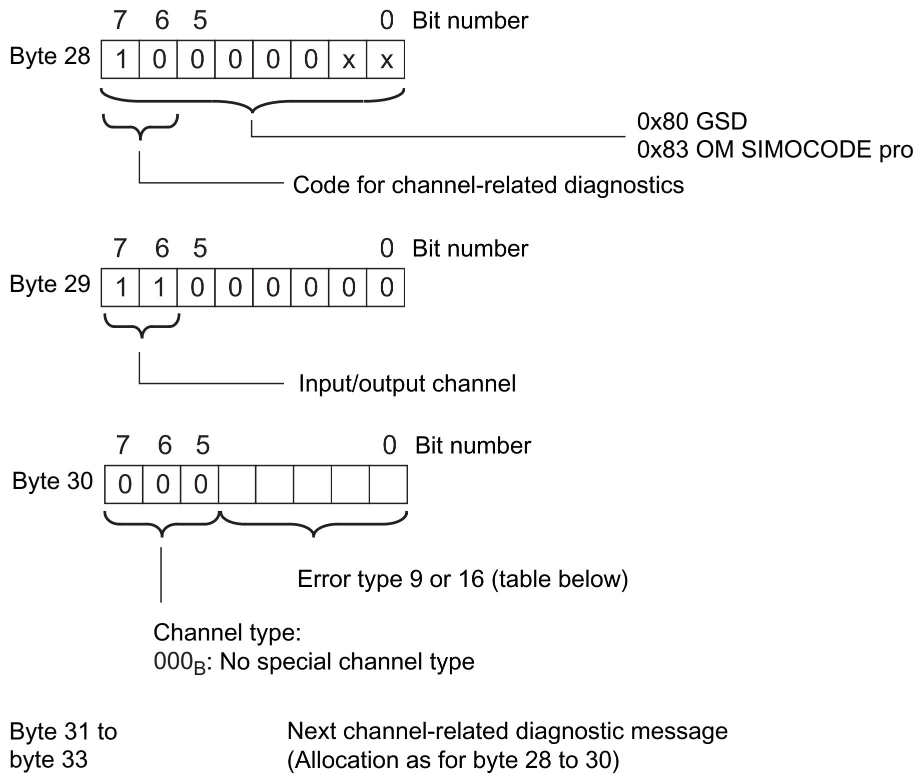


Figure 2-7 Configuration of the channel-related diagnostics

The block for the channel-related diagnostics, which has a length of 3 bytes, is either missing (if there is no channel-related diagnostics) or is available once or twice.

Fault types

The diagnostic message is output on channel 0.

Table 2-7 Fault types

No.	Fault type	Meaning / cause	
F9	01001: Error	• Internal fault / device fault • Error during self-test	Precise information: See Chapter Data record 92 - Device diagnostics (Page 151).
F16	10000: Parameterization error	• Incorrect parameter value	

Interrupts - diagnostic interrupt

Device faults or parameter errors are interrupt sources for diagnostic interrupts.

As soon as SIMOCODE pro sets a diagnostic interrupt, the OB 82 diagnostic interrupt will be started in the SIMATIC S7.

Diagnosis interrupt - structure

The diagnostic interrupt has the following structure:

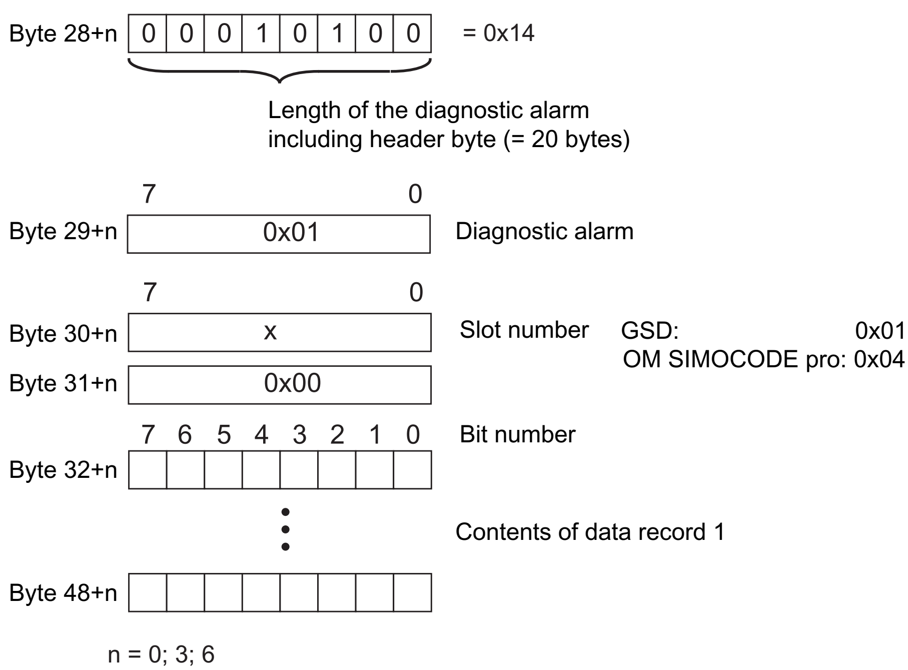


Figure 2-8 Structure of the diagnostic interrupt

The first byte of the block for diagnostic interrupt can be shifted by 3 or 6 bytes depending on the number of blocks for channel-related diagnostics.

You will find a description of the information contained in data record 1 in Chapter Detailed messages of the slave diagnostics (Page 140).

Interrupts - hardware interrupt

Process faults, warnings, and status information are interrupt sources for hardware interrupts.

As soon as SIMOCODE pro sets a hardware interrupt, the hardware interrupt OB 40 will be started in the SIMATIC S7.

Hardware interrupt - structure

The hardware interrupt has the following structure:

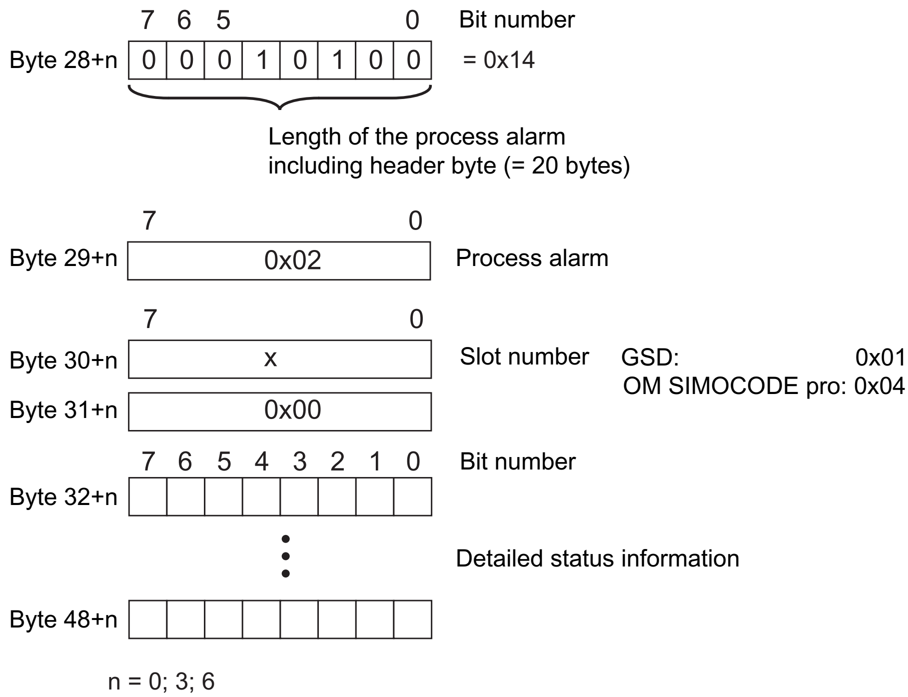


Figure 2-9 Structure of the hardware interrupt

The first byte of the block for hardware interrupts can be shifted by 3 or 6 bytes depending on the number of blocks for channel-related diagnostics.

The detailed messages can be found in Chapter "Detailed messages of the slave diagnostics" in Chapter Detailed messages of the slave diagnostics (Page 140).

2.1.5 Integration of SIMOCODE pro in DP master systems

2.1.5.1 Slave operating modes

The following table shows an overview of the slave operating modes with which SIMOCODE pro can be operated on the class 1 master:

Table 2-8 Slave operating modes of SIMOCODE pro

SIMOCODE pro integrated as	Class 1 master		
	Non-vendor-specific DP master, without DPV1 interrupts	**Non-vendor-specific DP master, with DPV1 interrupts**	**S7 master**
DPV1 slave via GSD	• Cyclic data exchange • Standard diagnostics • Status information • Parameterization during starting (SIMOCODE pro C basic unit only) • Acyclic writing and reading of DPV1 data records (if supported by the master)	• Cyclic data exchange • Standard diagnostics • Status information • Hardware and diagnostic interrupts • Parameterization during starting (SIMOCODE pro C basic unit only) • Acyclic reading and writing of DPV1 data records	• Cyclic data exchange • Standard diagnostics • Status information • Hardware and diagnostic interrupts • Parameterization during starting (SIMOCODE pro C basic unit only) • Acyclic reading and writing of DPV1 data records
S7 slave via OM SIMOCODE pro	—	—	• Cyclic data exchange • Standard diagnostics • Hardware and diagnostic interrupts • Parameterization during startup • Acyclic reading and writing of DPV1 data records

2.1.5.2 Preparing the data transfer

The precondition for communication with a master class 1 (PLC) is integration according to table "Slave modes of SIMOCODE pro" and the setting for the PROFIBUS DP address.

You will find information about setting the address in Chapter "Setting the PROFIBUS DP address" in Chapter "Commissioning and service" in the system manual.

2.1.5.3 Integration of SIMOCODE pro as a DPV1 slave via GSD in the configuring software

SIMOCODE pro is integrated into your system as a standard slave via the GSD file.

You can download the GSD file from GSD file (https://support.industry.siemens.com/cs/ww/en/view/113630) (switching devices).

The following GSD files are available for SIMOCODE pro C:

- SI0180FD.GSG (German)
- SI0180FD.GSE (English).
- SI0180FD.GSF (French).

The following GSD files are available for SIMOCODE pro S:

- SI0181A7.GSG (German)
- SI0181A7.GSE (English)
- SI0181A7.GSF (French).

The following GSD files are available for SIMOCODE pro V:

- SI1380FD.GSG (German)
- SI1380FD.GSE (English)
- SI1380FD.GSF (French).

Note

If you want to utilize the complete functionality of SIMOCODE pro (e.g. time stamping), your configuration tool must support GSD files - Rev. 5 such as STEP7 V5.3 and higher.

The following table describes how to integrate the GSD file in SIMATIC S7 and SIMOCODE pro from the hardware catalog.

Table 2-9 Integration of SIMOCODE pro as a DPV1 slave via GSD in the configuring software

Step	STEP7, V5.1+SP2 and higher
1	Start STEP7 and select "Options" > "Install New GSD File" in HW Config.
2	In the dialog box that then opens, select the GSD file to be installed and confirm with "OK" → the field device will be displayed in the hardware catalog in the "PROFIBUS DP" directory under "Other field devices > Switching devices > SIMOCODE pro."
3	Enter "SIMOCODE pro C", "SIMOCODE pro S" or "SIMOCODE pro V" on the PROFIBUS.
4	For SIMOCODE pro S and SIMOCODE pro V only. SIMOCODE pro S and SIMOCODE pro V can be integrated into two basic types (basic type 1 or basic type 2) (see Chapter Cyclic data (Page 20)). The default setting is basic type 2. If you wish to use "basic type 1," delete the default "basic type 2" module and insert "basic type 1" instead. Only in conjunction with the fail-safe digital module DM-F PROFIsafe: Insert the "PROFIsafe" module in the second position in addition to "Basic type 1" or "Basic type 2." You will find more information about using the DM-F PROFIsafe in the manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).

Step	STEP7, V5.1+SP2 and higher
5	Check the set DP interrupt mode (DPV0 or DPV1) as well as the enable of the DPV-1 interrupts on the properties page of the DP slave. These settings influence the evaluation of the diagnostics data and interrupts (see Chapter Evaluating diagnostics data (Page 35) and Chapter "Timestamping" in the operating manual (standard functions)).
6	For SIMOCODE pro C only: It is possible to set the device parameters, which are automatically transmitted to SIMOCODE pro during every startup, in the object properties of the DP slave under "Parameterization > Device-specific parameters" (see Chapter Parameter data during startup (Page 38)).

2.1.5.4 Integration of SIMOCODE pro as a SIMATIC PDM object (DPV1 slave via GSD) in STEP7 HW Config

SIMOCODE pro can be integrated as a PDM object into the STEP7 HW Config when version 6.0 + SP1 or higher of the SIMATIC PDM (Process Device Manager) is installed. This requires the PDM option "Integration in STEP7."

The following table describes how you can insert SIMOCODE pro as a PDM object in the STEP7 HW Config from the hardware catalog.

Table 2-10 SIMOCODE pro as a SIMATIC PDM object (DPV1 slave via GSD) in STEP7 HW Config

Step	STEP7, V5.1+SP2 and higher
1	Start STEP7 and open the "HW Config."
2	To integrate SIMOCODE pro as a PDM object, navigate to the "PROFIBUS DP > Switching Devices" directory in the hardware catalog.
3	Enter "SIMOCODE pro C (PDM)," "SIMOCODE pro S (PDM)," or "SIMOCODE pro V (PDM)" on the PROFIBUS. For SIMOCODE pro S and SIMOCODE pro V only. SIMOCODE pro S and SIMOCODE pro V can be integrated into two basic types (basic type 1 or basic type 2) (see Chapter Cyclic data (Page 20)). The default setting is basic type 2. If you wish to use "basic type 1," delete the default "basic type 2" module and insert "basic type 1" instead. Only in conjunction with the fail-safe digital module DM-F PROFIsafe: Insert the "PROFIsafe" module in the second position in addition to "Basic type 1" or "Basic type 2." You will find more information about using the DM-F PROFIsafe in the manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).
4	Check the set DP interrupt mode (DPV0 or DPV1) as well as the enable of the DPV-1 interrupts on the properties page of the DP slave. These settings influence the evaluation of the diagnostics data and interrupts (see Chapter Evaluating diagnostics data (Page 35) and Chapter "Timestamping" (standard functions) in the operating manual).
5	Start SIMATIC PDM to create the device parameters by double clicking on the slave symbol (see Chapter Parameter data during startup (Page 38)).

2.1.5.5 Integration of SIMOCODE pro as an S7 slave via OM SIMOCODE pro

The "OM SIMOCODE pro" software must be installed to utilize the advantages of SIMOCODE ES and parameterize SIMOCODE pro from the STEP7 HW Config. OM SIMOCODE pro is included in the scope of supply of the "SIMOCODE ES Premium" software.

Install the software accordingly.

The following table describes how to insert SIMOCODE pro into STEP7 HW Config from the hardware catalog.

Table 2-11 Integration of SIMOCODE pro as an S7 slave via OM SIMOCODE pro

Step	STEP7
1	Start STEP7 and open the "HW Config."
2	To integrate SIMOCODE pro as an S7 slave, navigate through the hardware catalog to directory "PROFIBUS DP → Switching Devices → Motor Management System"
3	Enter SIMOCODE pro C, SIMOCODE pro S, SIMOCODE pro V (basic type 1) or SIMOCODE pro S, SIMOCODE pro V (basic type 2) on the PROFIBUS. For SIMOCODE pro S and SIMOCODE pro V only. SIMOCODE pro S and SIMOCODE pro V can be integrated into two basic types (basic type 1 or basic type 2) (see Chapter Cyclic data (Page 20)). Enter the desired basic type "Basic type 1" or "Basic type 2" as the module. Only in conjunction with the fail-safe digital module DM-F PROFIsafe: Enter the desired basic type "Basic type 1 - PROFIsafe" or "Basic type 2 - PROFIsafe" as the module. You will find more information about using the DM-F PROFIsafe in the manual SIMOCODE pro fail-safe digital modules (https://support.automation.siemens.com/WW/view/en/50564852).
4	Start the SIMOCODE ES software to generate the device parameters with the "Parameters" button under "Parameters" in the object properties of slot 4 of this S7 slave. The created parameters are incorporated in STEP7 and automatically transmitted to SIMOCODE pro during startup (see Chapter Parameter data during startup (Page 38)).

If SIMOCODE pro has been integrated as an S7 slave, you can utilize the routing functionality provided by SIMOCODE ES Premium.

A prerequisite for the availability of this function is that an online connection can be established (for example via Industrial Ethernet) between the PC on which SIMOCODE ES is installed and the SIMATIC controller that supports routing.

In this manner, you can use routing to access all SIMOCODE pro devices connected to the controller.

2.1.5.6 Compatibility of SIMOCODE pro S and SIMOCODE pro V

SIMOCODE pro S and SIMOCODE pro C each have their own gsd file (see Integration of SIMOCODE pro as a DPV1 slave via GSD in the configuring software (Page 31)).

It is nevertheless possible to replace a SIMOCODE pro C basic unit with a SIMOCODE pro S basic unit.

SIMOCODE pro S basic units can be addressed with unchanged functionality by configuring with a SIMOCODE pro C gsd file. SIMOCODE pro C parameter settings using output 3 of the basic unit are changed in such a way when using SIMOCODE pro S that output 1 of the multifunction module is used instead of output 3 of the basic unit.

For configurations that use the new functions of the SIMOCODE pro S multifunction module (additional inputs and outputs, ground fault detection, temperature measurement), configuring using the SIMOCODE pro S gsd file is absolutely necessary.

The same applies when integrating into STEP 7 via the Object Manager of SIMOCODE pro C.

2.1.6 Evaluating diagnostics data

2.1.6.1 Evaluating diagnostics data

The way in which the diagnostics data is read out depends in which DP master system you have integrated SIMOCODE pro and the method of integration used (see Chapter Integration of SIMOCODE pro as a DPV1 slave via GSD in the configuring software (Page 31)).

2.1.6.2 SIMOCODE pro integrated with GSD

DP master with DPV1 interrupt support (DPV1 interrupt mode)(e.g. all later SIMATIC S7-300 / 400 DP master systems)

In a DP master system with DPV1 interrupt support, the diagnostics data is transferred and evaluated by means of diagnostic and hardware interrupts.

These interrupts must be enabled in the PROFIBUS configuring tool for this purpose (diagnostic interrupts, hardware interrupts).

Using the configuring tool, you can define the DP interrupt mode in which the integration took place in the DP slave properties and specify whether interrupts are enabled. In SIMATIC STEP7, this is carried out in HW Config via the properties of the DP slave.

- Behavior and sequence in STEP7: Behavior and sequence in STEP7A diagnosis interrupt (OB 82) is triggered in the CPU every time a new device fault is diagnosed, whereas a hardware interrupt (OB 40) is triggered every time a new process fault / warning / status information is diagnosed. If OB 82 or OB 40 has not been programmed, the CPU switches to "STOP" mode.
- Interrupts from a DPV1 slave, received with STEP7: The interrupt is read directly in OB 82 or OB 40 with SFB 54 "RALRM." The data range addressed with SFB 54 by means of the "AINFO" parameter contains the interrupt information described in Section "Diagnostic interrupt - structure" and in the Section "Hardware interrupt - structure." The first byte which is read corresponds to byte 28.

Note

The interface of SFB 54 "RALRM" is identical to the interface of FB "RALRM" as defined in the "PROFIBUS Guideline PROFIBUS Communication and Proxy Function Blocks according to IEC 61131-3" standard.

You will find further information about SFB 54 in the STEP7 online help.

DP master without DPV1 interrupt support (DPV0 interrupt mode) (e.g. all later SIMATIC S7-300 / 400 DP master systems)

SIMOCODE pro diagnostics data can be evaluated via device-specific diagnostics (status information) and channel-related diagnostics (as part of extended diagnostics, see Chapter Structure of the slave diagnostics (Page 22)) in DP master systems without DPV1 interrupt support.

Using the configuring tool, you can define the DP interrupt mode in which the integration took place in the DP slave properties.

Device-specific diagnostics contain detailed information about faults, warnings and status information which are recorded by the process via SIMOCODE pro. Information concerning hardware faults is transmitted via channel-related diagnostics.

- Behavior and sequence in STEP7: OB 82 is started in the CPU every time a new device or process fault / warning / status information is diagnosed. If OB 82 has not been programmed, the CPU switches to "STOP" mode.
- Readout of the slave diagnostics data with STEP7: You can determine which DP slave has supplied diagnostics data by evaluating the start information in OB 82 ("OB82_MDL_ADDR" variable). OB82_MDL_ADDR corresponds here to the diagnostics address of the slave that is configured in HW Config. The diagnostics data itself is read, for instance, in the cyclic part of the user program with SFC 13 "DPNRM_DG." The diagnostics data that is read with SFC 13 has the structure described in Chapter Structure of the slave diagnostics (Page 22). For further information on SFC 13, please refer to the STEP7 Online Help system.

2.1.6.3 Integration of SIMOCODE pro in SIMATIC S7 with OM SIMOCODE ES

Diagnostic interrupt/hardware interrupt

The diagnostics data concerning diagnosis alarms and process interrupts is transmitted and evaluated during the integration of SIMOCODE pro as an S7 slave.

DP masters operated in DP mode "DPV1" (e.g. all later SIMATIC S7-300/400 DP master systems)

Behavior and sequence in STEP7:

Behavior and sequence in STEP7A diagnosis interrupt (OB 82) is triggered in the CPU every time a new device fault is diagnosed, whereas a hardware interrupt (OB 40) is triggered every time a new process fault / warning / status information is diagnosed. If OB 82 or OB 40 has not been programmed, the CPU switches to "STOP" mode.

Interrupts from a DPV1 slave, received with STEP7:

The interrupt is read directly in OB 82 or OB 40 with SFB 54 "RALRM."

The data range addressed with SFB 54 by means of the "AINFO" parameter contains the interrupt information described in Section "Structure of the slave diagnostics (Page 22)". The first byte which is read corresponds to byte 28.

You will find further information on SFB 54 in the STEP7 online help.

DP masters operated in DP mode "S7-compatible" (e.g. all early SIMATIC S7-300/400 DP master systems)

Behavior and sequence in STEP7:

Behavior and sequence in STEP7A diagnosis interrupt (OB 82) is triggered in the CPU every time a new device fault is diagnosed, whereas a hardware interrupt (OB 40) is triggered every time a new process fault / warning / status information is diagnosed. If OB 82 or OB 40 has not been programmed, the CPU switches to "STOP" mode.

You will find information about the device fault in the start information of OB 82 in the "OB82_MDL_DEFECT" variable. The start information of OB 40 contains the "OB40_POINT_ADDR" variable, which in turn contains the data of the hardware interrupt that is described in bytes 32 to 35 (see Section "Structure of the slave diagnostics (Page 22)"). Reading the entire diagnosis can then be initiated, for example, from OB 40, while the complete diagnostic record 92 is being read in the cyclic user program with the SFC 52 "RD_REC", for example.

You will find further information on SFB 59 in the STEP7 online help.

2.1.7 Data records

Records - general information

Data records contain additional information about the DP slave that can be read and, in some cases, written.

Access is effected via acyclic DPV1 services for reading and writing these records. Operation, monitoring, and parameterization is possible, for example, by SIMOCODE pro.

You can use these services as long as they are supported by your DP master. You will find an overview of the records provided by SIMOCODE pro in Chapter PROFIBUS data records (Page 144).

Unlike when cyclic I/O data is accessed, special function blocks must be called in the PLC to access DPV1 data records in the user program.

Access to data records in STEP7

Read and write access to the data records takes with the system function blocks SFB 52 "RDREC" and SFB 53 "WRREC".

You will find further information about SFB and SFC in the STEP7 online help.

2.1.8 Parameterization via PROFIBUS

2.1.8.1 SIMOCODE ES Premium

With SIMOCODE ES Premium you can parameterize all the SIMOCODE pro devices which are connected to the same PROFIBUS DP network from a central location. Parameter data which has been previously created with the software can therefore be transmitted directly to SIMOCODE pro via PROFIBUS DP.

Note

A PC with a system connection for PROFIBUS (e.g. SIMATIC NET CP 5612 (PCI) or CP 5622 (PCI-Express)) is required to execute online functions via PROFIBUS DP, e.g. transfer of SIMOCODE pro parameters.

The system connections for PROFIBUS mentioned above are operated in conjunction with SIMOCODE ES Premium as master class 2 and use acyclic DPV1 communication functions for communication with SIMOCODE pro.

If SIMOCODE pro has been integrated as an S7 slave, you can utilize the routing functionality provided by SIMOCODE ES Premium. A prerequisite for the availability of this function is that an online connection can be established (for example via Industrial Ethernet) between the PC on which SIMOCODE ES is installed and the SIMATIC controller that supports routing. In this manner, you can use routing to access all SIMOCODE pro devices connected to the controller.

Note

The startup parameter block (Device Parameters > Bus Parameters) must always be set for this form of parameterization to avoid the device parameters from being overwritten by any existing parameter data during startup.

2.1.8.2 SIMATIC PDM

The standard version of SIMATIC PDM (PDM Basic) is available to you for parameterizing functionality comparable to that of SIMOCODE ES Professional via PROFIBUS for SIMOCODE pro.

The PDM options "Integration in STEP7" provides the following functions in addition:

- "Offline saving" of SIMOCODE pro parameter data in the STEP7 project and manual transmission (no automatic transfer of parameter data during startup!)
- "Routing via S7 stations." Example: Parameterization of all SIMOCODE pro devices from a central engineering station, together with hardware components which provide a data record gateway (CP443-5 Extended, IE / PB link), beyond the boundaries of different networks where required.

Note

The startup parameter block (Device parameters > Bus parameters) must always be set for this form of parameterization to avoid the device parameters from being overwritten by any existing parameter data during startup.

You will find further information about SIMATIC PDM in the Manual SIMATIC Process Control System PCS 7 SIMATIC PDM (https://support.automation.siemens.com/WW/view/en/57355963).

2.1.8.3 Parameter data during startup

Parameter data is transferred to the unit on the PROFIBUS DP each time SIMOCODE pro is started up.

Either standard parameters only or standard and device-specific parameters (SIMOCODE pro parameters) are transferred, depending on the master module used and the type of integration into the DP master system. The parameters are stored in the PLC or the DP master and automatically transferred to the DP slave when the system is started up.

You can set the device-specific parameters

- with the configuration tool with loaded GSD (SIMOCODE pro C basic unit only), e.g. with STEP7-HW Config. This option is available for SIMOCODE pro C. The SIMOCODE pro parameters are created by configuring the device-specific parameters on the slave properties page.
- in the SIMOCODE ES software with integration of SIMOCODE pro into STEP7-HW Config as an S7 slave via OM SIMOCODE pro. This option is available for SIMOCODE pro C, SIMOCODE pro S, and SIMOCODE pro V. You can start the SIMOCODE ES software for easy configuration of the parameterization from STEP7 HW Config using the button in the "Parameter" tab in the object properties of slot 4.

Note

To allow device parameterization during startup, the startup parameter block (Device parameters > Bus parameters) must not be set.

SIMOCODE pro is then parameterized with the device-specific parameters stored in the DP master. Any parameters already in the device will be overwritten.

2.1.9 Timestamping/time synchronization

See Chapter "Timestamping" (standard functions) in the manual Parameterizing SIMOCODE pro (https://support.industry.siemens.com/cs/ww/en/view/109743958).

2.2 PROFINET communication

2.2.1 Definitions

GSD file

The properties of a PROFINET devices are described in a GSD (General Station Description) file that contains all the necessary information for the configuration. Just as with PROFIBUS, you can link a PROFINET device into an automation system using a GSD file: PROFINET GSD (https://support.industry.siemens.com/cs/ww/en/view/38702563)

In the case of PROFINET IO, the GSD file is in XML format. The structure of the GSD file conforms to ISO 15734, the worldwide standard for device descriptions.

Device name

Before an IO device can be addressed by an IO controller, it must have a device name because the IP address is permanently assigned to the device name. In the case of PROFINET, this method was chosen because names are easier to handle than complex IP addresses.

Assignment of a device name for a specific IO device is comparable to setting the PROFIBUS address on a DP slave.

An IO device does not have a device name when it is delivered. It can only be addressed by an IO controller once a device name has been assigned to it, e.g. for transmission of the configuration data (including the IP address) during startup or for exchanging useful data in cyclic operation.

IO Device

Distributed field device assigned to one of the IO controllers.

As a field device, the SIMOCODE pro V PN basic unit functions as a PROFINET-IO device.

IP address

To enable a PROFINET device to be addressed as a node on Industrial Ethernet, this device also requires an IP address that is unique within the network. The IP address is made up of 4 decimal numbers with a range of values from 0 through 255. The decimal numbers are separated by a decimal point.

The IP address is made up of

- The address of the (sub)net and
- The address of the node (generally called the host or network node)

MAC address

Each PROFINET device is assigned a globally unique device identifier at the factory. This 6-byte long device identifier is the MAC address.

The MAC address is divided up as follows:

- 3 bytes manufacturer's ID and
- 3 bytes device identifier (consecutive number).

The MAC address can generally be read from the front on the device, e.g.: 08-00-06-6B-80-C0

OPC Unified Architecture (UA)

OPC Unified Architecture (UA) is the next generation technology of the OPC Foundation for safe and reliable data transfer and defines access to industrial communication networks.

OPC UA client

An OPC UA client is a user program that accesses process data via the OPC UA interface. Access to the process data is made possible by the OPC UA server.

OPC UA server

The OPC server provides the OPC client with a wide range of functions with which it can communicate via industrial networks. SIMOCODE pro V PN (GP) provides extensive process data via OPC UA.

PROFINET

Within the context of Totally Integrated Automation (TIA), PROFINET is the systematic development of the following systems:

- PROFIBUS DP, the established fieldbus
- Industrial Ethernet, the communications bus for the cell level.

Experiences from both systems have been and are being integrated in PROFINET. PROFINET was defined as an Ethernet-based automation standard of PROFIBUS International (PROFIBUS Nutzerorganisation e. V.).

PROFINET IO controller

Device via which the connected IO devices are addressed. That means the IO controller exchanges input and output signals with assigned field devices. The IO controller is often the controller on which the automation program runs.

PROFINET IO Supervisor

PG/PC for commissioning and diagnostics.

2.2.2 Data security in automation

Introduction

The topic of data security and access protection (security) is becoming more and more important in industrial environments. Increased networking of entire industrial plants, vertical integration and networking of the levels within a company, and new technologies, such as remote maintenance, are resulting in more increased requirements for protection of the industrial plant. Security is the generic term for all protection measures

- Loss of confidentiality due to unauthorized accessing of data
- Loss of integrity due to data manipulation
- Loss of availability due to destruction of data

To provide protection from manipulation in sensitive plant and production networks, it is not enough to apply data security solutions for offices to industrial applications without any adaptation.

Requirements

The special requirements of communication in an industrial environment (e.g. communication in real time) result in additional requirements for security in industrial use:

- Protection against interaction between automated cells
- Protection of network segments
- Protection from unauthorized access

- Scalability of the security functionality
- No influence on the network structure.

Threats

Threats can arise from external and internal manipulation. Loss of data security is not always caused by deliberate actions.

Internal threats arise due to:

- Technical faults
- Operating errors
- Errors in programs.

This internal hazards are compounded by external threats. The external hazards do not differ from the known threats in the office environment:

- Computer viruses and computer worms
- Trojan horses
- Unauthorized access
- Password phishing.

Password phishing means attempting to get a user to divulge access data and passwords by masquerading as a different identity in an e-mail.

Precautions

The most important precautions against manipulation and loss of data security in an industrial environment are:

- Filtering and verification of data traffic through virtual private networks (VPN). A virtual private network is used to exchange private data in a public network (e.g. the Internet). The most common VPN technology is IPsec. IPsec is a collection of protocols based on the IP protocol at the network layer.
- Segmentation into protected automation cells. The aim of this concept is to protect devices in the network through security modules. A group of protected devices forms a protected automation cell. Only security modules in the same group or the device protected by you can be interchanged.
- Authentication (identification) of the networked devices. The security modules identify themselves to each other via a secure (encrypted) channel using authentication procedures. This prevents access to a protected segment by unauthorized persons from outside.
- Encryption of the data traffic. The confidentiality of the data is ensured by encrypting the data traffic. For this purpose, every security module is given a VPN certificate which includes the encryption key.

Guidelines on information security in industrial automation

VDI guideline

The VDI/VDE Association of German Engineers "Measurement and Automation" has published with the VDI guideline "VDI/VDE 2182 Sheet 1, IT Security for Industrial Automation - General Model" a guideline in implementation of a security architecture in the industrial environment. The guideline is found under "VDI guidelines" on the VDI home page: VDI guidelines (http://www.vdi.eu/engineering/vdi-standards)

PROFINET Security Guideline

The PROFIBUS & PROFINET user organization supports you with building up safety standards in your company with the PROFINET Security Guideline. These guidelines are found under downloads on the home page of the PROFIBUS & PROFINET user organization: PI - PROFIBUS & PROFINET International Home (http://www.profibus.com)

Security information

See Security information (Page 13).

2.2.3 Data transfer

Options for data transfer

The following figure shows an overview of the communication functions supported by SIMOCODE, which are described in the following sections:

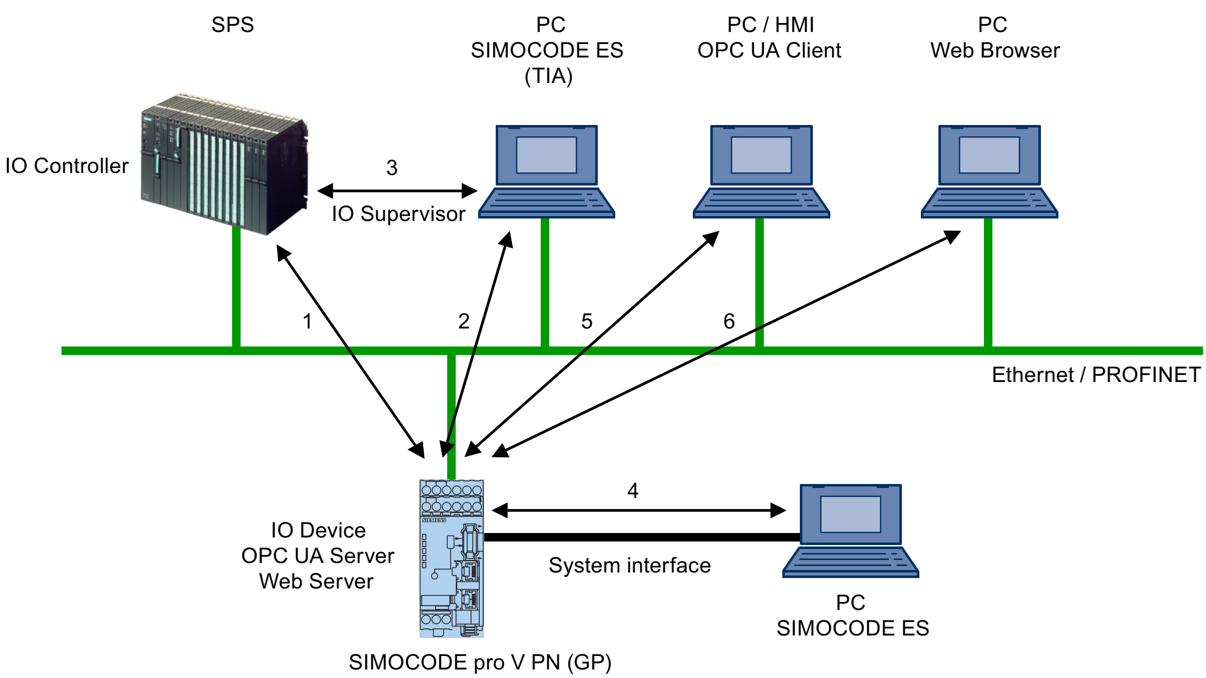


Figure 2-10 Communication functions as exemplified by SIMOCODE pro V PN (GP)

1 Communication between PLC (IO controller) and SIMOCODE pro (IO device) via PROFINET / Ethernet

2 Communication between PC with parameterization software SIMOCODE ES and SIMOCODE pro via PROFINET

3 Communication between PC with parameterization software SIMOCODE ES Premium and SIMOCODE pro via SIMATIC S7 (SIMOCODE pro integrated into SIMOCODE ES (TIA-Portal))

4 Communication between PC parameterization software SIMOCODE and SIMOCODE pro via the SIMOCODE pro system interface (point-to-point via RS 232 or USB)

5 Communication between PC or HMI with OPC UA Client and SIMOCODE pro via Ethernet/ OPC UA

6 Communication between PC with a web browser and SIMOCODE pro via TCP/IP and HTTP

2.2.4 Communication via PROFINET IO

SIMOCODE pro V PN (GP) offers communication functions via PROFINET IO with the following features:

- Integrated switch with 2 ports (applies to devices with 2 ports)

It is possible to build PROFINET bus and ring topologies without additional switches.

The integrated 2-port switch supports functions for port diagnostics if this functions are used by the automation system.

- Device replacement without removable medium/programming device

This is a function that permits replacement of a device (e.g. in case of a device defect) by a new device with factory settings without the help of PCs or programming devices without a memory module.

- Shared device

Shared device is the function with which an IO device is used simultaneously by two or more IO controllers.

This function can be used in conjunction with the fail-safe DM-F PROFIsafe digital module. An automation system communicates with SIMOCODE pro via PROFINET IO and performs the standard control tasks while a second fail-safe automation system via PROFINET IO can be used for safety-related tripping using the PROFIsafe profile.

Use of this function depends on whether the automation system supports the function. It is configured using the configuration tool of the automation system, e.g. with STEP 7 HW Config.

- Media redundancy

SIMOCODE pro V PN supports media redundancy according to the Media Redundancy Protocol (MRP). This function is configured using the configuration tool of the automation system, e.g., HW Config with STEP 7.

- System redundancy

SIMOCODE pro V PN product version *E05* and higher and SIMOCODE pro V PN (GP) support a redundant-system connection with two S7-400H CPUs. This provides for a communication link (Application Relation) between each IO device and each of the two H CPUs. The communication link can be set up by means of a freely selectable topological connection.

This function is configured using the configuration tool of the automation system, e.g., HW Config with STEP 7.

- RT communication

As a motor management system, SIMOCODE pro V PN does not have any time-critical communication functions itself but it does support PROFINET hardware RT used. The integrated 2-port switch can therefore be used to forward RT data.

- Support for PROFIenergy

PROFIenergy, a protocol defined by the PROFINET User Organization, lays the foundations for a vendor-neutral, universal system for flexible, short-term, and intelligent shutdown of individual loads or whole production units.

SIMOCODE pro V PN supports the functions defined in the protocol in the form of a switchgear with switching and measuring functions

You will find more information in the system manual "SIMATIC PROFINET System Description" (see System manual SIMATIC PROFINET System Description (https://support.industry.siemens.com/cs/ww/en/view/19292127)).

2.2.5 Integration of SIMOCODE pro into the automation system (PLC)

I/O configurations

SIMOCODE pro V PN (GP) supports a number of I/O configurations, which define the structure and length of the I/O data that are cyclically transferred between the IO controller (PLC) and the IO device (SIMOCODE pro). In the case of SIMOCODE pro, these configurations are termed **Basic types**.

Cyclic data to SIMOCODE pro V PN (GP)

The following basic types are available:

- Basic type 1, 4 bytes:

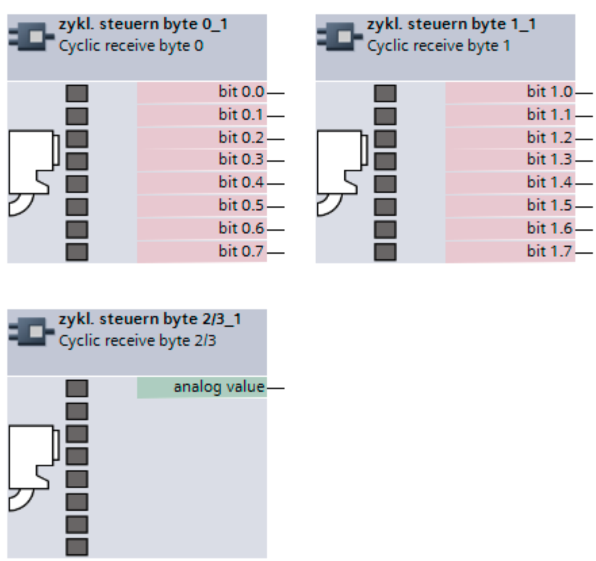


Figure 2-11 Cyclic data to SIMOCODE pro, basic type 1, 4 bytes

- Basic type 2, 2 bytes:

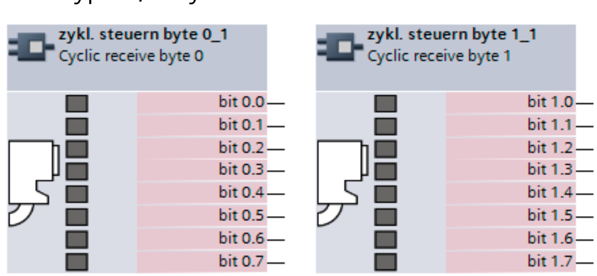


Figure 2-12 Cyclic data to SIMOCODE pro, basic type 2, 2 bytes

- Basic type 3, 6 bytes

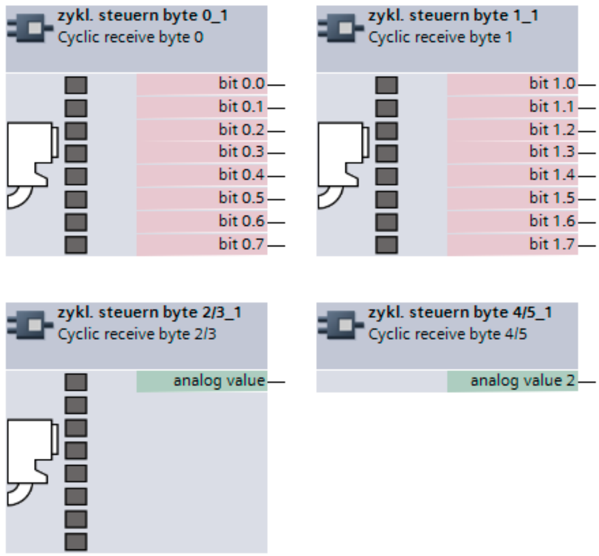


Figure 2-13 Cyclic data to SIMOCODE pro, basic type 3, 6 bytes

- PROFIsafe, 1 F-DO

Permanently assigned to the fail-safe relay enable circuits of the DM-F PROFIsafe, length 5 bytes.

Cyclic data from SIMOCODE pro V PN

- Basic type 1, 10 bytes

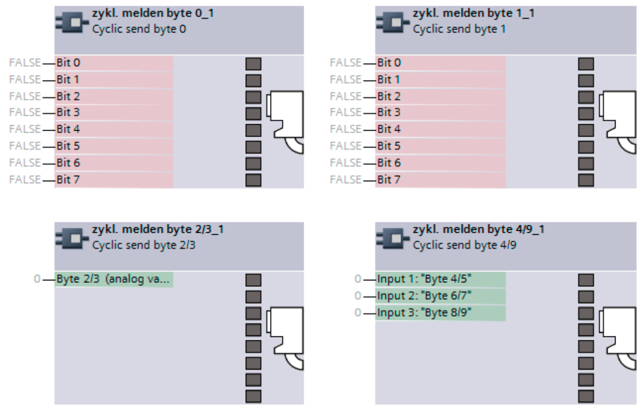


Figure 2-14 Cyclic data from SIMOCODE pro, basic type 1, 10 bytes

- Basic type 2, 4 bytes

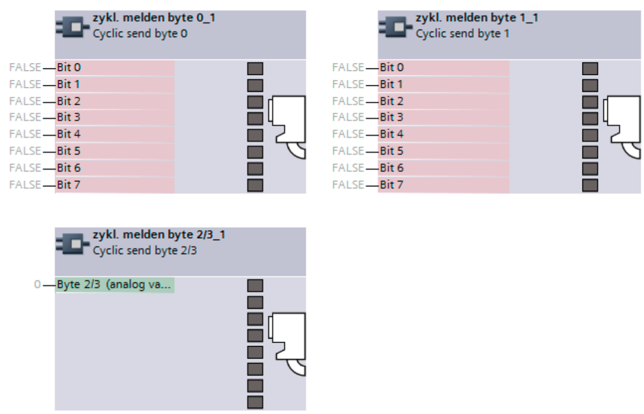


Figure 2-15 Cyclic data from SIMOCODE pro, basic type 2, 4 bytes

- Basic type 3, 20 bytes

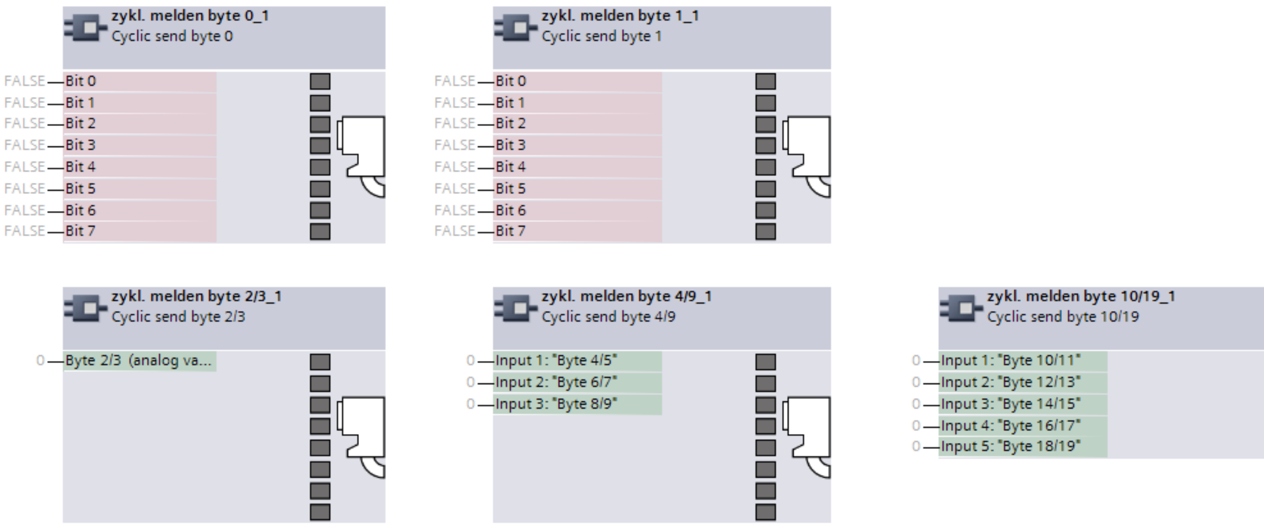


Figure 2-16 Cyclic data from SIMOCODE pro, basic type 3, 20 bytes

- PROFIsafe

No useful data, length 4 bytes.

2.2.6 Integration of SIMOCODE pro V PN via GSD

Using the GSD, integration into the PROFINET-IO system and device diagnostics are possible. For parameterization of the device function of SIMOCODE pro, use the SIMOCODE ES software.

Integrate the GSD for SIMOCODE pro V PN (GP) into the configuration tool of your automation system (e.g. STEP 7 HW Config). The GSD is available for downloading at the following link: PROFINET GSD (https://support.industry.siemens.com/cs/ww/en/view/38702563).

Note

GSD for SIMOCODE pro V PN (GP)

Different GSDs are available for 1-port/2-port devices.

After installation of the GSD, you will find SIMOCODE pro V PN (GP) in the hardware catalog of STEP7 V5 under "Hardware Catalog → Additional Field Devices → PROFINET IO → Switching Devices → Siemens AG → Motor Management System." Insert the SIMOCODE pro V PN (GP) into the PROFINET IO system.

After insertion of SIMOCODE pro V PN (GP), configure one of the three possible basic types in Slot 1 of the IO device inserted in this way (see figures about "Cyclic data to SIMOCODE pro" and "Cyclic data of SIMOCODE pro").

If SIMOCODE pro V PN (GP) is used in conjunction with the fail-safe DM-F PROFIsafe digital module, additionally configure the I/O configuration for PROFIsafe in slot 2.

2.2.7 Integration of SIMOCODE pro V PN in SIMATIC STEP 7 V5 via OM SIMOCODE pro

Integration of SIMOCODE pro V PN in SIMATIC STEP 7 V5 via OM SIMOCODE pro

In addition to integration via GSD, with SIMATIC S7 controllers from Siemens it is possible to integrate SIMOCODE pro V PN in STEP 7 V5 using the "Object Manager (OM) SIMOCODE pro V PN" software in STEP 7 as part of Totally Integrated Automation (TIA).

The advantage is that the SIMOCODE ES parameterization software can be called directly from STEP 7 HW Config and can be used for developing SIMOCODE pro V PN device parameters.

The SIMOCODE pro device parameters are stored in the STEP 7 project. After transmission of the hardware configuration, the device parameters are available in the form of start-up parameter data records in the CPU and are automatically transmitted during start-up.

The necessary OM SIMOCODE pro V PN software is part of SIMOCODE ES. During installation of SIMOCODE ES, select the "Integration in STEP 7" installation option to use the described function.

When the hardware is being configured, SIMOCODE pro V PN is integrated by selecting SIMOCODE pro in the hardware catalog from STEP 7 HW Config under "PROFINET IO → Switching Devices → Motor Management System".

Insert the SIMOCODE pro V PN into the PROFINET IO system.

Select one of the three possible basic types (see Integration of SIMOCODE pro into the automation system (PLC) (Page 46), figures "Cyclic data to SIMOCODE pro" and "Cyclic data from SIMOCODE pro").

Note

Changing the slot

It is only possible to change the slot by selecting another SIMOCODE type!

When using SIMOCODE pro V PN in conjunction with the fail-safe DM-F PROFIsafe digital module, select the relevant configuration with PROFIsafe.

Module replacement without exchangeable medium/PC

Note

Precondition for module replacement without exchangeable medium/PC

The use of this function depends whether the IO controller and the neighboring IO devices support this function.

Assuming the basic device has been integrated and parameterized using either the STEP 7 (TIA Portal) hardware catalog (Detecting and Monitoring – SIRIUS Monitoring and Control Devices) or SIMOCODE ES (TIA Portal), and the topology (partner port) has been configured, the

IO controller can automatically restore the device name, the IP configuration, and then the complete device parameterization of the replaced device.

Note

Do not use a memory module or initialization module!

To use this function, you do not have to and indeed must not use of a memory module or an initialization module!

For further information, see Chapter "Restoring factory settings" in SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

2.2.8 Configuring SIMOCODE pro V PN ports

Configuring the ports

SIMOCODE pro V PN (GP) has two RJ45 ports labeled 1 and 2 on the front. In the configuration tool of the automation system (e.g. STEP 7 HW Config), the settings for topology, diagnostics and other options of the two ports X1P1 and X1P2 are defined.

2.2.9 Configuration of further properties of SIMOCODE pro V PN as an IO device

Device name and IP parameters

The precondition for PROFINET IO communications is setting and configuring the IO device name and IP parameters.

The device name and the IP parameters can be assigned in different ways:

- Assigning device names using the configuration tool of the automation system
- Configure device names with SIMOCODE ES parameterization software and download to the device.

Assigning device names using the configuration tool of the automation system

The device name is assigned during the commissioning phase by the configuration tool of the automation system (e.g. STEP 7) or with the SIMOCODE ES configuration software and transmitted into the IO device via Ethernet. For transmission, the basic unit must be connected and accessible via the Ethernet interface. Using the MAC address (e.g. 00-0E-8C-BD-1F-27) printed on the front of the basic unit, the device can be accessible via LAN. In this case, the "Overwrite device name in device" parameter set with the SIMOCODE ES parameterization software under "PROFINET Parameters → Station" must not be active.

1. Device is given a technological name as part of configuration by the user (device name here: Motor-1). STEP 7 automatically assigns an IP parameter
2. The user assigns the device name to an IO device based on the MAC address and transfers this in the Online & Diagnostic functions of SIMOCODE ES (TIA Portal)

3. The user loads the configuration into the IO controller
4. IO controller assigns the IP parameters during start-up based on the device name

Configuring device names with SIMOCODE ES parameterization software and downloading to the device

In this case, the device name must be configured under "PROFINET Parameters → Station" and the "Overwrite device name in device" parameter must be active.

Note

Transferring the device parameters

It is always possible to transfer the device parameters via the system interface.

If the PROFINET IO device name has already been configured in a different way, the device parameters can be transferred via PROFINET, too.

Note

Assignment of the device name

The device name can be assigned with the "SIMOCODE ES" parameterization software in the Online & Diagnostic Functions. This function is not identical with parameterization with the "PROFINET parameter" dialog box. Unlike in this dialog box, under "PROFINET Parameters → Station," the "Overwrite device name in device" parameter must **not** be active.

Note

Changing the device name

Every change to the device name with SIMOCODE ES in the "PROFINET Parameters" dialog box requires a restart of the communication interface. A new start interrupts all Ethernet and PROFINET links and reestablishes them afterward.

---

1. Device is given a technological name (device name here: Motor-1)
2. Configuration is loaded into the IO controller
3. Configuration of device names and IP parameters with SIMOCODE ES:
   a) Device name "Motor-1" is configured with SIMOCODE ES and is transferred into the device via the system interface / PROFINET
   b) Device name and IP parameter are configured with SIMOCODE ES and are transferred into the device via the system interface / PROFINET

Transferring IP parameters

The IP parameters, consisting of IP address, subnet mask, and router can also be assigned in various ways and transferred to the IO Device.

Possibilities for this are:

- The IO Controller assigns the IP parameters to the IO Device. In this case, the "Overwrite IP parameters in device" parameter set with the SIMOCODE ES parameterization software under "PROFINET Parameters → IP Parameters" must **not** be active.

Note

Deleting IP parameters

IP parameters assigned by the IO controller are stored non-retentively in the device, i.e. they are deleted again when the supply voltage is switched off.

- The IP parameters are configured with SIMOCODE ES parameterization software and transferred to the device. In this case, the "Overwrite IP parameters in device" parameter under "PROFINET Parameters → IP Parameters" must be active.

Note

Transferring the device parameters

It is always possible to transfer the device parameters via the system interface.

If the PROFINET IO device name has already been configured in a different way, the device parameters can be transferred via PROFINET, too.

Note

Assigning the IP parameters

The IP parameters can be assigned with the "SIMOCODE ES" parameterization software in the Online & Diagnostic Functions. This function is not identical with the parameterization of the IP parameters with the "PROFINET Parameters" dialog box. Unlike in this dialog box, under "PROFINET Parameters → IP Parameters," the "Overwrite IP parameters in device" parameter must **not** be active.

Note

Restarting the communication interface

Every change to the IP parameter with SIMOCODE ES in the "PROFINET Parameters" dialog box requires a restart of the communication interface.

A new start of the communication interface interrupts all Ethernet and PROFINET links and reestablishes them afterward.

2.2.10 Identification data for PROFINET IO

Brief description of the identification data

Identification data are information that is stored in the PROFINET IO device and supports the user with the following activities:

- Checking the system configuration
- Locating modified system hardware
- Troubleshooting a system.

With the identification data, SIMOCODE pro V PN (GP) can be uniquely identified online.

The identification data can be edited with the configuration tool of the automation system (e.g. STEP 7) and with SIMOCODE ES and transferred to the device or read out of the device.

In STEP 7, the identification data are displayed on the "Module status" and "Properties ..." tab cards and loaded into the modules with "Load module identification data ..." with menu item "Target System." It is possible to transfer data already in the device into the configuration with "Load module identification data into the programming device" when configuring via GSD file (see STEP 7 Online Help on this function).

You can also assign the identification data with SIMOCODE ES. You will find this under "Identification." Only I&M 1 to I&M 3 can be changed.

The following identification data records are supported:

- I&M 0: Identification (device identification); read only
- I&M 1: Tag (plant identifier, location designation)
- I&M 2: Installation Date
- I&M 3: Descriptor (comment).

2.2.11 Shared device

Shared device provision

PROFINET IO provides the shared device function. Shared device enables access by two IO controllers to one IO device. Input and output data can be flexibly assigned to different IO controllers.

This function can only be used in conjunction with the fail-safe DM-F PROFIsafe expansion module. While one controller accesses the standard I/O data via an IO controller and performs the routine control, the fail-safe program is processed in a separate, fail-safe controller that is responsible for safety-related tripping via PROFIsafe.

Shared device configuration

The I/O data is assigned to the IO controllers in the configuration tool of the automation system (e.g. STEP 7 HW Config).

Note

Shared device function

The system redundancy function is not available when the "Shared Device Function" is used.

2.2.12 Media redundancy

Media redundancy support

The media redundancy protocol manages a redundant network. The data that are exchanged between IO controller and IO device are transmitted via two different paths.

If both Ethernet ports are used, the function enables communication to be maintained even if one of the two transmission channels fails.

Settings for media redundancy

In the configuration tool of the automation system (e.g. STEP 7 HW Config), the settings for media redundancy in the properties of Slot X1 of the relevant PN-IO devices. In particular, the MRP domain is assigned and the role is defined that will be taken over in the MRP by the device. SIMOCODE pro V PN (GP) supports ring redundancy in the role as a client.

Information material for media redundancy

You will also find useful information about "Ring redundancy with the Media Redundancy Protocol (MRP)" under Ring redundancy with the Media Redundancy Protocol (MRP) (https://support.industry.siemens.com/cs/ww/en/view/109739614)

2.2.13 System redundancy

System redundancy with H CPUs

The redundant-system connection via PROFINET provides a communication link (Application Relation) between each SIMOCODE pro V PN (GP) IO device and each of the two H CPUs. The communication link can be set up by means of a freely selectable topological connection, i.e. the topology of a plant does not indicate whether or not SIMOCODE pro PN (GP) is interfaced via a redundant-system connection. In addition to operation as a redundant system, the SIMOCODE pro V PN (GP) can also be operated on H CPUs as a so-called "non-redundant IO device". In this mode, only one of the two CPUs establishes a communication link to the IO device. The disadvantage of operating an IO device as a non-redundant device is that it will fail in the event of failure of the CPU to which it is linked.

Note

Firmware version of the H CPU

System redundancy is supported with H CPU firmware version V6.0.3 and higher.

SIMOCODE pro V PN with system redundancy

The diagram below illustrates a configuration with two redundant-system SIMOCODE pro V PN (GP) basic units. This topology offers particular advantages. The entire system can remain in operation if a line break occurs anywhere in the configuration. One of the two SIMOCODE pro V PN (GP) communication links always remains operational. The SIMOCODE pro V PN units then function like non-redundant devices.

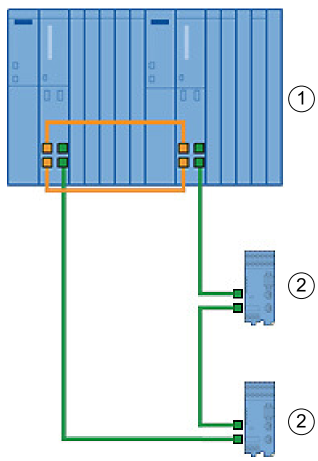


Figure 2-17 S7-400 H system with redundant I/Os

① S7-400H system

② SIMOCODE pro V PN (GP) as a redundant IO device

PN/IO with non-redundant I/Os

The following diagram illustrates an example of a topographical configuration with one switch. Two IO devices are connected as non-redundant units and the other three IO devices as redundant-system units.

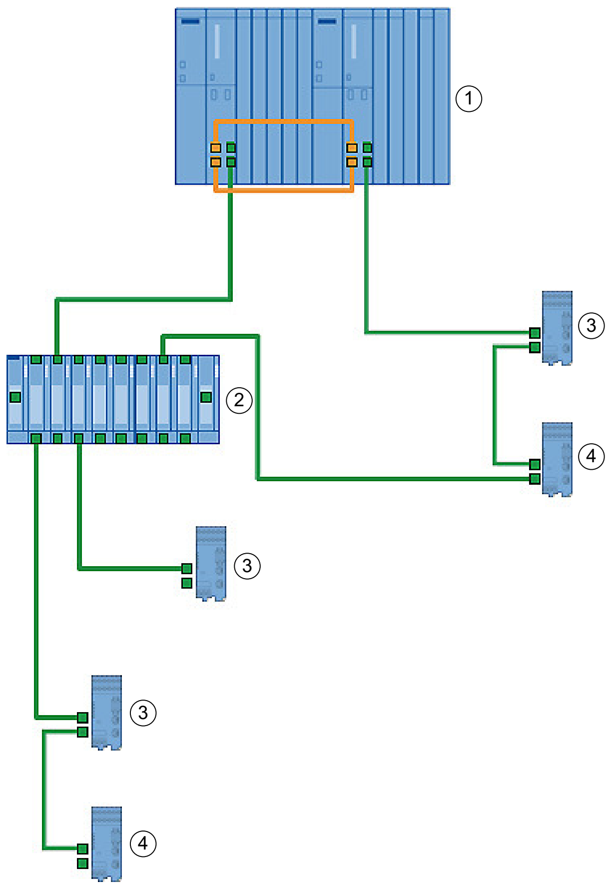


Figure 2-18 S7-400 H system with redundant and non-redundant I/Os

① S7-400H system

② SCALANCE (e.g. X400)

③ SIMOCODE pro as a redundant IO device

④ SIMOCODE pro as a non-redundant IO device

Maximum number of IO devices

You can connect a maximum number of 256 IO devices to the two integrated PN/IO interfaces. The station numbers range from 1 to 256 and must be unique at both the PN/IO interfaces, i.e. they must not be assigned to a station more than once.

Configuring system redundancy with PROFINET IO

Requirements

In the example below, you will configure a redundant-system PROFINET configuration with redundant I/Os as discussed in diagram "S7-400 H system with redundant I/Os" in the previous chapter.

The PROFIBUS elements have been excluded from this example. Please refer to manual Fault-tolerant S7-400H systems (https://support.automation.siemens.com/WW/view/en/1186523) for basic instructions on configuring H systems.

Procedure

Set up a new H station in the SIMATIC Manager and open "HW Config" for the station.

1. Insert a rack 400 (e.g. UR2-H) for redundant controllers.
2. Insert a CPU 400-H PN/DP (e.g. CPU 417-5H PN/DP).
3. Network the Ethernet interface in the normal way and set the IP parameters.
4. Configure a power supply module and the H-Sync modules.
5. Copy the station that you have set up: To do this, select the station and then select command Edit → Copy followed by command Edit → Paste.
6. Configure SIMOCODE pro V PN (GP) as a redundant IO device by dragging the IO devices in the normal way to one of the two IO systems. The modules will be connected as redundant units (to both PROFINET lines) as standard.

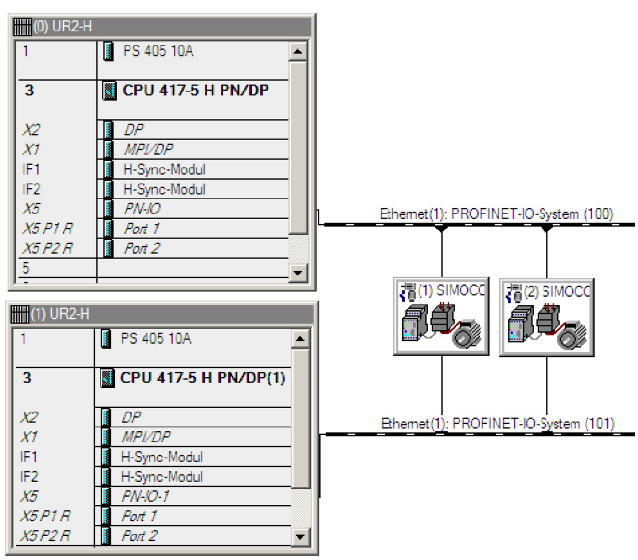


Figure 2-19 SIMOCODE pro V PN (GP) as a redundant I/O unit in HW Config

There are two methods by which you can connect SIMOCODE pro V PN (GP) as a non-redundant IO device:

- Configure a SIMOCODE pro V PN (GP) as a redundant IO device as described above and then navigate to the tab card labeled "Redundancy" in the module properties dialog. By activating the checkbox, you can assign the IO device to a single IO system and thus to a single CPU.

Figure 2-20 "Redundancy" tab card in module properties screen

Configure the SIMOCODE pro V PN (GP) specifically as a non-redundant IO at the relevant IO system.

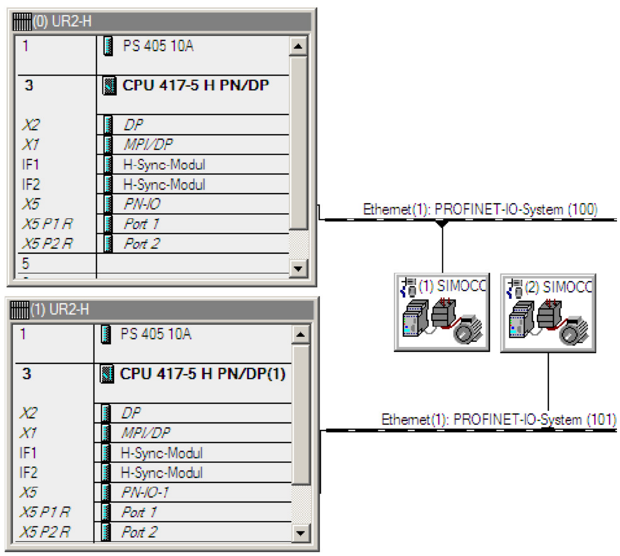


Figure 2-21 SIMOCODE pro V PN (GP) connected as a non-redundant device

Note

H systems and separate subnets

IO devices are connected as redundant units only if the two PROFINET I/O systems of the H system are in the same subnet. As an alternative, each CPU can be networked with a different subnet. In this case, the IO devices will always be connected as non-redundant units.

Note

Shared device function

The system redundancy function is not available when the "Shared Device Function" is used.

Note

Product version of SIMOCODE pro V PN basic unit

System redundancy is supported by product version *E05* and higher of SIMOCODE pro V PN with firmware version V1.2.

Possible topologies

You can also combine PROFINET-based system redundancy with other PROFINET functions.

System redundancy with media redundancy:

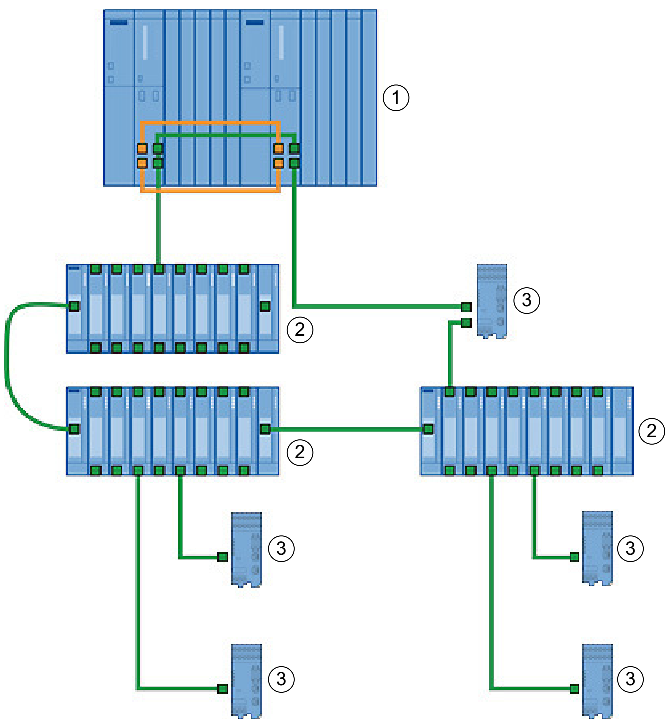


Figure 2-22 Sample configuration for system redundancy with MRP

① S7-400H system

② SCALANCE X400 (non-redundant IO device)

③ SIMOCODE pro V PN (GP) (non-redundant/redundant-system IO device)

④ SIMOCODE pro V PN (GP) (MRP, non-redundant/redundant-system IO device)

Note

Response monitoring time of IO devices

RT communication is interrupted (station failure) if the reconfiguration time setting of the ring is higher than the response monitoring time setting of the IO devices.

For this reason, make sure that the response monitoring time of the IO devices is set to a high enough value. This also applies to IO devices configured with MRP outside the ring.

2.2.14 Diagnostics

Diagnosis - Overview

When an error occurs, the defective IO device generates a diagnostics alarm and sends it to the IO controller. To respond to errors with a defined (programmed) response, this alarm calls a corresponding part in the user program (e.g. in the case of SIMATIC S7: organization block OB 82 for the diagnostics alarm).

SIMOCODE pro V PN (GP) provides the diagnostics as channel diagnostics data records. Channel diagnostics data records are generated as an alarm for

- Selected messages (see Chapter Data record 92 - Device diagnostics (Page 220), PNIO diagnostics column, marked with "1")
- Warnings
- Faults
- Device faults.

Diagnostic status

The channel diagnostics is transmitted with different diagnostics states:

- Maintenance required:
- Maintenance demand (maintenance requested):

All SIMOCODE pro monitoring functions with "warn" configured as their response are transmitted with this diagnostics status.

- Failure:

All SIMOCODE pro monitoring functions with "trip" configured as their response are transmitted with this diagnostics status.

Configuring the diagnostics response

The diagnostics response is configured with the SIMOCODE ES configuration software. The global enable of the diagnostics can be set for the following events under "PROFINET Parameters → Diagnostics":

Diagnostics for process events

Selected diagnostics events are transmitted with the "maintenance required" diagnostics status.

See also Chapter Data record 92 - Device diagnostics (Page 220), diagnostics events marked "1" in the "PNIO diagnostics" column.

Diagnostics for process warnings

All SIMOCODE pro monitoring functions in which the response has been configured with "warn" are transmitted with the "maintenance demand" diagnostics status.

Diagnostics for process faults

All SIMOCODE pro monitoring functions with "trip" configured as their response are transmitted with the "fault" diagnostics status.

Diagnostics for device faults

Diagnostics events that can occur in connection with defective hardware or incorrect parameterization are also transmitted with the "fault" diagnostics status.

The response of the different monitoring functions can be configured individually. Depending on the function, the following can be selected by configuration:

- Deactivated: There is no response. No diagnostics are produced.
- Signaling: The diagnostics event is entered in data record 92 and is displayed in the "Faults/ Warnings/Events" online dialog box of SIMOCODE ES. No diagnostics alarm is triggered.
- Warning: A diagnostics alarm is generated with the "maintenance demand" diagnostics status.
- Tripping: A diagnostics alarm is generated with the "fault" diagnostics status.

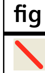
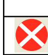
Evaluating diagnostics with SIMATIC S7 300/400 and STEP 7 V5

Diagnostics with STEP 7 HW Config

In the online display of STEP 7 HW Config, after selection of the corresponding module (in this case: SIMOCODE pro V PN), the status of the module is determined with the "module status" function.

The following statuses are represented in the overview:

Table 2-12 Module statuses in diagnostics with STEP 7 HW Config

Symbol representation in HW Config Online	Status in HW Config Online	Possible cause with SIMOCODE
	Module does not exist	SIMOCODE shut down or not accessible on the bus
	Module defective	Fault is pending
	Maintenance required	Warning is pending
	Maintenance required	Event it pending
OK	OK	None

The detailed diagnostics is displayed as follows on the "IO device diagnostics" tab card under "Channel-specific diagnostics":

Table 2-13 Detailed diagnostics with STEP 7 HW Config

Slot	Channel No.	Error
1: I/O module	0	Error text, e.g. "Execution of ON command"

Diagnostics in the STEP 7 user program

With PROFINET IO, you can perform diagnostics in the user program via system function modules.

Possibilities of diagnostics evaluation in the S7 user program:

PROFINET IO uses a non-manufacturer-specific structure for data records with diagnostics information. Diagnostics information are only formed for defective components. Two ways in which you can evaluate the diagnostics of SIMOCODE pro V PN via PROFINET are shown below.

You will find more information and detailed examples in the programming manual "PROFINET IO - from PROFIBUS DP to PROFINET IO" (https://support.automation.siemens.com/WW/view/en/19289930), Chapter 8 "Diagnostics in the STEP 7 User Program."

Evaluating diagnostics alarms with SFB 54 "RALRM" in OB 82

SIMOCODE pro V PN (GP) as a diagnostics-capable IO device detects both internal faults (e.g. of hardware components) and events relating to the motor feeder and generates a diagnostics alarm to which you can respond using an alarm OB.

Initial information on the cause and class of the error is already available, based on the OB number and start information for the fault event.

You can then obtain detailed information on the error event in this error OB with the SFB 54 "RALRM" (read supplementary alarm information).

Note

STEP 7 online help

You will find a detailed explanation of SFB 54 "RALRM" in the STEP 7 Online Help.

Alarm processing

On process warnings, process faults, and device faults, SIMOCODE pro V PN (GP) makes diagnostic interrupt requests to the CPU (on both the raised and the cleared event). The precondition is that the diagnostics response has been enabled for these events in the device parameterization (see Section "Configuring the diagnostics response" above).

The operating system calls the OB 82 based on the diagnostics request. The local variables of OB 82 contain the logical base address and four bytes of diagnostics data about the SIMOCODE pro V PN (GP) device in question.

If you have not programmed OB 82, the CPU will switch to the "STOP" status.

Reading diagnostics data records with SFB 52 "RDREC" in OB 1

With SFB 52 "RDREC," you read the data record with number INDEX from the SIMOCODE pro V PN (GP) IO Device addressed by means of ID. ID contains the logical address with which SIMOCODE pro V PN was configured in STEP 7 HW Config.

Example:

If you want to obtain diagnostic information with the 0xE00A diagnostics data record for the pending faults from SIMOCODE pro V PN at the device level, INDEX = W#16#E00A.

With the MLEN variable, you specify the maximum number of bytes to be read. For this reason, you select the target area RECORD to be at least the same size as MLEN.

The "true" value of the VALID output parameter indicates that the data record has been successfully transferred to the target area RECORD. In this case, the output parameter LEN has the length of the read data in bytes.

If an error occurs during data record transmission, this will be displayed in the "ERROR" output parameter. In case of an error, "ERROR = true" is set and the error data will be contained in the "STATUS" output parameter.

Note

STEP 7 online help

You will find a detailed explanation of SFB 52 "RDREC" in the STEP 7 Online Help.

Note

Complete diagnostics information from SIMOCODE pro V PN (GP)

Note that reading the diagnostics data records 0xCXXX only ever provides the pending diagnostics.

You can evaluate the complete diagnostics information of SIMOCODE pro V PN (GP) by reading data record 92 (0x005C).

You will find more information and detailed examples in Chapter 8 of the programming manual "PROFINET IO - from PROFIBUS DP to PROFINET IO" (https://support.automation.siemens.com/WW/view/en/19289930).

Addressing levels

PROFINET IO defines different addressing levels via which diagnostics information of the IO devices can be accessed. You will find more information in Chapter 5 of the programming manual "PROFINET IO - from PROFIBUS DP to PROFINET IO" (https://support.automation.siemens.com/WW/view/en/19289930).

Diagnostics information from SIMOCODE pro V PN is evaluated at the addressing level for the slot.

Overview of the diagnostics data records

Table 2-14 Diagnostics data records at slot level

Diagnostics data record No.	Diagnostic status
0xC010	Maintenance required
0xC011	Maintenance demand
0xC00A	Fault
0xC00C	All (maintenance required, maintenance demand, fault)

Example:

- Reading the diagnostics data record 0xC00C provides all pending diagnostics information (maintenance required, maintenance demand, fault).
- Reading the diagnostics data record 0xC011 provides all pending diagnostics information with the "maintenance demand" diagnostics status at slot level.

Structure of the diagnostics data records

Data blocks, diagnostics data records

In the following description, the main structure of the diagnostics data records at slot level (0xC010, 0xC011, 0xC00A) is described with the individual data blocks:

Table 2-15 Data blocks, diagnostics data records

BlockType	2 bytes
BlockLength	2 bytes
BlockVersion	2 bytes
API (Application Process Identifier)	4 bytes
SlotNumber	2 bytes
SubslotNumber	2 bytes
ChannelNumber	2 bytes
ChannelProperties	2 bytes
USI (User Structure Identifier)	2 bytes
Number of repeats = number of entries	
ChannelNumber	2 bytes
ChannelProperties	2 bytes
ChannelErrorType	2 bytes

Data block "BlockType"

Table 2-16 Data block "BlockType"

BlockType	Meaning
0x0010	Diagnostics data record
0x0001	Alarm transport channel 1
0x0002	Alarm transport channel 2

Data block "BlockLength"

In the "BlockLength" data field, the number of the following bytes of the diagnostics data record is coded. This is the length of the diagnostics data record without the number of bytes for the data fields "BlockType" and "BlockLength," which each have a length of 2 bytes.

Data block "BlockVersion"

Table 2-17 Data block "BlockVersion"

BlockVersion	Value	Meaning
BlockVersionHigh	0x01	First value of the version number, 0x01
BlockVersionLow	0x01	Version number, always 0x01 in the case of SIMOCODE pro

Data block "API"

API (Application Process Identifier): SIMOCODE pro uses the standard API 0.

Data blocks "SlotNumber," "SubslotNumber"

As a compact PROFINET IO Device, SIMOCODE pro V PN (GP) has the following structure:

Table 2-18 Data blocks "SlotNumber," "SubslotNumber"

Designation	SlotNumber	SubslotNumber
Head module - Interface - Port 1 - Port 2	0x0000	0x0001 0x8000 0x8001 0x8002
I/O module	0x0001	0x0001
PROFIsafe [1)]	0x0002	0x0001

1) Only in conjunction with fail-safe DM-F PROFIsafe expansion module

Data block "ChannelNumber"

Table 2-19 ChannelNumber

ChannelNumber	Meaning
0x0000 - 0x7FFF	Manufacturer-specific
0x8000	Submodule

Data block "ChannelProperties"

Table 2-20 ChannelProperties

<table>
<tr><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr>
<tr><td colspan="3" rowspan="5">.Direction</td><td colspan="2" rowspan="4">.Specifier</td><td colspan="2" rowspan="3">.Qualifier</td><td rowspan="2">.Acc.</td><td colspan="8">.Type</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td colspan="9"></td></tr>
<tr><td colspan="11"></td></tr>
<tr><td colspan="13"></td></tr>
</table>

Data block "ChannelProperties.Type (Bit 0 -7)"

Table 2-21 ChannelProperties.Type (Bit 0 - 7)

Value	Meaning
0	If ChannelNumber has the value 0x8000
1	1 bit
2	2 bits
3	4 bits
4	8 bits
5	16 bits
6	32 bits
7	64 bits

Data block "ChannelProperties.Accumulative (bit 8)"

Table 2-22 ChannelProperties.Accumulative (bit 8)

Value	Meaning
0	No channel error group signal
1	Channel error group signal (more than one channel affected)

Combination of ChannelProperties.Qualifier (bit 9/10) and ChannelProperties.Specifier (bit 11/12)

Maintenance Required Bit 9	Maintenance Demanded Bit 10	Specifier Bit 12/11	Meaning	Diagnostics in user programs SIMATIC S7 300 and SIMATIC S7 400
0	0	00	All lower-level diagnostics are no longer pending	Evaluation of diagnostic interrupts with SFB54 in the OB82
		01	Diagnostics active	Evaluation of diagnostic interrupts with SFB54 in the OB82 read data records with SFB52
		10	Diagnostics no longer active	Evaluation of diagnostic interrupts with SFB54 in the OB82
		11	Status signal - only possible for manufacturer-specific errors	Evaluation of diagnostic interrupts with SFB54 in the OB82

Maintenance Required Bit 9	Maintenance Demanded Bit 10	Specifier Bit 12/11	Meaning	Diagnostics in user programs SIMATIC S7 300 and SIMATIC S7 400
0	1	00	Reserved	-
		01	Maintenance required is active	Evaluation of diagnostic interrupts with SFB54 in the OB82 read data records with SFB52
		10	Maintenance required no longer active	Evaluation of diagnostic interrupts with SFB54 in the OB82
		11	Maintenance required no longer active - all others still active	

Combination of ChannelProperties.Qualifier (bit 9/10) and ChannelProperties.Specifier (bit 11/12) (continued)

Maintenance Required Bit 9	Maintenance Demanded Bit 10	Specifier Bit 12/11	Meaning	Diagnostics in user programs SIMATIC S7 300 and SIMATIC S7 400
1	0	00	Reserved	-
		01	Maintenance demand is active	Evaluation of diagnostic interrupts with SFB54 in the OB82 read data records with SFB52
		10	Maintenance demand no longer active	Evaluation of diagnostic interrupts with SFB54 in the OB82
		11	Maintenance demand no longer active - all others still active	
1	1	00	Reserved	-
		01	Graded diagnostics is active	Evaluation of diagnostic interrupts with SFB54 in the OB82 read data records with SFB52
		10	Graded diagnostics no longer active	Evaluation of diagnostic interrupts with SFB54 in the OB82
		11	Graded diagnostics no longer active - all others still active	

Data block "ChannelProperties.Specifier (Bit 11/12)"

Table 2-23 ChannelProperties.Specifier (bit 11/12)

Value	Meaning	Diagnostics in user programs SIMATIC S7 300 and SIMATIC S7 400
00	Reserved	-
01	Pending diagnostics	Evaluation of diagnostic interrupts with SFB54 in the OB82 read data records with SFB52

Value	Meaning	Diagnostics in user programs SIMATIC S7 300 and SIMATIC S7 400
10	Cleared event and no further events	Evaluation of diagnostic interrupts with SFB54 in the OB82
11	Cleared events, but other events remain	

Data block "ChannelProperties.Direction (bits 13 - 15)"

Table 2-24 ChannelProperties.Direction (bit 13 - 15)

Value	Meaning
000	Manufacturer-specific
001	Input
010	Output
011	Input/Output
100 - 111	Reserved

Data block "ChannelErrorType"

The ChannelErrorType does not indicate the "Fault" status. For this purpose, there is the PNIO diagnostics status for the raised alarm: Maintenance Required, Maintenance Demanded, Failure.

Table 2-25 ChannelErrorType

ChannelError-Type	Meaning
0x0009	Error [1)]
0x0010	Parameterization error [1)]
Error of the PROFINET interface	
0x8000	Data transmission not possible
0x8001	Incorrect neighborhood
0x8002	Loss of redundancy
0x8003	Loss of synchronization (bus end)
0x8004	Loss of clock synchronization (device end)
0x8005	Slave-to-slave traffic connection error
0x8008	Error in network component
0x8009	Timebase error
Device diagnostics	
0x1000	Execution ON command
0x1001	Execution stop command
0x1002	Feedback (FB) ON
0x1003	Feedback (FB) OFF
0x1004	Stalled positioner
0x1005	Double 0
0x1006	Double 1
0x1007	End position
0x1008	Antivalence
0x100A	Cold start (TPF)

ChannelError-Type	Meaning
0x100B	Power failure (UVO)
0x100C	Operational protection OFF (OPO)
0x1021	Unbalance
0x1022	Overload
0x1023	Overload + Loss of phase
0x1024	Thermistor overload
0x1025	Thermistor short circuit
0x1026	Thermistor open circuit
0x1027	Internal ground fault
0x1028	EM/EM+ External ground fault
0x1029	EM+ open circuit
0x1030	TM2 out of range
0x102A	EM+ short circuit
0x102B	TM1 trip level T>
0x102C	TM1 sensor error
0x102D	TM1 out of range
0x102E	TM2 trip level T>
0x102F	TM2 sensor error
0x1040	Trip level I>
0x1041	Trip level I<
0x1042	Trip level P>
0x1043	Trip level P<
0x1045	Trip level cos phi<
0x1047	Trip level U<
0x1048	AM1 trip level 0/4-20mA>
0x1049	AM1 trip level 0/4-20mA<
0x104A	AM2 trip level 0/4-20mA>
0x104B	AM2 trip level 0/4-20mA<
0x104C	Stalled rotor
0x1055	Test trip
0x1057	Number of starts>
0x105B	AM1 open circuit
0x105C	AM2 open circuit
0x105D	DM-F safety-related tripping
0x1061	DM-F wiring
0x1062	DM-F cross circuit
0x1070	External fault 1
0x1071	External fault 2
0x1072	External fault 3
0x1073	External fault 4
0x1074	External fault 5
0x1075	External fault 6

1) Further details of the cause of error can be obtained by reading data record 92 "Device diagnostics."

Data block "User Structure Identifier (USI)"

Table 2-26 User Structure Identifier (USI)

USI	Meaning
0x0000 - 0x7FFF	Manufacturer-specific diagnostics
0x8000	Channel diagnostics
0x8002	Extended channel diagnostics
0x9000 - 0x9FFF	Profile-specific

Example of the diagnostics data records

The following example shows the content of the data record 0xC010 with the pending fault "execution of ON command":

Table 2-27 Content of data record 0xC010 for the pending fault "execution ON command"

BlockType	0x0010: Diagnostics data record
BlockLength	0x0016: Block length 22 bytes
BlockVersion	0x0101: always 0x0101 in the case of SIMOCODE
API	0x00000000: always 0 in the case of SIMOCODE
SlotNumber	0x0001: Slot 1 - I/O address
SubslotNumber	0x0001: Sub-slot 1
ChannelNumber	0x8000: Submodule
ChannelProperties	0x0800: Pending diagnostics
USI (User Structure Identifier)	0x8000: Channel diagnostics
ChannelNumber	0x0000: always 0 in the case of SIMOCODE
ChannelProperties	0x6804: Pending diagnostics
ChannelErrorType	0x1000: Execution ON command

2.2.15 Data records

Reading and writing data records in the STEP7 user program

With SFB 52 "RDREC," you read the data record with number INDEX from the SIMOCODE pro V PN (GP) IO Device addressed by means of ID.

ID contains the logical address with which SIMOCODE pro V PN (GP) was configured in STEP 7 HW Config.

Example:

SIMOCODE pro V PN (GP) was configured in STEP 7 HW Config with basic type 2 (I address 0 / O address 0).

You want to read data record 94 - measured values.

SFB "RDREC"

INDEX:	W#16#005E	Data record 94 - measured values (0x005E)
ID:	DW#16#0	Logical address 0
LEN:	W#16#00AC	Data record length 172 bytes (0x00AC)

With SFB 53 "WRREC," you read the data record with number INDEX into the SIMOCODE pro V PN (GP) IO device addressed by means of ID.

ID contains the logical address with which SIMOCODE pro V PN (GP) was configured in STEP 7 HW Config.

Example:

SIMOCODE pro V PN (GP) was configured in STEP 7 HW Config with basic type 2 (I address 16 / O address 16).

You want to write data record 95 - service data/statistical data (data record length 148 bytes (0x0094)).

SFB "WRREC"

INDEX:	W#16#005F	Data record 95 - service data/ statistical data (0x005F)
ID:	DW#16#F	Logical address 16
LEN:	W#16#0094	Data record length 148 bytes (0x0094C)

Note

STEP 7 online help

You will find a detailed explanation of SFB 52 "RDREC" in the STEP 7 Online Help.

An overview of the data records is provided in Chapter PROFINET data records (Page 214).

2.2.16 PROFIenergy

PROFIenergy - definition

PROFIenergy, a protocol defined by the PROFINET User Organization, lays the foundations for a vendor-neutral, universal system for flexible, short-term, and intelligent shutdown of individual loads or whole production units.

PROFIenergy - functions supported

With the PROFIenergy data record index 0x80A0, SIMOCODE pro V PN (GP) supports the following PROFIenergy functions of device class type 3 "Switching and measuring devices without their own energy-saving level":

Table 2-28 PROFIenergy - functions supported

Service	Service-ID	Meaning
Start_Pause	0x01	Switching off the motor in "remote" mode
End_Pause	0x02	Possible to switch on the motor again
Query_Modes - list of modes - get mode	0x03	Energy-saving modes - Query the supported energy-saving modes - Read out the energy-saving mode
PEM_Status	0x04	Read out of the PROFIenergy status
PE_Identify	0x05	Read out of the supported PROFIenergy services
Query_Measurement - get measurement list - get measurement values	0x10	Measured values - Query the list of supported measured values - Read out the supported measured val-ues

Start_Pause

The "Start_Pause" command result in direct shutdown of the motor and activation of the OFF command. This command only affects the control station PLC/PCS [PN] on the precondition that the commands of this control station are enabled in the relevant mode. It therefore only has an effect if the control commands of this control station are also active. The "PE command Start_Pause pending" status is output.

If the motor is already switched off, the "PE energy-saving mode active" status is output. In this status, the LED "device" flashes green on the basic unit.

Note

Command "Start_Pause"

Use of this function is not meaningful in conjunction with the "overload" control function because this does not need any control station for routine switch-off and switch-on.

Minimum pause time

A pause time is transferred with the "Start_Pause" command. SIMOCODE pro V PN (GP) executes this command if the pause time is greater than the minimum pause time configured in the device. The minimum pause time of the motor is configured with the SIMOCODE ES software under "PROFIenergy." The minimum pause time is preset to the smallest possible value 0.1 s. You can increase the minimum pause time if executing the command in longer pauses is convenient for technological reasons.

End_Pause

The "End_Pause" command results in the stop command being canceled at the PLC/PCS control station and the motor being switched on again via enabled control stations.

Note

Command "End_Pause"

The command to switch on has to be output again because subsequent automatic switch-on is not performed.

Note

Switching on the motor in the paused condition

If the PLC/PCS control station is disabled, the motor can also be switched on in the paused condition.

Query_Measurement

Depending on the use of the current measuring or the current-voltage measuring module, the following measured values are supported:

Table 2-29 Query_Measurement

Measurement-ID	PROFIenergy identifier	SIMOCODE pro identifier	Unit
4	Voltage (a-b)	Voltage U_L12 V	V
5	Voltage (b-c)	Voltage U_L31 V	V
6	Voltage (c-a)	Voltage U_L31 V	V
7	Current (a)	Phase current I_L1 A	A
8	Current (b)	Phase current I_L2 A	A
9	Current (c)	Phase current I_L3 A	A
33	Current average (abc)	Average phase current I_L A	A
34	Active power (total)	Active power P	W
36	Apparent power (total)	Apparent power S	VA
37	Power factor (total)	Cos phi	-
200	Active energy import (total)	Energy W	Wh

Function blocks for SIMATIC S7

The application description "Saving Energy with SIMATIC S7 and ET200 S" (http://support.automation.siemens.com/WW/view/en/41986454), which also contains an example program for using PROFIenergy functions, is available on the Internet service portal of Siemens AG, Industry Automation and Drives Technologies. You can also make use of the blocks from the example to implement PROFIenergy functions in conjunction with SIMOCODE pro V PN (GP).

In the application description in Chapter 4.2 "FB 815 PE_START_END functionality," you will find the description of the block with which the "PE_START_Pause" or "PE_END_Pause" commands can be directly transferred to an IO device.

With the FB 815 "PE_START_END" function block, you can transfer the "START_Pause" or "END_Pause" commands directly to SIMOCODE pro V PN (GP).

For use of further functions, in Chapter 4.3 "FB 816 PE_CMD functionality" you will find a universal function block with which you can transfer further commands of the PROFIenergy profile (e.g. Query_Modes, PEM_Status, PE_Identify, Query_Measurement).

You will also find the structure of the command and response data of the FB 816 in Chapter 4.4 "Response Data" of the application description "Saving Energy with SIMATIC S7 and ET200 S."

2.2.17 Further communication functions via Ethernet

OPC basics

The OPC Foundation (an interest group of renowned manufacturers for definition of standard interfaces) has defined numerous software interfaces over the past years to standardize the flow of information from the process level to the management level. In the past, the various OPC specifications have been drawn up in line with the different requirements within an industrial application.

Based on the experience of these classic OPC interfaces, the OPC Foundation has defined a new platform with the name OPC Unified Architecture (UA). The aim of this new standard is generic description and standardized access to all information that has to be exchanged between systems and/or applications.

What is OPC?

In the past, OPC was a collection of software interfaces for data exchange between PC applications and process devices. These software interfaces were defined according to the rules of Microsoft COM (component object model) and can therefore be easily integrated on Microsoft operating systems. COM or DCOM (Distributed COM) provides the functionality of interprocess communication and organizes information exchange between applications, including across computer boundaries (DCOM).

An OPC client (COM client) can therefore exchange information with an OPC server (COM server) using mechanisms of the Microsoft operating system.

The OPC server provides process information of a device at its interface. The OPC client connect to the server and can access the data offered.

The consequence of using COM or DCOM is that the OPC server and clients can only run on a Windows PC or in the local area network and usually have to implement communication with the corresponding automation system via proprietary protocols. This practice, in particular, results in additional communication and software layers that increase the configuration effort and complexity.

To resolve the above restrictions in practice and to meet the additional requirements, the OPC Foundation has defined a new platform with the name OPC Unified Architecture, which provides a standardized basis for exchanging information between components and systems. OPC-UA will also be available as an IEC 62541 standard and will thus form the basis for other international standards.

To summarize, OPC-UA offers the following features:

- Use of open and non-platform-specific protocols for network communication.
- Internet access and communication through firewalls.
- Integrated access control and security mechanisms at the protocol and application level.

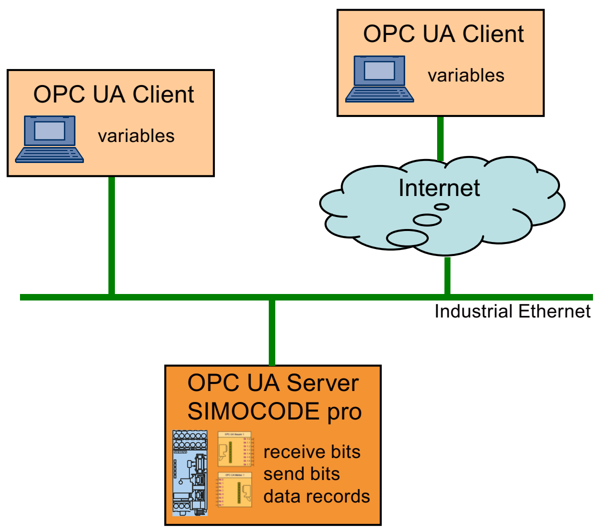


Figure 2-23 Block diagram of OPC-UA

Configuring the SIMOCODE pro V PN OPC UA server - Requirements

Activating the OPC UA server

In the default setting, the OPC UA server is **not** active. For activation, the parameter "PROFINET Parameters → OPC UA Server Activated" must be set.

Note

Restarting the communication interface

Each change to the "Activate OPC UA server" parameter requires that the communication interface be restarted.

A new start of the communication interface interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Note

Firmware version of SIMOCODE pro V PN basic unit

OPC UA is supported by SIMOCODE pro V PN from firmware version V1.2.2, product version *E07*.

Setting the IP parameters

To enable a link to be established via OPC-UA, SIMOCODE pro V PN (GP) must have valid IP parameters.

Example of the URL of the SIMOCODE pro V PN-OPC UA server:

opc.tcp://192.168.0.2:4840, where 192.168.0.2 is the IP address of SIMOCODE pro V PN (GP).

The IP parameters, consisting of IP address, subnet mask, and router can be configured with SIMOCODE ES and transferred to the device.

If SIMOCODE pro V PN (GP) does not obtain these parameters in another way (e.g. from the controller via PROFINET IO), the "Overwrite IP parameters in device" parameter must be activated under "PROFINET Parameters → IP Parameters."

Note

If the IP parameters are changed during an active OPC-UA connection under "Online access → Accessible nodes → Online & Diagnostics → Functions → Assign IP address", then a restart is necessary with Commissioning → Command → Restart/Cold start.

Connecting to the SIMOCODE pro OPC UA server

Introduction

An OPC UA client can access process values in the hierarchical namespace of the SIMOCODE pro V PN (GP)-OPC UA server.

To enable this, the OPC UA server and the OPC UA client authorize each other by exchanging certificates. You can additionally encrypt the data traffic.

The SIMOCODE pro V PN (GP)-OPC UA server classes every certificate of an OPC UA client as "trustworthy" by default.

Note

Configuring the connection on the client side

You can obtain information directly from the manufacturer of the software that is to access the data of the SIMOCODE pro V PN (GP)-OPC UA server via OPC UA.

Supported OPC UA services of the SIMOCODE pro V PN (GP) OPC UA server

SIMOCODE pro V PN (GP) supports the following OPC UA services:

- SecurityPolicy:
  - None
  - Basic128Rsa15
- MessageSecurityMode:
  - None
  - Sign&Encrypt.

Explanation of security settings:

The following table shows the security functions supported by the SIMOCODE pro V PN (GP) OPC UA server, which have to be set in the connection configuration of the OPC UA client:

Table 2-30 Security functions that have to be set in the connection configuration of the OPC UA client

Security Policy	MessageSecurityMode
None 1)	None
Basic128Rsa152	SignAndEncrypt 2)

1) Exchange of certificates is deactivated

2) The data packets are signed and encrypted with the certificates.

Note

When using the MessageSecurityMode "SignAndEncrypt", the connection timeout effective in the OPC UA Client must be set to at least 15 s.

DANGER

Unsecured connection between the client and the server possible!

Use the setting "none" for test purposes only.

During productive operation, use the following settings for secure communication between the client and server:

- Security Policy: Basic128Rsa15
- Message Security Mode: SignAndEncrypt.

Note

Requirement for certificate exchange in SIMOCODE pro V PN (GP)

The precondition for certificate exchange in SIMOCODE pro V PN is the presence of a valid time (see Section "Time-of-day synchronization by the NTP procedure" below).

Access to SIMOCODE pro V PN (GP)-OPC UA variables

The OPC-UA server integrated into SIMOCODE pro V PN (GP) provides the following structured objects in its address space to which the client can have read access and, in some case, write access. The precondition for write access is a secure connection with Security Policy "Basic128Rsa15" and Message Security Mode "SignAndEncrypt."

Table 2-31 Access to SIMOCODE pro V PN (GP)-OPC UA variables

Tag	Designation	Read / write
Diagnostics	Device diagnostics	Read
Diagnostic events		
Diagnostic status		
Diagnostic trips		
Diagnostic warnings		

Tag	Designation	Read / write
Measured values	Measured values	Read
Statistics	Display and statistical data	Read
Acyclic receive	Receive data (OPC UA Receive)	Read / write
Analog value	Analog value	
Bit 0.0 - 1.7	Digital receive data	
Acyclic send	Send data (OPC UA Send)	Read
Bit 0.0 - 1.7 1)	Digital send data	

1) The current assignment of the OPC UA send data is displayed as it was configured in SIMOCODE pro V PN (GP).

You will find a detailed description of each variable in Chapter OPC UA variables (Page 193)

Write access is only possible via a secure connection.

Table 2-32 Quantities and update interval

Maximum number of clients	Max. 2
Maximum number of monitored terms	160
Maximum number of subscriptions	2
Shortest update interval for subscriptions	100 ms

Configuring the OPC UA receive and send data with SIMOCODE ES

OPC UA Receive

The bit information that is to be transferred via OPC UA Receive to SIMOCODE pro is also assigned by configuring with SIMOCODE ES.

OPC-UA variables (write):

- Receive data byte 0, bits 0-7
- Receive data byte 1, bits 0-7
- Receive data byte 2/3

Data to SIMOCODE pro V PN (GP):

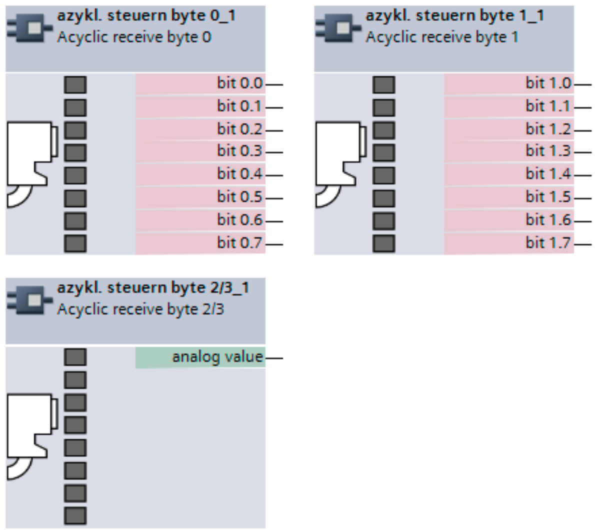


Figure 2-24 OPC UA Receive 0, 1, 2/3 function blocks

Example:

The motor is to be switched on and off via the control station "PC/OPC UA."

OPC UA - Acyclic receive - Bit 0.0 → Motor ON<

OPC UA - Acyclic receive - Bit 0.1 → Motor OFF

OPC UA - Acyclic receive - Bit 0.2 → Motor ON>

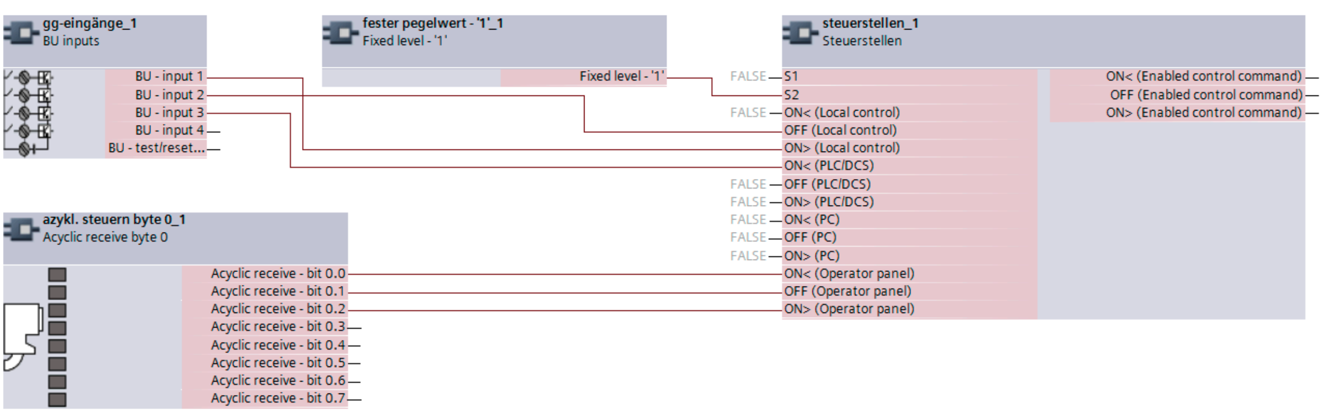


Figure 2-25 Example of OPC UA motor control

Note

Write access

Write access is only possible if a secure connection is used with Security policy "Basic128Rsa15" and with Message security mode "SignAndEncrypt."

Note

Non-maintained command mode

Do **not** use the "non-maintained command mode" for motor control with OPC UA!

Connection monitoring

The OPC UA connection is monitored over time. The monitoring time is set by the OPC UA client and is in the range of 10 s to 100 s. If the OPC UA connection is terminated, the OPC UA control variables set by this OPC client will be deleted in SIMOCODE pro only after this time has expired. In SIMOCODE pro, no fault is triggered.

If failure of the OPC UA connection of SIMOCODE pro is to be monitored, this can be done as follows:

WARNING

The drive cannot be controlled.

Can result in death, serious injury, or property damage.

If the connection is interrupted, the drive cannot be controlled while the OPC-UA connection monitoring time is active.

Take suitable safety measures to avoid personal injury or property damage.

Example:

Makes sure that Bit 0.7 is set statically at the client end. If the connection is interrupted, this will activate the "PLC/PCS" fault in "remote" mode (mode selector S1=1, S2=1).

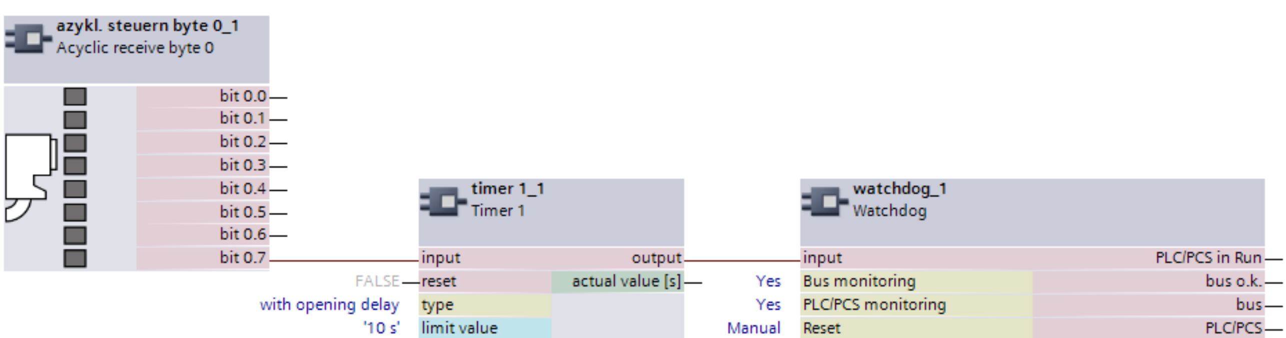


Figure 2-26 Example of connection monitoring

OPC UA send

The bit information that is to be transferred to the client via OPC UA Send is also defined by configuring with SIMOCODE ES.

OPC-UA variables (read):

- Send data byte 0, bits 0-7
- Send data byte 1, bits 0-7

Data from SIMOCODE PRO V PN (GP):

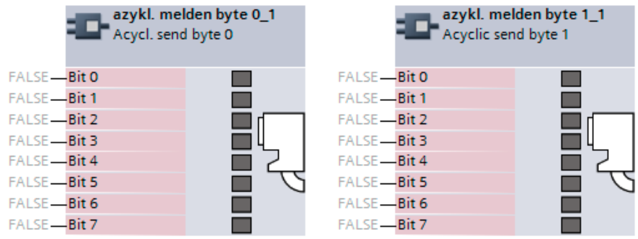


Figure 2-27 OPC UA Send 0, 1 function blocks

Example:

The feedback of the switching state of the motor is transferred to the client via OPC UA. When selecting the variables in the OPC UA client, the assigned status signals are then as follows:

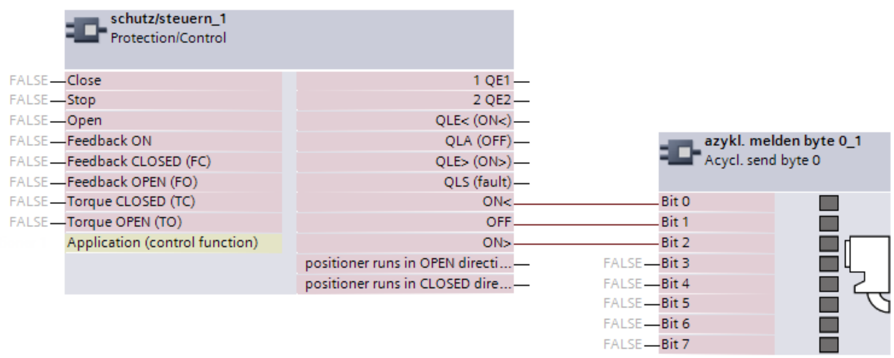


Figure 2-28 Configuration of OPC UA Send in SIMOCODE ES

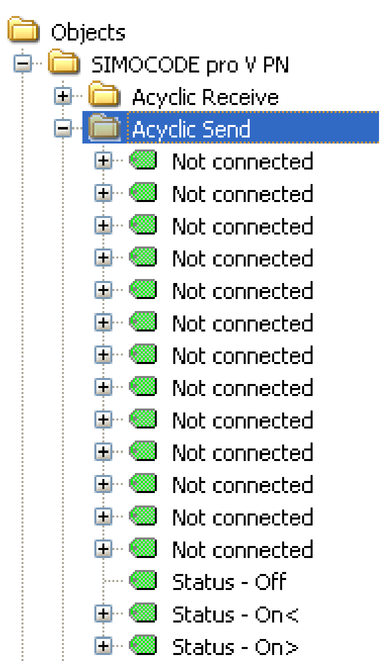


Figure 2-29 Representation in the object directory of the SIMOCODE pro V PN-OPC UA server (see also table below)

Configuration of OPC UA Send in SIMOCODE ES	Representation in the object directory of the SIMO-CODE pro V PN-OPC UA server
OPC UA Send - Bit 0.0: "Status ON<"	Acyclic Send → Status - On <
OPC UA Send - Bit 0.1: "Status Off"	Acyclic Send → Status - Off
OPC UA Send - Bit 0.2: "Status ON>"	Acyclic Send → Status - On >
...	...
OPC UA Send - Bit 0.3: "Not connected"	Acyclic Send → Not connected
OPC UA Send - Bit 1.7: "Not connected"	Acyclic Send → Status - On <

Note

Restarting the communication interface

Each change to the configuration of the OPC UA send data requires that the communication interface be restarted.

A new start of the communication interface interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Web diagnostics (web server)

SIMOCODE pro V PN (GP) offers you with the web diagnosis the possibility of calling the following information of the motor feeder from a PG/PC using an HTTP client:

- Status information
- Faults, warnings, events
- Measured values
- Service and statistical data
- Error buffer, error protocol.

The following functions for controlling the motor feeder is available for authorized users after log-on with user name and password:

- Receive (switching the motor on and off, not available in non-maintained command mode)
- Acknowledging faults
- Execution of the test function.

Number of web server connections: One connection is supported.

Web diagnostics are available in Chinese, Russian, English and German.

Activating the web server:

The default setting of the web server is "not active." To activate it, the "PROFINET Parameters →Web Server Activated" parameter must be active.

Note

Restarting the communication interface

Each change to the configuration of the web server requires that the communication interface be restarted.

A new start of the communication interface interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Setting the IP parameters:

To enable a link to be established via the web, SIMOCODE pro V PN (GP) must have valid IP parameters. You can find out how to make these settings in Chapter Configuration of further properties of SIMOCODE pro V PN as an IO device (Page 51).

Configuration of the user name and password:

If the functions are to be used to control the motor feeder, a user must additionally be configured with the user name and password. User name and password must not contain any blanks. Configuration is performed under "PROFINET Parameters → OPC UA server / web server"

Note

Control station PC/OPC UA

The control via the web uses the SIMOCODE pro control station PC/OPC UA [HMI], for which the configured enabled commands are then active.

Web browser

You need a web browser to access the HTML pages in the SIMOCODE pro V PN (GP).

The following web browsers are suitable for communication with SIMOCODE pro etc.:

- Internet Explorer (recommended version: Version 11)
- Firefox (recommended version: Version 56)
- Google Chrome (recommended version: Version 62)
- Opera (recommended version: Version 49.0)

Note

Connection to a web client

Connection to a web client is supported.

Settings of the web browser for access to the information

Check the following settings, which are a precondition for access to the information made available via the web:

- To load the diagnostics data, Javascript must be activated in the Internet browser.
- The browser must support frames.
- Cookies must be permitted.
- The browser should be set in such a way that whenever it accesses a page, it automatically loads the current data from the server.

In the Internet Explorer, you will find these settings with menu "Tools" → "Internet Options" → "General" tab card → "Temporary Internet Files" group box → "Settings" button.

To use a firewall in your PG/PC, the following port must be enabled for use of the web diagnostics: "http Port 80/TCP" or, in the case of secure connections, "https Port 443/TCP".

Logging on to the web server

You can only use functions for controlling the motor feeder after you have logged on to the web server with user name and password. Only then are the buttons with a controlling function active.

The log-on dialog box is only available via a secure https connection.

Certificates:

To enable the web browser to access the web server via an https connection, certificates are mutually exchanged. On each change of the SIMOCODE pro V PN IP address, a unique certificate with a validity of two years is created for this purpose.

You can also install a CA certificate with a validity up to 2037 via the integrated web server as follows: Click the "Download certificate" link in the header of the home page and open or install the CA certificate.

Note

Installing the SIMOCODE pro CA certificate

You only have to install the SIMOCODE pro CA certificate once for the web client inquestion and it then applies to all SIMOCODE pro V PN devices.

If you do not install the CA certificate, the web browser will signal a certificate error when the connection is established to SIMOCODE pro V PN.

Time-of-day synchronization by the NTP procedure

SIMOCODE pro V PN (GP) has a non-battery-backed realtime clock that can be synchronized via the NTP procedure.

Network Time Protocol (NTP) is the implementation of a TCP/IP protocol for time synchronization in network. The NTP procedure uses hierarchical time synchronization, that is, an external clock (e.g. SICLOCK TM or a PC in the network) is used for synchronization.

The device transmits time-of-day queries to the configured NTP server at configured time intervals. Using the responses of the server, the time of day of the non-battery-backed clock is synchronized in SIMOCODE pro. This ensures that a synchronized time of day is available shortly after the supply voltage is switched on.

The NTP synchronization is configured with the SIMOCODE ES configuration software under "PROFINET Parameters → NTP procedure/synchronization."

The following settings are also made:

- NTP server address: Enter the NTP server address when the "Activate NTP synchronization" checkbox is selected.

  Note

  Adoption of the NTP server address

  The NTP server address is not adopted until the device has been restarted after the supply voltage has been switched off and on again.

- Cyclic update interval: Time interval in seconds at which synchronization of the time of day with the NTP server is performed
- Time shift: Time difference in minutes between UTC time (UTC = Universal Time Coordinated) and the time in the device.

Examples:

- Time shift for CET (Central European Time): +60 min
- Time shift for CST (Central Standard Time, North America): -360 min.

If an NTP server address has not been configured or a server was not found on the network, you can also set the time of day using SIMOCODE ES. To do this, proceed as follows:

Mark the relevant SIMOCODE device in the project navigation window and then select "Connect online" to establish a direct connection to the device. Expand the list of device settings by clicking on the arrow on the left of the SIMOCODE device: You can now select "Commissioning → Set time (= PC time in UTC)" to download the time of day of your PC to the SIMOCODE device.

Note

Command execution

Commands are executed immediately.

If a valid time of day is available (either synchronized by NTP or set via SIMOCODE ES), the entries in the error buffer / error protocol (i.e. log) will be additionally displayed with the time of day. In addition, the "Clock set (NTP)" and "Clock synchronized (NTP)" messages are displayed.

Note

Access using OPC UA

A valid time of day is necessary to be able to use the "Sign" and "SignAndEncrypt" OPC-UA Security Modes.

Simple Network Management Protocol (SNMP)

SNMP is a network protocol for monitoring and controlling network elements (e.g. switches).

SIMOCODE pro V PN (GP) supports the Ethernet service SNMP. MIB-2 (RFC1213) is supported. R/W objects can be changed with SNMP tools and are stored in the basic unit.

After replacement with a new basic unit from the factory or a basic unit that has undergone a general reset, the R/W objects will be in the factory settings.

2.3 Modbus communication

2.3.1 Modbus RTU communication

2.3.1.1 Modbus RTU - general

Modbus RTU (Remote Terminal Unit) is a standard protocol for network communication and uses the electrical RS485 connection for serial data transmission between Modbus devices in the network.

Modbus RTU uses a master/slave network in which the entire communication is triggered by only one master device while the slaves can only respond to the request of the master. The master sends a request to a slave address and only this slave address responds to the command (exception: broadcast frames to slave address 0 which are not acknowledged by the slaves).

2.3.1.2 Supported data transfer rates for RTU

SIMOCODE pro supports the following data transfer rates in Modbus RTU mode:

- 300 baud
- 600 baud
- 1,200 baud
- 2,400 baud
- 4,800 baud
- 9,600 baud
- 19,200 baud (default setting)
- 57,600 baud.

2.3.1.3 Assignment of SIMOCODE data to Modbus addresses with Modbus RTU

All SIRIUS data are available in datasets or in the process image:

- System datasets
- Datasets specific to a device subfamily
- Product-specific datasets.

To be addressable via Modbus, the data in these datasets or in this process image are converted to Modbus data formats.

Data access to	Data type according to Modbus nomenclature
Read-only bits	Discrete inputs
Read/write bits	Coils
Read-only datasets and words (16-bit)	Input registers
Read/write datasets and words	Holding registers

1 coil corresponds to 1 bit.

1 register corresponds to 1 word (2 bytes).

2.3.1.4 Modbus RTU data transfer

Principle of Modbus RTU data transfer

In contrast to cyclic/acyclic data transfer in the PROFIBUS bus system, the data are transferred linearly using the Modbus protocol.

The master is an automation system (PLC). The slave is a SIMOCODE pro device.

The master takes the initiative in the data transfer. SIMOCODE pro works as a slave and supplies the corresponding feedback signals to the bits/registers called up by the master, or it accepts the bits/registers written by the master into the internal SIMOCODE memory.

The master sends requests to one or more slaves. The slave processes the requests of the master and responds within a certain time with an acknowledgment, or with the requested data, or an error code if applicable. The requests contain the function code and additional data. The data can only be transferred between the master and a slave. Requests cannot be transferred between slaves. A slave cannot transfer any information, e.g. alarms, autonomously to the master. This always requires continuous polling of the corresponding bit by the master.

Data transfer options with Modbus RTU

The following figure shows the data transfer options:

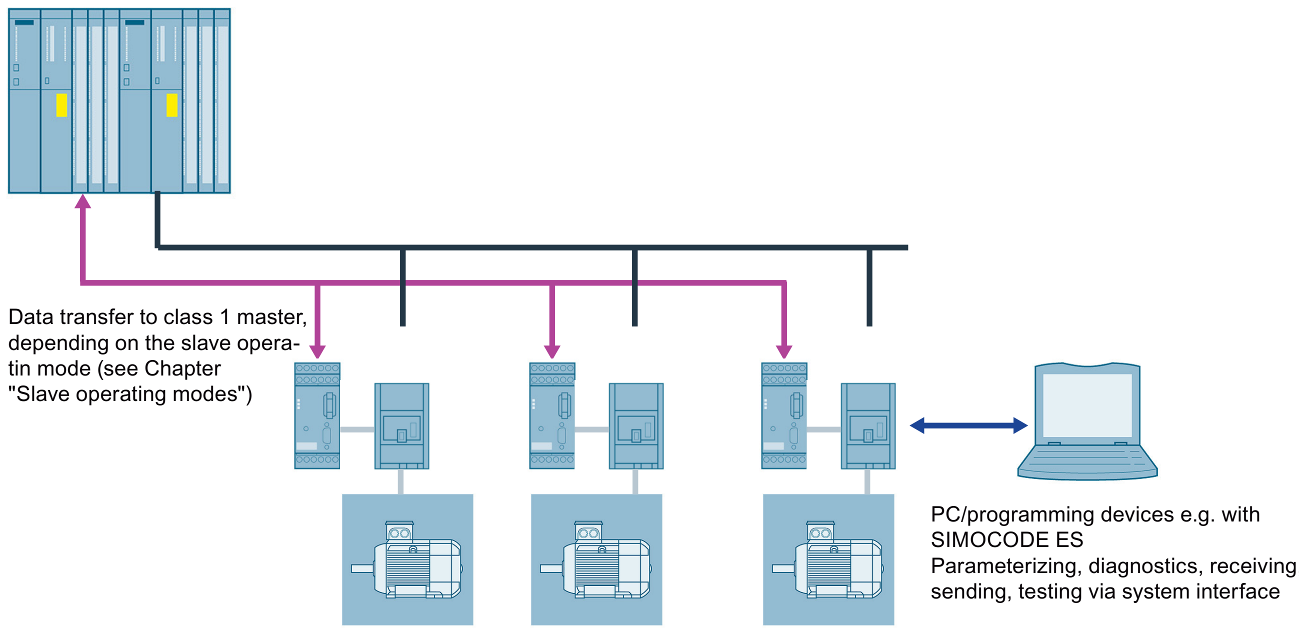


Figure 2-30 Options for data transfer

2.3.1.5 Modbus RTU telegram format

The data exchange "Master → Slave" and/or the corresponding response "Slave → Master" begins with the slave address, followed by the function code. Following this, the data are transferred. The structure of the data field depends on the function code used. The CRC check is transmitted at the end of the frame. The response frame from the slave to the master contains the same slave address and the same function code. The data area is filled according to the requested data.

Slave address	Function code	DATA	CRC-CHECK
1 byte	1 byte	n bytes	2 bytes

- Slave address: This address is used to address a defined slave on the bus. Standard address: 1 to 247
- Function code: Defines the slave function desired by the frame
- DATA = frame data: Function-code-dependent administration data and net data. When transferring the register data, the high byte is always transferred first, followed by the low byte, in accordance with the Modbus specification.
- CRC CHECK = frame checksum: The end of the frame is identified by the CRC-16 checksum of two bytes in length,

End of frame

The end of frame is recognized when no transmission takes place during the time period required for the transmission of three and a half characters (3.5 times character delay time) (see Modbus Protocol Reference Guide).

Exception responses

On recognition of an error in the request frame from the master (illegal register address, for example), the slave sets the highest value bit in the function code of the response frame (that is, the requested function code + 80h). This step is followed by transmission of a byte with the exception code that describes the cause of the error.

For details: See Modbus RTU error codes (Page 99).

2.3.1.6 Modbus RTU function codes

General

Definition of function code

The function code defines the meaning of the message frame. The frame structure is also defined by the function code.

Overview of the function codes

The table below provides an overview of the supported function codes. Which of these are supported by SIMOCODE pro depends on the start address (see Section Modbus RTU data tables (Page 270)).

Table 2-33 Overview of the function codes

Function code (decimal/ hexadecimal)	Designation according to Modbus specification
01 / 0x01 (Page 91)	Read Coils
02 / 0x02 (Page 91)	Read Discrete Inputs
03 / 0x03 (Page 93)	Read Holding Registers
04 / 0x04 (Page 93)	Read Input Registers
05 / 0x05 (Page 93)	Write Single Coil
06 / 0x06 (Page 94)	Write Single Register
15 / 0x0F (Page 95)	Write Multiple Coils
16 / 0x10 (Page 96)	Write Multiple Registers
23 / 0x17 (Page 97)	Read/Write Multiple Registers
43 / 0x2B (Page 99)	Read Device Identification

Access to memory areas

In SIMOCODE pro, only two memory areas are used, one each for addressing the bit information and the register information.

The function codes for bit information (01, 02, 05, 15) thus always access the bit memory area. The function codes for register information (03, 04, 06, 16, 23) always access the register memory area.

The distinction as to whether information is read-only (r) or read/writeable (r/w), can be seen from the dataset tables (see Section Modbus RTU data tables (Page 270)).

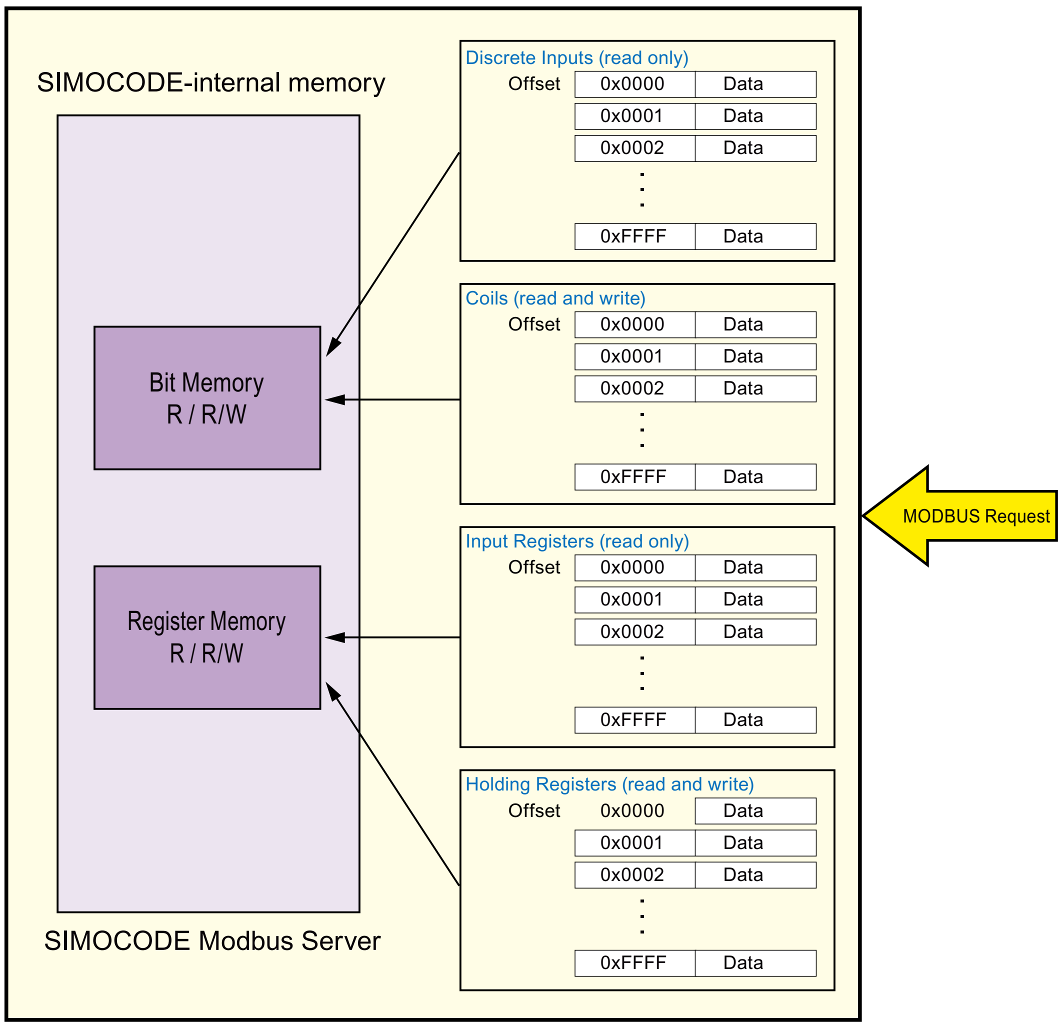


Figure 2-31 Memory areas used in SIMOCODE pro

Function codes 01 - Read Coils and 02 - Read Discrete Inputs

Function

These functions enable the Modbus master system to read individual bits from the SIMOCODE pro bit memory area.

Functions codes 01 and 02 behave in the same way here and supply an identical feedback signal. A valid offset from the bit memory area is expected as the start address. Up to 2000 bits can be read per frame.

If a number that is not equal to a multiple of eight bits is called up, the remaining bits are filled with zeros. The number of bytes n always refers to the number of fully returned bytes.

Note

Start address and number of coils

The start address and the number of coils must be within the valid range.

Request message frame

Slave address	Function code	Start address	Number of bits	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Response message frame

Slave address	Function code	Number of bytes n	Bit status	CRC
1 byte	1 byte	1 byte	n bytes	2 bytes

Example

Reading in of the SIMOCODE pro device statuses from slave number 16. The device statuses start from offset 0x1C08 and are 16 bits in length.

Request message frame

Slave address	Function code	Start address	Number of bits	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10	0x01	0x1C08	0x000F	0x....

Response message frame

Slave address	Function code	Number of bytes n	Bit status	CRC
1 byte	1 byte	1 byte	2 bytes	2 bytes
0x10	0x01	0x02	0x3C08	0x....

In the example, the following status information is returned:

- Device ok
- Bus ok
- PLC/PCS ok
- Current flowing ok
- Motor on>

See also Device diagnostics (Page 274) for more information.

The returned bytes contain the bits in the following order:

Byte 1: 0x3C == address 0x1C0F - 0x1C08

Byte 2: 0x08 == address 0x1C17 - 0x1C10

Function codes 03 - Read Holding Register and 04 - Read Input Registers

Function

This function enables the Modbus master system to read registers from the SIMOCODE pro register memory area.

Functions codes 03 and 04 behave in the same way here and supply an identical feedback signal. A valid offset from the register memory area is expected as the start address. Up to 125 registers per frame can be read.

Request message frame

Slave address	Function code	Start address	Number of registers	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Response message frame

Slave address	Function code	Number of bytes	Register value	CRC
1 byte	1 byte	1 byte	n registers	2 bytes

Example: Reading in of the SIMOCODE pro current measured values from slave number 16. The current measured values start from offset 0x0807 and comprise 3 registers.

Request message frame

Slave address	Function code	Start address	Number of registers	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10	0x03	0x8007	0x00 0x03	0x ....

Response message frame

Slave address	Function code	Number of bytes	Register value	CRC
1 byte	1 byte	1 byte	3 registers (6 bytes)	2 bytes
0x10	0x03	0x06	0x0064 0x0064 0x 0064	0x ....

In the example, the measured values of the current motor current in phases 1, 2 and 3, each with 100 % (0x0064) of the rated motor current, are returned as the feedback signal.

Function code 05 - Write Single Coil

Function

This function enables the Modbus master system to write an individual bit from the SIMOCODE pro bit memory area.

A valid address from the bit memory area is expected as the start address. The selected address must be designated as writable (see the tables in Section Modbus RTU data tables (Page 270), "Access" column).

0000h for a logical zero and FF00h for a logical one are accepted as data. Any other value is impermissible and given a negative acknowledgment.

Request message frame

Slave address	Function code	Start address	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Response message frame

Slave address	Function code	Start address	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Example

Controlling a motor connected to SIMOCODE pro from slave address 16 (assuming the assignment of the process image corresponds to the default settings). For this purpose, bit address 00 0x02 (see the tables in Section Modbus RTU data tables (Page 270)) is controlled with logical one. This bit address lies within the process image output that can be accessed both by bit access and by register access.

Request message frame

Slave address	Function code	Start address	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10	0x05	0x00 0x02	0xFF 0x00	0x....

Response message frame

Slave address	Function code	Start address	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10	0x05	0x00 0x02	0xFF 0x00	0x....

Function code 06 - Write Single Register

Function

This function enables the Modbus master system to write an individual register from the SIMOCODE pro register memory area.

A valid address from the register memory area is expected as the start address. The selected address must be designated as writable (see the tables in Section Modbus RTU data tables (Page 270), "Access" column).

Typical SIMOCODE parameters that can be written via Modbus RTU are the motor protection parameters (e.g. rated motor current, trip class, as well as delay times of the function blocks).

Request message frame

Slave address	Function code	Start address	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10	0x06	0x419A	0x0258	0x....

Response message frame

Slave address	Function code	Start address	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10	0x06	0x419A	0x0258	0x....

Example:

The cooling down period of the motor on SIMOCODE with slave address 16 is to be reset. To this end, the new cooling down period value of 600 s is loaded into SIMOCODE.

The register address for the cooling down period is 0x419A. Cooling down period in seconds: 600 s = 0x0258.

Function code 15 - Write Multiple Coils

Function

This function enables the Modbus master system to write several bits from the SIMOCODE pro bit memory area.

A valid address from the bit memory area is expected as the start address. The selected address must be designated as writable (see the tables in Section Modbus RTU data tables (Page 270), "Access" column).

When writing several bits, they must be marked as a "writable" coherent block. A bit area that is interrupted by read-only bits cannot be written to as a block.

Request message frame

Slave address	Function code	Start address	Number of bits	Number of bytes	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	n bytes	n bytes	2 bytes

Response message frame

Slave address	Function code	Start address	Number of bits	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Example

Several output bits in the area of the PIQ (process image output) of the SIMOCODE pro with slave address 16 are to be written via Modbus. Using these bits, the motor is usually switched on and off, "Remote/Manual" mode selected, or a reset command output.

In the case shown, the motor is to be started and "Remote" mode activated for a SIMOCODE device operated as a direct-on-line starter (see Chapter "Example circuits" in the manual

SIMOCODE pro - application examples (https://support.industry.siemens.com/cs/ww/en/view/109743959)):

Offset	Meaning	State
0x0001	Motor off	0
0x0002	Motor on	1
0x0003	Test function	0
0x0004	Emergency start	0
0x0005	Remote	1

Value to be transferred: 000**10010**b = 0x12

Request message frame

Slave address	Function code	Start address	Number of bits	Bytes	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	1 byte	n bytes	2 bytes
0x10	0x0F	0x0001	0x0005	0x01	0x12	0x....

Response message frame

Slave address	Function code	Start address	Number of bits	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10	0x0F	0x0001	0x0005	0x....

Function code 16 - Write Multiple Registers

Function

This function enables the Modbus master system to write several registers from the SIMOCODE pro register memory area.

A valid address from the register memory area is expected as the start address. The selected addresses must be designated as writable (see the tables in Section Modbus RTU data tables (Page 270), "Access" column).

Typical SIMOCODE parameters that can be written via Modbus RTU are the motor protection parameters (e.g. rated motor current, trip class) and the warning and trip levels, as well as delay times of the function blocks.

When writing several registers, they must be marked as a "writable" coherent block. A register area that is interrupted by read-only registers cannot be written to as a block.

Request message frame

Slave address	Function code	Start address	Number of registers	Number of bytes	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	1 byte	n x 2 bytes	2 bytes

Response message frame

Slave address	Function code	Start address	Number of registers	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Example

The rated motor current of the SIMOCODE pro with slave address 16, stored as a double word, is to be changed via Modbus. For this purpose, the new rated motor current of 10 A is to be written to the device. The expected value is the rated motor current in units of 10 mA, that is, 10 A = 10,000 mA = **1000** x 10 mA = **03E8h** x 10 mA.

Request message frame

Slave address	Function code	Start address	Number of registers	Number of bytes	Data	CRC
1 byte	1 byte	2 bytes	2 bytes	1 byte	n x 2 bytes	2 bytes
0x10	0x10h	0x41A8	0x0002	0x04	0x0000 0x 03E8	0x....

Response message frame

Slave address	Function code	Start address	Number of registers	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x10h	0x10	0x41A8	0x0002	0x....

Function code 23 - Read/Write Multiple Registers

Function

This function enables the Modbus master system to write and read several registers from SIMOCODE using a single function call. The write operation is the first executed operation here. This function is the typically used function call for outputting cyclic data in SIMOCODE and for reading back inputs or device statuses.

A valid address from the register memory area is expected as the start address. The selected address must be designated as writable (see the tables in Section Modbus RTU data tables (Page 270), "Access" column).

Request message frame

Slave address	Function code	Start address read operation	Number of registers (read access)	Start address write operation	Number of registers N (write access)	Number of bytes (write access)	Data (write access)	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes	1 byte	Nx2bytes	2 bytes

Response message frame

Slave address	Function code	Number of bytes N	Data	CRC
1 byte	1 byte	1 byte	Nx2 bytes	2 bytes

Example

Writing the outputs and reading back the input signals of the SIMOCODE pro device. To do this, register 0x0000 in the PIQ (process image output) is written, and at the same time, 4 registers from 0x0400 in the PII (process image input) are read. Slave address of the SIMOCODE pro = 16 (10h).

The register written to SIMOCODE here is to start the motor in clockwise rotation in "Remote" mode (24h).

In this example, it must be noted that the requested function "Start motor clockwise" is not returned in the same cycle as the new status. This is due to the ON command execution time in SIMOCODE and the delay of the contactors. Not until a few communication cycles later will the feedback signal of the PII also begin with 0x0024.

Note

Read/Write Multiple Registers

The FC23 can only access the PII/PIQ.

Request message frame

Slave address	Function code	Start address read operation	Number of registers (read access)	Start address write operation	Number of registers N (write access)	Number of bytes (write access)	Data (write access)	CRC
1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes	1 byte	Nx2bytes	2 bytes
0x10	0x17	0x04 0x00	0x0004	0x00 0x00	0x00 0x01	0x02	0x00 0x24	

Response message frame

Slave address	Function code	Number_bytes	Data	CRC
1 byte	1 byte	1 byte	Nx2 bytes	2 bytes
0x10	0x17	0x08	0x00 0x00	0x00 0x00

Note

"Read/Write Multiple Registers" function

The "Read/Write Multiple Registers" function cannot be used for writing parameter values via Modbus.

Writing of parameter values results in an execution time in SIMOCODE for writing parameters to the internal memory during which this SIMOCODE cannot respond to a communication request and/or the command "Read/Write Multiple Registers" cannot be concluded.

Function code 43 - Read Device Identification

Function

The function "43/14 (0x2B/0x0E) Read Device Identification" enables identification of the addressed device configuration.

Modbus identification data

The Modbus identification data are a representation of the device I&M0 data.

Table 2-34 Assignment of the I&M0 for Modbus identification

Modbus object ID	SIRIUS device information	Type	Mandatory/optional	Assignment of I&M0
Manufacturer	SIEMENS AG	ASCII string	Mandatory	Name of manufacturer
Article number	MLFB	ASCII string	Mandatory	
FW version	Vx.x	ASCII string	Mandatory	Software revision
Internet address of the manufacturer	Device-specific	ASCII string	Optional	-
Device family	Device-specific	ASCII string	Optional	-
Device subfamily	Device-specific	ASCII string	Optional	-
Name of the user	Device-specific	ASCII string	Optional	

2.3.1.7 Modbus RTU error codes

Exception responses

Operating principle

On recognition of an error in the request frame from the master (illegal register address, for example), the slave sets the highest value bit in the function code of the response frame (that is, the requested function code + 80h). This step is followed by transmission of a byte with the exception code that describes the cause of the error.

Typical exception code frame

The exception code frame from the slave has the following structure, for example: slave address 5, requested function code 5, exception code 2.

Response frame from slave:

Slave address	Function code	Error code	CRC
05H	85H	02H	0x....

Error codes supported by SIMOCODE pro

Error code	Meaning in accordance with Modbus specification	Cause	Brief description
1	Illegal function	Illegal function code	The requested function code is not supported. It is not included in the list of function codes supported by SIMOCODE pro (see Modbus RTU function codes (Page 90)).
2	Illegal data address	Illegal bit or register address on the slave	Address does not exist. For functions that work with an addressing range, all addresses affected by the request are checked.
3	Illegal data value	Slave has illegal data value	The number of addresses is not correct. The number of parameters for the requested function was too high (or 0)
4	Failure in Associated Device	Slave has internal error	There is an unspecified server error that prevented execution of the request.
6	Busy, rejected message	Slave is not ready to receive	The device is busy and unable to process the request at this time. This can occur following a parameterization operation via Modbus when the new parameter values are transferred to the device.

2.4 EtherNet/IP communication

2.4.1 Important notes

Note

Trademarks

This chapter makes reference to technologies with names protected by the Open DeviceNet Vendor Association (ODVA).

The ODVA technologies referred to in this manual are as follows:

- EtherNet/IP (EtherNet Industrial Protocol, often referred to as EIP) ™
- CIP (Common Industrial Protocol) ™

Further information about ODVA and technologies protected by ODVA can be found on the ODVA website (odva.org (http://www.odva.org)).

2.4.2 Definitions

EDS file

The properties of the EtherNet/IP device are described in an EDS file (EDS = Electronic Data Sheet) containing all the information required to integrate the device into an EtherNet/IP system.

You can find the EDS file in Industry Online Support at Generating an EDS file (https://support.industry.siemens.com/cs/ww/en/view/109741009).

IP address

To enable a PROFINET device to be addressed as a node on Industrial Ethernet, this device also requires an IP address that is unique within the network. The IP address is made up of 4 decimal numbers with a range of values from 0 through 255. The decimal numbers are separated by a decimal point.

The IP address is made up of

- The address of the (sub)net and
- The address of the node (generally called the host or network node)

Connection

Logical connection between two devices Various methods of connecting devices are described below. Two devices can be interlinked by more than one connection.

Scanner

The device which initiates a connection or a request. It can be regarded as the "master".

Adapter

The device which receives the connection or service request. A scanner can normally be integrated in a network with multiple adapters.

Assembly

A predefined collection of data stored in the adapter. Each data collection is identified by a unique instance number. It is further identified by size and type. Three types of assembly are those which generate (data to be sent), consume (data to be received) and configure (information required to parameterize the device).

MAC address

The MAC address can generally be read from the front on the device, e.g.: 08-00-06-6B-80-C0.

CIP

Message-based application protocol. This protocol implements a relative path for sending a message from the modules that generate the message in one system to the modules that consume the message. CIP operates with a generator-consumer model rather than a source-destination model (master/slave). With a generator-consumer model, the volume of network traffic is lower and transmission times shorter.

EIP

Abbreviation for EtherNet/IP.

Requested Packet Interval (RIP)

EtherNet/IP devices normally generate or consume data on the basis of an RPI value (Requested Packet Interval). Generating devices transmit data packets in predefined time intervals on the basis of RPI, while consumer devices wait for data packets at a specific RPI.

2.4.3 Data security in automation

See Data security in automation (Page 41).

2.4.4 Data transmission

The following figure shows an overview of the EtherNet/IP communication functions supported by SIMOCODE pro which are described in more detail in the following sections:

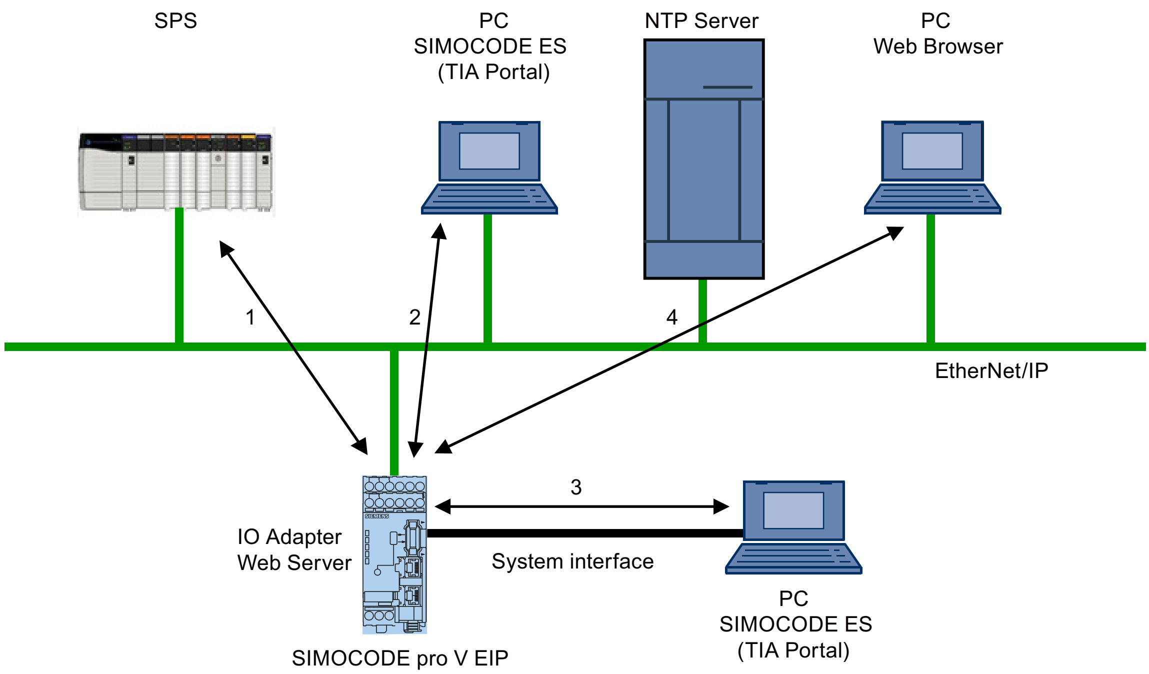


Figure 2-32 EtherNet/IP communication functions

1 Communication between PLC (I/O scanner) and SIMOCODE pro (I/O adapter) via EtherNet/IP

2 Communication between PC with parameterization software SIMOCODE ES (TIA Portal) and SIMOCODE pro via Ethernet

3 Communication between PC with parameterization software SIMOCODE ES (TIA Portal) and SIMOCODE pro via the SIMOCODE pro system interface (point-to-point via USB)

4 Communication between PC with web browser and SIMOCODE pro via Ethernet (TCP/IP); transmission of time of day via NTP from a PC with NTP server to the SIMOCODE pro V EIP devices

2.4.5 Electronic Data Sheet (EDS) file

Integrating SIMOCODE pro EIP using an EDS file

SIMOCODE pro V EIP can be integrated into an automation system by means of an EDS file (see also Definitions (Page 101)). This can be downloaded from Siemens Industry Online Support via the following link:

EDS file (https://support.industry.siemens.com/cs/ww/en/view/109741009)

The EDS file contains various information such as:

- Product symbol
- Manufacturer and device names
- Available cyclic data.

Note

Integration in Rockwell Studio 5000

To facilitate integration of SIMOCODE pro EIP into Rockwell Studio 5000, a function example and an add-on instruction for Studio 5000 are also provided on the Siemens Industry Online Support webpage mentioned above.

2.4.6 Setting up the IP address

NOTICE
Precondition for communication with the device The setting of IP parameters is a precondition for communication with the device. These parameters are the IP address, the subnet mask, the gateway address and the (Profinet) device name (optional).

IP parameters can be assigned by various methods:

- Using the SIMOCODE ES (TIA Portal) parameterization software
- Using a BOOTP/DHCP tool.

Assigning the IP address with the SIMOCODE ES parameterization software

Procedure:

- Start SIMOCODE ES (TIA Portal)
- Enter a project name under option "Create new project" and click on "Create"
- Switch to the project view.
- Click on the line "Online access" in the "Project navigation" window. You can choose between the following online access options:
  – COM <x> [SIRIUS PtP] - if the device is connected to the PC via the system interface
  – Intel(R) Gigabit Network Connection (or comparable designation) - if the device is connected to the PC via Ethernet.
- Click "Show accessible nodes"
- Double-click on the relevant device to select it from the list. To do this, you will need the MAC address attached to the front of the device.

- Assign
  - the IP address and set the subnet mask under Parameters → Ethernet parameters → IP address when connecting via the system interface
  - the IP address and set the subnet mask under Online & Diagnostics → Functions → IP address when connecting via Ethernet
- Download the IP address and the subnet mask to the device.
- You can also assign a device name if you want to. The main purpose of doing so is to give the device a clear, symbolic name that will be displayed in the project navigation window. However, a device name is not essential for communication with the device.

Assigning the IP address with a BOOTP/DHCP tool

Procedure:

- Start the BOOTP/DHCP server tool (e.g. from the Rockwell Studio 5000 package)
- Set the subnet mask of your network and, if applicable, the gateway address in the tool network settings; all of the devices that transmit BOOTP or DHCP messages into the network are displayed under "Request History" in the tool.
- Select the relevant device from this list. To do this, you will need the MAC address of the device: this is attached to the front panel of the SIMOCODE device.
- By clicking on button "Add to Relation List", you can assign an IP address, a host name and (if necessary) a description to the device. After the IP address has been assigned, the device with appear in the "Relation List", the list of all devices in this network segment with a valid IP address.
- After the IP address has been successfully assigned, deactivate the BOOTP/DHCP mechanism in the SIMOCODE device by selecting the device and clicking on the button labeled "Disable BOOTP/DHCP".

Note

Behavior of SIMOCODE pro if BOOTP/DHCP is not deactivated in the SIMOCODE device

If you do not deactivate the BOOTP/DHCP mechanism in the SIMOCODE device, it will restart after the next Power ON without a valid IP address and start sending BOOTP/DHCP messages again.

2.4.7 Address Collision Detection (ACD)

In firmware version 1.1.0 (E04) and higher, SIMOCODE pro V EIP supports address collision detection. This is a mechanism for detecting and avoiding IP address conflicts during device startup.

If an address conflict exists, the BUS LED of the SIMOCODE pro V EIP basic unit flashes.

2.4.8 Parameterizing the device

Parameterization with SIMOCODE ES (TIA Portal)

SIMOCODE ES (TIA Portal) can access the device via the system interface and via Ethernet.

The "Getting Started" videos are useful for first-time users of SIMOCODE ES (TIA Portal). These can be found in Industry Online Support at Tutorial Center (https://support.industry.siemens.com/cs/ww/en/view/106656707).

Further guidance for working with the TIA Portal software can be found on the Internet at TIA Portal - An overview of the most important documents and links - Visualization (https://support.industry.siemens.com/cs/ww/en/view/90939751).

Procedure for handling IP parameters

The IP parameters, consisting of IP address, subnet mask, and router can be assigned in various ways and transferred to the IO device as described in Chapter Setting up the IP address (Page 104).

Please note the following points relating to the SIMOCODE ES parameterization software:

- If the IP parameters are managed and assigned to the device via a BOOTP/DHCP tool, the "Overwrite IP parameters in device" parameter set in the SIMOCODE ES parameterization software under "PROFINET Parameters → IP Parameters" must not be active. This ensures that no changes are made to previously set IP parameters when parameters are downloaded.
- If IP parameters are configured and downloaded to the device with the SIMOCODE ES parameterization software, the "Overwrite IP parameters in device" parameter under "PROFINET Parameters → IP Parameters" must be active. This ensures that IP parameter settings are also written to the device when parameters are downloaded.

Note

Resetting the IP address and reactivating the BOOTP function

In order to restart the BOOTP/DHCP function after the IP address has been permanently assigned, "Activate BOOTP/DHCP" (Parameters → Ethernet parameters) must be checked.

Note

Restarting the communication interface

Every change to the IP parameters with SIMOCODE ES in the "Ethernet Parameters" dialog box requires a restart of the communication interface.

A restart of the communication interface briefly interrupts all Ethernet and EtherNet/IP links and reestablishes them afterward.

2.4.9 Integrating SIMOCODE pro into the automation system (PLC)

I/O configurations

SIMOCODE pro V PN supports a number of I/O configurations which define the structure and length of the I/O data that are cyclically exchanged between the EtherNet/IP scanner (PLC) and the adapter (SIMOCODE pro). These configurations are referred to as "basic types" and can be selected on the basis of the chosen assembly instances when the device is integrated in Studio 5000.

The data that are exchanged with the EtherNet/IP scanner can be set by means of function blocks such as, for example, "Cyclic receive byte 0" or "Cyclic send byte 0" in the SIMOCODE ES software. Detailed information about the relationship between SIMOCODE ES function blocks and assembly instances can be found in Chapter Assembly object (Page 308).

Overview of the cyclic data available with SIMOCODE pro V EtherNet/IP:

	Input data length	Input assembly	Output data length	Output assembly
Basic Type 1	10 byte	150	4 bytes	100
Basic Type 2	4 bytes	151	2 bytes	101
Basic Type 3	20 bytes	152	6 bytes	102
Basic Type 4	488 bytes	153	6 bytes	102

2.4.10 Integration and commissioning in Rockwell Studio 5000

Sequence of steps for integrating by means of an EDS file

1. Connect the device to the control system via an Ethernet cable
2. Using the EDS wizard, register the SIMOCODE EDS file in Studio 5000
3. Add a new module to the Ethernet network of the communication card (e.g. 1756-EN2TR)
4. Select the Siemens SIMOCODE 3UF7 device in the "Select Module Type" window
5. The IP address assigned to the device, a symbolic name and the length of cyclic data ("Module Definition → Connections") are set in the "New Module" window. The default connection is basic type 1. It is possible to alter the default RPI (requested packet interval) time on the "Connection" tab.

Predefined device connections:

	Input data	Output data
SIMOCODE Basic Type 1	10 byte	4 bytes
SIMOCODE Basic Type 2	4 bytes	2 bytes
SIMOCODE Basic Type 3	20 bytes	6 bytes
SIMOCODE Basic Type 4	488 bytes	6 bytes
Basic Overload	1 byte	1 byte
Extended Overload	1 byte	1 byte

Sequence of steps for integrating by means of a generic Ethernet module

1. Connect the device to the control system via an Ethernet cable
2. Add a new generic Ethernet module to the Ethernet network of the communication card (e.g. 1756-EN2TR)
3. Enter the symbolic name and the IP address of the SIMOCODE pro EIP device. The IP address must match the IP address parameterized via BOOTP/DHCP or SIMOCODE ES.
4. Enter the connection parameters in the "Assembly Instance" and "Size" boxes on the screen. It is possible to alter the default RPI (requested packet interval) time on the "Connection" tab.

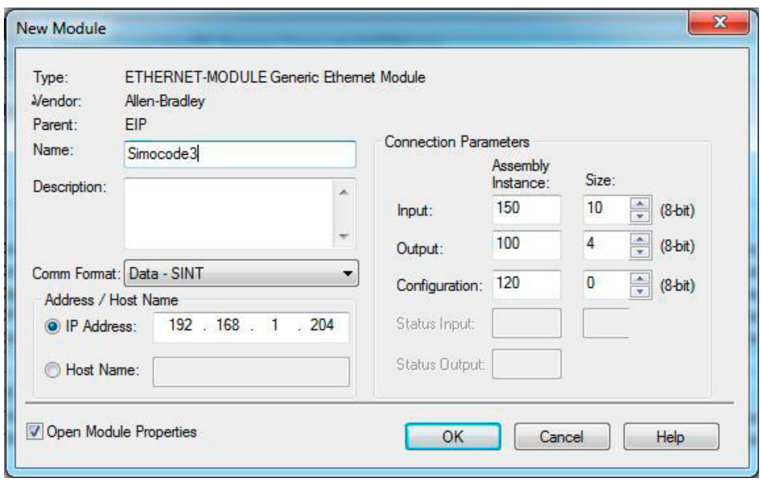


Figure 2-33 Adding a new generic Ethernet module in Studio 5000

2.4.11 Ethernet/IP Device Level Ring functionality

The SIMOCODE pro V EIP device has two RJ45 sockets with an integral switch. It is therefore possible to create ring structures from lines with Ethernet/IP. When a ring structure is implemented, SIMOCODE pro V EIP supports the Device Level Ring (DLR) mechanism which ensures that communication is maintained even when the ring is interrupted.

The advantages of a DLR are as follows:

- Simple installation using the two integral RJ45 ports.
- A single error in the communication chain does not result in restricted access to individual nodes.
- Communication can be restored quickly after a single error has occurred.

SIMOCODE pro V EIP functions as a "ring node" within the DLR.

For a DLR to function properly, it must also contain a "supervisor node" (e.g. a control system / a switch with supervisor node functionality).

A DLR network is configured by means of the "supervisor node" parameters ("Enable Supervisor Node"; "Beacon Time"; "Beacon TimeOut"). No parameter settings for DLR need to be set in the SIMOCODE pro V EIP devices.

There should be fewer than 50 ring node devices within a DLR network in order to keep the communication restore time within acceptable limits.

2.4.12 EtherNet/IP system redundancy

SIMOCODE pro V EIP product version *E03* supports the system-redundant connection to two fault-tolerant controllers, e. g. 1756-L72 by Rockwell Automation.

The redundant-system connection provides a communication link (Application Relation) between each IO device and each of the two controllers. As soon as the connection switches from the primary to the secondary controller, the communication modules perform what is called "IP address swapping".

2.4.13 Web diagnostics

SIMOCODE pro V EIP offers you with the web diagnosis the possibility of calling the following information of the motor feeder from a PG/PC using an HTTP client:

- Status information
- Faults, warnings, events
- Measured values
- Service and statistical data
- Error buffer, error protocol.

Web diagnostics are available in Chinese, Russian, English and German.

Activating the web server:

The default setting of the web server is "not active." To activate it, the "Ethernet Parameters → Web Server Activated" parameter must be active.

Note

Restarting the communication interface

Each change to the configuration of the web server requires that the communication interface be restarted.

A new start of the communication interface interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Setting the IP parameters:

To enable a link to be established via the web, SIMOCODE pro V EIP must have valid IP parameters. You can find out how to make these settings in Chapter Setting up the IP address (Page 104).

Configuration of the user name and password:

If the functions are to be used to control the motor feeder, a user must additionally be configured with the user name and password. User name and password must not contain any blanks. You perform the configuration under "Ethernet-Parameter → Webserver".

Web browser

For access to the HTML pages in the SIMOCODE pro V EIP, you need a web browser.

The following web browsers are suitable for communication with SIMOCODE pro etc.:

- Internet Explorer (recommended version: Version 11)
- Firefox (recommended version: Version 56)
- Google Chrome (recommended version: Version 62)
- Opera (recommended version: Version 49.0)

Note

Connection to a web client

Connection to a web client is supported.

Settings of the web browser for access to the information

Check the following settings, which are a precondition for access to the information made available via the web:

- To load the diagnostics data, Javascript must be activated in the Internet browser.
- The browser must support frames.
- Cookies must be permitted.
- The browser should be set in such a way that whenever it accesses a page, it automatically loads the current data from the server.

In the Internet Explorer, you will find these settings with menu "Tools" → "Internet Options" → "General" tab card → "Temporary Internet Files" group box → "Settings" button.

To use a firewall in your PG/PC, the following port must be enabled for use of the web diagnostics: "http Port 80/TCP" or, in the case of secure connections, "https Port 443/TCP".

Logging on to the web server (possible with product version *E04*and higher)

You can only use functions for controlling the motor feeder after you have logged on to the web server with user name and password. Only then are the buttons with a controlling function active.

The log-on dialog box is only available via a secure https connection.

Certificates:

To enable the web browser to access the web server via an https connection, certificates are mutually exchanged. On each change of the SIMOCODE pro V EIP IP address, a unique certificate with a validity of five years is created for this purpose.

You can also install a CA certificate with a validity up to 2037 via the integrated web server as follows: Click the "Download certificate" link in the header of the home page and open or install the CA certificate.

Note

Installing the SIMOCODE pro CA certificate

You only have to install the SIMOCODE pro CA certificate once for the web client in question, which then applies to all SIMOCODE pro V EIP devices.

If you do not install the CA certificate, the web browser will signal a certificate error when the connection is established to SIMOCODE pro V EIP.

2.4.14 Time-of-day synchronization by the NTP procedure

SIMOCODE pro V EIP has a non-battery-backed realtime clock that can be synchronized via the NTP procedure.

Network Time Protocol (NTP) is the implementation of a TCP/IP protocol for time synchronization in networks. The NTP procedure uses hierarchical time synchronization, that is, an external clock (e.g. SICLOCK TM or a PC in the network) is used for synchronization.

The device transmits time-of-day queries to the configured NTP server at configured time intervals. Using the responses of the server, the time of day of the non-battery-backed clock is synchronized in SIMOCODE pro. This ensures that a synchronized time of day is available shortly after the supply voltage is switched on.

The NTP synchronization is configured with the "SIMOCODE ES (TIA Portal)" configuration software under "EtherNet/IP Parameters → NTP procedure/synchronization."

The following settings are also made:

- NTP server address: Enter the NTP server address when the "Activate NTP synchronization" checkbox is selected.

  Note

  Adoption of the NTP server address

  The NTP server address is not accepted until the device has been restarted or after the supply voltage has been switched off and on again.

- Cyclic update interval: Time interval in seconds at which synchronization of the time of day with the NTP server is performed
- Time shift: Time difference in minutes between UTC time (UTC = Universal Time Coordinated) and the time in the device.

Examples:

- Time shift for CET (Central European Time): +60 min
- Time shift for CST (Central Standard Time, North America): -360 min.

If an NTP server address has not been configured or a server was not found on the network, you can also set the time of day using SIMOCODE ES. To do this, proceed as follows:

Mark the relevant SIMOCODE device in the project navigation window and then select "Connect online" to establish a direct connection to the device. Expand the list of device settings by clicking on the arrow on the left of the SIMOCODE device: You can now select "Commissioning → Command → Set time (= PC time in UTC)" to download the time of day of your PC to the SIMOCODE device.

If a valid time of day is available (either synchronized by NTP or set via SIMOCODE ES), the entries in the error buffer/error protocol (i.e. log) will be additionally displayed with the time of day. In addition, the "Clock set (NTP)" and "Clock synchronized (NTP)" messages are displayed.

2.4.15 Simple Network Management Protocol (SNMP)

SNMP is a network protocol for monitoring and controlling network elements (e.g. switches).

SIMOCODE pro V EIP supports the Ethernet service SNMP. MIB-2 (RFC1213) is supported. R/W objects can be changed with SNMP tools and are stored in the basic unit.

After replacement with a new basic unit from the factory or a basic unit that has undergone a general reset, the R/W objects will be in the factory settings.

Tables, data records

3

3.1 Tables general

3.1.1 Active control stations, contactor controls, lamp controls and status information for the control functions

Table 3-1 Active control stations of control functions

Designation / control function	Control station				
	ON <<	ON <	OFF	ON >	ON >>
Overload 1) 2) 3)	-	-	-	-	-
Direct starter (direct-on-line starter) 1) 2) 3)	-	-	OFF	ON	-
Reversing starter 1) 2) 3)	-	CCW	OFF	CW	-
Circuit breaker 1) 2) 3)	-	-	OFF	ON	-
Star-delta starter 2) 3)	-	-	OFF	ON	-
Star-delta reversing starter 3)	-	CCW	OFF	CW	-
Dahlander starter 3)	-	-	OFF	SLOW	FAST
Dahlander reversing starter 3)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Pole-changing starter 3)	-	-	OFF	SLOW	FAST
Pole-changing reversing starter 3)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Solenoid valve 3)	-	-	CLOSED	OPEN	-
Positioner 1 3)	-	CLOSED	Stop	OPEN	-
Positioner 2 3)	-	CLOSED	Stop	OPEN	-
Positioner 3 3)	-	CLOSED	Stop	OPEN	-
Positioner 4 3)	-	CLOSED	Stop	OPEN	-
Positioner 5 3)	-	CLOSED	Stop	OPEN	-
Soft starter 2) 3)	-	-	OFF	ON	-
Soft starter with reversing contactor 3)	-	CCW	OFF	CW	-

Table 3-2 Contactor control with control functions

Designation / control function	Contactor control				
	QE1	**QE2**	**QE3**	**QE4**	**QE5**
Overload 1) 2) 3)	-	-	Active	-	-
Direct-on-line starter 1) 2) 3)	ON	-	-	-	-
Reversing starter 1) 2) 3)	CW	CCW	-	-	-
Circuit breaker 1) 2) 3)	ON pulse	-	OFF pulse	-	-

Designation / control function	Contactor control				
Star-delta starter 2) 3)	Star contactor	Delta contactor	Line contactor	-	-
Star-delta reversing starter 3)	Star contactor	Delta contactor	RIGHT line contactor	LEFT line contactor	-
Dahlander starter 3)	FAST	SLOW	Star contactor FAST	-	-
Dahlander reversing starter 3)	CW-FAST	CW-SLOW	Star contactor FAST	CCW-SLOW	CCW-FAST
Pole-changing starter 3)	FAST	SLOW	-	-	-
Pole-changing reversing starter 3)	CW-FAST	CW-SLOW	-	CCW-SLOW	CCW-FAST
Solenoid valve 3)	OPEN	-	-	-	-
Positioner 1 3)	OPEN	CLOSED	-	-	-
Positioner 2 3)	OPEN	CLOSED	-	-	-
Positioner 3 3)	OPEN	CLOSED	-	-	-
Positioner 4 3)	OPEN	CLOSED	-	-	-
Positioner 5 3)	OPEN	CLOSED	-	-	-
Soft starter 2) 3)	ON line contactor	-	Reset	ON command	-
Soft starter with reversing contactor 3)	RIGHT line contactor	LEFT line contactor	Reset	ON command	-

Table 3-3 Lamp control with control functions

Designation / control function	Lamp control				
	QLE << (ON <<)	**QLE < (ON <)**	**QLA (OFF)**	**QLE > (ON >)**	**QLE >> (ON >>)**
Overload 1) 2) 3)	-	-	-	-	-
Direct-on-line starter 1) 2) 3)	-	-	OFF	ON	-
Reversing starter 1) 2) 3)	-	CCW	OFF	CW	-
Circuit breaker 1) 2) 3)	-	-	OFF	ON	-
Star-delta starter 2) 3)	-	-	OFF	ON	-
Star-delta reversing starter 3)	-	CCW	OFF	CW	-
Dahlander starter 3)	-	-	OFF	SLOW	FAST
Dahlander reversing starter 3)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Pole-changing starter 3)	-	-	OFF	SLOW	FAST
Pole-changing reversing starter 3)	CCW-FAST	CCW-SLOW	OFF	CW-SLOW	CW-FAST
Solenoid valve 3)	-	-	CLOSED	OPEN	-
Positioner 1 3)	-	CLOSED	Stop	OPEN	-
Positioner 2 3)	-	CLOSED	Stop	OPEN	-
Positioner 3 3)	-	CLOSED	Stop	OPEN	-
Positioner 4 3)	-	CLOSED	Stop	OPEN	-
Positioner 5 3)	-	CLOSED	Stop	OPEN	-
Soft starter 2) 3)	-	-	OFF	ON	-
Soft starter with reversing contactor 3)	-	CCW	OFF	CW	-

1) SIMOCODE pro C

2) SIMOCODE pro S / SIMOCODE pro V PN GP

3) SIMOCODE pro V (high-performance devices)

3.2 Assignment of cyclic receive and send data for predefined control functions

3.2.1 Overload relay

Table 3-4 Assignment of cyclic receive / send data, overload relay

Cycl. receive data	
Bit 0.0	Not connected
Bit 0.1	Not connected
Bit 0.2	Not connected
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Not connected
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cycl. send data	
Bit 0.0	Not connected
Bit 0.1	Not connected
Bit 0.2	Not connected
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Not connected
Bit 0.5	Not connected
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected

Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.2 Direct starter

Table 3-5 Assignment of cyclic receive / send data, direct starter (direct-on-line starter)

Cycl. receive data	
Bit 0.0	Not connected
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cycl. send data	
Bit 0.0	Not connected
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Not connected
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault

Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.3 Reversing starter

Table 3-6 Assignment of cyclic receive / send data, reversing starter

Cyclic receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cyclic send data	
Bit 0.0	Status - ON<
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)

Bit 0.4	Status - Interlocking time active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.4 Molded-case circuit breaker (MCCB)

Table 3-7 Assignment of cyclic receive / send data, molded-case circuit breaker (MCCB)

Cyclic receive data	
Bit 0.0	Not connected
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cyclic send data	
Bit 0.0	Not connected

Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Not connected
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.5 Star-delta starter

Table 3-8 Assignment of cyclic receive / send data, star/delta starter

Cyclic receive data	
Bit 0.0	Not connected
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected

Byte 2/3 *) (analog value)	Not connected
Cycl. send data	
Bit 0.0	Not connected
Bit 0.1	Status - Off
Bit 0.2	Status - ON
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Change-over pause active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.6 Star-delta reversing starter

Table 3-9 Assignment of cyclic receive / send data, star/delta reversing starter

Cyclic receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON <
Bit 0.1	Device parameters → Motor control → Control stations -> PLC/PCS [DP] -> OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected

Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cyclic send data	
Bit 0.0	Status - ON<
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Change-over pause active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Status - Interlocking time active
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.7 Dahlander starter

Table 3-10 Assignment of cyclic receive / send data, Dahlander starter

Cyclic receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >>
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected

Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cyclic send data	
Bit 0.0	Status - ON>>
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Change-over pause active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - General warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.8 Dahlander reversing starter

Table 3-11 Assignment of cyclic receive / send data, Dahlander reversing starter

Cyclic receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >>
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input

Bit 0.7	Not connected
Bit 1.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON <<
Bit 1.1	Not connected
Bit 1.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON <
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cyclic send data	
Bit 0.0	Status - ON>>
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Change-over pause active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - General warning
Bit 1.0	Status - ON<<
Bit 1.1	Not connected
Bit 1.2	Status - ON<
Bit 1.3	Status - Interlocking time active
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.9 Pole-changing starter

Table 3-12 Assignment of cyclic receive / send data, pole-changing starter

Cyclic receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >>
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input

Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cyclic send data	
Bit 0.0	Status - ON>>
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Change-over pause active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.10 Pole-changing reversing starter

Table 3-13 Assignment of cyclic receive / send data, pole-changing reversing starter

Cyclic receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >>

Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON <<
Bit 1.1	Not connected
Bit 1.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON <
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cyclic send data	
Bit 0.0	Status - ON>>
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Change-over pause active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Status - ON<<
Bit 1.1	Not connected
Bit 1.2	Status - ON<
Bit 1.3	Status - Interlocking time active
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.11 Solenoid valve

Table 3-14 Assignment of cyclic receive/send data, solenoid valve

Cyclic receive data	
Bit 0.0	Not connected
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → Close
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → Open
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Not connected
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 → Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cycl. send data	
Bit 0.0	Not connected
Bit 0.1	Status - OFF (CLOSED)
Bit 0.2	Status - ON > (OPEN)
Bit 0.3	Not connected
Bit 0.4	Not connected
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Not connected
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.12 Positioner

Table 3-15 Assignment of cyclic receive / send data, positioner

Cyclic receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → Close
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → Stop
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → Open
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cycl. send data	
Bit 0.0	Status - ON < (CLOSED)
Bit 0.1	Status - OFF (Stop)
Bit 0.2	Status - ON > (OPEN)
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Interlocking time active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Status - positioner runs in OPEN direction
Bit 1.1	Not connected
Bit 1.2	Status - positioner runs in CLOSED direction
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.13 Soft starter

Table 3-16 Assignment of cyclic receive / send data, soft starter

Cycl. receive data	
Bit 0.0	Not connected
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cycl. send data	
Bit 0.0	Not connected
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Not connected
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max

Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.2.14 Soft starter with reversing contactor

Table 3-17 Assignment of cyclic receive / send data, soft starter with reversing contactor

Cycl. receive data	
Bit 0.0	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON <
Bit 0.1	Device parameters → Motor control → Control stations → PLC/PCS [DP] → OFF
Bit 0.2	Device parameters → Motor control → Control stations → PLC/PCS [DP] → ON >
Bit 0.3	Further function blocks → Standard functions → Test / Reset → Test1 - Input
Bit 0.4	Further function blocks → Standard functions → Emergency start → Emergency start - Input
Bit 0.5	Device parameters → Motor control → Control stations → Mode selector S1
Bit 0.6	Further function blocks → Standard functions → Test / Reset → Reset 1 - Input
Bit 0.7	Not connected
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected
Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 *) (analog value)	Not connected
Cycl. send data	
Bit 0.0	Status - ON<
Bit 0.1	Status - Off
Bit 0.2	Status - ON>
Bit 0.3	Event - Prewarning overload (I>115 %)
Bit 0.4	Status - Interlocking time active
Bit 0.5	Status - Remote mode
Bit 0.6	Status - General fault
Bit 0.7	Status - general warning
Bit 1.0	Not connected
Bit 1.1	Not connected
Bit 1.2	Not connected
Bit 1.3	Not connected
Bit 1.4	Not connected
Bit 1.5	Not connected

Bit 1.6	Not connected
Bit 1.7	Not connected
Byte 2/3 (analog value)	Maximum current I_max
Byte 4/5 *) (analog value)	Not connected
Byte 6/7 *) (analog value)	Not connected
Byte 8/9 *) (analog value)	Not connected

*) for SIMOCODE pro V / pro S, basic type 1 only

3.3 Tables, PROFIBUS data records

3.3.1 PROFIBUS tables

3.3.1.1 Abbreviations and specifications

Abbreviations

See SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Specifications

The following specifications apply in the tables:

Table 3-18 Table specifications (example)

Designation	Type	Range	Unit	Information
Reserved	Byte[4] *)			
Cos phi	Byte	0 ... 100	1 %	BU2
Reserved	Byte[5] *)			
Max. current I_max	Word	0 ... 65535	1 % / I_s	BU0, BU1, BU2 **)
*) Items in italics are not relevant (reserved) and must be filled with "0" when written to.				
**) Entry relevant for basic unit 1 and basic unit 2				
Parameters that can be changed during operation				

Event - PRM error number (bytes):

If parameterization is not possible, the number of the parameter group (PRM group) that caused the error is communicated here.

Byte.Bit	Designation (PRM group)	. . .
0.0	Reserved	
4.0	Device configuration (12)	Parameter group 12

⋮

Figure 3-1 Example for parameter group

3.3.1.2 Socket assignment table - digital

This table contains all assignment numbers (No.) of the sockets (digital). You only need these assignment numbers if you, for example, use a user program to fill data records and write them back.

Table 3-19 Socket assignment table - digital

No.	Designation	Designation	Information
0	Static level	Not connected	BU0 BU1 BU2(+)
1		Fixed level ,0	BU0 BU1 BU2(+)
2		Fixed level ,1	BU0 BU1 BU2(+)
3		*Reserved*	
4		*Reserved*	
5		*Reserved*	
6		*Reserved*	
7		*Reserved*	
8	Basic unit (BU)	BU - Test / Reset button	BU0 BU1 BU2(+)
9		BU - Input 1	BU0 BU1 BU2(+)
10		BU - Input 2	BU0 BU1 BU2(+)
11		BU - Input 3	BU0 BU1 BU2(+)
12		BU - Input 4	BU0 BU1 BU2(+)
13		*Reserved*	
14		*Reserved*	
15		*Reserved*	
16	Digital module DM	DM1 - Input 1	DM1 MM
17		DM1 - Input 2	DM1 MM
18		DM1 - Input 3	DM1 MM
19		DM1 - Input 4	DM1 MM
20		DM2 - Input 1	DM2
21		DM2 - Input 2	DM2
22		DM2 - Input 3	DM2
23		DM2 - Input 4	DM2
24		DM-FL sensor channel 1 Y12	DM-FL
25		DM-FL sensor channel 1 Y22	DM-FL
26		*Reserved*	
27		*Reserved*	

No.	Designation	Designation	Information
28		*Reserved*	
29		*Reserved*	
30		*Reserved*	
31		*Reserved*	
32	Operator panel OP / OPD	OP - Test / Reset button	OP OPD
33		OP - Button 1	OP OPD
34		OP - Button 2	OP OPD
35		OP - Button 3	OP OPD
36		OP - Button 4	OP OPD
37		*Reserved*	
38		*Reserved*	
39		*Reserved*	
40	DPV1/RS-232 interface (acyclic data)	Acyclic receive data - Bit 0.0	BU0 BU1 BU2(+)
41		Acyclic receive data - Bit 0.1	BU0 BU1 BU2(+)
42		Acyclic receive data - Bit 0.2	BU0 BU1 BU2(+)
43		Acyclic receive data - Bit 0.3	BU0 BU1 BU2(+)
44		Acyclic receive data - Bit 0.4	BU0 BU1 BU2(+)
45		Acyclic receive data - Bit 0.5	BU0 BU1 BU2(+)
46		Acyclic receive data - Bit 0.6	BU0 BU1 BU2(+)
47		Acyclic receive data - Bit 0.7	BU0 BU1 BU2(+)
48		Acyclic receive data - Bit 1.0	BU0 BU1 BU2(+)
49		Acyclic receive data - Bit 1.1	BU0 BU1 BU2(+)
50		Acyclic receive data - Bit 1.2	BU0 BU1 BU2(+)
51		Acyclic receive data - Bit 1.3	BU0 BU1 BU2(+)
52		Acyclic receive data - Bit 1.4	BU0 BU1 BU2(+)
53		Acyclic receive data - Bit 1.5	BU0 BU1 BU2(+)
54		Acyclic receive data - Bit 1.6	BU0 BU1 BU2(+)
55		Acyclic receive data - Bit 1.7	BU0 BU1 BU2(+)
56	PLC/PCS interface PLC [DPV0] (cyclic data)	Cyclic receive data - Bit 0.0	BU0 BU1 BU2(+)
57		Cyclic receive data - Bit 0.1	BU0 BU1 BU2(+)
58		Cyclic receive data - Bit 0.2	BU0 BU1 BU2(+)
59		Cyclic receive data - Bit 0.3	BU0 BU1 BU2(+)
60		Cyclic receive data - Bit 0.4	BU0 BU1 BU2(+)
61		Cyclic receive data - Bit 0.5	BU0 BU1 BU2(+)
62		Cyclic receive data - Bit 0.6	BU0 BU1 BU2(+)
63		Cyclic receive data - Bit 0.7	BU0 BU1 BU2(+)
64		Cyclic receive data - Bit 1.0	BU0 BU1 BU2(+)
65		Cyclic receive data - Bit 1.1	BU0 BU1 BU2(+)
66		Cyclic receive data - Bit 1.2	BU0 BU1 BU2(+)
67		Cyclic receive data - Bit 1.3	BU0 BU1 BU2(+)
68		Cyclic receive data - Bit 1.4	BU0 BU1 BU2(+)
69		Cyclic receive data - Bit 1.5	BU0 BU1 BU2(+)
70		Cyclic receive data - Bit 1.6	BU0 BU1 BU2(+)

No.	Designation	Designation	Information
71		Cyclic receive data - Bit 1.7	BU0 BU1 BU2(+)
72	Enabled control command	Enabled control command ON<<	Dependent on the control function
73		Enabled control command ON<	
74		Enabled control command - OFF	
75		Enabled control command ON>	
76		Enabled control command ON>>	
77		*Reserved*	
78		*Reserved*	
79		*Reserved*	
80	Contactor controls	Contactor controls 1 QE1	Dependent on the control function
81		Contactor controls 2 QE2	
82		Contactor controls 3 QE3	
83		Contactor controls 4 QE4	
84		Contactor controls 5 QE5	
85		*Reserved*	
86		*Reserved*	
87		*Reserved*	
88	Lamp controls	Display - QLE<<(ON<<)	Dependent on the control function
89		Display - QLE<(ON<)	
90		Indication - QLA (OFF)	
91		Display - QLE>(ON>)	
92		Display - QLE>>(ON>>)	
93		Display - QLS (fault)	BU0 BU1 BU2(+)
94		*Reserved*	
95		*Reserved*	
96	Status information - General	Status - General fault	BU0 BU1 BU2(+)
97		Status - General warning	BU0 BU1 BU2(+)
98		Status - Device	BU0 BU1 BU2(+)
99		Status - Bus	BU0 BU1 BU2(+)
100		Status - PLC/PCS	BU0 BU1 BU2(+)
101		Status - Current flowing	IM UM(+)
102		*Reserved*	
103		*Reserved*	
104	Status information - Receive	Status - ON<<	Dependent on the control function
105		Status - ON<	
106		Status - Off	
107		Status - ON>	
108		Status - ON>>	
109		Status - Start active	BU0 BU1 BU2(+)
110		Status - Interlocking time active	All reversing starters and positioners

No.	Designation	Designation	Information
111		Status - Change-over pause active	Star-delta starter, Dahlander starter, pole-changing starter
112		Status - Runs in open direction	Dependent on the control function
113		Status - Runs in close direction	
114		Status - FC	
115		Status - FO	
116		Status - TC	
117		Status - TO	
118		Status - Cold start (TPF)	BU0 BU1 BU2(+)
119		Status - OPO	BU2(+)
120		Status - Remote mode	BU0 BU1 BU2(+)
121	Status information - Protection	Status - Emergency start executed	IM UM(+)
122		Status - Cooling down period active	IM UM(+)
123		Status - Pause time active	IM UM(+)
124	Status information - Miscellaneous	Status - Device check active	BU0 BU1 BU2(+)
125		Status - Phase sequence 1-2-3	UM(+)
126		Status - Phase sequence 3-2-1	UM(+)
127		Status - DM-F enabling circuit	DM-F
128	Events - Protection	Event - Overload operation	IM UM(+)
129		Event - Unbalance	IM UM(+)
130		Event - Overload	IM UM(+)
131		Event - overload + phase failure	IM UM(+)
132		Event - Internal ground fault	IM UM(+)
133		Event - External ground fault	EM MM
134		Event - Warning ext. ground fault	EM MM
135		Event - Thermistor overload	Th
136		Event - Thermistor short-circuit	Th
137		Event - Thermistor open circuit	Th
138		Event - TM warning T>	TM MM
139		Event - TM trip T>	TM MM
140		Event - TM sensor fault	TM MM
141		Event - TM out of range	TM MM
142		Event - EM+ open circuit	EM+ MM
143		Event - EM+ short-circuit	EM+ MM
144	Events - Level monitoring	Event - Warning I>	IM UM(+)
145		Event - Warning I<	IM UM(+)
146		Event - Warning P>	UM(+)
147		Event - Warning P<	UM(+)
148		Event - Warning cos phi<	UM(+)
149		Event - Warning U<	UM(+)
150		Event - Warning 0/4 - 20 mA>	AM
151		Event - Warning 0/4 - 20 mA <	AM

No.	Designation	Designation	Information
152		Event - Trip I>	IM UM(+)
153		Event - Trip I<	IM UM(+)
154		Event - Trip P>	UM(+)
155		Event - Trip P<	UM(+)
156		Event - Trip cos phi<	UM(+)
157		Event - Trip U<	UM(+)
158		Event - trip 0/4-20 mA>	AM
159		Event - trip 0/4-20 mA<	AM
160		Event - Stalled rotor	IM UM(+)
161	Events - Protection	Event - Warning internal ground fault	BU2(+)
162		*Reserved*	
163		Event - No start permitted	BU0 BU1 BU2(+)
164	Events - Level monitoring	Event - No. of starts >	BU0 BU1 BU2(+)
165		Event - Just one start possible	BU0 BU1 BU2(+)
166		Event - Motor operating hours >	BU0 BU1 BU2(+)
167		Event - Motor stop time >	BU0 BU1 BU2(+)
168		Event - Limit 1	BU2(+)
169		Event - Limit 2	BU2(+)
170		Event - Limit 3	BU2(+)
171		Event - Limit 4	BU2(+)
172	Events - Miscellaneous	Event - External fault 1	BU0 BU1 BU2(+)
173		Event - External fault 2	BU0 BU1 BU2(+)
174		Event - External fault 3	BU0 BU1 BU2(+)
175		Event - External fault 4	BU0 BU1 BU2(+)
176		Event - External fault 5	BU2(+)
177		Event - External fault 6	BU2(+)
178		*Reserved*	
179		*Reserved*	
180		Event - Analog module open circuit	AM
181		Event - DM-F safety-related tripping	DM-F
182		Event - DM-F - Test requirement	DM-F
183		*Reserved*	
184	Events - Time stamp function	Event - Timestamping function active + OK	BU2(+)
185		*Reserved*	
186	Events - Miscellaneous	Event - DM-FL safety o.k	DM-FL
187		Event - DM-FP PROFIsafe active	DM-FP
188	Events - System interface	Event - Configured operator panel missing	BU0 BU1 BU2(+)
189		*Reserved*	
190	Warnings - Miscellaneous	Warning - DM-F feedback circuit	DM-F
191		Warning - DM-FL simultaneity	DM-FL
192	Faults - General	Fault - HW fault basic unit	BU0 BU1 BU2(+)
193		Fault - Module fault (e.g. IM, DM)	BU0 BU1 BU2(+)

No.	Designation	Designation	Information
194		Fault - temporary components (e.g. memory module)	BU0 BU1 BU2(+)
195		Fault - configuration error	BU0 BU1 BU2(+)
196		Fault - Parameterization	BU0 BU1 BU2(+)
197		Fault - Bus	BU0 BU1 BU2(+)
198		Fault - PLC/PCS	BU0 BU1 BU2(+)
199		*Reserved*	
200	Faults - Control	Fault - Execution Time ON	Not for overload relays
201		Fault - Execution Time OFF	
202		Fault - feedback (FB) ON	
203		Fault - feedback (FB) OFF	
204		Fault - Stalled positioner	Positioner
205		Fault - Double 0	Solenoid valve / positioner
206		Fault - Double 1	Solenoid valve / positioner
207		Fault - End position	Solenoid valve / positioner
208		Fault - Antivalence	Positioner
209		Fault - Cold start (TPF) fault	BU0 BU1 BU2(+)
210		Fault - power failure (UVO)	BU2(+)
211		Fault - Operational Protection Off (OPO)	BU2(+)
212		*Reserved*	
213		*Reserved*	
214		*Reserved*	
215		*Reserved*	
216	Freely-programmable elements	Truth table 1 3I/1O output	BU0 BU1 BU2(+)
217		Truth table 2 3I/1O output	BU0 BU1 BU2(+)
218		Truth table 3 3I/1O output	BU0 BU1 BU2(+)
219		Truth table 4 3I/1O output	BU0 BU2(+)
220		Truth table 5 3I/1O output	BU2(+)
221		Truth table 6 3I/1O output	BU2(+)
222		Truth table 7 2I/1O output	BU0 BU2(+)
223		Truth table 8 2I/1O output	BU0 BU2(+)
224		Truth table 9 5I/2O output 1	BU2(+)
225		Truth table 9 5I/2O output 2	BU2(+)
226		*Reserved*	
227		*Reserved*	
228		*Reserved*	
229		*Reserved*	
230		*Reserved*	
231		*Reserved*	
232		Timer 1 output	BU0 BU1 BU2(+)
233		Timer 2 output	BU0 BU1 BU2(+)

No.	Designation	Designation	Information
234		Timer 3 output	BU2(+)
235		Timer 4 output	BU2(+)
236		Counter 1 output	BU0 BU1 BU2(+)
237		Counter 2 output	BU0 BU1 BU2(+)
238		Counter 3 output	BU2(+)
339		Counter 4 output	BU2(+)
240		Signal conditioning 1 output	BU0 BU1 BU2(+)
241		Signal conditioning 2 output	BU0 BU1 BU2(+)
242		Signal conditioning 3 output	BU0 BU2(+)
243		Signal conditioning 4 output	BU0 BU2(+)
244		Non-volatile element 1 output	BU0 BU1 BU2(+)
245		Non-volatile element 2 output	BU0 BU1 BU2(+)
246		Non-volatile element 3 output	BU2(+)
247		Non-volatile element 4 output	BU2(+)
248		Flashing 1 output	BU0 BU1 BU2(+)
249		Flashing 2 output	BU0 BU1 BU2(+)
250		Flashing 3 output	BU0 BU1 BU2(+)
251		Flicker 1 output	BU0 BU1 BU2(+)
252		Flicker 2 output	BU0 BU1 BU2(+)
253		Flicker 3 output	BU0 BU1 BU2(+)
254		*Reserved*	
255		*Reserved*	

3.3.1.3 Socket assignment table - analog

This table contains all assignment numbers (No.) of the sockets (analog). You only need these assignment numbers if you, for example, use a user program to fill data records and write them back. All inputs for analog data can only process values of type "Word" (2 bytes). In order to also be able to process values of type "Byte", the following applies:

The byte value is processed as a low byte, the high byte is always 0.

Table 3-20 Socket assignment table - analog

No.	Designation	Unit	Information
0	Not connected		BU0 BU1 BU2(+)
1	*Reserved*		
2	*Reserved*		
3	*Reserved*		
4	Timer 1 - Actual value	100 ms	BU0 BU1 BU2(+)
5	Timer 2 - Actual value	100 ms	BU0 BU1 BU2(+)
6	Timer 3 - Actual value	100 ms	BU2(+)
7	Timer 4 - Actual value	100 ms	BU2(+)
8	Counter 1 - Actual value		BU0 BU1 BU2(+)

No.	Designation	Unit	Information
9	Counter 2 - Actual value		BU0 BU1 BU2(+)
10	Counter 3 - Actual value		BU2(+)
11	Counter 4 - Actual value		BU2(+)
12	*Reserved*		
13	*Reserved*		
14	*Reserved*		
15	*Reserved*		
16	Max. current I_max	1 % / Is	IM UM
17	Current I_L1	1 % / Is	IM UM
18	Current I_L2	1 % / Is	IM UM
19	Current I_L3	1 % / Is	IM UM
20	Phase unbalance	1 %	IM UM
21	Ground-fault current	1 mA	UM+
22	Internal ground fault - last trip current	1 mA	UM+
23	Voltage U_min	1 V	UM(+)
24	Voltage U_L1	1 V	UM(+)
25	Voltage U_L2	1 V	UM(+)
26	Voltage U_L3	1 V	UM(+)
27	Cos phi	1 %	UM(+)
28	Frequency	0.01 Hz	UM+
29	*Reserved*		
30	Number of overload trips		IM UM(+)
31	Int. number of overload trips		IM UM(+)
32	Thermal motor model	2 %	IM UM(+)
33	Time to trip	100 ms	IM UM(+)
34	Recovery time	100 ms	IM UM(+)
35	Last trip current	1 % / I_e	IM UM(+)
36	TM - Max. temperature	1 K	TM MM
37	TM - Temperature 1	1 K	TM MM
38	TM - Temperature 2	1 K	TM
39	TM - Temperature 3	1 K	TM
40	Permissible starts - Actual value		BU0 BU1 BU2(+)
41	Motor stop time	1 h	BU0 BU1 BU2(+)
42	DM-F - Time until test required	1 week	DM-F
43	Last trip current	1 mA	EM(+) MM
44	AM - Input 1	See 1)	AM
45	AM - Input 2	See 1)	AM
46	*Reserved*		
47	Ground-fault current	1 mA	MMa EM(+)
)48	Acyclic receive data - analog value		BU0 BU1 BU2(+)
49	PLC / PCS receive - analog value 1		BU0 BU2(+)
50	*Reserved*		
51	Number of parameterizations		BU0 BU1 BU2(+)

No.	Designation	Unit	Information
52	Motor operating hours - H word	1 s	BU0 BU1 BU2(+)
53	Motor operating hours - L word		BU0 BU1 BU2(+)
54	Int. motor operating hours - H word		BU0 BU1 BU2(+)
55	Int. motor operating hours - L word		BU0 BU1 BU2(+)
56	Device operating hours - H word		BU0 BU1 BU2(+)
57	Device operating hours - L word		BU0 BU1 BU2(+)
58	Number of starts - H word		BU0 BU1 BU2(+)
59	Number of starts - L word		BU0 BU1 BU2(+)
60	Int. number of starts CW - H word		BU0 BU1 BU2(+)
61	Int. number of starts CW - L word		BU0 BU1 BU2(+)
62	Int. number of starts CCW - H word		BU0 BU1 BU2(+)
63	Int. number of starts CCW - L word		BU0 BU1 BU2(+)
64	Energy W - H word		UM(+)
65	Energy W - L word	1 kWh	UM(+)
66 ... 69	*Reserved*		
70	Active power P - H word	1 W	BU2(+)
71	Active power P - L word		BU2(+)
72	Apparent power S - H word	1 VA	BU2(+)
73	Apparent power S - L word		BU2(+)
74 ... 85	*Reserved*		
86	Calculator 1 - Output		BU2(+)
87 ... 89	*Reserved*		
90	Calculator 2 - Output		BU2(+)
91 ... 103	*Reserved*		
104 2)	Max. current I_max_10mA	10 mA	
105 2)	Current I_L1_10mA	10 mA	
106 2)	Current I_L2_10mA	10 mA	
107 2)	Current I_L3_10mA	10 mA	
108 2)	Max. current I_max_100mA	100 mA	
109 2)	Current I_L1_100mA	100 mA	
110 2)	Current I_L2_100mA	100 mA	
111 2)	Current I_L3_100mA	100 mA	
...			
255	*Reserved*		

1) S7 format: 0/4mA=0; 20mA=27648

2) For SIMOCODE pro S only

Table 3-21 Socket assignment table - analog in float format

No.	Designation	Unit	Info
0	Not connected		BU0 BU1 BU2(+)
1	*Reserved*		
2	*Reserved*		
3	*Reserved*		
4	Current I_max_A_F	1 A	UM+
5	Current I_avg_A_F	1 A	UM+
6	Current I_L1_A_F	1 A	UM+
7	Current I_L2_A_F	1 A	UM+
8	Current I_L3_A_F	1 A	UM+
9	Active power P_F	1 W	UM+
10	Apparent power S_F	1 VA	UM+
11	Voltage UL1_F	1 V	UM+
12	Voltage UL2_F	1 V	UM+
13	Voltage UL3_F	1 V	UM+
14	Cos phi_F	1 %	UM+
15	Frequency_F	1 Hz	UM+
16	*Reserved*		
...	*Reserved*		
255	*Reserved*		

3.3.1.4 Detailed messages of the slave diagnostics

The following table contains the detailed messages of the slave diagnostics for status information and the hardware interrupt. This information is also contained in data record 92.

Note

Structure of the slave diagnostics

The diagnostic messages listed below are the same as those contained in the hardware interrupts transferred via PROFIBUS. See also Chapter "Structure of the slave diagnostics → Hardware interrupt - Structure" in the SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Table 3-22 Detailed messages of the slave diagnostics

Byte.Bit	Status message		Information
0.0	Faults - control	Fault - execution ON command	BU0 BU1 BU2(+)
0.1		Fault - execution STOP command	BU0 BU1 BU2(+)
0.2		Fault - feedback (FB) ON	BU0 BU1 BU2(+)
0.3		Fault - feedback (FB) OFF	BU0 BU1 BU2(+)

Byte.Bit	Status message		Information
0.4		Fault - stalled positioner	BU2(+)
0.5		Fault - double 0	BU2(+)
0.6		Fault - double 1	BU2(+)
0.7		Fault - end position	BU2(+)
1.0		Fault - antivalence	BU2(+)
1.1		Fault - Cold start (TPF) fault	BU0 BU1 BU2(+)
1.2		Fault - power failure (UVO)	BU2(+)
1.3		Fault - Operational Protection Off (OPO)	BU2(+)
1.4		*Reserved*	
2.0		*Reserved*	
2.1	Faults - Protection	Fault - unbalance	IM UM
2.2		Fault - overload	IM UM
2.3		Fault - overload + phase failure	IM UM
2.4		Fault - int. ground fault	IM UM
2.5		Fault - ext. ground fault	EM
2.6		*Reserved*	
2.7		Fault - thermistor overload	Th
3.0		Fault - thermistor short circuit	Th
3.1		Fault - thermistor open circuit	Th
3.2		*Reserved*	
3.3		Fault - TM trip T>	TM MM
3.4		Fault - TM sensor fault	TM MM
3.5		Fault - TM out of range	TM MM
3.6		Fault - EM+ open circuit	MM EM+
3.7		Fault - EM+ short-circuit	MM EM+
4.0	Trips - level monitoring	Fault - trip I>	IM UM
4.1		Fault - trip I<	IM UM
4.2		Fault - trip P>	UM
4.3		Fault - trip P<	UM
4.4		Fault - trip cos phi<	UM
4.5		Fault - trip U<	UM
4.6		Fault - trip 0/4 - 20 mA>	AM
4.7		Fault - trip 0/4 - 20 mA<	AM
5.0		Fault - stalled rotor	IM UM
5.1		*Reserved*	
5.4		Fault - number of starts >	BU0 BU1 BU2(+)
5.5		*Reserved*	

Byte.Bit	Status message		Information
6.0	Faults - Miscellaneous	Fault - external fault 1	BU0 BU1 BU2(+)
6.1		Fault - external fault 2	BU0 BU1 BU2(+)
6.2		Fault - external fault 3	BU0 BU1 BU2(+)
6.3		Fault - external fault 4	BU0 BU1 BU2(+)
6.4		Fault - external fault 5	BU2(+)
6.5		Fault - external fault 6	BU2(+)
6.6		*Reserved*	
6.7		*Reserved*	
7.0		Fault - analog module open circuit	AM
7.1		Fault - test trip	BU0 BU1 BU2(+)
7.2		DM-F safety-related tripping	DM-FL DM-FP
7.3		Fault - DM-F wiring	DM-FL DM-FP
7.4		Fault - DM-FL cross circuit	DM-FL
8.0	Warnings - Protection	Warning - Overload operation	IM UM
8.1		Warning - Unbalance	IM UM
8.2		Warning - Overload	IM UM
8.3		Warning - Overload + phase failure	IM UM
8.4		Warning - internal ground fault	IM UM
8.5		Warning - external ground fault	EM MM
8.6		*Reserved*	
8.7		Warning - Thermistor overload	Th
9.0		Warning - Thermistor short circuit	Th
9.1		Warning - Thermistor open circuit	Th
9.2		Warning - TM warning T>	TM MM
9.3		*Reserved*	
9.4		Warning - TM sensor fault	TM MM
9.5		Warning - TM out of range	TM MM
9.6		*Reserved*	
10.0	Warnings - Level monitoring	Warning - Warning I>	IM UM
10.1		Warning - Warning I<	IM UM
10.2		Warning - Warning P>	UM
10.3		Warning - Warning P<	UM
10.4		Warning - Warning cos phi<	UM
10.5		Warning - Warning U<	UM
10.6		Warning - warning 0/4 - 20 mA>	AM
10.7		Warning - warning 0/4 - 20 mA>	AM
11.0		Warning - Stalled rotor	IM UM
11.1		*Reserved*	
11.3		Warning - No start permitted	BU0 BU1 BU2(+)
11.4		Warning - Number of starts >	BU0 BU1 BU2(+)
11.5		Warning - Just one start possible	BU0 BU1 BU2(+)
11.6		Warning - Motor operating hours>	BU0 BU1 BU2(+)
11.7		Warning - Motor stop time >	BU0 BU1 BU2(+)

Byte.Bit	Status message		Information
12.0	Warnings - Miscellaneous	Warning - external fault 1	BU0 BU1 BU2(+)
12.1		Warning - external fault 2	BU0 BU1 BU2(+)
12.2		Warning - external fault 3	BU0 BU1 BU2(+)
12.3		Warning - external fault 4	BU0 BU1 BU2(+)
12.4		Warning - external fault 5	BU2(+)
12.5		Warning - external fault 6	BU2(+)
12.6		*Reserved*	
12.7		*Reserved*	
13.0		Warning - Analog module open circuit	BU2(+)
13.1		Warning - DM-F safety-related tripping	
13.2		Warning - Test requirement	DM-FL DM-FP
13.3		*Reserved*	
13.4		*Reserved*	
13.5		*Reserved*	
13.6		Warning - DM-F feedback circuit	DM-FL DM-FP
13.7		Warning - DM-FL	DM-FL
14.0		*Reserved*	
14.1	Status information - Protection	Status - Emergency start executed	IM UM
14.2		Status - Cooling down period active	IM UM
14.3		Status - Pause time active	IM UM
14.4		*Reserved*	
14.5		*Reserved*	
14.6	Status information - Receive	Status - Cold starting (TPF)	BU0 BU1 BU2(+)
14.7		*Reserved*	
15.0	Events - parameterization	Event - startup parameter block active	BU0 BU1 BU2(+)
15.1		Event - Parameter changes not allowed in the current operating state	BU0 BU1 BU2(+)
15.2		Event - Device does not support the required functions	BU0 BU1 BU2(+)
15.3		Event - Wrong parameter	BU0 BU1 BU2(+)
15.4		Event - Wrong password	BU0 BU1 BU2(+)
15.5		Event - Password protection active	BU0 BU1 BU2(+)
15.6		Event - Factory settings	BU0 BU1 BU2(+)
15.7		Event - Parameterization active	BU0 BU1 BU2(+)
17.0		Event - DM-FL configuration mode	DM-FL
17.1		Event - DM FL configuration deviation	DM-FL
17.2		Event - DM-FL waiting for start-up test	DM-FL
17.3		Event - DM FP F PRM error	DM-FP
17.4		*Reserved*	

3.3.2 PROFIBUS data records

3.3.2.1 PROFIBUS data records - general

Data records - Overview

Table 3-23 Data records - Overview

Data record No.	Description	Read / write
1	S7 system diagnostics (Page 146)	Read
63	Analog value recording (Page 148)	Read
67	Process image output (Page 149)	Read
69	Process image input (Page 150)	Read
72	Error buffer (Page 150)	Read
73	Event memory (Page 151)	Read
92	Device diagnostics (faults, warnings, status information) (Page 151)	Read
94	Measured values (Page 158)	Read
95	Service / statistical data (Page 159)	Read / write
130	Basic device parameters 1 (Page 161) (BU0 BU1 BU2)	Read / write
131	Basic device parameters 2 (Page 168) (BU0 BU1 BU2)	Read / write
132	Extended device parameters 1 (Page 174) (BU2)	Read / write
133	Extended device parameters 2 (Page 182) (BU0 BU2)	Read / write
139	Labeling (Page 185)	Read / write
160	Communication parameters (Page 186)	Read / write
165	Marking (Page 187)	Read / write
202	Acyclic receive (Page 188)	Read / write
203	Acyclic send (Page 189)	Read
224	Password protection (Page 189)	Write
231	I&M0 - device information (Page 190)	Read
232	I&M1 - equipment identifier (Page 191)	Read / write
233	I&M2 - installation (Page 191)	Read / write
234	I&M3 - description (Page 192)	Read / write

Writing / reading data records

Access to data records via the slot and index

- Slot: Access via slot 1
- Index: Data record number

Writing / reading data records with STEP7

You can access the data records from the user program.

- Writing data records:
  - S7-DPV1 master: by calling SFB 53 "WR_REC" or SFC 58
  - S7 master: by calling SFC58
- Reading data sets:
  - S7-DPV1 master: by calling SFB 52 "RD_REC" or SFC 59
  - S7 master: by calling SFC 59

Further information

You will find further information about the SFBs:

- in Reference Manual System software for the S7-300/400, system and standard functions (https://support.automation.siemens.com/WW/view/en/44240604)
- In the STEP7 online help

Byte arrangements

When data longer than one byte is stored, the bytes are arranged as follows ("big endian"):

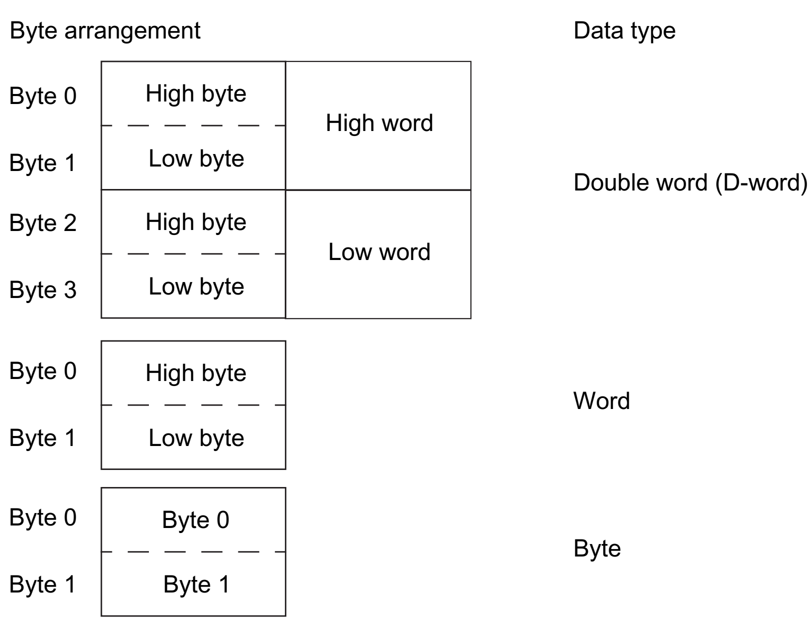


Figure 3-2 Byte arrangement in "big endian" format

Abbreviations

See SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Specifications

The following specifications apply in the tables:

Designation	Type	Range	Unit	Information
*Reserved *)*	*Byte[4] *)*			
Max. current I_max	Word	0 ... 65535	1 % / I_s	BU0 BU1 BU2
*) Items in italics are not relevant (reserved) and must be filled with "0" when written to.				
Parameters that can be changed during operation.				
BU0 BU1 BU2: Entry relevant for basic units SIMOCODE pro S, SIMOCODE pro C, and SIMOCODE pro V.				

Settings are valid/can only be made when the corresponding system components are used.

"Float" data type

32-bit floating-point number

S: Sign (0 = positive; 1 = negative)

E: Exponent

M: Mantissa

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
S	E: Exponent + 127 (8 bits)								M: Mantissa (23 bits)																						

3.3.2.2 Data record 0/1 - S7 system diagnostics

Table 3-24 Data record 0/1 S7 system diagnostics

Byte Bit	DR0	DS1	Designation	Type	No error	Error	Information
0.0	X	X	Module fault / OK	Bit	0	1	
0.1	X	X	Internal fault	Bit	0	0	
0.2	X	X	External fault	Bit	0	1	
0.3	X	X	Channel fault	Bit	0	1	
0.4	X	X	External auxiliary voltage missing	Bit	0	0	
0.5	X	X	Front panel plug missing	Bit	0	0	
0.6	X	X	Module not parameterized	Bit	0	0	
0.7	X	X	Wrong parameters on module	Bit	0	0	
1.0	X	X	Module type	Bit[4]	3	3	
1.4	X	X	Channel information available	Bit	1	1	
1.5	X	X	Application information available	Bit	0	0	
1.6	X	X	Substitute diagnosis alarm	Bit	0	0	
1.7	*X*	*X*	*Reserved = 0*	*Bit*	*0*	*0*	
2.0	X	X	Application module wrong / missing	Bit	0	0	
2.1	X	X	Communication fault	Bit	0	0	

Byte Bit	DR0	DS1	Designation	Type	No error	Error	Information
2.2	X	X	Operating state (0=RUN, 1=STOP)	Bit	0	0	
2.3	X	X	Time monitoring activated	Bit	0	0	
2.4	X	X	Supply voltage within module failed	Bit	0	0	
2.5	X	X	Battery flat (BATTF)	Bit	0	0	
2.6	X	X	Total backup power failed	Bit	0	0	
2.7	X	X	Reserved = 0	Bit	0	0	
3.0	X	X	Rack failure (detected by IM / UM)	Bit	0	0	
3.1	X	X	Processor failure	Bit	0	0	
3.2	X	X	EEPROM error	Bit	0	0	
3.3	X	X	RAM error	Bit	0	0	
3.4	X	X	ADU/DAU error	Bit	0	0	
3.5	X	X	Blown fuse	Bit	0	0	
3.6	X	X	PRAL missing	Bit	0	0	
3.7	*X*	*X*	*Reserved = 0*	*Bit*	*0*	*0*	
4.0		X	Channel type	Byte	0x7D	0x7D	
5.0		X	Length of the channel-specific diagnostics	Byte	0x20	0x20	
6.0		X	Number of channels	Byte	0x01	0x01	
7.0		X	Channel fault vector (one bit per channel)	Byte	0x00	0x01	
8.0		*X*	*Reserved*	*Bit*	*0*	*0*	
8.1		X	Short circuit	Bit	0	0	
8.2		X	Undervoltage	Bit	0	0	
8.3		X	Overvoltage	Bit	0	0	
8.4		X	Overload	Bit	0	0	
8.5		X	Overtemperature	Bit	0	0	
8.6		X	Open circuit	Bit	0	0	
8.7		X	Upper limit overshot	Bit	0	0	
9.0		X	Lower limit undershot	Bit	0	0	
9.1		X	Error	Bit	0	X	Fault F9
9.2		*X*	*Reserved*	*Bit*	*0*	*0*	
9.3		*X*	*Reserved*	*Bit*	*0*	*0*	
9.4		*X*	*Reserved*	*Bit*	*0*	*0*	
9.5		*X*	*Reserved*	*Bit*	*0*	*0*	
9.6		*X*	*Reserved*	*Bit*	*0*	*0*	
9.7		*X*	*Reserved*	*Bit*	*0*	*0*	
10.0		X	Parameterization error	Bit	0	X	Fault F16
10.1		X	Sensor or load voltage missing	Bit	0	0	
10.2		X	Fuse defective	Bit	0	0	
10.3		*X*	*Reserved*	*Bit*	*0*	*0*	
10.4		X	Earth fault	Bit	0	0	

Byte Bit	DR0	DS1	Designation	Type	No error	Error	Information
10.5		X	Reference channel fault	Bit	0	0	
10.6		X	Process alarm missing	Bit	0	0	
10.7		X	Actuator warning	Bit	0	0	
11.0		X	Actuator trip	Bit	0	0	
11.1		X	Safety-related tripping	Bit	0	0	
11.2		X	External fault	Bit	0	0	
11.3		X	Non-specific error	Bit	0	0	
11.4		*X*	*Reserved*	*Bit*	*0*	*0*	
11.5		*X*	*Reserved*	*Bit*	*0*	*0*	
11.6		*X*	*Reserved*	*Bit*	*0*	*0*	
11.7		*X*	*Reserved*	*Bit*	*0*	*0*	
12.0		*X*	*Reserved*	*Byte[4]*	*0*	*0*	

3.3.2.3 Data record 63 - Analog value recording

Table 3-25 Data record 63 - Analog value recording

Byte.Bit	Designation	Type	Range	Information
0.0	StartPos	Word	0	BU2(+)
2.0	Channel No.	Byte	1	BU2(+)
3.0	Analog value record currently running	Bit	0, 1	BU2(+)
3.1	Trigger event occurred	Bit	0, 1	BU2(+)
3.2	Reserved	Bit[6]	0	
4.0	Measured value (0)	Word	0 ... 65535	BU2(+)
6.0	Measured value (1)	Word	0 ... 65535	BU2(+)
...				
122.0	Measured value (59)	Word	0 ... 65535	BU2(+)
124.0	Reserved	Byte[76]	0	

The unit of the measured value is dependent on the assigned analog value. You will find all available analog values with their units in Chapter Socket assignment table - analog (Page 137).

3.3.2.4 Data record 67 - Process image output

Table 3-26 Data record 67 - Process image output

Byte.Bit	Designation	Default (also see parameters)	Type	Information
0.0	Cyclic receive - Bit 0.0	Control station - PLC/ PCS [DP] ON<	Bit	BU0 BU1 BU2(+)
0.1	Cyclic receive - Bit 0.1	Control station - PLC/PCS [DP] OFF	Bit	
0.2	Cyclic receive - Bit 0.2	Control station - PLC/PCS [DP] ON>	Bit	
0.3	Cyclic receive - Bit 0.3	Test 1	Bit	
0.4	Cyclic receive - Bit 0.4	Motor protection - Emergency start	Bit	
0.5	Cyclic receive - Bit 0.5	Mode selector S1	Bit	
0.6	Cyclic receive - Bit 0.6	Reset 1	Bit	
0.7	Cyclic receive - Bit 0.7	Not assigned	Bit	
1.0	Cyclic receive - Bit 1.0	Not assigned	Bit	
1.1	Cyclic receive - Bit 1.1	Not assigned	Bit	
1.2	Cyclic receive - Bit 1.2	Not assigned	Bit	
1.3	Cyclic receive - Bit 1.3	Not assigned	Bit	
1.4	Cyclic receive - Bit 1.4	Not assigned	Bit	
1.5	Cyclic receive - Bit 1.5	Not assigned	Bit	
1.6	Cyclic receive - Bit 1.6	Not assigned	Bit	
1.7	Cyclic receive - Bit 1.7	Not assigned	Bit	
2.0 to 3.7	Cyclic receive - Analog value	Not assigned	Word	BU0 BU2(+)

3.3.2.5 Data record 69 - Process image input

Table 3-27 Data record 69 - Process image input

<table>
<tr><th>Byte. Bit</th><th colspan="2">Designation</th><th>Default (also see parameters)</th><th colspan="2">Type</th><th colspan="2">Information</th></tr>
<tr><td>0.0</td><td colspan="2">Cyclic send - Bit 0.0</td><td>Status - ON<</td><td colspan="2">Bit</td><td colspan="2" rowspan="16">BU0 BU1 BU2(+)</td></tr>
<tr><td>0.1</td><td colspan="2">Cyclic send - Bit 0.1</td><td>Status - Off</td><td colspan="2">Bit</td></tr>
<tr><td>0.2</td><td colspan="2">Cyclic send - Bit 0.2</td><td>Status - ON></td><td colspan="2">Bit</td></tr>
<tr><td>0.3</td><td colspan="2">Cyclic send - Bit 0.3</td><td>Event - Overload operation</td><td colspan="2">Bit</td></tr>
<tr><td>0.4</td><td colspan="2">Cyclic send - Bit 0.4</td><td>Status - Interlocking time active</td><td colspan="2">Bit</td></tr>
<tr><td>0.5</td><td colspan="2">Cyclic send - Bit 0.5</td><td>Status - Remote mode</td><td colspan="2">Bit</td></tr>
<tr><td>0.6</td><td colspan="2">Cyclic send - Bit 0.6</td><td>Status - General fault</td><td colspan="2">Bit</td></tr>
<tr><td>0.7</td><td colspan="2">Cyclic send - Bit 0.7</td><td>Status - general warning</td><td colspan="2">Bit</td></tr>
<tr><td>1.0</td><td colspan="2">Cyclic send - Bit 1.0</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.1</td><td colspan="2">Cyclic send - Bit 1.1</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.2</td><td colspan="2">Cyclic send - Bit 1.2</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.3</td><td colspan="2">Cyclic send - Bit 1.3</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.4</td><td colspan="2">Cyclic send - Bit 1.4</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.5</td><td colspan="2">Cyclic send - Bit 1.5</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.6</td><td colspan="2">Cyclic send - Bit 1.6</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.7</td><td colspan="2">Cyclic send - Bit 1.7</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>2.0</td><td>PLC/ PCS analog Input 1</td><td rowspan="2">PLC / PCS analog FI input 1</td><td>Max. current I_max</td><td>Word</td><td rowspan="2">Float</td><td>BU0 , BU1, BU2(+)</td><td rowspan="4">BU2+</td></tr>
<tr><td>4.0</td><td>PLC/PCS analog input 2</td><td>Not assigned</td><td>Word</td><td rowspan="3">BU0, BU2(+)</td></tr>
<tr><td>6.0</td><td>PLC/PCS analog input 3</td><td rowspan="2">PLC / PCS analog FI input 2</td><td>Not assigned</td><td>Word</td><td rowspan="2">Float</td></tr>
<tr><td>8.0</td><td>PLC/PCS analog input 4</td><td>Not assigned</td><td>Word</td></tr>
</table>

3.3.2.6 Data record 72 - Error buffer

Table 3-28 Data record 72 - Error buffer

Byte.Bit	Entry	Designation	Type	Information
0.0	1	Time stamp	D-word	BU0 BU1 BU2(+)
4.0		Type	Byte	
5.0		Error number	Byte	
6.0	2	Time stamp	D-word	
10.0		Type	Byte	
11.0		Error number	Byte	
...				

Byte.Bit	Entry	Designation	Type	Information
120.0	21	Time stamp	D-word	BU0 BU1 BU2(+)
124.0		Type	Byte	
125.0		Error number	Byte	

Time stamp

The operating hours of the device are used as a time stamp (resolution: 1 s).

Type/error number

Refer to the error numbers for detailed information. You will find the meaning in Chapter Data record 92 - Device diagnostics (Page 151) in column "Error number" of table "Data record 92 - Diagnostics."

3.3.2.7 Data record 73 - Event memory

Table 3-29 Data record 73 - Event memory

Byte.Bit	Entry	Designation	Type	Information
0.0	1	Time stamp	D-word	BU2(+)
4.0		Type	Byte	BU2(+)
5.0		Information	Byte	BU2(+)
8.0	2	Time stamp	D-word	BU2(+)
12.0		Type	Byte	BU2(+)
13.0		Information	Byte	BU2(+)
14.0		Info	Byte[2]	BU2(+)

3.3.2.8 Data record 92 - Device diagnostics

Table 3-30 Data record 92 - Device diagnostics

Byte.Bit	Designation		Information	DP diag-nostics *)	Error No. **)
0.0		*Reserved*			
1.0	Status information - General	Status - General fault	BU0 BU1 BU2(+)		
1.1		Status - General warning	BU0 BU1 BU2(+)		
1.2		Status - Device	BU0 BU1 BU2(+)		
1.3		Status - Bus	BU0 BU1 BU2(+)		
1.4		Status - PLC/PCS	BU0 BU1 BU2(+)		
1.5		Status - Current flowing	IM UM		
1.6		*Reserved*			

Byte.Bit	Designation		Information	DP diagnostics *)	Error No. **)
2.0	Status information - Receive	Status - ON<<	Dependent on the control function		
2.1		Status - ON<			
2.2		Status - Off			
2.3		Status - ON>			
2.4		Status - ON>>			
2.5		Status - Start active	BU0 BU1 BU2(+)		
2.6		Status - Interlocking time active	All reversing starters and positioners		
2.7		Status - Change-over pause active	Star-delta starter, Dahlander starter, pole-changing starter		
3.0		Status - Runs in open direction	Dependent on the control function		
3.1		Status - Runs in close direction			
3.2		Status - FC			
3.3		Status - FO			
3.4		Status - TC			
3.5		Status - TO			
3.6		Status - Cold start (TPF)	BU0 BU1 BU2(+)	M	
3.7		Status - OPO	BU2(+)		
4.0		Status - Remote mode	BU0 BU1 BU2(+)		
4.1	Status information - Protection	Status - Emergency start executed	IM UM	M	
4.2		Status - Cooling down period active	IM UM	M	
4.3		Status - Pause time active	IM UM		
4.4	Status information - Miscellaneous	Status - Device check active	BU0 BU1 BU2(+)		
4.5		Status - Phase sequence 1-2-3	UM		
4.6		Status - Phase sequence 3-2-1	UM		
4.7		Status - DM-F enabling circuit	DM-F		
5.0	Events - Protection	Event - Overload operation	IM UM		
5.1		Event - Unbalance	IM UM		
5.2		Event - Overload	IM UM		
5.3		Event - overload + phase failure	IM UM		
5.4		Event - Internal ground fault	IM UM		
5.5		Event - External ground fault	EM		
5.6		Event - Warning ext. ground fault	EM		
5.7		Event - Thermistor overload	Th		
6.0		Event - Thermistor short-circuit	Th		
6.1		Event - Thermistor open circuit	Th		
6.2		Event - TM warning T>	TM MM		
6.3		Event - TM trip T>	TM MM		
6.4		Event - TM sensor fault	TM MM		

Byte.Bit	Designation		Information	DP diag-nostics *)	Error No. **)
6.5		Event - TM out of range	TM MM		
6.6		Event - EM+ open circuit	MM EM(+) [1)]		
6.7		Event - EM+ short-circuit	MM EM(+) [1)]		
7.0	Events - Level monitoring	Event - Warning I>	IM UM		
7.1		Event - Warning I<	IM UM		
7.2		Event - Warning P>	UM		
7.3		Event - Warning P<	UM		
7.4		Event - Warning cos phi<	UM		
7.5		Event - Warning U<	UM		
7.6		Event - Warning 0/4 - 20mA>	AM		
7.7		Event - Warning 0/4 - 20mA<	AM		
8.0		Event - Trip I>	IM UM		
8.1		Event - Trip I<	IM UM		
8.2		Event - Trip P>	UM		
8.3		Event - Trip P<	UM		
8.4		Event - Trip cos phi<	UM		
8.5		Event - Trip U<	UM		
8.6		Event - trip 0/4 - 20mA>	AM		
8.7		Event - trip 0/4 - 20mA<	AM		
9.0		Event - Stalled rotor	IM UM		
9.1	Events - Protection	Warning - Internal ground fault	UM+		
9.2		*Reserved*			
9.3	Events - Level monitoring	Event - No start permitted	BU0 BU1 BU2(+)		
9.4		Event - No. of starts >	BU0 BU1 BU2(+)		
9.5		Event - Just one start possible	BU0 BU1 BU2(+)		
9.6		Event - motor operating hours >	BU0 BU1 BU2(+)		
9.7		Event - Motor stop time >	BU0 BU1 BU2(+)		
10.0		Event - Limit 1	BU2(+)		
10.1		Event - Limit 2	BU2(+)		
10.2		Event - Limit 3	BU2(+)		
10.3		Event - Limit 4	BU2(+)		
10.4	Events - Miscellaneous	Event - ext. fault 1	BU0 BU1 BU2(+)		
10.5		Event - ext. fault 2	BU0 BU1 BU2(+)		
10.6		Event - ext. fault 3	BU0 BU1 BU2(+)		
10.7		Event - ext. fault 4	BU0 BU1 BU2(+)		
11.0		Event - ext. fault 5	BU2(+)		
11.1		Event - ext. fault 6	BU2(+)		
11.2	Events - FW update	Event - BU FW update active	BU2+		
11.3		Event - Module FW update active	BU2+		
11.4	Events - Miscellaneous	Event - Analog module open circuit	AM		

Byte.Bit	Designation		Information	DP diagnostics *)	Error No. **)
11.5		Event - DM-F safety-related tripping	DM-F		
11.6		Event - DM-F - Test requirement	DM-F		
11.7		*Reserved*			
12.0	Events - Time stamp function	Event - Timestamping function active + OK	BU2(+)		
12.1		*Reserved*			
12.2	Events - Miscellaneous	Event - DM-FL safety ok	DM-FL		
12.3		Event - DM-FP PROFIsafe active	DM-FP		
12.4	Events - System interfaces	Event - Configured operator panel missing	BU0 BU1 BU2(+)		
12.5		Event - Module not supported	BU0 BU1 BU2(+)		
12.6		Event - No module voltage	BU2(+)		
13.0	Events - Memory module	Event - Memory module read in	BU0 BU1 BU2(+)		
13.1		Event - Memory module programmed	BU0 BU1 BU2(+)		
13.2		Event - Memory module erased	BU0 BU1 BU2(+)		
13.3		*Reserved*			
13.4		Event - Initialization module read in	BU0 BU2(+)		
13.5		Event - Initialization module programmed	BU0 BU2(+)		
13.6		Event - Initialization module cleared	BU0 BU2(+)		
13.7	Event - Addressing plug	Event - Addressing plug read in	BU0 BU1 BU2(+)		
14.0	Events - parameterization	Event - startup parameter block active	BU0 BU1 BU2(+)	M	
14.1		Event - Parameter changes not allowed in the current operating state	BU0 BU1 BU2(+)	M	
14.2		Event - Device does not support the required functions	BU0 BU1 BU2(+)	M	
14.3		Event - Wrong parameter	BU0 BU1 BU2(+)	M	
14.4		Event - Wrong password	BU0 BU1 BU2(+)	M	
14.5		Event - Password protection active	BU0 BU1 BU2(+)		
14.6		Event - Factory settings	BU0 BU1 BU2(+)		
14.7		Event - Parameterization active	BU0 BU1 BU2(+)		
15.0		Event - PRM error number (bytes) ****)**	BU0 BU1 BU2(+)		
16.0		Event - DM-FL configuration mode	DM-FL		
16.1		Event - DM-FL actual and set configuration are different	DM-FL		
16.2		Event - DM-FL waiting for start-up test	DM-FL		
16.3		Event - DM FP PRM error	DM-FP		

Byte.Bit	Designation		Information	DP diagnostics *)	Error No. **)
16.4		*Reserved*			
17.0	Warnings - Protection	Warning - Overload operation	IM UM	W	
17.1		Warning - Unbalance	IM UM	W	
17.2		Warning - Overload	IM UM	W	
17.3		Warning - Overload + phase failure	IM UM	W	
17.4		Warning - Internal ground fault	IM UM	W	
17.5		Warning - external ground fault	EM MM	W	
17.6		*Reserved*			
17.7		Warning - Thermistor overload	Th	W	
18.0		Warning - Thermistor short circuit	Th	W	
18.1		Warning - Thermistor open circuit	Th	W	
18.2		Warning - TM warning T>	TM MM	W	
18.3		*Reserved*			
18.4		Warning - TM sensor fault	TM MM	W	
18.5		Warning - TM out of range	TM MM	W	
18.6		Warning - EM+ open circuit	MM EM+ [1)]	W	
18.7		Warning - EM+ short-circuit	MM EM+ [1)]	W	
19.0	Warnings - Level monitoring	Warning - Warning I>	IM UM	W	
19.1		Warning - Warning I<	IM UM	W	
19.2		Warning - Warning P>	UM	W	
19.3		Warning - Warning P<	UM	W	
19.4		Warning - Warning cos phi<	UM	W	
19.5		Warning - Warning U<	UM	W	
19.6		Warning - Warning 0/4 - 20mA>	AM	W	
19.7		Warning - Warning 0/4 - 20mA<	AM	W	
20.0		Warning - Stalled rotor	IM UM	W	
20.1		*Reserved*			
20.3		Warning - No start permitted	BU0 BU1 BU2(+)	W	
20.4		Warning - Number of starts >	BU0 BU1 BU2(+)	W	
20.5		Warning - Just one start possible	BU0 BU1 BU2(+)	W	
20.6		Warning - Motor operating hours>	BU0 BU1 BU2(+)	W	
20.7		Warning - Motor stop time >	BU0 BU1 BU2(+)	W	
21.0	Warnings - Miscellaneous	Warning - ext. fault 1	BU0 BU1 BU2(+)	W	
21.1		Warning - ext. fault 2	BU0 BU1 BU2(+)	W	
21.2		Warning - ext. fault 3	BU0 BU1 BU2(+)	W	
21.3		Warning - ext. fault 4	BU0 BU1 BU2(+)	W	
21.4		Warning - ext. fault 5	BU2(+)	W	
21.5		Warning - ext. fault 6	BU2(+)	W	
21.6		*Reserved*			
21.7		*Reserved*			

Byte.Bit	Designation		Information	DP diag-nostics *)	Error No. **)
22.0		Warning - Analog module open circuit	AM	W	
22.1		Warning - DM-F safety-related tripping	DM-F	W	
22.2		Warning - DM-F test requirement	DM-F	W	
22.3		*Reserved*			
22.6		Warning - DM-F feedback circuit	DM-F	W	
22.7		Warning - DM-FL simultaneity	DM-FL	W	
23.0	Faults - General	Fault - HW fault basic unit	BU0 BU1 BU2(+)	F9	0
23.1		Fault - Module fault (e.g. module IM, UM, DM)	BU0 BU1 BU2(+)	F9	1
23.2		Fault - temporary components (e.g. memory module)	BU0 BU1 BU2(+)	F9	2
23.3		Fault - configuration error	BU0 BU1 BU2(+)	F16	3
23.4		Fault - Parameterization	BU0 BU1 BU2(+)	F16	4
23.5		Fault - Bus	BU0 BU1 BU2(+)		5
23.6		Fault - PLC/PCS	BU0 BU1 BU2(+)		6
23.7		*Reserved*			
24.0	Faults - Control	Fault - execution ON command	BU1 BU2(+)	F	8
24.1		Fault - execution STOP command	BU1 BU2(+)	F	9
24.2		Fault - feedback (FB) ON	BU1 BU2(+)	F	10
24.3		Fault - feedback (FB) OFF	BU1 BU2(+)	F	11
24.4		Fault - Stalled positioner	CF = positioner	F	12
24.5		Fault - Double 0	CF = positioner	F	13
24.6		Fault - Double 1	CF = positioner	F	14
24.7		Fault - End position	CF = positioner	F	15
25.0		Fault - Antivalence	CF = positioner	F	16
25.1		Fault - Cold start (TPF) fault	BU0 BU1 BU2(+)	F	17
25.2		Fault - power failure (UVO)	BU2(+)	F	18
25.3		Fault - Operational Protection Off (OPO)	BU2(+)	F	19
25.4		*Reserved*			
26.0		*Reserved*			
26.1	Faults - Protection	Fault - unbalance	IM UM	F	25
26.2		Fault - overload	IM UM	F	26
26.3		Fault - overload + phase failure	IM UM	F	27
26.4		Fault - int. ground fault	IM UM	F	28
26.5		Fault - ext. ground fault	EM MM	F	29
26.6		*Reserved*			
26.7		Fault - thermistor overload	Th	F	31
27.0		Fault - thermistor short circuit	Th	F	32
27.1		Fault - thermistor open circuit	Th	F	33
27.2		*Reserved*			

Byte.Bit	Designation		Information	DP diag-nostics *)	Error No. **)
27.3		Fault - TM trip T>	TM MM	F	35
27.4		Fault - TM sensor fault	TM MM	F	36
27.5		Fault - TM out of range	TM MM	F	37
27.6		Fault - EM+ open circuit	MM EM(+) [1]	F	38
27.7		Fault - EM+ short-circuit	MM EM(+) [1]	F	39
28.0	Faults - level monitoring	Fault - trip I>	IM UM	F	40
28.1		Fault - trip I<	IM UM	F	41
28.2		Fault - trip P>	UM	F	42
28.3		Fault - trip P<	UM	F	43
28.4		Fault - trip cos phi<	UM	F	44
28.5		Fault - trip U<	UM	F	45
28.6		Fault - Trip 0/4 - 20mA>	AM	F	46
28.7		Fault - Trip 0/4 - 20mA<	AM	F	47
29.0		Fault - stalled rotor	IM UM	F	48
29.1		*Reserved*			
29.4		Fault - Number of starts >	BU0 BU1 BU2(+)	F	52
29.5		*Reserved*			
30.0	Faults - Miscellaneous	Fault - external fault 1	BU0 BU1 BU2(+)	F	56
30.1		Fault - external fault 2	BU0 BU1 BU2(+)	F	57
30.2		Fault - external fault 3	BU0 BU1 BU2(+)	F	58
30.3		Fault - external fault 4	BU0 BU1 BU2(+)	F	59
30.4		Fault - external fault 5	BU2(+)	F	60
30.5		Fault - external fault 6	BU2(+)	F	61
31.0		Fault - analog module open circuit	AM	F	64
31.1		Fault - test trip	BU0 BU1 BU2(+)	F	65
31.2		Fault - DM-F - safety-related tripping	DM-F	F	66
31.3		Fault - DM-F wiring	DM-F	F	67
31.4		Fault - DM-FL cross circuit	DM-FL	F	68
31.5		*Reserved*			

*) The "DP Diagnostics" column contains the bits that are additionally available in the diagnostics using PROFIBUS DP:

- F: Fault
- M: Status information
- W: Warning
- F9, F16: Fault types

See also Chapter Detailed messages of the slave diagnostics (Page 140).

**) Events - PRM error number (bytes):

If parameterization is not possible, the number of the parameter group (PRM group) that caused the error is communicated here. You will find the parameter group in the parameter data records 130 to 133.

Byte.Bit	Designation (PRM group)
0.0	Reserved
4.0	Device configuration (see above) (12)

Parameter group 12

⋮

Figure 3-3 Example for parameter group

1) 3UF7510-1AA00-0 ground-fault module

3.3.2.9 Data record 94 - measured values

Table 3-31 Data record 94 - measured values

Byte.Bit	Designation	Type	Range	Unit	Information
0.0	*Reserved*	*Byte[4]*			
4.0	Thermal motor model	Byte	0 - 255	See 2)	IM UM(+)
5.0	Phase unbalance	Byte	0 - 100	1%	IM UM(+)
6.0	cos phi	Byte	0 - 100	1%	UM(+)
7.0	*Reserved*	*Byte[5]*			
12.0	Max. current I_max	Word	0 - 65535	1% / I_s	IM UM(+)
14.0	Current I_L1	Word	0 - 65535	1% / I_s	IM UM(+)
16.0	Current I_L2	Word	0 - 65535	1% / I_s	IM UM(+)
18.0	Current I_L3	Word	0 - 65535	1% / I_s	IM UM(+)
20.0	Last trip current	Word	0 - 65535	1% / I_s	IM UM(+)
22.0	Time to trip	Word	0 - 65535	100 ms	IM UM(+)
24.0	Cooling down period	Word	0 - 65535	100 ms	IM UM(+)
26.0	Voltage U_L1	Word	0 - 65535	1 V	UM(+)
28.0	Voltage U_L2	Word	0 - 65535	1 V	UM(+)
30.0	Voltage U_L3	Word	0 - 65535	1 V	UM(+)
32.0	AM output	Word	0 - 32767	See 1)	AM
34.0	AM - Input 1	Word	0 - 32767		AM
36.0	AM - Input 2	Word	0 - 32767		AM
38.0	*Reserved*				
40.0	TM - Max. temperature	Word	0 - 65535	1 K see 3)	TM MM
42.0	TM - Temperature 1	Word	0 - 65535	1 K see 3)	TM MM
44.0	TM - Temperature 2	Word	0 - 65535	1 K see 3)	TM
46.0	TM - Temperature 3	Word	0 - 65535	1 K see 3)	TM
48.0	EM+ 4) - ground-fault current	Word	0 - 65535	1 mA	MM EM(+)

Byte.Bit	Designation	Type	Range	Unit	Information
50.0	EM+ [4)] - last tripping current	Word	0 - 65535	1 mA	MM EM(+)
52.0	Active power P	D-word	0 - 0xFFFFFFFF	1 W	UM(+)
56.0	Apparent power S	D-word	0 - 0xFFFFFFFF	1 VA	UM(+)
60.0	*Reserved*	*Byte[14]*			
132.0	Frequency	Word	0 - 65535	0.01 Hz	UM+
134.0	*Reserved*				
136.0	res. UM+ - ground-fault current	Word			UM+
138.0	Internal ground fault+ - res. last trip current				UM+
140.0	*Reserved*	*Byte[4]*			
144.0	Current I_max_F (float)	Float		1 A	UM+
148.0	Current I_avg_F	Float		1 A	UM+
152.0	Current I_L1_F	Float		1 A	UM+
156.0	Current I_L2_F	Float		1 A	UM+
160.0	Current I_L3_F	Float		1 A	UM+
164.0	Active power P_F	Float		1 W	UM+
168.0	Apparent power S_F	Float		1 VA	UM+
172.0	Voltage U1_F	Float		1 V	UM+
176.0	Voltage U2_F	Float		1 V	UM+
180.0	Voltage U3_F	Float		1 V	UM+
184.0	Cos phi_F	Float			UM+
188.0	Frequency_F	Float		1 Hz	UM+
192.0	*Reserved*	*Byte[8]*			

1) S7 format:

0/4 mA = 0

20 mA = 27648

2) Representation of the "Thermal motor model":

Value always refers to symm. trip level,
representation in 2% increments in bits 6 - 0 (range 0 to 254%), bit 7 shows unbalance (fixed level 50%).

3) Representation in Kelvin.

4) 3UF7510-1AA00-0 ground-fault module

3.3.2.10 Data record 95 - Service data/statistical data

Writing the service data/statistical data

Writing is only possible if password protection is not active.

Additional abbreviations:

- r / w = value can be written / changed
- r = value can only be read

Table 3-32 Data record 95 - Diagnostics - Statistical data

Byte.Bit	Designation	Type	Range	Unit		Information
0.0	*Coordination*	*Byte[4]*				BU0 BU1 BU2(+)
4.0	Permissible starts - actual value	Byte	0 - 255		r [1)]	BU0 BU1 BU2(+)
5.0	DM-F - Time until test required	Byte	0 - 255	1 week	r	BU2(+)
6.0	*Reserved*	*Byte[2]*				
8.0	Number of parameterizations	Word	0 - 65535		r	BU0 BU1 BU2(+)
10.0	Number of overload trips	Word	0 - 65535		r / w	BU0 BU1 BU2(+)
12.0	Number of internal overload trips	Word	0 - 65535		r	BU0 BU1 BU2(+)
14.0	Motor stop time	Word	0 - 65535	1 h	r / w	BU0 BU1 BU2(+)
16.0	Timer 1 - Actual value	Word	0 - 65535	100 ms	r	BU0 BU1 BU2(+)
18.0	Timer 2 - Actual value	Word	0 - 65535	100 ms	r	BU0 BU1 BU2(+)
20.0	Timer 3 - Actual value	Word	0 - 65535	100 ms	r	BU2(+)
22.0	Timer 4 - Actual value	Word	0 - 65535	100 ms	r	BU2(+)
24.0	Counter 1 - Actual value	Word	0 - 65535		r	BU0 BU1 BU2(+)
26.0	Counter 2 - Actual value	Word	0 - 65535		r	BU0 BU1 BU2(+)
28.0	Counter 3 - Actual value	Word	0 - 65535		r	BU2(+)
30.0	Counter 4 - Actual value	Word	0 - 65535		r	BU2(+)
32.0	Calculator 1 Output	Word	0 - 65535		r	BU2(+)
34.0	Calculator 2 Output		0 - 65535		r	BU2(+)
36.0	*Reserved*	*Byte[4]*	*0*			
40.0	Motor operating hours	D-word	0 - 0xFFFFFFFF	1 s	r / w	BU0 BU1 BU2(+)
44.0	Int. motor operating hours	D-word	0 - 0xFFFFFFFF	1 s	r	BU0 BU1 BU2(+)
48.0	Device operating hours	D-word	0 - 0xFFFFFFFF	1 s	r	BU0 BU1 BU2(+)
52.0	Number of starts	D-word	0 - 0xFFFFFFFF		r / w	BU0 BU1 BU2(+)
56.0	Internal number of starts CW	D-word	0 - 0xFFFFFFFF		r	BU0 BU1 BU2(+)
60.0	Internal number of starts CCW	D-word	0 - 0xFFFFFFFF		r	BU0 BU1 BU2(+)
64.0	Consumed energy	D-word	0 - 0xFFFFFFFF	1 kWh	r / w	UM(+)
68.0	Consumed energy	Float		1 kWh	r	UM(+)
72.0	*Reserved*	*D-word*				
76.0	*Reserved*	*D-word[6]*				
100.0	*Reserved*	*Byte[16]*				
130.0	*Reserved*	*Word*				
132.0	*Reserved*	*Word*				
134.0	*Reserved*	*Word*				
136.0	*Reserved*					

1) Can only be written when the start monitoring function is active!

3.3.2.11 Data record 130 - Basic device parameters 1

Table 3-33 Data record 130 - Basic device parameters 1

Byte .Bit	Designation (PRM group)	Type	Range	Unit	De-fault	Note	Information
4.0	**Device configuration (12)**						
0.0	Coordination (byte[4]	Byte					BU0 BU1 BU2(+)
4.0	Device class	Byte	5, 7, 9			5 = BU1 7 = BU0 9 = BU2(+)	BU0 BU1 BU2(+)
5.0	Thermistor	Bit	0, 1			1 = active; thermistor in the BU	BU0 BU1 BU2(+)
(+)5.1	*Reserved*	*Bit[5]*					
5.6	Multifunction module (MM).	Bit	0, 1				BU0
5.7	Initialization module (InM)	Bit	0, 1				BU0 BU2(+)
6.0	Operator panel (OP)	Bit	0, 1				BU0 BU1 BU2(+)
6.1	Analog module 1 (AM1)	Bit	0, 1				BU2(+)
6.2	Temperature module 1 (TM1)	Bit	0, 1				BU0 BU2(+)
6.3	3UF7500 ground-fault module for 3UL22 residual current transformer	Bit	0, 1				BU2(+)
6.4	Digital module 1 (DM1)	Bit[2]	0 - 3			0 = no digital module 1 = monostable 2 = bistable 3 = special type (see 7.4)	BU0 BU2(+)
6.6	Digital module 2 (DM2)	Bit[2]	0 - 2				BU2(+)
7.0	Operator panel with display (OPD)	Bit	0, 1				BU2(+)
7.1	3UF7510 ground-fault module for 3UL23 residual current transformer	Bit	0, 1				BU0 BU2(+)
7.4	DM1 - Special type	Bit[2]	0, 1			0 = DM-FL 1 = DM-FP	BU2(+)
7.6	*Reserved*	*Bit[2]*					

Byte .Bit	Designation (PRM group)	Type	Range	Unit	De-fault	Note	Information
8.0	Current measur-ing (IM)	Bit[7]	0 - 5			IM / UM: 0 = no current measure-ment 1 = 0.3 A - 3 A 2 = 2.4 A - 25 A 3 = 10 A - 100 A 4 = 20 A - 200 A 5 = 63 A - 630 A UM+: 9 = 0.3 A - 4 A 10 = 3 A - 40 A 11 = 10 A - 115 A 12 = 20 - 200 A 13 = 63 - 630 A	BU0 BU1 BU2(+)
8.7	Voltage measuring module (UM)	Bit	0, 1				BU2(+)
9.0	*Reserved*						
10.0	Control function (CF)		0x00 0x10 0x11 0x12 0x20 0x21 0x30 0x31 0x40 0x41 0x50 0x60 0x61 0x62 0x63 0x64 0x70 0x71			0x00 = Overload 0x10 = Direct starter 0x11 = Reversing starter 0x12 = 3VA molded case circuit breaker (MCCB) 0x20 = Star-delta starter 0x21 = Star-delta revers-ing starter 0x30 = Dahlander start-er 0x31 = Dahlander re-versing starter 0x40 = Pole-changing starter 0x41 = Pole-changing reversing starter 0x50 = Solenoid valve 0x60 = Positioner 1 0x61 = Positioner 2 0x62 = Positioner 3 0x63 = Positioner 4 0x64 = Positioner 5 0x70 = Soft starter 0x71 = Soft starter with reversing contactor	BU0 BU1 BU2(+) BU0 BU1 BU2(+) BU0 BU1 BU2(+) BU0 BU1 BU2(+) BU0 BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU2(+) BU0 BU2(+) BU2(+)
11.0	*Reserved*	*Bit[8]*					

Byte .Bit	Designation (PRM group)	Type	Range	Unit	De-fault	Note	Information
12.0	**Bit parameters (16)**						
12.0	No configuration fault due to OP	Bit	0, 1		0		BU0 BU1 BU2(+)
12.1	Startup parameter block active	Bit	0, 1		1		BU0 BU1 BU2(+)
12.2	Test / Reset keys disa-bled	Bit	0, 1		0		BU0 BU1 BU2(+)
12.3	Bus and PLC/PCS - Re-set	Bit	0, 1		0	0 = Manual 1 = Auto	BU0 BU1 BU2(+)
12.4	*Reserved*	*Bit*			*0*		
12.5	*Reserved*	*Bit*			*0*		
12.6	*Reserved*	*Bit*			*0*		
12.7	*Reserved*	*Bit*			*0*		
13.0	Diagnostics for proc-ess events	Bit	0, 1		0		BU0 BU1 BU2(+)
13.1	Diagnostics for proc-ess warnings	Bit	0, 1		1		BU0 BU1 BU2(+)
13.2	Diagnostics for proc-ess faults	Bit	0, 1		1		BU0 BU1 BU2(+)
13.3	Diagnostics for de-vice faults	Bit	0, 1		1		BU0 BU1, BU2(+)
13.4	*Reserved*	*Bit*			*0*		
13.5	*Reserved*	*Bit*			*0*		
13.6	Bus monitoring	Bit	0, 1		1		BU0 BU1 BU2(+)
13.7	PLC/PCS monitoring	Bit	0, 1		1		BU0 BU1 BU2(+)
14.0	Overload protection - Load type	Bit	0, 1		0	0 = 3-phase 1 = 1-phase	IM UM(+)
14.1	Overload protection - Reset	Bit	0, 1		0	0 = Manual 1 = Auto	IM UM(+)
14.2	*Reserved*	*Bit*			*0*		
14.3	Save change-over command	Bit	0, 1		0		BU0 BU1 BU2(+)
14.4	Non-maintained command mode	Bit	0, 1		0		BU0 BU1 BU2(+)
14.5	Cold start level (TPF)	Bit	0, 1		0	0 = NO contact 1 = NC contact	BU0 BU1 BU2(+)
14.6	Type of consumer load	Bit	0, 1		0	0 = Motor 1 = ohmic load	BU0 BU1 BU2(+)
14.7	*Reserved*	*Bit*			*0*		
15.0	External fault 1 - Type	Bit	0, 1		0	0 = NO contact 1 = NC contact	BU0 BU1 BU2(+)
15.1	External fault 2 - Type	Bit	0, 1		0		BU0 BU1 BU2(+)
15.2	External fault 3 - Type	Bit	0, 1		0		BU0 BU1 BU2(+)
15.3	External fault 4 - Type	Bit	0, 1		0		BU0 BU1 BU2(+)

Byte .Bit	Designation (PRM group)	Type	Range	Unit	De- fault	Note	Information
15.4	External fault 1 - active status	Bit	0, 1		0	0 = Always 1 = Only motor ON	BU0 BU1 BU2(+)
15.5	External fault 2 - Activity	Bit	0, 1		0		BU0 BU1 BU2(+)
15.6	External fault 3 - Activity	Bit	0, 1		0		BU0 BU1 BU2(+)
15.7	External fault 4 - Activity	Bit	0, 1		0		BU0 BU1 BU2(+)
16.0	**Bit[2] - Parameters (20)**						

Byte .Bit	Designation (PRM group)	Type	Range	Unit	De-fault	Note	Information
16.0	Thermistor - Overload response	Bit[2]	1, 2, 3		3	0 = disabled 1 = signaling 2 = warn 3 = tripping	Th
16.2	Thermistor - Response to sensor fault	Bit[2]	0, 1, 2, 3		2		Th
16.4	Internal ground fault - Response	Bit[2]	0, 1, 2, 3		0		BU0 BU1 BU2(+)
16.6	Motor protection - Overload response	Bit[2]	0, 1, 2, 3		3		IM
17.0	Motor protection - Overload response	Bit[2]	0, 1, 2		2		IM
17.2	Unbalance protection - Response	Bit[2]	0, 1, 2, 3		2		IM
17.4	Trip response I>	Bit[2]	0, 1, 3		0		BU0 BU1 BU2(+)
17.6	Warning response I>	Bit[2]	0, 1, 2		0		BU0 BU1 BU2(+)
18.0	Trip response I<	Bit[2]	0, 1, 3		0		BU0 BU1 BU2(+)
18.2	Warning response I<	Bit[2]	0, 1, 2		0		BU0 BU1 BU2(+)
18.4	Stalled rotor - Response	Bit[2]	0, 1, 2, 3		0		BU0 BU1 BU2(+)
18.6	EM+ [1)] - response to sensor fault	Bit[2]	0, 1, 2, 3		0		BU0 BU2(+)
19.0	Monitoring the number of starts - Response to overshoot	Bit[2]	0, 1, 2, 3		0		BU0 BU1 BU2(+)
19.2	Monitoring the number of starts - Response to prewarning	Bit[2]	0, 1, 2		0		BU0 BU1 BU2(+)
19.4	Motor operating hours monitoring - Response	Bit[2]	0, 1, 2		0		BU0 BU1 BU2(+)
19.6	Motor stop time monitoring - Response	Bit[2]	0, 1, 2		0		BU0 BU1 BU2(+)
20.0	External fault 1 - Response	Bit[2]	1, 2, 3		1		BU0 BU1 BU2(+)
20.2	External fault 2 - Response	Bit[2]	1, 2, 3		1		BU0 BU1 BU2(+)
20.4	External fault 3 - Response	Bit[2]	1, 2, 3		1		BU0 BU1 BU2(+)
20.6	External fault 4 - Response	Bit[2]	1, 2, 3		1		BU0 BU1 BU2(+)
21.0	*Reserved*	*Bit[2]*			*0*		
21.2	Basic unit - Debounce time inputs	Bit[2]	0 - 3	10 ms	1	Offset 6 ms	BU0 BU1 BU2(+)

Byte .Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
21.4	Timer 1 - Type	Bit[2]	0, 1, 2, 3		0	0 = With closing delay 1 = Closing delay with memory 2 = With opening delay 3 = With fleeting closing	BU0 BU1 BU2(+)
21.6	Timer 2 - Type	Bit[2]	0, 1, 2, 3		0		BU0 BU1 BU2(+)
22.0	Signal conditioning 1 - Type	Bit[2]	0, 1, 2, 3		0	0 = Non-inverting 1 = Inverting 2 = Edge rising with memory 3 = Edge falling with memory	BU0 BU1 BU2(+)
22.2	Signal conditioning 2 - Type	Bit[2]	0, 1, 2, 3		0		BU0 BU1 BU2(+)
22.4	Non-volatile element 1 - Type	Bit[2]	0, 1, 2, 3		0		BU0 BU1 BU2(+)
22.6	Non-volatile element 2 - Type	Bit[2]	0, 1, 2, 3		0		BU0 BU1 BU2(+)
23.0	EM+ [2)] - monitoring	Bit[2]	0, 1, 2, 3		0	0 = on 1 = on+ 2 = run 3 = run+	BU0 BU2(+)
23.2	EM+ [2)] - monitoring warning	Bit[2]	0, 1, 2, 3		0		BU0 BU2(+)
23.4	EM - response to an external ground fault	Bit[2]	1, 3		1	0 = disabled 1 = signaling 2 = warn 3 = tripping	BU0 BU1 BU2(+)
23.6	EM - response to warning of an external ground fault	Bit[2]	0, 1, 2,		0		BU0 BU1 BU2(+)
24.0	**Part - Bit[4] parameters (24)**						
24.0	External fault 1 - Reset also by	Bit[4]	0 - 1111B		0101 B	Bit[0] = Panel reset Bit[1] = Auto-reset Bit[2] = Remote reset Bit[4] = OFF command reset	BU0 BU1 BU2(+)
24.4	External fault 2 - Reset also by	Bit[4]	0 - 1111B		0101 B		BU0 BU1 BU2(+)
25.0	External fault 3 - Reset also by	Bit[4]	0 - 1111B		0101 B		BU0 BU1 BU2(+)
25.4	External fault 4 - Reset also by	Bit[4]	0 - 1111B		0101 B		BU0 BU1 BU2(+)
26.0	Limit monitor - Hysteresis for limit monitor	Bit[4]	0 - 15	1%	5		BU2(+)
26.4	EM+ [2)] - hysteresis	Bit[4]	0 - 15	1%	5		BU0 BU2(+)
27.0	*Reserved*	*Bit[4]*			*0*		*BU0 BU1 BU2(+)*
27.4	*Reserved*	*Bit[4]*			*0*		*BU2+*
28.0	**Byte parameters (28)**						
28.0	Internal ground fault - Delay	Byte	0 - 255	100 ms	5		IM / UM
29.0	Overload protection - Class	Byte	5, 7 [3)], 10 ... 35, 40		10		BU0 BU1 BU2(+)
30.0	Motor protection - Delay with overload operation	Byte	0 - 255	100 ms	5		IM / UM(+)

Byte .Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
31.0	Motor protection - Unbalance protection level	Byte	0 - 100	1%	40		IM / UM(+)
32.0	Unbalance protection - Delay with unbalance	Byte	0 - 255	100 ms	5		IM / UM(+)
33.0	Interlocking time	Byte	0 - 255	1 s	0		
34.0	FB time	Byte	0 - 255	100 ms	5	0 = disabled	
35.0	Trip level I>	Byte	0 - 255	4% / I_s	0		IM / UM(+)
36.0	Warning level I>	Byte	0 - 255	4% / Is	0		IM / UM(+)
37.0	Trip level I<	Byte	0 - 255	4% / Is	0		IM / UM(+)
38.0	Warning level I<	Byte	0 - 255	4% / Is	0		IM / UM(+)
39.0	Stalled rotor level	Byte	0 - 255	4% / Is	0		IM / UM(+)
40.0	Trip delay I>	Byte	0 - 255	100 ms	5		IM / UM(+)
41.0	Warning delay I>	Byte	0 - 255	100 ms	5		IM / UM(+)
42.0	Trip delay I<	Byte	0 - 255	100 ms	5		IM / UM(+)
43.0	Warning delay I<	Byte	0 - 255	100 ms	5		IM / UM(+)
44.0	Blocking delay	Byte	0 - 255	100 ms	5		IM / UM(+)
45.0	Monitoring the number of starts - Permissible starts	Byte	1 - 255		1		BU0 BU1 BU2(+)
46.0	*Reserved*	*Byte*			*0*		
47.0	EM / MM [2)] - delay warning	Byte	0 - 255	100 ms	1		BU0 BU2(+)
48.0	Truth table 1 type 3I/1O	Byte	0 - 11111111B		0		BU0 BU1 BU2(+)
49.0	Truth table 2 type 3I/1O	Byte	0 - 11111111B		0		BU0 BU1 BU2(+)
50.0	Truth table 3 type 3I/1O	Byte	0 - 11111111B		0		BU0 BU1 BU2(+)
51.0	*Reserved*	*Byte*			*0*		
52.0	**Word parameters (32)**						
52.0	Motor protection - Cooling down period	Word	600 - 65535	100 ms	3000		IM / UM(+)
54.0	Motor protection - Pause time	Word	0 - 65535	100 ms	0	0 = disabled	IM / UM(+)
56.0	Execution time	Word	0 - 65535	100 ms	10	0 = disabled	BU0 BU1 BU2(+)
58.0	Monitoring the number of starts - Time range for starts	Word	0 - 65535	1 s	0		BU0 BU1 BU2(+)
60.0	Monitoring the number of starts - Interlocking time	Word	0 - 65535	1 s	0		BU0 BU1 BU2(+)
62.0	Motor stop time level >	Word	0 - 65535	1 h	0		BU0 BU1 BU2(+)

Byte .Bit	Designation (PRM group)	Type	Range	Unit	De- fault	Note	Information
64.0	Timer 1 - Limit	Word	0 - 65535	100 ms	0		BU0 BU1 BU2(+)
66.0	Timer 2 - Limit	Word	0 - 65535	100 ms	0		BU0 BU1 BU2(+)
68.0	Counter 1 - Limit	Word	0 - 65535		0		BU0 BU1 BU2(+)
70.0	Counter 2 - Limit	Word	0 - 65535		0		BU0 BU1 BU2(+)
72.0	EM+ 2) - trip level	Word	30 - 40000	1 mA	1000		BU0 BU2(+)
74.0	EM+ 2) - warning level	Word	30 - 40000	1 mA	500		BU0 BU2(+)
76.0	**D-word parameters (36)**						
76.0	Operator control enable	Bit[32]	0 ... 1..1B		0..0B		
80.0	Motor protection - set current $I_{s}1$	D-word	1)	10 mA	30		IM / UM(+)
84.0	Motor operating hours level >	D-word	0 - 0xFFFFFFFF	1 s	0		BU0 BU1 BU2(+)
88.0	*Reserved*	*D-word*			*0*		

1) Value range dependent on current range of the IM / UM and the conversion factor; bit 31 = 1, i.e. conversion factor is active

2) 3UF7510-1AA00-0 ground-fault module

3) Class 7 only for BU2+

3.3.2.12 Data record 131 - Basic device parameters 2 (plug binary)

Table 3-34 Data record 131 - Basic device parameters 2

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
0.0	*Reserved*	*Byte[4]*				
4.0	**Byte parameters (40)**					
4.0	BU - Output 1	Byte	0 - 255	0		BU0 BU1 BU2(+)
5.0	BU - Output 2	Byte	0 - 255	0		BU0 BU1 BU2(+)
6.0	BU - Output 3	Byte	0 - 255	0		BU1 BU2(+)
7.0	*Reserved*	*Byte*		*0*		
8.0	OP - LED green 1	Byte	0 - 255	0		OP OPD
9.0	OP - LED green 2	Byte	0 - 255	0		OP OPD
10.0	OP - LED green 3	Byte	0 - 255	0		OP OPD
11.0	OP - LED green 4	Byte	0 - 255	0		OP OPD
12.0	OP - LED yellow 1	Byte	0 - 255	0		OP
13.0	OP - LED yellow 2	Byte	0 - 255	0		OP
14.0	OP - LED yellow 3	Byte	0 - 255	0		OP
15.0	*Reserved*	*Byte*		*0*		
16.0	Cyclic send - Bit 0.0	Byte	0 - 255	105	Default: Status - ON<	BU0 BU1 BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
17.0	Cyclic send - Bit 0.1	Byte	0 - 255	106	Default: Status - Off	BU0 BU1 BU2(+)
18.0	Cyclic send - Bit 0.2	Byte	0 - 255	107	Default: Status - ON>	BU0 BU1 BU2(+)
19.0	Cyclic send - Bit 0.3	Byte	0 - 255	128	Default: Event - Overload operation	BU0 BU1 BU2(+)
20.0	Cyclic send - Bit 0.4	Byte	0 - 255	110	Default: Status - Interlocking time active	BU0 BU1 BU2(+)
21.0	Cyclic send - Bit 0.5	Byte	0 - 255	120	Default: Status - Auto mode	BU0 BU1 BU2(+)
22.0	Cyclic send - Bit 0.6	Byte	0 - 255	96	Default: Status - General fault	BU0 BU1 BU2(+)
23.0	Cyclic send - Bit 0.7	Byte	0 - 255	97	Default: Status - group warning	BU0 BU1 BU2(+)
24.0	Cyclic send - Bit 1.0	Byte	0 - 255	0		BU0 BU1 BU2(+)
25.0	Cyclic send - Bit 1.1	Byte	0 - 255	0		BU0 BU1 BU2(+)
26.0	Cyclic send - Bit 1.2	Byte	0 - 255	0		BU0 BU1 BU2(+)
27.0	Cyclic send - Bit 1.3	Byte	0 - 255	0		BU0 BU1 BU2(+)
28.0	Cyclic send - Bit 1.4	Byte	0 - 255	0		BU0 BU1 BU2(+)
29.0	Cyclic send - Bit 1.5	Byte	0 - 255	0		BU0 BU1 BU2(+)
30.0	Cyclic send - Bit 1.6	Byte	0 - 255	0		BU0 BU1 BU2(+)
31.0	Cyclic send - Bit 1.7	Byte	0 - 255	0		BU0 BU1 BU2(+)
32.0	Acyclic send - Bit 0.0	Byte	0 - 255	0		BU0 BU1 BU2(+)
33.0	Acyclic send - Bit 0.1	Byte	0 - 255	0		BU0 BU1 BU2(+)
34.0	Acyclic send - Bit 0.2	Byte	0 - 255	0		BU0 BU1 BU2(+)
35.0	Acyclic send - Bit 0.3	Byte	0 - 255	0		BU0 BU1 BU2(+)
36.0	Acyclic send - Bit 0.4	Byte	0 - 255	0		BU0 BU1 BU2(+)
37.0	Acyclic send - Bit 0.5	Byte	0 - 255	0		BU0 BU1 BU2(+)
38.0	Acyclic send - Bit 0.6	Byte	0 - 255	0		BU0 BU1 BU2(+)
39.0	Acyclic send - Bit 0.7	Byte	0 - 255	0		BU0 BU1 BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
40.0	Acyclic send - Bit 1.0	Byte	0 - 255	0		BU0 BU1 BU2(+)
41.0	Acyclic send - Bit 1.1	Byte	0 - 255	0		BU0 BU1 BU2(+)
42.0	Acyclic send - Bit 1.2	Byte	0 - 255	0		BU0 BU1 BU2(+)
43.0	Acyclic send - Bit 1.3	Byte	0 - 255	0		BU0 BU1 BU2(+)
44.0	Acyclic send - Bit 1.4	Byte	0 - 255	0		BU0 BU1 BU2(+)
45.0	Acyclic send - Bit 1.5	Byte	0 - 255	0		BU0 BU1 BU2(+)
46.0	Acyclic send - Bit 1.6	Byte	0 - 255	0		BU0 BU1 BU2(+)
47.0	Acyclic send - Bit 1.7	Byte	0 - 255	0		BU0 BU1 BU2(+)
48.0	Monitoring PLC/PCS input	Byte	0 - 255	0		BU0 BU1 BU2(+)
49.0	Motor protection - Emergency start	Byte	0 - 255	60	Default: Cyclic receive - Bit 0.4	IM UM
50.0	*Reserved*	*Byte*		*0*		
51.0	*Reserved*	*Byte*		*0*		
52.0	Mode selector S1	Byte	0 - 255	61	Default: Cyclic receive - Bit 0.5	BU0 BU1 BU2(+)
53.0	Mode selector S2	Byte	0 - 255	2	Default: Fixed level value "1"	BU0 BU1 BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
54.0	Control station - Local control [LC] ON<	Byte	0 - 255	0		Dependent on the control function
55.0	Control station - Local control [LC] OFF	Byte	0 - 255	0		
56.0	Control station - Local control [LC] ON>	Byte	0 - 255	0		
57.0	Control station - PLC/PCS [DP] ON<	Byte	0 - 255	56	Default: Cyclic receive - Bit 0.0	
58.0	Control station - PLC/PCS [DP] OFF	Byte	0 - 255	57	Default: Cyclic receive - Bit 0.1	
59.0	Control station - PLC/PCS [DP] ON>	Byte	0 - 255	58	Default: Cyclic receive - Bit 0.2	
60.0	Control station - PC[DPV1] ON<	Byte	0 - 255	0		
61.0	Control Station - PC[DPV1] OFF	Byte	0 - 255	0		
62.0	Control station - PC[DPV1] ON>	Byte	0 - 255	0		
63.0	Control station - Operator panel [OP] ON<	Byte	0 - 255	0		
64.0	Control station - Operator panel [OP] OFF	Byte	0 - 255	0		
65.0	Control station - Operator panel [OP] ON>	Byte	0 - 255	0		
66.0	Control function - ON<	Byte	0 - 255	73	Default: Group control station ON<	
67.0	Control function - OFF	Byte	0 - 255	74	Default: Group control station OFF	
68.0	Control function - ON>	Byte	0 - 255	75	Default: Group control station ON>	
69.0	Control function - Feedback ON	Byte	0 - 255	101	Default: Status - current flowing	
70.0	External fault 1 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
71.0	External fault 2 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
72.0	External fault 3 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
73.0	External fault 4 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
74.0	External fault 1 - Reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
75.0	External fault 2 - Reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
76.0	External fault 3 - Reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
77.0	External fault 4 - Reset	Byte	0 - 255	0		BU0 BU1 BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
78.0	Cold starting (TPF)	Byte	0 - 255	0		BU0 BU1 BU2(+)
79.0	Test 1 - Input	Byte	0 - 255	59	Default: Cyclic receive - Bit 0.3	BU0 BU1 BU2(+)
80.0	Test 2 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
81.0	Reset 1 - Input	Byte	0 - 255	62	Default: Cyclic receive - Bit 0.6	BU0 BU1 BU2(+)
82.0	Reset 2 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
83.0	Reset 3 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
84.0	*Reserved*	*Byte*		*0*		
85.0	*Reserved*	*Byte*		*0*		
86.0	*Reserved*	*Byte*		*0*		
87.0	*Reserved*	*Byte*		*0*		
88.0	Truth table 1 3I/1O - input 1	Byte	0 - 255	0		BU0 BU1 BU2(+)
89.0	Truth table 1 3I/1O - input 2	Byte	0 - 255	0		BU0 BU1 BU2(+)
90.0	Truth table 1 3I/1O - input 3	Byte	0 - 255	0		BU0 BU1 BU2(+)
91.0	Truth table 2 3I/1O - input 1	Byte	0 - 255	0		BU0 BU1 BU2(+)
92.0	Truth table 2 3I/1O - input 2	Byte	0 - 255	0		BU0 BU1 BU2(+)
93.0	Truth table 2 3I/1O - input 3	Byte	0 - 255	0		BU0 BU1 BU2(+)
94.0	Truth table 3 3I/1O - input 1	Byte	0 - 255	0		BU0 BU1 BU2(+)
95.0	Truth table 3 3I/1O - input 2	Byte	0 - 255	0		BU0 BU1 BU2(+)
96.0	Truth table 3 3I/1O - input 3	Byte	0 - 255	0		BU0 BU1 BU2(+)
97.0	*Reserved*	*Byte*		*0*		
98.0	Timer 1 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
99.0	Timer 1 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
100.0	Timer 2 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
101.0	Timer 2 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
102.0	Counter 1 - input +	Byte	0 - 255	0		BU0 BU1 BU2(+)
103.0	Counter 1 - input -	Byte	0 - 255	0		BU0 BU1 BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
104.0	Counter 1 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
105.0	Counter 2 - input +	Byte	0 - 255	0		BU0 BU1 BU2(+)
106.0	Counter 2 - input -	Byte	0 - 255	0		BU0 BU1 BU2(+)
107.0	Counter 2 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
108.0	Signal conditioning 1 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
109.0	Signal conditioning 1 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
110.0	Signal conditioning 2 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
111.0	Signal conditioning 2 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
112.0	Non-volatile element 1 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
113.0	Non-volatile element 1 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
114.0	Non-volatile element 2 - input	Byte	0 - 255	0		BU0 BU1 BU2(+)
115.0	Non-volatile element 2 - reset	Byte	0 - 255	0		BU0 BU1 BU2(+)
116.0	Flashing 1 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
117.0	Flashing 2 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
118.0	Flashing 3 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
119.0	Flicker 1 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
120.0	Flicker 2 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
121.0	Flicker 3 - Input	Byte	0 - 255	0		BU0 BU1 BU2(+)
122.0	**Analog parameters (44)**					
122.0	PLC/PCS analog input	Byte	0 - 255	16	Default: Max. current I_max	BU0 BU1 BU2(+)
123.0	*Reserved*	*Byte*		*0*		

3.3.2.13 Data record 132 - Extended device parameters 1

Table 3-35 Data record 132 - Extended device parameters 1

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
0.0	**Coordination**	**Byte[4]**					BU0 BU2(+)
4.0	**Bit parameters (17)**						
4.0	3UF50 compatibility mode	Bit	0, 1		0		BU2(+)
4.1	3UF50 operating mode	Bit	0, 1		0	0 = DPV0 1 = DPV1	BU2(+)
4.2	*Reserved*	*Bit*			*0*		
4.3	*Reserved*	*Bit*			*0*		
4.4	*Reserved*	*Bit*			*0*		
4.5	*Reserved*	*Bit*			*0*		
4.6	*Reserved*	*Bit*			*0*		
4.7	*Reserved*	*Bit*			*0*		
5.0	*Reserved*	*Bit*			*0*		
5.1	*Reserved*	*Bit*			*0*		
5.2	OPD - Warnings	Bit	0, 1		0	0 = Do not display 1 = Display	BU2(+)
5.3	OPD - Faults	Bit	0, 1		0		BU2(+)
5.4	Analog mole - Measuring range input	Bit	0, 1		0	0 = 0 - 20mA 1 = 4 - 20mA	AM1
5.5	Analog module - Measuring range output	Bit	0, 1		0		AM1
5.6	*Reserved*	*Bit*			*0*		
5.7	*Reserved*	*Bit*			*0*		
6.0	Overshooting/undershooting limit 1	Bit	0, 1		0	0 = ">" (overshooting) 1 = "<" (undershooting)	BU2(+)
6.1	Overshooting/undershooting limit 2	Bit	0, 1		0		BU2(+)
6.2	Overshooting/undershooting limit 3	Bit	0, 1		0		BU2(+)
6.3	Overshooting/undershooting limit 4	Bit	0, 1		0		BU2(+)
6.4	Line-to-line voltage	Bit	0, 1		0	0 = No, 1 = Yes	BU2(+)
6.5	OPO level	Bit	0, 1		0	0 = NO contact 1 = NC contact	BU2(+)
6.6	Positioner response for OPO	Bit	0, 1		0	0 = CLOSED 1 = OPEN	BU2(+)
6.7	Star-delta - Transformer mounting	Bit	0, 1		0	0 = Delta 1 = In supply cable	BU0 BU2(+)
7.0	External fault 5 - Type	Bit	0, 1		0	0 = NO contact 1 = NC contact	BU2(+)
7.1	External fault 6 - Type	Bit	0, 1		0		BU2(+)
7.2	*Reserved*	*Bit*			*0*		
7.3	*Reserved*	*Bit*			*0*		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
7.4	Monitoring external fault 5	Bit	0, 1		0	0 = Always 1 = Only motor ON	BU2(+)
7.5	Monitoring external fault 6	Bit	0, 1		0		BU2(+)
7.6	*Reserved*	*Bit*			*0*		
7.7	*Reserved*	*Bit*			*0*		
8.0	Calculator 2, Operating mode	Bit	0, 1		0	0 = Word 1 = D-word	BU2(+)
8.1	*Reserved*	*Bit*			*0*		
8.2	DM-F - Safe tripping function	Bit	0, 1		0	0 = No 1 = Yes	DM-F
8.3	DM-F - reset safety-related tripping	Bit	0, 1		0	0 = Manual, 1 = Auto	DM-F
8.4	Time stamping active	Bit	0, 1		0		BU2(+)
8.5	*Reserved*	*Bit*			*0*		
8.6	*Reserved*	*Bit*			*0*		
8.7	*Reserved*	*Bit*			*0*		
9.0	DM-FL - Configuration 1	Bit	0, 1		0	Configurable parameters comparable with the module configuration	DM-FL
9.1	DM-FL - Configuration 2	Bit	0, 1		0		DM-FL
9.2	DM-FL - Configuration 3	Bit	0, 1		0		DM-FL
9.3	DM-FL - Configuration 4	Bit	0, 1		0		DM-FL
9.4	DM-FL - Configuration 5	Bit	0, 1		0		DM-FL
9.5	DM-FL - Configuration 6	Bit	0, 1		0		DM-FL
9.6	DM-FL - Configuration 7	Bit	0, 1		0		DM-FL
9.7	DM-FL - Configuration 8	Bit	0, 1		0		DM-FL
10.0	**Bit[2] - Parameters (21)**						
10.0	3UF50 basic type	Bit[2]	0, 1, 2		0		BU2(+)
10.2	*Reserved*	*Bit[2]*			*0*		
10.4	UVO timebase	Bit[2]	0, 1, 2		0	0 = 100 ms, 1 = 1 s, 2 = 10 s	BU2(+)
10.6	UVO operating mode	Bit[2]	0, 1		0	0 = Deactivated, 1 = Activated	BU2(+)
11.0	Trip monitoring U<	Bit[2]	0, 1, 2		1	0 = ON (always) 1 = on+ (always, not TPF) 2 = RUN (motor ON, not TPF)	UM(+)
11.2	Warning monitoring U<	Bit[2]	0, 1, 2		1		UM(+)
11.4	*Reserved*	*Bit[2]*			*0*		
11.6	*Reserved*	*Bit[2]*			*0*		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
12.0	Trip monitoring 0/4-20 mA>	Bit[2]	0, 1, 2, 3		0	0 = ON (always) 1 = ON + (always, not TPF) 2 = RUN (motor ON, not TPF) 3 = RUN+ (motor ON, not TPF, startup override)	AM1
12.2	Warning monitoring 0/4-20 mA>	Bit[2]	0, 1, 2, 3		0		AM1
12.4	Trip monitoring 0/4-20 mA<	Bit[2]	0, 1, 2, 3		0		AM1
12.6	Warning monitoring 0/4-20 mA<	Bit[2]	0, 1, 2, 3		0		AM1
13.0	Monitoring limit 1	Bit[2]	0, 1, 2, 3		0		BU2(+)
13.2	Monitoring limit 2	Bit[2]	0, 1, 2, 3		0		BU2(+)
13.4	Monitoring limit 3	Bit[2]	0, 1, 2, 3		0		BU2(+)
13.6	Monitoring limit 4	Bit[2]	0, 1, 2, 3		0		BU2(+)
14.0	*Reserved*	*Bit[2]*			*0*		
14.2	*Reserved*	*Bit[2]*			*0*		
14.4	*Reserved*	*Bit[2]*			*0*		
14.6	AM1 - active inputs	Bit[2]	0, 1, 2		0	0 = 1 input 1 = 2 inputs 2 = 3 inputs	AM1
15.0	DM - Debounce time inputs	Bit[2]	0, 1, 2, 3	10 ms	1	Offset 6ms	DM1 DM2 MM
15.2	AM1 - Response for open circuit	Bit[2]	1, 2, 3		2	0 = disabled 1 = signal 2 = warn 3 = tripping	AM1
15.4	EM - response to an external ground fault	Bit[2]	1, 3		1		EM EM(+) MM
15.6	EM - response to warning of an external ground fault	Bit[2]	0, 1, 2		0		EM EM(+) MM
16.0	*Reserved*	*Bit[2]*			*0*		
16.2	*Reserved*	*Bit[2]*			*0*		
16.4	DM-F - Test requirement response	Bit[2]	0, 1, 2		0	0 = disabled 1 = signal 2 = warn 3 = tripping	DM-F
16.6	DM-F - safety-related tripping response	Bit[2]	0, 1, 2, 3		0		DM-F
17.0	TM1 - Trip response T>	Bit[2]	1, 3		3		TM1 MM
17.2	TM1 - Warning response T>	Bit[2]	0, 1, 2		2		TM1 MM
17.4	TM1 - Response to a sensor fault / out of range	Bit[2]	0, 1, 2, 3		2		TM1 MM
17.6	TM1 - Active sensors	Bit[2]	0, 1, 2		2	0 = 1 sensors 1 = 2 sensors 2 = 3 sensors	TM1 MM

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
18.0	Trip response P>	Bit[2]	0, 1, 3		0	0 = disabled 1 = signal 2 = warn 3 = tripping	UM(+)
18.2	Warning response P>	Bit[2]	0, 1, 2		0		UM(+)
18.4	Trip response P<	Bit[2]	0, 1, 3		0		UM(+)
18.6	Warning response P<	Bit[2]	0, 1, 2		0		UM(+)
19.0	Trip response cos phi <	Bit[2]	0, 1, 3		0		UM(+)
19.2	Warning response cos phi <	Bit[2]	0, 1, 2		0		UM(+)
19.4	Trip response U<	Bit[2]	0, 1, 3		0		UM(+)
19.6	Warning response U<	Bit[2]	0, 1, 2		0		UM(+)
20.0	Trip response 0/4-20 mA>	Bit[2]	0, 1, 3		0		AM1
20.2	Warning response 0/4-20 mA>	Bit[2]	0, 1, 2		0		AM1
20.4	Trip response 0/4-20 mA<	Bit[2]	0, 1, 3		0		AM1
20.6	Warning response 0/4-20 mA<	Bit[2]	0, 1, 2		0		AM1
21.0	*Reserved*	*Bit[2]*			*0*		
21.2	*Reserved*	*Bit[2]*			*0*		
21.4	*Reserved*	*Bit[2]*			*0*		
21.6	*Reserved*	*Bit[2]*			*0*		
22.0	External fault 5 - Response	Bit[2]	1, 2, 3		1	0 = disabled 1 = signal 2 = warn 3 = tripping	BU2(+)
22.2	External fault 6 - Response	Bit[2]	1, 2, 3		1		BU2(+)
22.4	*Reserved*	*Bit[2]*			*0*		
22.6	*Reserved*	*Bit[2]*			*0*		
23.0	Analog-value recording - Trigger edge	Bit[2]	0, 1		0	0 = positive 1 = Negative	BU2(+)
23.2	*Reserved*	*Bit[2]*			*0*		
23.4	*Reserved*	*Bit[2]*			*0*		
23.6	*Reserved*	*Bit[2]*			*0*		
24.0	*Reserved*	*Bit[2]*			*0*		
24.2	*Reserved*	*Bit[2]*			*0*		
24.4	*Reserved*	*Bit[2]*			*0*		
24.6	*Reserved*	*Bit[2]*			*0*		
25.0	Timer 3 - Type	Bit[2]	0, 1, 2, 3		0	0 = With closing delay 1 = Closing delay with memory 2 = With opening delay 3 = With fleeting closing	BU2(+)
25.2	Timer 4 - Type	Bit[2]	0, 1, 2, 3		0		BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Unit	De-fault	Note	Informa-tion
25.4	Signal conditioning 3 - Type	Bit[2]	0, 1, 2, 3		0	0 = Non-inverting 1 = Inverting 2 = Edge rising with memory 3 = Edge falling with memory	BU0 BU2(+)
25.6	Signal conditioning 4 - Type	Bit[2]	0, 1, 2, 3		0		BU0 BU2(+)
26.0	Non-volatile element 3 - Type	Bit[2]	0, 1, 2, 3		0		BU2(+)
26.2	Non-volatile element 4 - Type	Bit[2]	0, 1, 2, 3		0		BU2(+)
26.4	Calculator 2, Operator	Bit[2]	0, 1, 2, 3		0	0 = +, 1 = -, 2 = *, 3 = /	BU2(+)
26.6	*Reserved*	*Bit[2]*			*0*		
27.0	*Reserved*	*Bit[2]*			*0*		
27.2	*Reserved*	*Bit[2]*			*0*		
27.4	OPD - Operator panel display (bit 0 to 1)	Bit[2]	0 - 4		2	0 = Manual 1 = 3 s 2 = 10 s 3 = 1 min 4 = 5 min	BU2+
27.6	OPD - Operator panel display (bit 2 to 3)	Bit[2]	0 - 4				BU2+
28.0	**Bit[4] - Parameters (25)**						
28.0	TM - sensor type	Bit[3] + Bit	000B to 100B		000B	000B = PT100 001B = PT1000 010B = KTY83 011B = KTY84 100B = NTC	TM1 MM
28.4	OPD - Language	Bit[4]	0 - 15		0		BU2+
29.0	External fault 5 - Reset also by	Bit[4]	0 - 1111B		0101B	Bit[0] = Panel reset Bit[1] = Auto-reset Bit[2] = Remote reset Bit[3] = OFF command reset	BU2(+)
29.4	External fault 6 - Reset also by	Bit[4]	0 - 1111B		0101B		BU2(+)
30.0	OPD - Contrast (bit 0 to 3)	Bit[4]	0 - 255	1 %	50		BU2+
30.4	OPD - Contrast (bit 4 to 7)	Bit[4]					BU2+
31.0	OPD - Profile (bit 0 to 3)	Bit[4]	0 - 33		0		BU2+
31.4	OPD - Profile (bit 4 to 7)	Bit[4]					BU2+
32.0	Truth table 7 type 2I/1O	Bit[4]	0 - 1111B		0		BU0 BU2(+)
32.4	Truth table 8 type 2I/1O	Bit[4]	0 - 1111B		0		BU0 BU2(+)
33.0	I_s1 conversion factor - Denominator	Bit[4]	0 - 15		0		BU2(+)
33.4	I_s2 conversion factor - Denominator	Bit[4]	0 - 15		0		BU2(+)
34.0	Hysteresis P - Cos phi - U	Bit[4]	0 - 15		5	1 %	UM(+)
34.4	Hysteresis 0/4-20 mA	Bit[4]	0 - 15		5	1 %	AM1

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
35.0	Hysteresis free limits	Bit[4]	0 - 15		5	1 %	BU2(+)
35.4	OPD - Lighting	Bit[4]	0 - 4		2	0 = Off 1 = 3 s 2 = 10 s 3 = 1 min 4 = 5 min	BU2+
36.0	**Byte parameters (29)**						
36.0	*Reserved*	*Byte*			*0*		
37.0	EM / MM - delay trip	Byte	0 - 255	100 ms	5		EM MM
38.0	Trip level cos phi<	Byte	0 - 100	1 %	0		UM(+)
39.0	Warning level cos phi<	Byte	0 - 100	1 %	0		UM(+)
40.0	Trip level U<	Byte	0 - 255	8 V	0		UM(+)
41.0	Warning level U<	Byte	0 - 255	8 V	0		UM(+)
42.0	Trip level 0/4-20 mA>	Byte	0 - 255	*128	0		AM1
43.0	Warning level 0/4-20 mA>	Byte	0 - 255	*128	0		AM1
44.0	Trip level 0/4-20 mA<	Byte	0 - 255	*128	0		AM1
45.0	Warning level 0/4-20 mA<	Byte	0 - 255	*128	0		AM1
46.0	Trip delay P>	Byte	0 - 255	100 ms	5		UM(+)
47.0	Warning delay P>	Byte	0 - 255	100 ms	5		UM(+)
48.0	Trip delay P<	Byte	0 - 255	100 ms	5		UM(+)
49.0	Warning delay P<	Byte	0 - 255	100 ms	5		UM(+)
50.0	Trip delay cos phi<	Byte	0 - 255	100 ms	5		UM(+)
51.0	Warning delay cos phi<	Byte	0 - 255	100 ms	5		UM(+)
52.0	Trip delay U<	Byte	0 - 255	100 ms	5		UM(+)

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
53.0	Warning delay U<	Byte	0 - 255	100 ms	5		UM(+)
54.0	Trip delay 0/4-20 mA>	Byte	0 - 255	100 ms	5		AM1
55.0	Warning delay 0/4-20 mA>	Byte	0 - 255	100 ms	5		AM1
56.0	Trip delay 0/4-20 mA<	Byte	0 - 255	100 ms	5		AM1
57.0	Warning delay 0/4-20 mA<	Byte	0 - 255	100 ms	5		AM1
58.0	Delay limit 1	Byte	0 - 255	100 ms	5		BU2(+)
59.0	Delay limit 2	Byte	0 - 255	100 ms	5		BU2(+)
60.0	Delay limit 3	Byte	0 - 255	100 ms	5		BU2(+)
61.0	Delay limit 4	Byte	0 - 255	100 ms	5		BU2(+)
62.0	TM - Hysteresis	Byte	0 - 255	1 K	5		TM1 MM
63.0	Max. star time	Byte	0 - 255	1 s	20	Star-delta starter	BU0 BU2(+)
64.0	UVO time	Byte	0 - 255	100 ms	0		BU2(+)
65.0	Staggering time	Byte	0 - 255	1 s	0		BU2(+)
66.0	Analog value recording - Sampling rate	Byte	0 - 20	5%	0		BU2(+)
67.0	Calculator 2, Denominator 1	Byte	0 - 255		0		BU2(+)
68.0	Calculator 2, Numerator 2	Byte	0 - 255		0		BU2(+)
69.0	Calculator 1, Denominator	Byte	0 - 255		0		BU2(+)
70.0	Truth table 4 type 3I/1O	Byte	0 - 11111111B		0		BU0, BU2(+)
71.0	Truth table 5 type 3I/1O	Byte	0 - 11111111B		0		BU2(+)
72.0	Truth table 6 type 3I/1O	Byte	0 - 11111111B		0		BU2(+)
73.0	Calculator 2, Numerator 1	Byte	-128 - 127		0		BU2(+)
74.0	Calculator 2, Denominator 2	Byte	-128 - 127		0		BU2(+)
75.0	DM-F - Test requirement level	Byte	0 - 255	1 week	0		BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
76.0	**Word parameters (33)**						
76.0	Analog module - Start value output	Word	0 - 65535		0	Value for 0/4mA	AM1
78.0	Analog Module - End value output	Word	0 - 65535		27648	Value for 20mA	AM1
80.0	TM - Trip level T>	Word	0 - 65535	1 K	0		TM1 MM
82.0	TM - Warning level T>	Word	0 - 65535	1 K	0		TM1 MM
84.0	Limit monitor 1 - Limit	Word	0 - 65535		0		BU2(+)
86.0	Limit monitor 2 - Limit	Word	0 - 65535		0		BU2(+)
88.0	Limit monitor 3 - Limit	Word	0 - 65535		0		BU2(+)
90.0	Limit monitor 4 - Limit	Word	0 - 65535		0		BU2(+)
92.0	Timer 3 - Limit	Word	0 - 65535	100 ms	0		BU2(+)
94.0	Timer 4 - Limit	Word	0 - 65535	100 ms	0		BU2(+)
96.0	Counter 3 - Limit	Word	0 - 65535		0		BU2(+)
98.0	Counter 4 - Limit	Word	0 - 65535		0		BU2(+)
100.0	Change-over pause	Word	0 - 65535	10 ms	0		
102.0	Analog value recording - Sampling rate	Word	1 - 50000	1 ms	100		BU2(+)
104.0	I_s1 conversion factor - Numerator	Word	0 - 65535		0		BU2(+)
106.0	I_s2 conversion factor - Numerator	Word	0 - 65535		0		BU2(+)
108.0	**D-word parameters (37)**						
108.0	Motor protection - Set current I_s2	D-word	1)	10 mA	0		BU2(+)
112.0	Trip level P>	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
116.0	Warning level P>	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
120.0	Trip level P<	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
124.0	Warning level P<	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
128.0	Truth Table 9 5I/2O type - Output 1	Bit[32]	0 ... 1..1B		0		BU2(+)
132.0	Truth Table 9 5I/2O type - Output 2	Bit[32]	0 ... 1..1B		0		BU2(+)
136.0	Calculator 2, Offset	D-word	-0x800000000x7FFFFFFF		0		BU2(+)
140.0	Calculator 1, Numerator/Offset	D-word	2x -32768..32767		0		BU2(+)

1) Value range dependent on current range of the IM / UM and the conversion factor

3.3.2.14 Data record 133 - Extended device parameters 2 (plug binary)

Table 3-36 Data record 133 - Extended device parameters

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
0.0	*Reserved*	*Byte[4]*				
4.0	**Byte parameters (41)**					
4.0	DM1 - Output 1	Byte	0 - 255	0		DM1 DM-F MM
5.0	DM1 - Output 2	Byte	0 - 255	0		DM1 DM-F MM
6.0	DM2 - Output 1	Byte	0 - 255	0		DM2
7.0	DM2 - Output 2	Byte	0 - 255	0		DM2
8.0	*Reserved*	*Byte*		*0*		
9.0	*Reserved*	*Byte*		*0*		
10.0	*Reserved*	*Byte*		*0*		
11.0	*Reserved*	*Byte*		*0*		
12.0	Time stamping - input 0	Byte	0 - 255	0		BU2(+)
13.0	Time stamping - input 1	Byte	0 - 255	0		BU2(+)
14.0	Time stamping - input 2	Byte	0 - 255	0		BU2(+)
15.0	Time stamping - input 3	Byte	0 - 255	0		BU2(+)
16.0	Time stamping - input 4	Byte	0 - 255	0		BU2(+)
17.0	Time stamping - input 5	Byte	0 - 255	0		BU2(+)
18.0	Time stamping - input 6	Byte	0 - 255	0		BU2(+)
19.0	Time stamping - input 7	Byte	0 - 255	0		BU2(+)
20.0	Analog-value recording - Trigger input	Byte	0 - 255	0		BU2(+)
21.0	*Reserved*	*Byte*		*0*		
22.0	Control station - Local control [LC] ON<<	Byte	0 - 255	0		Dependent on the control function
23.0	Control station - Local control [LC] ON>>	Byte	0 - 255	0		
24.0	Control station - PLC/PCS [DP] ON<<	Byte	0 - 255	0		
25.0	Control station - PLC/PCS [DP] ON>>	Byte	0 - 255	0		
26.0	Control station - PC[DPV1] ON<<	Byte	0 - 255	0		
27.0	Control station - PC[DPV1] ON>>	Byte	0 - 255	0		
28.0	Control station - Operator panels [OP] ON>>	Byte	0 - 255	0		
29.0	Control station - Operator panels [OP]<>/<<>>	Byte	0 - 255	0		
30.0	Control function - ON<<	Byte	0 - 255	0		
31.0	Control function - ON>>	Byte	0 - 255	0		
32.0	Auxiliary control input - FC	Byte	0 - 255	0		
33.0	Auxiliary control input - FO	Byte	0 - 255	0		
34.0	Auxiliary control input - TC	Byte	0 - 255	0		
35.0	Auxiliary control input - TO	Byte	0 - 255	0		

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
36.0	External fault 5 - input	Byte	0 - 255	0		BU2(+)
37.0	External fault 6 - input	Byte	0 - 255	0		BU2(+)
38.0	*Reserved*	*Byte*		*0*		
39.0	*Reserved*	*Byte*		*0*		
40.0	External fault 5 - Reset	Byte	0 - 255	0		BU2(+)
41.0	External fault 6 - Reset	Byte	0 - 255	0		BU2(+)
42.0	*Reserved*	*Byte*		*0*		
43.0	*Reserved*	*Byte*		*0*		
44.0	UVO fault	Byte	0 - 255	0		BU2(+)
45.0	OPO error	Byte	0 - 255	0		BU2(+)
46.0	Truth table 4 3E/1A - input 1	Byte	0 - 255	0		BU0 BU2(+)
47.0	Truth table 4 3I/1O - input 2	Byte	0 - 255	0		BU0 BU2(+)
48.0	Truth table 4 3I/1O - input 3	Byte	0 - 255	0		BU0 BU2(+)
49.0	Truth table 5 3I/1O - input 1	Byte	0 - 255	0		BU2(+)
50.0	Truth table 5 3I/1O - input 2	Byte	0 - 255	0		BU2(+)
51.0	Truth table 5 3I/1O - input 3	Byte	0 - 255	0		BU2(+)
52.0	Truth table 6 3I/1O - input 1	Byte	0 - 255	0		BU2(+)
53.0	Truth table 6 3I/1O - input 2	Byte	0 - 255	0		BU2(+)
54.0	Truth table 6 3I/1O - input 3	Byte	0 - 255	0		BU2(+)
55.0	Truth table 7 2I/1O - input 1	Byte	0 - 255	0		BU0 BU2(+)
56.0	Truth table 7 2I/1O - input 2	Byte	0 - 255	0		BU0 BU2(+)
57.0	Truth table 8 2I/1O - input 1	Byte	0 - 255	0		BU0 BU2(+)
58.0	Truth table 8 2I/1O - input 2	Byte	0 - 255	0		BU0 BU2(+)
59.0	Truth table 9 5I/2O - input 1	Byte	0 - 255	0		BU2(+)
60.0	Truth table 9 5I/2O - input 2	Byte	0 - 255	0		BU2(+)
61.0	Truth table 9 5I/2O - input 3	Byte	0 - 255	0		BU2(+)
62.0	Truth table 9 5I/2O - input 4	Byte	0 - 255	0		BU2(+)
63.0	Truth table 9 5I/2O - input 5	Byte	0 - 255	0		BU2(+)
64.0	Timer 3 - input	Byte	0 - 255	0		BU2(+)
65.0	Timer 3 - reset	Byte	0 - 255	0		BU2(+)
66.0	Timer 4 - input	Byte	0 - 255	0		BU2(+)
67.0	Timer 4 - reset	Byte	0 - 255	0		BU2(+)
68.0	Counter 3 - input +	Byte	0 - 255	0		BU2(+)
69.0	Counter 3 - input -	Byte	0 - 255	0		BU2(+)
70.0	Counter 3 - reset	Byte	0 - 255	0		BU2(+)
71.0	Counter 4 - input +	Byte	0 - 255	0		BU2(+)
72.0	Counter 4 - input -	Byte	0 - 255	0		BU2(+)
73.0	Counter 4 - reset	Byte	0 - 255	0		BU2(+)
74.0	Signal conditioning 3 - input	Byte	0 - 255	0		BU0 BU2(+)
75.0	Signal conditioning 3 - reset	Byte	0 - 255	0		BU0 BU2(+)
76.0	Signal conditioning 4 - input	Byte	0 - 255	0		BU0 BU2(+)
77.0	Signal conditioning 4 - reset	Byte	0 - 255	0		BU0 BU2(+)
78.0	Non-volatile element 3 - input	Byte	0 - 255	0		BU2(+)

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
79.0	Non-volatile element 3 - reset	Byte	0 - 255	0		BU2(+)
80.0	Non-volatile element 4 - input	Byte	0 - 255	0		BU2(+)
81.0	Non-volatile element 4 - reset	Byte	0 - 255	0		BU2(+)
82.0	*Reserved*	*Byte*		*0*		
83.0	*Reserved*	*Byte*		*0*		
84.0	*Reserved*	*Byte*		*0*		
85.0	*Reserved*	*Byte*		*0*		
86.0	*Reserved*	*Byte*		*0*		
87.0	*Reserved*	*Byte*		*0*		
88.0	**Analog parameters (45)**					
88.0	Analog module - output	Byte	0 - 255	0		AM1
89.0	Analog input limit 1	Byte	0 - 255	0		BU2(+)
90.0	Analog input limit 2	Byte	0 - 255	0		BU2(+)
91.0	Analog input limit 3	Byte	0 - 255	0		BU2(+)
92.0	Analog input limit 4	Byte	0 - 255	0		BU2(+)
93.0	Calculator 1, Input	Byte	0 - 255	0		BU2(+)
94.0	Analog value recording - analog input	Byte	0 - 255	0		BU2(+)
95.0	PLC/PCS analog input 2	Byte	0 - 255	0		BU0 BU2(+)
96.0	PLC/PCS analog input 3	Byte	0 - 255	0		BU0 BU2(+)
97.0	PLC/PCS analog input 4	Byte	0 - 255	0		BU0 BU2(+)
98.0	Calculator 2, Input 1	Byte	0 - 255	0		BU2(+)
99.0	Calculator 2, Input 2	Byte	0 - 255	0		BU2(+)

3.3.2.15 Data record 134 - Extended device parameters 2

Table 3-37 Data record 134 - ExtendedPlus device parameters

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Info
8.0	**Part - Bit[2] parameters (22)**						
17.0	Internal ground fault+ - Warning response	Bit[2]	0, 1, 2		0	0 = Disabled 1 = Signaling 2 = Warn	UM+
17.2	DRP performance	Bit[2]	0, 3		0	0 = Disabled 3 = Tripping	UM+
22.0	**Part - Bit[4] parameters (26)**						
22.4	Internal ground fault+ - Hysteresis	Bit[4]	0 ... 15	1%	5		UM+
30.0	**Part - Byte parameters (30)**						
42.0	Internal ground fault+ - warning delay	Byte	0 ... 255	100 ms	1		UM+
	Part - Word parameters						

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Info
43.0	Internal ground fault+ - Trip level	Word	10 ... 120	% / I_e	0	Value range dependent on current range of the UM+	UM+
44.0	Internal ground fault+ - Warning level	Word	10 ... 120	% / I_e	0	Value range dependent on current range of the UM+	UM+
45.0	DRP delay	Byte	0 ... 100	100 ms	5		UM+_TL
46.0	DRP - T bridge	Byte	0 ... 120	500 ms	0		UM+_TL
60.0	**Part - Word parameters (34)**						
148.0	**Part - Float parameters (58)**						
172.0	*Reserved*	*Float*					
176.0	DRP threshold	Float					UM+_TL

3.3.2.16 Data record 135 - Extended device parameters 2

This data record is available for the SIMOCODE pro V PROFIBUS basic unit from version V4.0 and the SIMOCODE pro V Modbus RTU basic unit from version V2.0.

The bytes of this data record that are not mentioned are reserved entries that are not used by the stated devices.

Table 3-38 Data record 135 - ExtendedPlus device parameters 2

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Info
100.0	**Part - FII byte parameters (62)**						
100.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		BU2+
101.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		BU2+
102.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		BU2+
103.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		BU2+
107 ... 113	*Reserved*						

3.3.2.17 Data record 139 - Marking

For external faults, limit monitors, and monitoring functions of the temperature and analog modules, user-specific texts can be configured for marking. The diagnostics

- **External fault 1 to 6** (status information, warnings, and faults)
- **Limit 1 to 4** (status information)

- **TM warning T> / tripping T>** (status information, warnings, and faults)
- **AM Warning / tripping 0/4-20mA<>** (status information, warnings, and faults)

can be parameterized to have various meanings, e.g. fill level >, bearing hot, etc. To simplify diagnostics, these texts can be saved in the device. These can be created, read out and displayed, for example, with **SIMOCODE ES**. The texts do not contain any functions.

You can access the following texts via data record 139:

Table 3-39 Data record 139 - Marking

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	
4.0	*Reserved*	*Byte[6]*	
10.0	Marking - External fault 1	Byte[10]	BU0 BU1 BU2(+)
20.0	Marking - External fault 2	Byte[10]	BU0 BU1 BU2(+)
30.0	Marking - External fault 3	Byte[10]	BU0 BU1 BU2(+)
40.0	Marking - External fault 4	Byte[10]	BU0 BU1 BU2(+)
50.0	Marking - External fault 5	Byte[10]	BU2(+)
60.0	Marking - External fault 6	Byte[10]	BU2(+)
70.0	*Reserved*	*Byte[10]*	
80.0	*Reserved*	*Byte[10]*	
90.0	Marking limit 1	Byte[10]	BU2(+)
100.0	Marking limit 2	Byte[10]	BU2(+)
110.0	Marking limit 3	Byte[10]	BU2(+)
120.0	Marking limit 4	Byte[10]	BU2(+)
130.0	Marking - TM warning T>	Byte[10]	BU0 BU2(+)
140.0	Marking - TM trip T>	Byte[10]	BU0 BU2(+)
150.0	Marking warning 0/4-20mA>	Byte[10]	BU2(+)
160.0	Marking - Warning 0/4-20 mA<	Byte[10]	BU2(+)
170.0	Marking - Trip 0/4-20 mA>	Byte[10]	BU2(+)
180.0	Marking - Trip 0/4-20 mA<	Byte[10]	BU2(+)
190.0	*Reserved*	*Byte[10]*	

3.3.2.18 Data record 160 - Communication parameters

Note

Only the address is relevant for writing. The baud rate is detected automatically. The actual baud rate is read.

Table 3-40 Data record 160 - Communication parameters

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	BU0 BU1 BU2(+)
4.0	Station address	Byte	
5.0	Baud rate	Byte	
6.0 to 9.0	*Reserved*	*Byte[6]*	
10.0	PROFIsafe address (read only)	Word	BU2(+)

3.3.2.19 Data record 165 - Identification

Table 3-41 Data record 165 - Identification

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	BU0 BU1 BU2(+)
4.0	Plant identifier	Byte[32]	
36.0	Location designation	Byte[22]	
58.0	Date installed	Byte[16]	
74.0	*Reserved*	*Byte[38]*	
112.0	Description	Byte[54]	

3.3.2.20 Data record 202 - Acyclic receive

Description

The acyclic receive data can be used for any functions. The receive data is available as device-internal outputs (sockets).

Table 3-42 Data record 202 - Acyclic receive

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	BU0 BU1 BU2(+)
4.0	Acyclic receive - Bit 0.0	Bit	
4.1	Acyclic receive - Bit 0.1	Bit	
4.2	Acyclic receive - Bit 0.2	Bit	
4.3	Acyclic receive - Bit 0.3	Bit	
4.4	Acyclic receive - Bit 0.4	Bit	
4.5	Acyclic receive - Bit 0.5	Bit	
4.6	Acyclic receive - Bit 0.6	Bit	
4.7	Acyclic receive - Bit 0.7	Bit	
5.0	Acyclic receive - Bit 1.0	Bit	
5.1	Acyclic receive - Bit 1.1	Bit	
5.2	Acyclic receive - Bit 1.2	Bit	
5.3	Acyclic receive - Bit 1.3	Bit	
5.4	Acyclic receive - Bit 1.4	Bit	
5.5	Acyclic receive - Bit 1.5	Bit	
5.6	Acyclic receive - Bit 1.6	Bit	
5.7	Acyclic receive - Bit 1.7	Bit	
6.0	Acyclic receive - Analog value	Word	

3.3.2.21 Data record 203 - Acyclic send

Description

Any data can be transmitted via the acyclic send data. The send data is available as device-internal inputs (plugs).

Table 3-43 Data record 203 - Acyclic send

Byte.Bit	Designation	Type	Information
0.0	Acyclic send - Bit 0.0	Bit	BU0 BU1 BU2(+)
0.1	Acyclic send - Bit 0.1	Bit	
0.2	Acyclic send - Bit 0.2	Bit	
0.3	Acyclic send - Bit 0.3	Bit	
0.4	Acyclic send - Bit 0.4	Bit	
0.5	Acyclic send - Bit 0.5	Bit	
0.6	Acyclic send - Bit 0.6	Bit	
0.7	Acyclic send - Bit 0.7	Bit	
1.0	Acyclic send - Bit 1.0	Bit	
1.1	Acyclic send - Bit 1.1	Bit	
1.2	Acyclic send - Bit 1.2	Bit	
1.3	Acyclic send - Bit 1.3	Bit	
1.4	Acyclic send - Bit 1.4	Bit	
1.5	Acyclic send - Bit 1.5	Bit	
1.6	Acyclic send - Bit 1.6	Bit	
1.7	Acyclic send - Bit 1.7	Bit	

3.3.2.22 Data record 224 - Password protection

Description

- Password protection ON
  If the data record is received with this control flag, the password protection is activated and the password applied. If "Password protection on" applies and the password is not identical at the time of receipt, the event "Event - Wrong password" is set and no change will be made.
- Password protection OFF
  If the data record is received with this control flag, the password protection is deactivated. If the password is incorrect, the event "Event - Wrong password" is set and no change is made.

Table 3-44 Data record 224 - Password protection

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	BU0 BU1 BU2(+)
4.0	Control flag: 0 = Password protection off, 1 = Password protection on	Bit	

Byte.Bit	Designation	Type	Information
4.1	*Reserved*	*Bit[31]*	
8.0	Password	Byte[8]	BU0 BU1 BU2(+)
16.0	*Reserved*	*Byte[8]*	

3.3.2.23 I&M data

I&M data overview

The following I&M data are supported:

Number	Name	Comment
I&M0 (Page 190)	Device identification	This is stored in the device on initialization
I&M1 (Page 191)	Equipment identifier	These are entered in the engineering system
I&M2 (Page 191)	Installation	
I&M3 (Page 192)	Description	

Data set 231: I&M0 - device identification

Only read (r) access to the device identification (I&M0) is possible.

Byte	Data length	Content
0	10 bytes	I&M header

Byte	Data length	Content	Meaning	Access
10	2 bytes	MANUFACTURER_ID	42 = SIEMENS manufacturer identification	r
12	20 bytes	ORDER_ID	Order number	r
32	16 bytes	SERIAL_NUMBER	Serial number	r
48	2 bytes	HARDWARE_REVISION	Revision level	r
50	4 bytes	SOFTWARE_REVISION	Firmware version	r
54	2 bytes	REV_COUNTER	Provides information about the parameterized changes on the device.	r
56	2 bytes	PROFILE_ID	Provides information about the profile supported by the device and the device family belonging to the device.	r

Byte	Data length	Content	Meaning	Access
58	2 bytes	PROFILE_SPECIFIC_TYPE	Used to supplement the object "PROFILE_ID" and contains further information on the profile.	r
60	2 bytes	IM_VERSION	Provides information about the version of the identification files (0x0101 = Version 1.1).	r
62	2 bytes	IM_SUPPORTED	Provides information about the available identification files (Index 2 to 4).	r

Data set 232: I&M1 - equipment identifier

Read (r) and write (w) access to the equipment identifier (I&M1) is possible.

Note

Validity of the write access

SIMOCODE pro checks the validity of the write access. The ASCII characters 0x20 - 0x7E are accepted. If SIMOCODE pro does not accept the data of the write access, it responds with a negative acknowledgment.

Byte	Data format	Meaning
0 ... 9	-	I&M header
9	-	Transfer the value 0x00 for writing the data set for byte 9.

Byte	Data length	Content	Meaning	Access
10	32 bytes	TAG_FUNCTION	Plant identifier Fill unused positions with blanks (0x20).	r/w
42	22 bytes	TAG_LOCATION	Location designation Fill unused positions with blanks (0x20).	r/w

Data set 233: I&M2 - installation

Read (r) and write (w) access to the installation (I&M2) is possible.

Note

Validity of the write access

SIMOCODE checks the validity of the write access. The accepted display formats are "YYYY-MM-DD" (year-month-day) and "YYYY-MM-DD HH:MM" (year-month-day hour:minute). If SIMOCODE does not accept the data of the write access, the SIMOCODE responds with a negative acknowledgment.

- YYYY (year): 0001 - 9999
- MM (month): 01 - 12
- DD (day): 01 - 31 (depending on month)
- HH (hour): 00 - 23
- MM (minute): 00 - 59

Byte	Data format	Meaning
0 ... 9	-	I&M header
9	-	Transfer the value 0x00 for writing the data set for byte 9.

Byte	Data length	Content	Meaning	Access
10	16 bytes	INSTALLATION_DATE	Installation date Fill unused positions with blanks (0x20).	r/w
26	38 bytes	RESERVED	-	r

Data set 234: I&M3 - description

Read (r) and write (w) access to the description (I&M3) is possible.

Note

Validity of the write access

SIMOCODE checks the validity of the write access. The ASCII characters 0x20 - 0x7E are accepted. If SIMOCODE does not accept the data of the write access, the SIMOCODE responds with a negative acknowledgment.

Byte	Data format	Meaning
0 ... 9	-	I&M header
9	-	Transfer the value 0x00 for writing the data set for byte 9.

Byte	Data length	Content	Meaning	Access
10	32 bytes	DESCRIPTOR	Individual additional information and explanations. Fill unused positions with blanks (0x20).	r/w

3.4 Tables, PROFINET data records

3.4.1 PROFINET tables

3.4.1.1 OPC UA variables

Node IDs

The name of the variable is composed of the namespace ID2 and the node ID as follows:

ns=http://siemens.com/automation/simocode/provpn;i=Node ID of the relevant variable.

Example:

You want to access the maximum motor current. You search for the node ID of the variable "Max. Current I_max" in the following table: Node ID=33

Table 3-45 Node IDs (1)

Node ID	Data type	Description	Unit	GG3	GG3 GP
Acyclic receive					
11	Boolean	Acyclic receive - Bit 0.0		✓	✓
12	Boolean	Acyclic receive - Bit 0.1		✓	✓
13	Boolean	Acyclic receive - Bit 0.2		✓	✓
14	Boolean	Acyclic receive - Bit 0.3		✓	✓
15	Boolean	Acyclic receive - Bit 0.4		✓	✓
16	Boolean	Acyclic receive - Bit 0.5		✓	✓
17	Boolean	Acyclic receive - Bit 0.6		✓	✓
18	Boolean	Acyclic receive - Bit 0.7		✓	✓
19	Boolean	Acyclic receive - Bit 1.0		✓	✓
20	Boolean	Acyclic receive - Bit 1.1		✓	✓
21	Boolean	Acyclic receive - Bit 1.2		✓	✓
22	Boolean	Acyclic receive - Bit 1.3		✓	✓
23	Boolean	Acyclic receive - Bit 1.4		✓	✓
24	Boolean	Acyclic receive - Bit 1.5		✓	✓
25	Boolean	Acyclic receive - Bit 1.6		✓	✓
26	Boolean	Acyclic receive - Bit 1.7		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
27	Unsigned word	Acyclic receive - analog value		✓	✓
Measured values					
30	Unsigned byte	Thermal memory	See 2)	✓	✓
31	Unsigned byte	Phase unbalance	1%	✓	✓
32	Unsigned byte	Cos phi	1%	✓	—
33	Unsigned word	Max. current I_max	1% / I_s	✓	✓
34	Unsigned word	Current I_L1	1% / I_s	✓	✓
35	Unsigned word	Current I_L2	1% / I_s	✓	✓
36	Unsigned word	Current I_L3	1% / I_s	✓	✓
37	Unsigned word	Last trip current	1% / I_s	✓	✓
38	Unsigned word	Time to trip	100 ms	✓	✓
39	Unsigned word	Cooling down period	100 ms	✓	✓
40	Unsigned word	Phase voltage UL1-N	1 V	✓	—
41	Unsigned word	Phase voltage UL2-N	1 V	✓	—
42	Unsigned word	Phase voltage UL3-N	1 V	✓	—
43	Unsigned word	AM1 output	See 1)	✓	—
44	Unsigned word	AM1 input 1		✓	—
45	Unsigned word	AM1 input 2		✓	—
47	Unsigned word	TM1 max. temperature	1 K see 3)	✓	✓
48	Unsigned word	TM1 temperature 1		✓	✓
49	Unsigned word	TM1 temperature 2		✓	✓
50	Unsigned word	TM1 temperature 3		✓	✓
51	Unsigned Dword	Active power P	1 W	✓	—
52	Unsigned Dword	Apparent power S	1 VA	✓	—

Node ID	Data type	Description	Unit	GG3	GG3 GP
53	Unsigned word	AM2 output	See [1]	✓	—
54	Unsigned word	AM2 input 1		✓	—
55	Unsigned word	AM2 input 2		✓	—
56	Unsigned word	AM2 input 3		✓	—
57	Unsigned word	Max. temperature	1 K see [3]	✓	—
58	Unsigned word	TM2 temperature 1		✓	—
59	Unsigned word	TM2 temperature 2		✓	—
60	Unsigned word	TM2 temperature 3		✓	—
61	Unsigned word	EM Ground Fault Current		✓	✓
62	Unsigned word	EM Last Trip Current		✓	✓
63	Unsigned word	Frequency	0.01 Hz	✓	—
64	Float	Max. current I_max	1 A	✓	—
65	Float	Average current I_avg	1 A	✓	—
66	Float	Current I_L1	1 A	✓	—
67	Float	Current I_L2	1 A	✓	—
68	Float	Current I_L3	1 A	✓	—
69	Float	Active power P	1 W	✓	—
Statistics					
70	Unsigned byte	Permissible starts - actual value		✓	✓
71	Unsigned byte	Time until test required		✓	✓
72	Unsigned word	Number of parameterizations		✓	✓
73	Unsigned word	Number of overload trips		✓	✓
74	Unsigned word	Int. number of overload trips		✓	✓
75	Unsigned word	Motor stop time		✓	✓
76	Unsigned word	Timer 1		✓	✓
77	Unsigned word	Timer 2		✓	✓
78	Unsigned word	Timer 3		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
79	Unsigned word	Timer 4		✓	✓
80	Unsigned word	Counter 1		✓	✓
81	Unsigned word	Counter 2		✓	✓
82	Unsigned word	Counter 3		✓	✓
83	Unsigned word	Counter 4		✓	✓
84	Unsigned word	Calculation module 1 - output		✓	✓
85	Unsigned word	Calculation module 2 - output		✓	✓
86	Unsigned Dword	Motor operating hours		✓	✓
87	Unsigned Dword	Int. motor operating hours		✓	✓
88	Unsigned Dword	Device operating hours		✓	✓
89	Unsigned Dword	Number of starts		✓	✓
90	Unsigned Dword	Int. number of direct starts		✓	✓
91	Unsigned Dword	Int. number of reverse starts		✓	✓
92	Unsigned Dword	Consumed energy		✓	—
93	Unsigned word	Timer 5		✓	✓
94	Unsigned word	Timer 6		✓	✓
95	Unsigned word	Counter 5		✓	✓
96	Unsigned word	Counter 6		✓	✓
97	Unsigned word	Calculation module 3 - output		✓	✓
98	Unsigned word	Calculation module 4 - output		✓	✓
99	Unsigned word	Analog multiplexer - output		✓	✓
100	Float	Consumed energy		✓	—
Diagnostic status					
108	Boolean	Status - General fault		✓	✓
109	Boolean	Status - General warning		✓	✓
110	Boolean	Status - Device OK		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
111	Boolean	Status - Bus OK		✓	✓
112	Boolean	Status - PLC/DCS in run		✓	✓
113	Boolean	Status - Current flowing		✓	✓
114	Boolean	Status - PE command Start_Pause is pending		✓	✓
115	Boolean	Status - PE energy-saving mode active		✓	✓
116	Boolean	Status - On<<		✓	✓
117	Boolean	Status - On <		✓	✓
118	Boolean	Status - Off		✓	✓
119	Boolean	Status - On >		✓	✓
120	Boolean	Status - On >>		✓	✓
121	Boolean	Status - Start active		✓	✓
122	Boolean	Status - Interlocking time active		✓	✓
123	Boolean	Status - Change-over pause active		✓	✓
124	Boolean	Status - Positioner running in open direction		✓	—
125	Boolean	Status - Positioner running in close direction		✓	—
126	Boolean	Status - Feedback closed (FC)		✓	—
127	Boolean	Status - Feedback open (FO)		✓	—
128	Boolean	Status - Torque closed (TC)		✓	—
129	Boolean	Status - Torque open (TO)		✓	—
130	Boolean	Status - Test position (TPF)		✓	✓
131	Boolean	Status - Operational Protection OFF (OPO)		✓	—
132	Boolean	Status - Remote mode		✓	✓
133	Boolean	Status - Emergency start executed		✓	✓
134	Boolean	Status - Cooling down period active		✓	✓
135	Boolean	Status - Pause time active		✓	✓
136	Boolean	Status - Device test active		✓	✓
137	Boolean	Status - Phase-sequence 1-2-3		✓	—
138	Boolean	Status - Phase-sequence 3-2-1		✓	—
139	Boolean	Status - Enabling circuit closed		✓	—
Diagnostic events					
140	Boolean	Event - Prewarning overload (I>115%Is)		✓	✓
141	Boolean	Event - Unbalance		✓	✓
142	Boolean	Event - Overload		✓	✓
143	Boolean	Event - Overload + loss of phase		✓	✓
144	Boolean	Event - Internal ground fault		✓	✓
145	Boolean	Event - External Ground Fault		✓	✓
146	Boolean	Event - Warning external ground fault		✓	✓
147	Boolean	Event - Thermistor trip level		✓	✓
148	Boolean	Event - Thermistor short circuit		✓	✓
149	Boolean	Event - Thermistor open circuit		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
150	Boolean	Event - TM1 warning level T>		✓	✓
151	Boolean	Event - TM1 trip level T>		✓	✓
152	Boolean	Event - TM1 sensor fault		✓	✓
153	Boolean	Event - TM1 out of range		✓	✓
154	Boolean	Event - EM Open Circuit		✓	✓
155	Boolean	Event - EM Short Circuit		✓	✓
156	Boolean	Event - Warning level I>		✓	✓
157	Boolean	Event - Warning level I<		✓	✓
158	Boolean	Event - Warning level P>		✓	—
159	Boolean	Event - Warning level P<		✓	—
160	Boolean	Event - Warning level cos phi<		✓	—
161	Boolean	Event - Warning level U<		✓	—
162	Boolean	Event - AM1 warning level 0/4-20mA>		✓	—
163	Boolean	Event - AM1 warning level 0/4-20mA<		✓	—
164	Boolean	Event - Trip level I>		✓	✓
165	Boolean	Event - Trip level I<		✓	✓
166	Boolean	Event - Trip level P>		✓	—
167	Boolean	Event - Trip level P<		✓	—
168	Boolean	Event - Trip level cos phi<		✓	—
169	Boolean	Event - Trip level U<		✓	—
170	Boolean	Event - AM1 trip level 0/4-20mA>		✓	—
171	Boolean	Event - AM1 trip level 0/4-20mA<		✓	—
172	Boolean	Event - Stalled rotor		✓	✓
173	Boolean	Event - Warning Internal ground fault		✓	✓
175	Boolean	Event - No start possible		✓	✓
176	Boolean	Event - No. of starts>		✓	✓
177	Boolean	Event - Just one start possible		✓	✓
178	Boolean	Event - Motor operating hours >		✓	✓
179	Boolean	Event - Motor stop time >		✓	✓
180	Boolean	Event - Limit monitor 1		✓	✓
181	Boolean	Event - Limit monitor 2		✓	✓
182	Boolean	Event - Limit monitor 3		✓	✓
183	Boolean	Event - Limit monitor 4		✓	✓
184	Boolean	Event - External fault 1		✓	✓
185	Boolean	Event - External fault 2		✓	✓
186	Boolean	Event - External fault 3		✓	✓
187	Boolean	Event - External fault 4		✓	✓
188	Boolean	Event - External fault 5		✓	✓
189	Boolean	Event - External fault 6		✓	✓
191	Boolean	Event - Module-FW update active		✓	✓
192	Boolean	Event - AM1 open circuit		✓	—
193	Boolean	Event - DM-F safety-related tripping		✓	—

Node ID	Data type	Description	Unit	GG3	GG3 GP
194	Boolean	Event - Monitoring interval for mandato-ry testing - test required		✓	—
195	Boolean	Event - Time set (NTP)		✓	✓
196	-	-			
197	Boolean	Event - Time synchronized (NTP)		✓	✓
198	Boolean	Event - DM-F LOCAL o.k.		✓	—
199	Boolean	Event - DM-F PROFIsafe active		✓	—
200	Boolean	Event - Configured operation panel missing		✓	✓
201	Boolean	Event - Module not supported		✓	✓
202	Boolean	Event - No module voltage		✓	✓
204	Boolean	Event - Memory module read in		✓	✓
205	Boolean	Event - Memory module programmed		✓	✓
206	Boolean	Event - Memory module cleared		✓	✓
208	Boolean	Event - Initialization module read in		✓	✓
209	Boolean	Event - Initialization module programmed		✓	✓
210	Boolean	Event - Initialization module cleared		✓	✓
212	Boolean	Event - Parameter blocking during start-up active		✓	✓
213	Boolean	Event - Parameter changes not allowed in the current operating state		✓	✓
214	Boolean	Event - Device does not support the re-quired functions		✓	✓
215	Boolean	Event - Wrong parameter		✓	✓
216	Boolean	Event - Wrong password		✓	✓
217	Boolean	Event - Password protection active		✓	✓
218	Boolean	Event - Factory settings		✓	✓
219	Boolean	Event - Parameter setting active		✓	✓
220	Unsigned byte	Event - Prm error number		✓	✓
228	Boolean	Event - DM-F LOCAL configuration mode		✓	—
229	Boolean	Event - DM-F LOCAL - actual configuration and desired configuration different		✓	—
230	Boolean	Event - DM-F LOCAL waiting for start-up test		✓	—
231	Boolean	Event - DM-F incorrect PROFIsafe address or incorrect PROFIsafe parameter		✓	—
232	Boolean	Event - Initialization Module write protec-ted, parameter changes not allowed		✓	✓
233	Boolean	Event - Memory module write-protected		✓	✓
234	Boolean	Event - Initialization module write-protec-ted		✓	✓
235	Boolean	Event - Initialization module identification data write-protected		✓	✓
Diagnostic warnings (1)					
236	Boolean	Warning - Prewarning overload (I>115%Is)		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
237	Boolean	Warning - Unbalance		✓	✓
238	Boolean	Warning - Overload		✓	✓
239	Boolean	Warning - Overload + loss of phase		✓	✓
240	Boolean	Warning - Internal ground fault		✓	✓
241	Boolean	Warning - External ground fault		✓	✓
243	Boolean	Warning - Thermistor trip level		✓	✓
244	Boolean	Warning - Thermistor short circuit		✓	✓
245	Boolean	Warning - Thermistor open circuit		✓	✓

Table 3-46 Node IDs (2)

Node ID	Data type	Description	Unit	GG3	GG3 GP
Diagnostic warnings (2)					
246	Boolean	Warning - TM1 warning level T>		✓	✓
248	Boolean	Warning - TM1 sensor fault		✓	✓
249	Boolean	Warning - TM1 out of range		✓	✓
250	Boolean	Warning - EM Open Circuit		✓	✓
251	Boolean	Warning - EM Short Circuit		✓	✓
252	Boolean	Warning - Warning level I>		✓	✓
253	Boolean	Warning - Warning level I<		✓	✓
254	Boolean	Warning - Warning level P>		✓	✓
255	Boolean	Warning - Warning level P<		✓	✓
256	Boolean	Warning - Warning level cos phi<		✓	✓
257	Boolean	Warning - Warning level U<		✓	✓
258	Boolean	Warning - AM1 warning level 0/4-20mA>		✓	✓
259	Boolean	Warning - AM1 warning level 0/4-20mA<		✓	✓
260	Boolean	Warning - Stalled rotor		✓	✓
263	Boolean	Warning - No start possible		✓	✓
264	Boolean	Warning - No. of starts>		✓	✓
265	Boolean	Warning - Just one start possible		✓	✓
266	Boolean	Warning - Motor operating hours >		✓	✓
267	Boolean	Warning - Motor stop time >		✓	✓
268	Boolean	Warning - External fault 1		✓	✓
269	Boolean	Warning - External fault 2		✓	✓
270	Boolean	Warning - External fault 3		✓	✓
271	Boolean	Warning - External fault 4		✓	✓
272	Boolean	Warning - External fault 5		✓	✓
273	Boolean	Warning - External fault 6		✓	✓
276	Boolean	Warning - AM1 open circuit		✓	✓
277	Boolean	Warning - Safety-related tripping		✓	✓
278	Boolean	Warning - Test required		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
282	Boolean	Warning - Feedback circuit		✓	✓
283	Boolean	Warning - Simultaneity		✓	✓
Diagnostic trips					
284	Boolean	Trip - Hardware fault basic unit		✓	✓
285	Boolean	Trip - Module fault		✓	✓
286	Boolean	Trip - Temporary components		✓	✓
287	Boolean	Trip - Configuration fault		✓	✓
288	Boolean	Trip - Parameterization		✓	✓
289	Boolean	Trip - Bus		✓	✓
290	Boolean	Trip - PLC/DCS		✓	✓
292	Boolean	Trip - Execution on-command		✓	✓
293	Boolean	Trip - Execution stop command		✓	✓
294	Boolean	Trip - Feedback on		✓	✓
295	Boolean	Trip - Feedback off		✓	✓
296	Boolean	Trip - Stalled positioner		✓	✓
297	Boolean	Trip - Double 0		✓	✓
298	Boolean	Trip - Double 1		✓	✓
299	Boolean	Trip - End position		✓	✓
300	Boolean	Trip - Antivalence		✓	✓
301	Boolean	Trip - Test position feedback (TPF)		✓	✓
302	Boolean	Trip - Power failure (UVO)		✓	✓
303	Boolean	Trip - Operational Protection OFF (OPO)		✓	✓
309	Boolean	Trip - Unbalance		✓	✓
310	Boolean	Trip - Overload		✓	✓
311	Boolean	Trip - Overload + loss of phase		✓	✓
312	Boolean	Trip - Internal ground fault		✓	✓
313	Boolean	Trip - External ground fault		✓	✓
315	Boolean	Trip - Thermistor trip level		✓	✓
316	Boolean	Trip - Thermistor short circuit		✓	✓
317	Boolean	Trip - Thermistor open circuit		✓	✓
319	Boolean	Trip - TM1 trip level T>		✓	✓
320	Boolean	Trip - TM1 sensor fault		✓	✓
321	Boolean	Trip - TM1 out of range		✓	✓
322	Boolean	Trip - EM Open Circuit		✓	✓
323	Boolean	Trip - EM Short Circuit		✓	✓
324	Boolean	Trip - Trip level I>		✓	✓
325	Boolean	Trip - Trip level I<		✓	✓
326	Boolean	Trip - Trip level P>		✓	✓
327	Boolean	Trip - Trip level P<		✓	✓
328	Boolean	Trip - Trip level cos phi<		✓	✓
329	Boolean	Trip - Trip level U<		✓	✓
330	Boolean	Trip - AM1 trip level 0/4-20mA>		✓	✓
331	Boolean	Trip - AM1 trip level 0/4-20mA<		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
332	Boolean	Trip - Stalled rotor		✓	✓
336	Boolean	Trip - No. of starts >		✓	✓
340	Boolean	Trip - External fault 1		✓	✓
341	Boolean	Trip - External fault 2		✓	✓
342	Boolean	Trip - External fault 3		✓	✓
343	Boolean	Trip - External fault 4		✓	✓
344	Boolean	Trip - External fault 5		✓	✓
345	Boolean	Trip - External fault 6		✓	✓
346	Boolean	Trip - Dry running pump		✓	—
347	Boolean	Trip - Dry-running protection error		✓	—
348	Boolean	Trip - AM1 open circuit		✓	✓
349	Boolean	Trip - Test shutdown		✓	✓
350	Boolean	Trip - Safety-related tripping		✓	✓
351	Boolean	Trip - Wiring		✓	✓
352	Boolean	Trip - Cross circuit		✓	✓
356	Boolean	Trip - TM2 trip level T>		✓	✓
357	Boolean	Trip - TM2 sensor fault		✓	✓
358	Boolean	Trip - TM2 out of range		✓	✓
364	Boolean	Trip - AM2 trip level 0/4-20mA>		✓	✓
365	Boolean	Trip - AM2 trip level 0/4-20mA<		✓	✓
372	Boolean	Trip - AM2 open circuit		✓	✓
Diagnostic warnings					
388	Boolean	Warning - TM2 warning level T>		✓	✓
390	Boolean	Warning - TM2 sensor fault		✓	✓
391	Boolean	Warning - TM2 out of range		✓	✓
396	Boolean	Warning - AM2 warning level 0/4-20mA>		✓	✓
397	Boolean	Warning - AM2 warning level 0/4-20mA<		✓	✓
404	Boolean	Warning - AM2 open circuit		✓	✓
Diagnostic events					
420	Boolean	Event - TM2 warning level T>		✓	✓
421	Boolean	Event - TM2 trip level T>		✓	✓
422	Boolean	Event - TM2 sensor fault		✓	✓
423	Boolean	Event - TM2 out of range		✓	✓
428	Boolean	Event - AM2 warning level 0/4-20mA>		✓	✓
429	Boolean	Event - AM2 warning level 0/4-20mA<		✓	✓
430	Boolean	Event - AM2 trip level 0/4-20mA>		✓	✓
431	Boolean	Event - AM2 trip level 0/4-20mA<		✓	✓
432	Boolean	Event - Limit monitor 5		✓	✓
433	Boolean	Event - Limit monitor 6		✓	✓
444	Boolean	Event - AM2 open circuit		✓	✓
Acyclic send					
450	Boolean	Acyclic send data 0.0		✓	✓
451	Boolean	Acyclic send data 0.1		✓	✓

Node ID	Data type	Description	Unit	GG3	GG3 GP
452	Boolean	Acyclic send data 0.2		✓	✓
453	Boolean	Acyclic send data 0.3		✓	✓
454	Boolean	Acyclic send data 0.4		✓	✓
455	Boolean	Acyclic send data 0.5		✓	✓
456	Boolean	Acyclic send data 0.6		✓	✓
457	Boolean	Acyclic send data 0.7		✓	✓
458	Boolean	Acyclic send data 1.0		✓	✓
459	Boolean	Acyclic send data 1.1		✓	✓
460	Boolean	Acyclic send data 1.2		✓	✓
461	Boolean	Acyclic send data 1.3		✓	✓
462	Boolean	Acyclic send data 1.4		✓	✓
463	Boolean	Acyclic send data 1.5		✓	✓
464	Boolean	Acyclic send data 1.6		✓	✓
465	Boolean	Acyclic send data 1.7		✓	✓
Measured values					
466	Float	Apparent power S	1 VA	✓	—
467	Float	Phase voltage UL1-N	1 V	✓	—
468	Float	Phase voltage UL2-N	1 V	✓	—
469	Float	Phase voltage UL3-N	1 V	✓	—
470	Float	Power factor (cos phi)		✓	—
471	Float	Frequency	1 Hz	✓	—

1) S7 format: 0/4 mA = 0; 20 mA = 27648

2) Representation of the "Thermal motor model": Value always related to symmetrical trip level, representation in steps of 2% in bits 6 ...0 (range 0 to 254%), bit 7 shows unbalance (fixed level 50%)

3) Representation in Kelvin

3.4.1.2 Abbreviations and specifications

Abbreviations

See SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Specifications

The following specifications apply in the tables:

Table 3-47 Table specifications (example)

Designation	Type	Range	Unit	Information
*Reserved *)*	*Byte[4] *)*			
Max. current I_max	Word	0 ... 65535	1 % / I_s	
*) Items in italics are not relevant (reserved) and must be filled with "0" when written to. Parameters that can be changed during operation.				

Event - PRM error number (bytes):

If parameterization is not possible, the number of the parameter group (PRM group) that caused the error is communicated here.

Byte.Bit	Designation (PRM group)	...
0.0	Reserved	
4.0	Device configuration (12)	Parameter group 12
	⋮	

Figure 3-4 Example for parameter group

3.4.1.3 Socket assignment table - digital

This table contains all assignment numbers (No.) of the sockets (digital). You only need these assignment numbers if you, for example, use a user program to fill data records and write them back.

Table 3-48 Socket assignment table - digital

No.	Designation	Designation	Information
0	Static level	Not connected	
1		Fixed level value,0	
2		Fixed level value,1	
3		*Reserved*	
4	Events – Level monitoring	Event – Warning 0/4 - 20mA>	AM2
5	Events – Level monitoring	Event – Warning 0/4 - 20mA<	AM2
6		Event – Trip 0/4 - 20mA>	AM2
7		Event – Trip 0/4 - 20mA<	AM2
8	Basic unit (BU)	BU - Test / Reset button	
9		BU - Input 1	
10		BU - Input 2	
11		BU - Input 3	
12		BU - Input 4	
13		*Reserved*	

No.	Designation	Designation	Information
14		*Reserved*	
15		*Reserved*	
16	Digital module DM	DM1 - Input 1	DM1
17		DM1 - Input 2	DM1
18		DM1 - Input 3	DM1
19		DM1 - Input 4	DM1
20		DM2 - Input 1	DM2
21		DM2 - Input 2	DM2
22		DM2 - Input 3	DM2
23		DM2 - Input 4	DM2
24		DM-FL sensor channel 1 Y12	DM-FL
25		DM-FL sensor channel 1 Y22	DM-FL
26		*Reserved*	
27		*Reserved*	
28	Events - Protection	Event – TM2 sensor fault	TM2
29		Event – TM2 out of range	TM2
30		Event – TM2 warning T>	TM2
31		Event – TM2 trip T>	TM2
32	Operator panel OP / OPD	OP – Test / Reset button	OP, OPD
33		OP – Button 1	OP, OPD
34		OP – Button 2	OP, OPD
35		OP – Button 3	OP, OPD
36		OP – Button 4	OP, OPD
37		*Reserved*	
38	Events – Limit 5+6	Event – Limit 5	
39		Event – Limit 6	
40	PC / OPC UA [OCM]	Acyclic receive data - Bit 0.0	
41		Acyclic receive data - Bit 0.1	
42		Acyclic receive data - Bit 0.2	
43		Acyclic receive data - Bit 0.3	
44		Acyclic receive data - Bit 0.4	
45		Acyclic receive data - Bit 0.5	
46		Acyclic receive data - Bit 0.6	
47		Acyclic receive data - Bit 0.7	
48		Acyclic receive data - Bit 1.0	
49		Acyclic receive data - Bit 1.1	
50		Acyclic receive data - Bit 1.2	
51		Acyclic receive data - Bit 1.3	
52		Acyclic receive data - Bit 1.4	
53		Acyclic receive data - Bit 1.5	
54		Acyclic receive data - Bit 1.6	
55		Acyclic receive data - Bit 1.7	
56	PLC/PCS interface PLC [PN] (cyclic data)	Cyclic receive data - Bit 0.0	

No.	Designation	Designation	Information
57		Cyclic receive data - Bit 0.1	
58		Cyclic receive data - Bit 0.2	
59		Cyclic receive data - Bit 0.3	
60		Cyclic receive data - Bit 0.4	
61		Cyclic receive data - Bit 0.5	
62		Cyclic receive data - Bit 0.6	
63		Cyclic receive data - Bit 0.7	
64		Cyclic receive data - Bit 1.0	
65		Cyclic receive data - Bit 1.1	
66		Cyclic receive data - Bit 1.2	
67		Cyclic receive data - Bit 1.3	
68		Cyclic receive data - Bit 1.4	
69		Cyclic receive data - Bit 1.5	
70		Cyclic receive data - Bit 1.6	
71		Cyclic receive data - Bit 1.7	
72	Enabled control command	Enabled control command ON<<	Dependent on the control function
73		Enabled control command ON<	
74		Enabled control command - OFF	
75		Enabled control command ON>	
76		Enabled control command ON>>	
77		*Reserved*	
78		*Reserved*	
79		*Reserved*	
80	Contactor controls	Contactor controls 1 QE1	Dependent on the control function
81		Contactor controls 2 QE2	
82		Contactor controls 3 QE3	
83		Contactor controls 4 QE4	
84		Contactor controls 5 QE5	
85		*Reserved*	
86		*Reserved*	
87		*Reserved*	
88	Lamp controls	Display - QLE<<(ON<<)	Dependent on the control function
89		Display - QLE<(ON<)	
90		Indication - QLA (OFF)	
91		Display - QLE>(ON>)	
92		Display - QLE>>(ON>>)	
93		Display - QLS (fault)	
94		*Reserved*	
95		*Reserved*	
96	Status information - General	Status - General fault	
97		Status - General warning	
98		Status - Device	
99		Status - Bus	

No.	Designation	Designation	Information
100		Status - PLC/PCS	
101		Status - Current flowing	IM UM(+)
102		Status – PE command Start_Pause pending	
103		*Reserved*	
104	Status information - Receive	Status - ON<<	Dependent on the control function
105		Status - ON<	
106		Status - Off	
107		Status - ON>	
108		Status - ON>>	
109		Status - Start active	
110		Status - Interlocking time active	All reversing starters and positioners
111		Status - Change-over pause active	Star-delta starter, Dahlander starter, pole-changing starter
112		Status - Runs in open direction	Dependent on the control function
113		Status - Runs in close direction	
114		Status - FC	
115		Status - FO	
116		Status - TC	
117		Status - TO	
118		Status - Cold start (TPF)	
119		Status - OPO	
120		Status - Remote mode	
121	Status information - Protection	Status - Emergency start executed	IM UM(+)
122		Status - Cooling down period active	IM UM(+)
123		Status - Pause time active	IM UM(+)
124	Status information - Miscellaneous	Status - Device test active	
125		Status - Phase sequence 1-2-3	UM(+)
126		Status - Phase sequence 3-2-1	UM(+)
127		Status - DM-F enabling circuit	DM-F
128	Events - Protection	Event - Overload operation	IM UM(+)
129		Event - Unbalance	IM UM(+)
130		Event - Overload	IM UM(+)
131		Event - overload + phase failure	IM UM(+)
132		Event - Internal ground fault	IM UM(+)
133		Event - External ground fault	EM
134		Event - Warning ext. ground fault	EM
135		Event - Thermistor overload	Th
136		Event - Thermistor short-circuit	Th
137		Event - Thermistor open circuit	Th
138		Event - TM1 warning T>	TM1
139		Event - TM1 trip T>	TM1

No.	Designation	Designation	Information
140		Event - TM1 sensor fault	TM
141		Event - TM1 out of range	TM
142		Event - EM+ open circuit	EM+
143		Event - EM+ short-circuit	EM+
144	Events - Level monitoring	Event - Warning I>	IM UM(+)
145		Event - Warning I<	IM UM(+)
146		Event - Warning P>	UM(+)
147		Event - Warning P<	UM(+)
148		Event - Warning cos phi<	UM(+)
149		Event - Warning U<	UM(+)
150		Event - Warning 0/4 - 20mA>	AM1
151		Event - Warning 0/4 - 20mA<	AM1
152		Event - Trip I>	IM UM(+)
153		Event - Trip I<	IM UM(+)
154		Event - Trip P>	UM(+)
155		Event - Trip P<	UM(+)
156		Event - Trip cos phi<	UM(+)
157		Event - Trip U<	UM(+)
158		Event - Trip 0/4-20 mA>	AM1
159		Event - Trip 0/4-20 mA<	AM1
160		Event - Stalled rotor	IM UM(+)
161	Events - Protection	Event - Warning internal ground fault	
162		*Reserved*	
163		Event - No start permitted	
164	Events - Level monitoring	Event - No. of starts >	
165		Event - Just one start possible	
166		Event - Motor operating hours >	
167		Event - Motor stop time >	
168		Event - Limit 1	
169		Event - Limit 2	
170		Event - Limit 3	
171		Event - Limit 4	
172	Events - Miscellaneous	Event - External fault 1	
173		Event - External fault 2	
174		Event - External fault 3	
175		Event - External fault 4	
176		Event - External fault 5	
177		Event - External fault 6	
178		*Reserved*	
179		Event - AM2 open circuit	AM2
180		Event - AM1 open circuit	AM1, AM2
181		Event - DM-F safety-related tripping	DM-F
182		Event - DM-F - Test requirement	DM-F

No.	Designation	Designation	Information
183		*Reserved*	
184		*Reserved*	
185		*Reserved*	
186	Events - Miscellaneous	Event - DM-FL safety o.k	DM-FL
187		Event - DM-FP PROFIsafe active	DM-FP
188	Events - System interface	Event - Configured operator panel missing	
189		*Reserved*	
190	Warnings - Miscellaneous	Warning - DM-F feedback circuit	DM-F
191		Warning - DM-FL simultaneity	DM-FL
192	Faults - General	Fault - HW fault basic unit	
193		Fault - Module fault (e.g. IM, DM)	
194		Fault - Temporary components (e.g. memory module)	
195		Fault - Configuration error	
196		Fault - Parameterization	
197		Fault - Bus	
198		Fault - PLC/PCS	
199		Fault - Dry running pump	UM+ TL
200	Faults - Control	Fault - Execution Time ON	Not for overload relays
201		Fault - Execution Time OFF	
202		Fault - Feedback (FB) ON	
203		Fault - Feedback (FB) OFF	
204		Fault - Stalled positioner	Positioner
205		Fault - Double 0	Solenoid valve / positioner
206		Fault - Double 1	Solenoid valve / positioner
207		Fault - End position	Solenoid valve / positioner
208		Fault - Antivalence	Positioner
209		Fault - Cold run (TPF) error	
210		Fault - power failure (UVO)	
211		Fault - Operational Protection Off (OPO)	
212		*Reserved*	
213		*Reserved*	
214	Freely programmable elements	Signal conditioning 5 output	
215		Signal conditioning 6 output	
216		Truth table 1 3I/1O output	
217		Truth table 2 3I/1O output	
218		Truth table 3 3I/1O output	
219		Truth table 4 3I/1O output	
220		Truth table 5 3I/1O output	
221		Truth table 6 3I/1O output	
222		Truth table 7 2I/1O output	

No.	Designation	Designation	Information
223		Truth table 8 2I/1O output	
224		Truth table 9 5I/2O output 1	
225		Truth table 9 5I/2O output 2	
226		Truth table 10 3I/1O output	
227		Truth table 11 3I/1O output	
228		Counter 5 output	
229		Counter 6 output	
230		Timer 5 output	
231		Timer 6 output	
232		Timer 1 output	
233		Timer 2 output	
234		Timer 3 output	
235		Timer 4 output	
236		Counter 1 output	
237		Counter 2 output	
238		Counter 3 output	
239		Counter 4 output	
240		Signal conditioning 1 output	
241		Signal conditioning 2 output	
242		Signal conditioning 3 output	
243		Signal conditioning 4 output	
244		Non-volatile element 1 output	
245		Non-volatile element 2 output	
246		Non-volatile element 3 output	
247		Non-volatile element 4 output	
248		Flashing 1 output	
249		Flashing 2 output	
250		Flashing 3 output	
251		Flicker 1 output	
252		Flicker 2 output	
253		Flicker 3 output	
254		PWM output	
255		*Reserved*	

3.4.1.4 Socket assignment table - analog

This table contains all assignment numbers (No.) of the sockets (analog). You only need these assignment numbers if you, for example, use a user program to fill data records and write them back. All inputs for analog data can only process values of type "Word" (2 bytes). In order to also be able to process values of type "Byte", the following applies: The byte value is processed as a low byte, the high byte is always 0.

Table 3-49 Socket assignment table - analog

No.	Designation	Unit	Information
0	Not connected		
1	Fixed level		
2	*Reserved*		
3	*Reserved*		
4	Timer 1 - Actual value	100 ms	
5	Timer 2 - Actual value	100 ms	
6	Timer 3 - Actual value	100 ms	
7	Timer 4 - Actual value	100 ms	
8	Counter 1 - Actual value		
9	Counter 2 - Actual value		
10	Counter 3 - Actual value		
11	Counter 4 - Actual value		
12	Counter 5 - Actual value		
13	Counter 6 - Actual value		
14	Timer 5 - Actual value	100 ms	
15	Timer 6 - Actual value	100 ms	
16	Max. current I_max	1 % / Is	IM UM(+)
17	Current I_L1	1 % / Is	IM UM(+)
18	Current I_L2	1 % / Is	IM UM(+)
19	Current I_L3	1 % / Is	IM UM(+)
20	Phase unbalance	1 %	IM UM(+)
21	Ground-fault current	1 mA	UM+
22	Internal ground fault - last trip current	1 mA	UM+
23	Voltage U_min	1 V	UM(+)
24	Voltage U_L1	1 V see 2)	UM(+)
25	Voltage U_L2	1 V see 2)	UM(+)
26	Voltage U_L3	1 V see 2)	UM(+)
27	Cos phi	1 %	UM(+)
28	Frequency	0.01 Hz	UM+
29	*Reserved*		
30	Number of overload trips		IM UM(+)
31	Int. Number of overload trips		IM UM(+)
32	Thermal motor model	2 %	IM UM(+)
33	Time to trip	100 ms	IM UM(+)
34	Recovery time	100 ms	IM UM(+)

No.	Designation	Unit	Information
35	Last trip current	1 % / Is	IM UM(+)
36	TM1 - max. temperature	1 K	TM1
37	TM1 - temperature 1	1 K	TM1
38	TM1 - temperature 2	1 K	TM1
39	TM1 - temperature 3	1 K	TM1
40	Permissible starts - Actual value		
41	Motor stop time	1 h	
42	DM-F - Time until test required	1 week	DM-F
43	EM+ - last trip current	1 mA	EM+
44	AM1 - input 1	See 1)	AM1
45	AM1 - input 2	See 1)	AM1
46	AM1 - input 3	See 1)	
47	EM+ - ground fault current	1 mA	
48	Acyclic receive data - analog value		
49	Cyclic receive data - analog value 1		
50	Cyclic receive data - analog value 2		
51	Number of parameterizations		
52	Motor operating hours - H word	1 s	
53	Motor operating hours - L word	1 s	
54	Int. motor operating hours - H word	1 s	
55	Int. motor operating hours - L word	1 s	
56	Device operating hours - H word	1 s	
57	Device operating hours - L word	1 s	
58	Number of starts - H word		
59	Number of starts - L word		
60	Int. number of starts CW - H word		
61	Int. number of starts CW - L word		
62	Int. number of starts CCW - H word		
63	Int. number of starts CCW - L word		
64	Energy W - high word	1 kWh	UM(+)
65	Energy W - low word	1 kWh	UM(+)
66	*Reserved*		
..	*Reserved*		
69	*Reserved*		
70	Active power P - H word	1 W	
71	Active power P - L word	1 W	
72	Apparent power S - H word	1 VA	
73	Apparent power S - L word	1 VA	
74	*Reserved*		
..	*Reserved*		
85	*Reserved*		
86	Calculator 1 Output		
87	*Reserved*		

No.	Designation	Unit	Information
88	*Reserved*		
89	*Reserved*		
90	Calculator 2 Output		
91	Calculator 1 Output		
92	Calculator 2 Output		
93	Analog multiplexer output		
94	*Reserved*		
..	*Reserved*		
103	*Reserved*		
104	Max. current I_max_10mA	10 mA	UM(+) IM
105	Current I_L1_10mA	10 mA	UM(+) IM
106	Current I_L2_10mA	10 mA	UM(+) IM
107	Current I_L3_10mA	10 mA	UM(+) IM
108	Max. current I_max_100mA	100 mA	UM(+) IM
109	Current I_L1_100mA	100 mA	UM(+) IM
110	Current I_L2_100mA	100 mA	UM(+) IM
111	Current I_L3_100mA	100 mA	UM(+) IM
112	*Reserved*		
113	*Reserved*		
114	*Reserved*		
115	*Reserved*		
116	TM2 - max. temperature	1 K	TM2
117	TM2 - temperature 1	1 K	TM2
118	TM2 - temperature 2	1 K	TM2
119	TM2 - temperature 3	1 K	TM2
120	AM2 - input 1		AM2
121	AM2 - input 2		AM2
122	AM2 - input 3		AM2
123	*Reserved*		
..	*Reserved*		
255	*Reserved*		

1) S7 format: 0/4mA=0; 20mA=27648

2) If "line-to-line voltage = 1," "Voltage U_Lx" contain the line-to-line voltages

Table 3-50 Socket assignment table - analog in float format

No.	Designation	Unit	Info
0	Not connected		
1	*Reserved*		
2	*Reserved*		
3	*Reserved*		

No.	Designation	Unit	Info
4	Current I_max_A_F	1 A	UM+
5	Current I_avg_A_F	1 A	UM+
6	Current I_L1_A_F	1 A	UM+
7	Current I_L2_A_F	1 A	UM+
8	Current I_L3_A_F	1 A	UM+
9	Active power P_F	1 W	UM+
10	Apparent power S_F	1 VA	UM+
11	Voltage UL1_F	1 V	UM+
12	Voltage UL2_F	1 V	UM+
13	Voltage UL3_F	1 V	UM+
14	Cos phi_F	1	UM+
15	Frequency_F	1 Hz	UM+
16	*Reserved*		
...	*Reserved*		
49	*Reserved*		
50	Active power Pa_F 1)	1 W	V2.1 UM+
51	Active power Pb_F 1)	1 W	V2.1 UM+
52	*Reserved*		
...	*Reserved*		
255	*Reserved*		

1) When replacing the current/voltage acquisition module (UM+), you must check the sign (+, -).

3.4.2 PROFINET data records

3.4.2.1 PROFINET data records - general

Data records - overview

Table 3-51 Data records - overview

Data record No.	Length [byte]	Description	Read / write
63	200	Analog value recording (Page 217)	Read
67	10	Process image output (Page 217)	Read
69	30	Process image input (Page 218)	Read
72	126	Error buffer (Page 219)	Read
73	168	Event memory (Page 219)	Read
92	46	Device diagnostics (faults, warnings, status information) (Page 220)	Read
94	172	Measured values (Page 228)	Read

Data record No.	Length [byte]	Description	Read / write
95	148	Service / statistical data (Page 230)	Read / write
130	92	Basic device parameters 1 (Page 231)	Read / write
131	124	Basic device parameters 2 (Page 239)	Read / write
132	144	Extended device parameters 1 (Page 242)	Read / write
133	100	Extended device parameters 2 (Page 250)	Read / write
134	180	Extended device parameters 1 (Page 252)	Read / write
135	114	Extended device parameters 2 (Page 258)	Read / write
139	200	Labeling (Page 261)	Read / write
140	200	Labeling 2 (Page 262)	Read / write
165	168	Marking (Page 263)	Read / write
224	24	Password protection (Page 264)	Write
231		I&M0 - device information (Page 265)	Read
232		I&M1 - equipment identifier (Page 265)	Read / write
233		I&M2 - installation (Page 266)	Read / write
234		I&M3 - description (Page 267)	Read / write

Writing / reading data records

Access to data records via the slot and index

- Index: Data record number

Writing / reading data records with STEP7

You can access the data records from the user program.

- Writing data records: By calling SFB 53 "WR_REC"
- Reading data records: By calling SFB 52 "RD_REC"

Further information

You can find additional information about the SFBs

- in System Software for S7-300/400, System and Standard Functions reference manual (https://support.automation.siemens.com/WW/view/en/1214574)
- In the STEP7 online help

Byte arrangements

When data longer than one byte is stored, the bytes are arranged as follows ("big endian"):

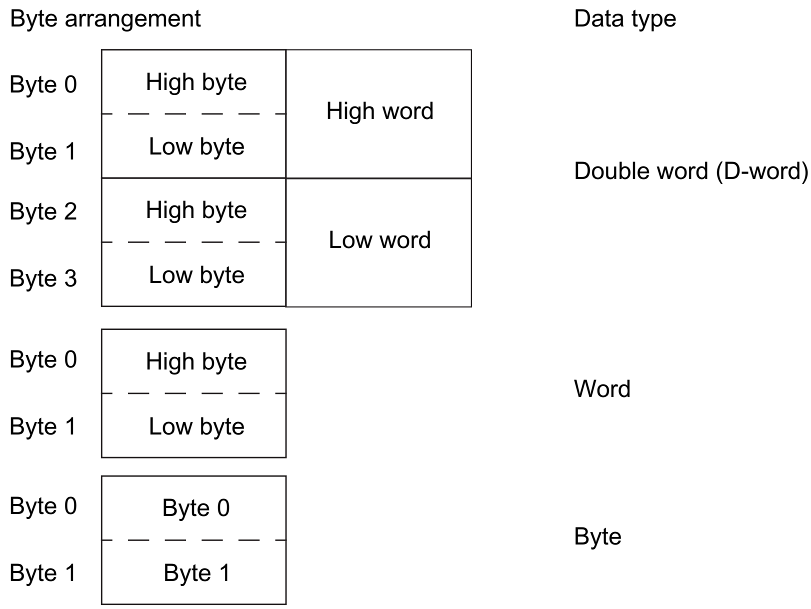


Figure 3-5 Byte arrangement in "big endian" format

Abbreviations

See SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

Specifications

The following specifications apply in the tables:

Table 3-52 Table specifications (example)

Designation	Type	Range	Unit	Information
*Reserved *)*	*Byte[4] *)*			
Max. current I_max	Word	0 ... 65535	1 % / I_s	
*) Items in italics are not relevant (reserved) and must be filled with "0" when written to.  Parameters that can be changed during operation.				

Settings are valid/can only be made when the corresponding system components are used.

The following specifications apply in the tables:

Settings are valid/can only be made when the corresponding system components are used.

"Float" data type

32-bit floating-point number

S: Sign (0 = positive; 1 = negative)

E: Exponent

M: Mantissa

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
S	E: Exponent + 127 (8 bits)								M: Mantissa (23 bits)																						

3.4.2.2 Data record 63 - Analog value recording

You can read out the data of the "Analog value recording" function stored in the device.

Table 3-53 Data record 63 - Analog value recording

Byte.Bit	Designation	Type	Range	Information
0.0	StartPos	Word	0	
2.0	Channel No.	Byte	1	
3.0	Analog value record currently running	Bit	0, 1	
3.1	Trigger event occurred	Bit	0, 1	
3.2	*Reserved*	*Bit[6]*	*0*	
4.0	Measured value (0)	Word	0 - 65535	
6.0	Measured value (1)	Word	0 - 65535	
...				
122.0	Measured value (59)	Word	0 - 65535	
124.0	*Reserved*	*Byte[76]*	*0*	

The unit of the measured value is dependent on the assigned analog value. You will find all available analog values with their units in Chapter Socket assignment table - analog (Page 211).

3.4.2.3 Data record 67 - Process image output

Table 3-54 Data record 67 - Process image output

Byte.Bit	Designation	Default (also see parameters)	Type	Information
0.0	Cyclic receive - Bit 0.0	Control station - PLC/PCS [PN] ON<	Bit	
0.1	Cyclic receive - Bit 0.1	Control station - PLC/PCS [PN] OFF	Bit	
0.2	Cyclic receive - Bit 0.2	Control station - PLC/PCS [PN] ON>	Bit	
0.3	Cyclic receive - Bit 0.3	Test 1	Bit	
0.4	Cyclic receive - Bit 0.4	Motor protection - Emergency start	Bit	
0.5	Cyclic receive - Bit 0.5	Mode selector S1	Bit	
0.6	Cyclic receive - Bit 0.6	Reset 1	Bit	
0.7	Cyclic receive - Bit 0.7	Not assigned	Bit	
1.0	Cyclic receive - Bit 1.0	Not assigned	Bit	
1.1	Cyclic receive - Bit 1.1	Not assigned	Bit	
1.2	Cyclic receive - Bit 1.2	Not assigned	Bit	
1.3	Cyclic receive - Bit 1.3	Not assigned	Bit	

Byte.Bit	Designation	Default (also see parameters)	Type	Informa-tion
1.4	Cyclic receive - Bit 1.4	Not assigned	Bit	
1.5	Cyclic receive - Bit 1.5	Not assigned	Bit	
1.6	Cyclic receive - Bit 1.6	Not assigned	Bit	
1.7	Cyclic receive - Bit 1.7	Not assigned	Bit	
2.0	Cyclic receive - analog value 1	Not assigned	Word	
4.0	Cyclic receive - analog value 2	Not assigned	Word	
6.0	*Reserved*		*Bytes[4]*	

3.4.2.4 Data record 69 - Process image input

Table 3-55 Data record 69 - Process image input

<table>
<tr><th>Byte.Bit</th><th colspan="2">Designation</th><th>Default (also see parameters)</th><th colspan="2">Type</th></tr>
<tr><td>0.0</td><td colspan="2">Cyclic send - Bit 0.0</td><td>Status - ON<</td><td colspan="2">Bit</td></tr>
<tr><td>0.1</td><td colspan="2">Cyclic send - Bit 0.1</td><td>Status - Off</td><td colspan="2">Bit</td></tr>
<tr><td>0.2</td><td colspan="2">Cyclic send - Bit 0.2</td><td>Status - ON></td><td colspan="2">Bit</td></tr>
<tr><td>0.3</td><td colspan="2">Cyclic send - Bit 0.3</td><td>Event - Overload operation</td><td colspan="2">Bit</td></tr>
<tr><td>0.4</td><td colspan="2">Cyclic send - Bit 0.4</td><td>Status - Interlocking time active</td><td colspan="2">Bit</td></tr>
<tr><td>0.5</td><td colspan="2">Cyclic send - Bit 0.5</td><td>Status - Remote mode</td><td colspan="2">Bit</td></tr>
<tr><td>0.6</td><td colspan="2">Cyclic send - Bit 0.6</td><td>Status - General fault</td><td colspan="2">Bit</td></tr>
<tr><td>0.7</td><td colspan="2">Cyclic send - Bit 0.7</td><td>Status - General warning</td><td colspan="2">Bit</td></tr>
<tr><td>1.0</td><td colspan="2">Cyclic send - Bit 1.0</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.1</td><td colspan="2">Cyclic send - Bit 1.1</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.2</td><td colspan="2">Cyclic send - Bit 1.2</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.3</td><td colspan="2">Cyclic send - Bit 1.3</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.4</td><td colspan="2">Cyclic send - Bit 1.4</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.5</td><td colspan="2">Cyclic send - Bit 1.5</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.6</td><td colspan="2">Cyclic send - Bit 1.6</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>1.7</td><td colspan="2">Cyclic send - Bit 1.7</td><td>Not assigned</td><td colspan="2">Bit</td></tr>
<tr><td>2.0</td><td>PLC/PCS analog Input 1</td><td rowspan="2">PLC / PCS analog FI input 1</td><td>Max. current I_max</td><td>Word</td><td rowspan="2">Float</td></tr>
<tr><td>4.0</td><td>PLC/PCS analog input 2</td><td>Not assigned</td><td>Word</td></tr>
<tr><td>6.0</td><td>PLC/PCS analog input 3</td><td rowspan="2">PLC / PCS analog FI input 2</td><td>Not assigned</td><td>Word</td><td rowspan="2">Float</td></tr>
<tr><td>8.0</td><td>PLC/PCS analog input 4</td><td>Not assigned</td><td>Word</td></tr>
<tr><td>10.0</td><td>PLC/PCS analog input 5</td><td rowspan="2">PLC / PCS analog FI input 3</td><td>Not assigned</td><td>Word</td><td rowspan="2">Float</td></tr>
<tr><td>12.0</td><td>PLC/PCS analog input 6</td><td>Not assigned</td><td>Word</td></tr>
<tr><td>14.0</td><td>PLC/PCS analog input 7</td><td rowspan="2">PLC / PCS analog FI input 4</td><td>Not assigned</td><td>Word</td><td rowspan="2">Float</td></tr>
<tr><td>16.0</td><td>PLC/PCS analog input 8</td><td>Not assigned</td><td>Word</td></tr>
<tr><td>18.0</td><td>PLC/PCS analog input 9</td><td></td><td>Unassigned</td><td colspan="2">Word</td></tr>
<tr><td>20.0</td><td>Reserved</td><td></td><td></td><td>Bytes[10]</td><td></td></tr>
</table>

3.4.2.5 Data record 72 - Error buffer

Table 3-56 Data record 72 - Error buffer

Byte.Bit	Entry	Designation	Type	Information
0.0	1	Time stamp	D-word	
4.0		Type	Byte	
5.0		Error number	Byte	
6.0	2	Time stamp	D-word	
10.0		Type	Byte	
11.0		Error number	Byte	
...				
120.0	21	Time stamp	D-word	
124.0		Type	Byte	
125.0		Error number	Byte	

Time stamp

The operating hours of the device are used as a time stamp (resolution: 1 s).

Type/error number

You will find the mean in Chapter Data record 92 - Device diagnostics (Page 220) in column "Error number" of table "Data record 92 - Device diagnostics."

If the type has the value 255, the entry displays "Power - On". In this case, the error number contains the number of power ON operations, reduced by 1 (0 = 1x power ON, ...).

3.4.2.6 Data record 73 - Event memory

Table 3-57 Data record 73 - Event memory

Byte.Bit	Entry	Designation	Type	Information
0.0	1	Time stamp	D-word	
4.0		Entry - Type	Byte	
5.0		Entry - Info	Byte[3]	
8.0	2	Time stamp	D-word	
12.0		Entry - Type	Byte	
13.0		Entry - Info	Byte[3]	
16.0	3	Time stamp	D-word	
20.0		Entry - Type	Byte	
21.0		Entry - Info	Byte[3]	
...				
160.0	21	Time stamp	D-word	
164.0		Entry - Type	Byte	
165.0		Entry - Info	Byte[3]	

3.4.2.7 Data record 92 - Device diagnostics

Table 3-58 Data record 92 - Diagnostics

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
0.0		*Reserved*				
1.0	Status information - General	Status - General fault				
1.1		Status - General warning				
1.2		Status - Device				
1.3		Status - Bus				
1.4		Status - PLC/PCS				
1.5		Status - Motor current flowing	IM UM(+)			
1.6		*Reserved*				
1.7		*Reserved*				
2.0	Status information - Receive	Status - ON<<	Dependent on the control function			
2.1		Status - ON<				
2.2		Status - Off				
2.3		Status - ON>				
2.4		Status - ON>>				
2.5		Status - Start active				
2.6		Status - Interlocking time active	All reversing starters and positioners			
2.7		Status - Change-over pause active	Star-delta starter, Dahlander starter, pole-changing starter			
3.0		Status - Runs in open direction	Dependent on the control function			
3.1		Status - Runs in close direction				
3.2		Status - FC				
3.3		Status - FO				
3.4		Status - TC				
3.5		Status - TO				
3.6		Status - Cold starting (TPF)		1	0x1009	
3.7		Status - OPO				
4.0		Status - Auto mode				
4.1	Status information - Protection	Status - Emergency start executed	IM UM(+)	1	0x1031	
4.2		Status - Cooling down period active	IM UM(+)	1	0x1032	
4.3		Status - Pause time active	IM UM(+)			

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
4.4	Status information - Miscellaneous	Status - Device check active				
4.5		Status - Phase sequence 1-2-3	UM(+)			
4.6		Status - Phase sequence 3-2-1	UM(+)			
4.7		Status - DM-F enabling circuit	DM-F			
5.0	Events - Protection	Event - Overload operation	IM UM(+)			
5.1		Event - Unbalance	IM UM(+)			
5.2		Event - Overload	IM UM(+)			
5.3		Event - Overload + loss of phase	IM UM(+)			
5.4		Event - Internal ground fault	IM UM(+)			
5.5		Event - External ground fault	EM			
5.6		Event - Warning ext. ground fault	EM			
5.7		Event - Thermistor overload	Th			
6.0		Event - Thermistor short-circuit	Th			
6.1		Event - Thermistor open circuit	Th			
6.2		Event - TM1 warning T>	TM1			
6.3		Event - TM1 trip T>	TM1			
6.4		Event - TM1 sensor fault	TM1			
6.5		Event - TM1 out of range	TM			
6.6		Event - EM+ open circuit	EM+ 1)			
6.7		Event - EM+ short-circuit	EM+ 1)			
7.0	Events - Level monitoring	Event - Warning I>	IM UM(+)			
7.1		Event - Warning I<	IM UM(+)			
7.2		Event - Warning P>	UM(+)			
7.3		Event - Warning P<	UM(+)			
7.4		Event - Warning cos phi<	UM(+)			
7.5		Event - Warning U<	UM(+)			
7.6		Event - Warning 0/4-20 mA>	AM1			
7.7		Event - Warning 0/4-20 mA<	AM1			
8.0		Event - Trip I>	IM UM(+)			
8.1		Event - Trip I<	IM UM(+)			
8.2		Event - Trip P>	UM(+)			
8.3		Event - Trip P<	UM(+)			
8.4		Event - Trip cos phi<	UM(+)			
8.5		Event - Trip U<	UM(+)			
8.6		Event - Trip 0/4-20 mA>	AM1			
8.7		Event - Trip 0/4-20 mA<	AM1			

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
9.0		Event - Stalled rotor	IM UM(+)			
9.1	Events - Protection	Warning - Internal ground fault	UM+			
9.2		*Reserved*				
9.3	Events - Level monitoring	Event - No start possible				
9.4		Event - No. of starts >				
9.5		Event - Just one start possible				
9.6		Event - Motor operating hours >				
9.7		Event - Motor stop time >				
10.0		Event - Limit 1				
10.1		Event - Limit 2				
10.2		Event - Limit 3				
10.3		Event - Limit 4				
10.4	Events - Miscellaneous	Event - ext. fault 1				
10.5		Event - ext. fault 2				
10.6		Event - ext. fault 3				
10.7		Event - ext. fault 4				
11.0		Event - ext. fault 5				
11.1		Event - ext. fault 6				
11.2	Events - FW update	Event - BU FW update active				
11.3		Event - Module FW update active				
11.4	Events - Miscellaneous	Event - AM1 open circuit	AM1			
11.5		Event - DM-F safety-related tripping	DM-F			
11.6		Event - DM-F - Test requirement	DM-F			
11.7		Event - NTP clock set				
12.1	Events - Miscellaneous	Event - NTP clock synchronized				
12.2		Event - DM-FL safety ok	DM-FL			
12.3		Event - DM-FP PROFIsafe active	DM-FP			
12.4	Events - System interfaces	Event - Configured operator panel missing				
12.5		Event - Module not supported				
12.6		Event - No module voltage				
12.7		*Reserved*				
13.0	Events - Memory module / initialization module	Event - Memory module read in				

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
13.1		Event - Memory module programmed				
13.2		Event - Memory module cleared				
13.3		*Reserved*				
13.4		Event - Initialization module read in				
13.5		Event - Initialization module programmed				
13.6		Event - Initialization module cleared				
13.7	*Reserved*					
14.0	Events - parameterization	Event - Start-up parameter block active			***)	
14.1		Event - Parameter changes not allowed in the current operating state		1	0x0010	
14.2		Event - Device does not support the required functions		1	0x0010	
14.3		Event - Wrong parameter		1	0x0010	
14.4		Event - Wrong password		1	0x0010	
14.5		Event - Password protection active				
14.6		Event - Factory settings				
14.7		Event - Parameterization active				
15.0		Event - PRM error number (bytes) ****)				
16.0		Event - DM-FL configuration mode				
16.1		Event - DM-FL configuration deviation				
16.2		Event - DM-FL waiting for start-up test				
16.3		Event - DM-FP F-Prm error *)		3	0x0010	
16.4		Event - Initialization module write-protected, parameter changes not allowed		1	0x0010	
16.5	Events - Memory module - initialization module (InM)	Event - Memory module write-protected				
16.6		Event - Initialization module write-protected				
16.7		Event - Initialization module identification data write-protected				

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
17.0	Warnings - Protection	Warning - Overload operation	IM UM(+)	2	0x1020	
17.1		Warning - Unbalance	IM UM(+)	2	0x1021	
17.2		Warning - Overload	IM UM(+)	2	0x1022	
17.3		Warning - Overload + phase failure	IM UM(+)	2	0x1023	
17.4		Warning - Internal ground fault	IM UM(+)	2	0x1027	
17.5		Warning - External ground fault	EM	2	0x1028	
17.6		*Reserved*				
17.7		Warning - Thermistor overload	Th	2	0x1024	
18.0		Warning - Thermistor short circuit	Th	2	0x1025	
18.1		Warning - Thermistor open circuit	Th	2	0x1026	
18.2		Warning - TM1 warning T >	TM1	2	0x102B	
18.3		*Reserved*				
18.4		Warning - TM1 sensor fault	TM1	2	0x102C	
18.5		Warning - TM1 out of range	TM1	2	0x102D	
18.6		Warning - EM+ open circuit	EM+ [1)]	2	0x1029	
18.7		Warning - EM+ short-circuit	EM+ [1)]	2	0x102A	
19.0	Warnings - Level monitoring	Warning - Warning I>	IM UM(+)	2	0x1040	
19.1		Warning - Warning I<	IM UM(+)	2	0x1041	
19.2		Warning - Warning P>	UM(+)	2	0x1042	
19.3		Warning - Warning P<	UM(+)	2	0x1043	
19.4		Warning - Warning cos phi<	UM(+)	2	0x1045	
19.5		Warning - Warning U<	UM(+)	2	0x1047	
19.6		Warning - Warning 0/4-20 mA>	AM1	2	0x1048	
19.7		Warning - Warning 0/4-20 mA<	AM1	2	0x1049	
20.0		Warning - Stalled rotor	IM UM(+)	2	0x104C	
20.1		*Reserved bit [2]*				
20.3		Warning - No start possible		2	0x1056	
20.4		Warning - Number of starts >		2	0x1057	
20.5		Warning - Just one start possible		2	0x1058	
20.6		Warning - Motor operating hours>		2	0x1059	
20.7		Warning - Motor stop time >		2	0x105A	
21.0	Warnings - Miscellaneous	Warning - ext. fault 1		2	0x1070	
21.1		Warning - ext. fault 2		2	0x1071	
21.2		Warning - ext. fault 3		2	0x1072	

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
21.3		Warning - ext. fault 4		2	0x1073	
21.4		Warning - ext. fault 5		2	0x1074	
21.5		Warning - ext. fault 6		2	0x1075	
21.6		*Reserved*				
21.7		*Reserved*				
22.0		Warning - AM1 open circuit	AM1	2	0x105B	
22.1		Warning - DM-F safety-related tripping	DM-F	2	0x0019	
22.2		Warning - DM-F test requirement	DM-F	2	0x105E	
22.3		*Reserved bit[3]*				
22.6		Warning - DM-F feedback circuit	DM-F	2	0x105F	
22.7		Warning - DM-FL simultaneity	DM-FL	2	0x1060	
23.0	Faults - General	Fault - HW fault basic unit		3	0x0009	0
23.1		Fault - Module fault (e.g. module IM, UM, DM)		3	0x0009	1
23.2		Fault - Temporary components (e.g. memory module)		3	0x0009	2
23.3		Fault - Configuration fault		3	0x0010	3
23.4		Fault - Parameterization		3	0x0010	4
23.5		Fault - Bus				5
23.6		Fault - PLC/PCS				6
23.7		*Reserved*				
24.0	Faults - Control	Fault - Execution ON command		3	0x1000	8
24.1		Fault - Execution STOP command		3	0x1001	9
24.2		Fault - FB ON		3	0x1002	10
24.3		Fault - FB OFF		3	0x1003	11
24.4		Fault - Stalled positioner	CF = positioner	3	0x1004	12
24.5		Fault - Double 0	CF = positioner	3	0x1005	13
24.6		Fault - Double 1	CF = positioner	3	0x1006	14
24.7		Fault - End position	CF = positioner	3	0x1007	15
25.0		Fault - Antivalence	CF = positioner	3	0x1008	16
25.1		Fault - Cold starting (TPF) fault		3	0x100A	17
25.2		Fault - UVO fault		3	0x100B	18
25.3		Fault - OPO fault		3	0x100C	19
25.4		*Reserved bit[4]*				
26.0		*Reserved*				
26.1	Fault - Protection	Fault - Unbalance	IM UM(+)	3	0x1021	25
26.2		Fault - Overload	IM UM(+)	3	0x1022	26
26.3		Fault - Overload + phase failure	IM UM(+)	3	0x1023	27

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
26.4		Fault - Int. ground fault	IM UM(+)	3	0x1027	28
26.5		Fault - Ext. ground fault	EM	3	0x1028	29
26.6		*Reserved*				
26.7		Fault - Thermistor overload	Th	3	0x1024	31
27.0		Fault - Thermistor short circuit	Th	3	0x1025	32
27.1		Fault - Thermistor open circuit	Th	3	0x1026	33
27.2		*Reserved*				
27.3		Fault - TM1 trip T>	TM1	3	0x102B	35
27.4		Fault - TM1 sensor fault	TM1	3	0x102C	36
27.5		Fault - TM1 out of range	TM1	3	0x102D	37
27.6		Fault - EM+ open circuit	EM+	3	0x1029	38
27.7		Fault - EM+ short-circuit	EM+	3	0x102A	39
28.0	Faults - Level monitoring	Fault - Trip I>	IM UM(+)	3	0x1040	40
28.1		Fault - Trip I<	IM UM(+)	3	0x1041	41
28.2		Fault - Trip P>	UM(+)	3	0x1042	42
28.3		Fault - Trip P<	UM(+)	3	0x1043	43
28.4		Fault - Trip cos phi<	UM(+)	3	0x1045	44
28.5		Fault - Trip U<	UM(+)	3	0x1047	45
28.6		Fault - Trip 0/4-20 mA>	AM1	3	0x1048	46
28.7		Fault - Trip 0/4-20 mA<	AM1	3	0x1049	47
29.0		Fault - Stalled rotor	IM UM(+)	3	0x104C	48
29.1		*Reserved bit[3]*				
29.4		Fault - Number of starts >		3	0x1057	52
29.5		*Reserved bit[3]*				
30.0	Faults - Miscellaneous	Fault - External fault 1		3	0x1070	56
30.1		Fault - External fault 2		3	0x1071	57
30.2		Fault - External fault 3		3	0x1072	58
30.3		Fault - External fault 4		3	0x1073	59
30.4		Fault - External fault 5		3	0x1074	60
30.5		Fault - External fault 6		3	0x1075	61
30.6		Fault - Dry running pump		3	0x104D	62
30.7		Fault - Dry-running protection - Error		3	0x104E	63
31.0		Fault - AM1 open circuit	AM1	3	0x105B	64
31.1		Fault - Test trip		3	0x1055	65
31.2		Fault - DM-F safety-related tripping	DM-F	3	0x0019	66
31.3		Fault - DM-F wiring	DM-FL	3	0x1061	67
31.4		Fault - DM-FL cross circuit	DM-FL	3	0x1062	68

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
31.5		*Reserved bit[3]*				
32.0	Faults - Protection extended	Fault - TM2 trip T >	TM2	3	0x102E	
32.1		Fault - TM2 sensor fault	TM2	3	0x102F	
32.2		Fault - TM2 out of range	TM2	3	0x1030	
32.3		*Reserved bit[5]*				
33.0	Faults - Level monitoring extended	Fault - Trip 0/4-20mA >	AM2	3	0x104A	
33.1		Fault - Trip 0/4-20mA <	AM2	3	0x104B	
33.2		*Reserved bit[6]*				
34.0	Faults - Miscellaneous extended	Fault - AM2 open circuit	AM2	3	0x105C	
34.1		*Reserved bit[7]*				
35.0		*Reserved bit[8]*				
36.0	Warnings - Protection extended	Warning - TM2 warning T >	TM2	2	0x102E	
36.1		*Reserved*				
36.2		Warning - TM2 sensor fault	TM2	2	0x102F	
36.3		Warning - TM2 out of range	TM2	2	0x1030	
36.4		*Reserved bit[4]*				
37.0	Warnings - Level monitoring extended	Warning - Warning 0/4-20mA >	AM2	2	0x104A	
37.1		Warning - Warning 0/4-20mA <	AM2	2	0x104B	
37.2		*Reserved bit[6]*				
38.0	Warnings - Miscellaneous extended	Warning - AM2 open circuit	AM2	2	0x105C	
38.1		*Reserved bit[7]*				
39.0		*Reserved bit[8]*				
40.0	Events - Protection extended	Event - TM2 warning T>	TM2			
40.1		Event - TM2 trip T>	TM2			
40.2		Event - TM2 sensor fault	TM2			
40.3		Event – TM2 out of range	TM2			
40.4		*Reserved bit[4]*				
41.0	Events - Level monitoring	Event - Warning 0/4-20mA >	AM2			
41.1		Event - Warning 0/4-20mA <	AM2			
41.2		Event - Trip 0/4-20mA > 2	AM2			
41.3		Event - Trip 0/4-20mA <	AM2			
41.4		Event - Limit 5	Limit monitor 5			

Byte.Bit	Designation		Information	PNIO diagnostic status **)	PNIO error number (channel error type)	Error no.
41.5		Event - Limit 6	Limit monitor 6			
41.6		*Reserved bit[2]*				
42.0		*Reserved bit[8]*				
43.0	Events - Miscellaneous extended	Event - AM2 open circuit	AM2			
43.1		*Reserved bit[7]*				
44.0		*Reserved bit[8]*				
45.0		*Reserved bit[8]*				

*) The "GEN. FAULT" LED on the basic unit is not activated; instead, the "SF" LED lights up on the DM-FP (because PROFIsafe is not active)

**) PNIO diagnostic status for the raised alarm:

- 1 = Maintenance required
- 2 = Maintenance demanded
- 3 = Failure

***) No PNIO diagnostics

****) Events - PRM error number (bytes):

If parameterization is not possible, the number of the parameter group (PRM group) that caused the error is communicated here. You will find the parameter group in the parameter data records 130 to 133.

1) 3UF7510-1AA00-0 ground-fault module

3.4.2.8 Data record 94 - measured values

Table 3-59 Data record 94 - measured values

Byte.Bit	Designation	Type	Range	Unit	Information
0.0	*Reserved*	*Byte[4]*			
4.0	Thermal motor model	Byte	0 - 255	See [2)]	IM UM(+)
5.0	Phase unbalance	Byte	0 - 100	1%	IM UM(+)
6.0	cos phi	Byte	0 - 100	1%	UM(+)
7.0	*Reserved*	*Byte[5]*			
12.0	Max. current I_max	Word	0 - 65535	1% / I_s	IM UM(+)
14.0	Current I_L1	Word	0 - 65535	1% / I_s	IM UM(+)
16.0	Current I_L2	Word	0 - 65535	1% / I_s	IM UM(+)
18.0	Current I_L3	Word	0 - 65535	1% / I_s	IM UM(+)
20.0	Last trip current	Word	0 - 65535	1% / I_s	IM UM(+)
22.0	Time to trip	Word	0 - 65535	100 ms	IM UM(+)
24.0	Cooling down period	Word	0 - 65535	100 ms	IM UM(+)

Byte.Bit	Designation	Type	Range	Unit	Information
26.0	Voltage U_L1	Word	0 - 65535	1 V	UM(+)
28.0	Voltage U_L2	Word	0 - 65535	1 V	UM(+)
30.0	Voltage U_L3	Word	0 - 65535	1 V	UM(+)
32.0	AM1 - output	Word	0 - 32767	See [1)]	AM1
34.0	AM1 - input	Word	0 - 32767		AM1
36.0	AM1 - input 2	Word	0 - 32767		AM1
38.0	*Reserved*				
40.0	TM1 - max. temperature	Word	0 - 65535	1 K see [3)]	TM1
42.0	TM1 - temperature 1	Word	0 - 65535		TM1
44.0	TM1 - temperature 2	Word	0 - 65535		TM1
46.0	TM1 - temperature 3	Word	0 - 65535		TM1
48.0	EM+ [4)] - ground-fault current	Word	0 - 65535		EM(+)
50.0	EM+ [4] - last trip current	Word	0 - 65535		EM(+)
52.0	Active power P	D-word	0 - 0xFFFFFFFF	1 W	UM(+)
56.0	Apparent power S	D-word	0 - 0xFFFFFFFF	1 VA	UM(+)
60.0	*Reserved*	*Byte[14]*			
64.0	*Reserved*	*Byte[28]*			
92.0	*Reserved*	*Byte[24]*			
116.0	AM2 - output	Word	0 - 32767	See [1)]	AM2
118.0	AM2 - input 1	Word	0 - 32767		AM2
120.0	AM2 - input 2	*Word*	0 - 32767		AM2
122.0	*Reserved*				
124.0	TM2 - max. temperature	Word	0 - 65535	1 K see [3)]	TM2
126.0	TM2 - temperature 1	Word	0 - 65535		TM2
128.0	TM2 - temperature 2	Word	0 - 65535		TM2
130.0	TM2 - temperature 3	Word	0 - 65535		TM2
132.0	Frequency	Word	0 - 65535	0.01 Hz	UM+
134.0	*Reserved*				
136.0	res. UM+ - ground-fault current	Word			UM+
138.0	Internal ground fault+ - res. last trip current				UM+
140.0	*Reserved*	*Byte[4]*			
144.0	Current I_max_F (float)	Float		1 A	UM+
148.0	Current I_avg_F	Float		1 A	UM+
152.0	Current I_L1_F	Float		1 A	UM+
156.0	Current I_L2_F	Float		1 A	UM+
160.0	Current I_L3_F	Float		1 A	UM+
164.0	Active power P_F	Float		1 W	UM+
168.0	Apparent power S_F	Float		1 VA	UM+
172.0	Voltage U1_F	Float		1 V	UM+
176.0	Voltage U2_F	Float		1 V	UM+
180.0	Voltage U3_F	Float		1 V	UM+
184.0	Cos phi_F	Float			UM+

Byte.Bit	Designation	Type	Range	Unit	Information
188.0	Frequency_F	Float		1 Hz	UM+
192.0	*Reserved*	*Byte[8]*			

1) S7 format: 0/4 mA = 0; 20 mA = 27648

2) Representation of the "Thermal motor model": Value always related to symmetrical trip level, representation in steps of 2% in bits 6 ...0 (range 0 to 254%), bit 7 shows unbalance (fixed level 50%)

3) Representation in Kelvin

4) 3UF7510-1AA00-0 ground-fault module

3.4.2.9 Data record 95 - Service data/statistical data

Writing the service data/statistical data

Writing is only possible if password protection is not active.

Additional abbreviations:

- r / w = value can be written / changed
- r = value can only be read

Table 3-60 Data record 95 - service data/statistical data

Byte.Bit	Designation	Type	Range	Unit		Information
0.0	*Coordination*	*Byte[4]*				
4.0	Permissible starts - Actual value	Byte	0 - 255		r 1)	
5.0	DM-F - Time until test required	Byte	0 - 255	1 week	r	
6.0	*Reserved*	*Byte[2]*				
8.0	Number of parameterizations	Word	0 - 65535		r	
10.0	Number of overload trips	Word	0 - 65535		r / w	
12.0	Number of internal overload trips	Word	0 - 65535		r	
14.0	Motor stop time	Word	0 - 65535	1 h	r / w	
16.0	Timer 1 - Actual value	Word	0 - 65535	100 ms	r	
18.0	Timer 2 - Actual value	Word	0 - 65535	100 ms	r	
20.0	Timer 3 - Actual value	Word	0 - 65535	100 ms	r	
22.0	Timer 4 - Actual value	Word	0 - 65535	100 ms	r	
24.0	Counter 1 - Actual value	Word	0 - 65535		r	
26.0	Counter 2 - Actual value	Word	0 - 65535		r	
28.0	Counter 3 - Actual value	Word	0 - 65535		r	
30.0	Counter 4 - Actual value	Word	0 - 65535		r	
32.0	Calculator 1 Output	Word	0 - 65535		r	
34.0	Calculator 2 Output	Word	0 - 65535		r	
36.0	*Reserved*	*Byte[4]*	*0*			
40.0	Motor operating hours	D-word	0 - 0xFFFFFFFF	1 s	r / w	

Byte.Bit	Designation	Type	Range	Unit		Information
44.0	Int. motor operating hours	D-word	0 - 0xFFFFFFFF	1 s	r	
48.0	Device operating hours	D-word	0 - 0xFFFFFFFF	1 s	r	
52.0	Number of starts	D-word	0 - 0xFFFFFFFF		r / w	
56.0	Internal number of starts CW	D-word	0 - 0xFFFFFFFF		r	
60.0	Internal number of starts CCW	D-word	0 - 0xFFFFFFFF		r	
64.0	Consumed energy	D-word	0 - 0xFFFFFFFF	1 kWh	r / w	UM(+)
68.0	Consumed energy	Float		1 kWh	r	UM+
72.0	*Reserved*	*D-word*				
76.0	*Reserved*	*D-word[6]*				
100.0	*Reserved*	*Byte[16]*				
116.0	Timer 5 - Actual value	Word	0 - 65535	100 ms	r	
118.0	Timer 6 - Actual value	Word	0 - 65535	100 ms	r	
120.0	Counter 5 - Actual value	Word	0 - 65535		r	
122.0	Counter 6 - Actual value	*Word*	0 - 65535		r	
124.0	Calculator 1 Output	Word	0 - 65535		r	
126.0	Calculator 2 Output	Word	0 - 65535		r	
128.0	Analog multiplexer output	Word	0 - 65535		r	
130.0	*Reserved*	*Word*				
132.0	*Reserved*	*Word*				
134.0	*Reserved*	*Word*				
136.0	*Reserved*	*Word[6]*				

1) Can only be written when the start monitoring function is active!

3.4.2.10 Data record 130 - Basic device parameters 1

Table 3-61 Data record 130 - Basic device parameters 1

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
0.0	Coordination (byte[4]	Byte					
4.0	**Device configuration (12)**						
4.0	Device class	Byte	5, 7, 9, 13			5 = BU1 7 = BU0 9 = BU2 13 = BU3	
5.0	Thermistor (Th)	Bit	0, 1			1 = active; thermistor in the BU	
5.1	*Reserved*	*Bit[5]*					
5.6	*Reserved*						
5.7	Initialization module (InM)	Bit	0, 1				
6.0	Operator panel (OP)	Bit	0, 1				

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
6.1	Analog module (AM1)	Bit	0, 1				
6.2	Temperature module (TM1)	Bit	0, 1				
6.3	Ground-fault module (EM)	Bit	0, 1				
6.4	Digital module 1 (DM1)	Bit[2]	0 - 3			0 = no digital module 1 = monostable 2 = bistable 3 = DM-F (see Byte.Bit 7.4)	
6.6	Digital module 2 (DM2)	Bit[2]	0 - 2				
7.0	Operator panel with display (OPD)	Bit	0, 1				
7.1	Ground-fault module for 3UL23 transformer (EM+)	Bit	0, 1				
7.2	Analog module 2 (AM2)	Bit	0, 1				
7.3	Temperature module 2 (TM2)	Bit	0, 1				
7.4	DM1 - Special type	Bit[2]	0, 1			0 = DM-FL 1 = DM-FP	
7.6	*Reserved*						
8.0	Current measuring (IM)	Bit[7]	0 .. 5			IM / UM: 0 = no current measurement 1 = 0.3 A - 3 A 2 = 2.4 A - 25 A 3 = 10 A - 100 A 4 = 20 A - 200 A 5 = 63 A - 630 A UM+: 9 = 0.3 A - 4 A 10 = 3 A - 40 A 11 = 10 A - 115 A 12 = 20 - 200 A 13 = 63 - 630 A	
8.7	Voltage measuring module (UM)	Bit	0, 1				
9.0	*Reserved*						

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
10.0	Control function (CF)	Byte	0x00 0x10 0x11 0x12 0x20 0x21 0x30 0x31 0x40 0x41 0x50 0x60 0x61 0x62 0x63 0x64 0x70 0x71			0x00 = Overload 0x10 = Direct starter 0x11 = Reversing starter 0x12 = 3VA molded case circuit breaker (MCCB) 0x20 = Star-delta starter 0x21 = Star-delta reversing starter 0x30 = Dahlander starter 0x31 = Dahlander reversing starter 0x40 = Pole-changing starter 0x41 = Pole-changing reversing starter 0x50 = Solenoid valve 0x60 = Positioner 1 0x61 = Positioner 2 0x62 = Positioner 3 0x63 = Positioner 4 0x64 = Positioner 5 0x70 = Soft starter 0x71 = Soft starter with reversing contactor	
11.0	*Reserved*	*Bit[8]*					
12.0	**Bit parameters (16)**						
12.0	No configuration fault due to OP	Bit	0, 1		0		
12.1	Startup parameter block active	Bit	0, 1		1		
12.2	Test/Reset keys disabled	Bit	0, 1		0		
12.3	Bus and PLC/PCS - Reset	Bit	0, 1		0	0 = Manual 1 = Auto	
12.4	*Reserved*	*Bit*			*0*		
12.5	*Reserved*	*Bit*			*0*		
12.6	*Reserved*	*Bit*			*0*		
12.7	*Reserved*	*Bit*			*0*		
13.0	Diagnostics for process events	Bit	0, 1		0		
13.1	Diagnostics for process warnings	Bit	0, 1		1		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
13.2	Diagnostics for process faults	Bit	0, 1		1		
13.3	Diagnostics for device faults	Bit	0, 1		1		
13.4	*Reserved*	*Bit*			*0*		
13.5	*Reserved*	*Bit*			*0*		
13.6	Bus monitoring	Bit	0, 1		1		
13.7	PLC/PCS monitoring	Bit	0, 1		1		
14.0	Overload protection - Load type	Bit	0, 1		0	0 = 3-phase 1 = 1-phase	IM UM(+)
14.1	Overload protection - Reset	Bit	0, 1		0	0 = Manual 1 = Auto	IM UM(+)
14.2	*Reserved*	*Bit*			*0*		
14.3	Save change-over command	Bit	0, 1		0		
14.4	Non-maintained command mode	Bit	0, 1		0		
14.5	Cold start level (TPF)	Bit	0, 1		0	0 = NO contact 1 = NC contact	
14.6	Type of consumer load	Bit	0, 1		0	0 = Motor 1 = Resistive load	
14.7	*Reserved*	*Bit*			*0*		
15.0	External fault 1 - Type	Bit	0, 1		0	0 = NO contact 1 = NC contact	
15.1	External fault 2 - Type	Bit	0, 1		0		
15.2	External fault 3 - Type	Bit	0, 1		0		
15.3	External fault 4 - Type	Bit	0, 1		0		
15.4	External fault 1 - Activity	Bit	0, 1		0	0 = Always 1 = Only motor ON	
15.5	External fault 2 - Activity	Bit	0, 1		0		
15.6	External fault 3 - Activity	Bit	0, 1		0		
15.7	External fault 4 - Activity	Bit	0, 1		0		
16.0	**Bit[2] - Parameters (20)**						

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
16.0	Thermistor - Overload response	Bit[2]	1, 2, 3		3	0 = Disabled 1 = signaling 2 = warn 3 = tripping	Th
16.2	Thermistor - Response to sensor fault	Bit[2]	0, 1, 2, 3		2		Th
16.4	Internal ground fault - Response	Bit[2]	0, 1, 2, 3		0		
16.6	Motor protection - Overload response	Bit[2]	0, 1, 2, 3		3		IM
17.0	Motor protection - Overload response	Bit[2]	0, 1, 2		2		IM
17.2	Unbalance protection - Response	Bit[2]	0, 1, 2, 3		2		IM
17.4	Trip response I>	Bit[2]	0, 1, 3		0		
17.6	Warning response I>	Bit[2]	0, 1, 2		0		
18.0	Trip response I<	Bit[2]	0, 1, 3		0		
18.2	Warning response I<	Bit[2]	0, 1, 2		0		
18.4	Stalled rotor - Response	Bit[2]	0, 1, 2, 3		0		
18.6	EM+ 1)- Response to sensor fault	Bit[2]	0, 1, 2, 3		0		
19.0	Monitoring the number of starts - Response to overshoot	Bit[2]	0, 1, 2, 3		0		
19.2	Monitoring the number of starts - Response to prewarning	Bit[2]	0, 1, 2		0		
19.4	Motor operating hours monitoring - Response	Bit[2]	0, 1, 2		0		
19.6	Motor stop time monitoring - Response	Bit[2]	0, 1, 2		0		
20.0	External fault 1 - Response	Bit[2]	1, 2, 3		1		
20.2	External fault 2 - Response	Bit[2]	1, 2, 3		1		
20.4	External fault 3 – Response	Bit[2]	1, 2, 3		1		
20.6	External fault 4 - Response	Bit[2]	1, 2, 3		1		
21.0	*Reserved*	*Bit[2]*			*0*		
21.2	Basic unit - Debounce time inputs	Bit[2]	0 - 3	10 ms	1	Offset 6 ms	

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
21.4	Timer 1 - Type	Bit[2]	0, 1, 2, 3		0	0 = With closing delay, 1 = Closing delay with memory 2 = With opening delay 3 = With fleeting closing	
21.6	Timer 2 - Type	Bit[2]	0, 1, 2, 3		0		
22.0	Signal conditioning 1 - Type	Bit[2]	0, 1, 2, 3		0	0 = Non-inverting 1 = Inverting 2 = Edge rising with memory 3 = Edge falling with memory	
22.2	Signal conditioning 2 - Type	Bit[2]	0, 1, 2, 3		0		
22.4	Non-volatile element 1 - Type	Bit[2]	0, 1, 2, 3		0		
22.6	Non-volatile element 2 - Type	Bit[2]	0, 1, 2, 3		0		
23.0	EM+ 2) - monitoring	Bit[2]	0, 1, 2, 3		0	0 = on 1 = on+ 2 = run 3 = run+	
23.2	EM+ 2) - monitoring warning	Bit[2]	0, 1, 2, 3		0		
23.4	EM - response to an external ground fault	Bit[2]	1, 3		1	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	
23.6	EM - response to warning of an external ground fault	Bit[2]	0, 1, 2		0		
24.0	**Bit[4] - Parameters (24)**						
24.0	External fault 1 - Reset also by	Bit[4]	0 - 1111B		0101B	Bit[0] = Panel reset Bit[1] = Auto-reset Bit[2] = Remote reset Bit[4] = OFF command reset	
24.4	External fault 2 - Reset also by	Bit[4]	0 - 1111B		0101B		
25.0	External fault 3 - Reset also by	Bit[4]	0 - 1111B		0101B		
25.4	External fault 4 - Reset also by	Bit[4]	0 - 1111B		0101B		
26.0	Limit monitor - Hysteresis for limit monitoring	Bit[4]	0 - 15	1%	5		
26.4	EM+ 2) - hysteresis	Bit[4]	0 - 15	1%	5		
27.0	Parameter target version - Part a	Bit[4]			0		
27.4	Parameter target version - Part b	Bit[4]			0		
28.0	**Byte parameters (28)**						
28.0	Internal ground fault - Delay	Byte	0 .. 255	100 ms	5		IM UM(+)
29.0	Overload protection - Class	Byte	5, 7, 10 .. 35, 40		10		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
30.0	Motor protection - Delay with overload operation	Byte	0 - 255	100 ms	5		IM UM(+)
31.0	Motor protection - unbalance protection level	Byte	0 - 100	1%	40		IM UM(+)
32.0	Motor protection - Unbalance protection - Delay in the event of unbalance	Byte	0 - 255	100 ms	5		IM UM(+)
33.0	Interlocking time	Byte	0 - 255	1 s	0		
34.0	FB time	Byte	0 - 255	100 ms	5	0 = disabled	
35.0	Trip level I>	Byte	0 - 255	4% / I_s	0		IM UM(+)
36.0	Warning level I>	Byte	0 - 255	4% / Is	0		IM UM(+)
37.0	Trip level I<	Byte	0 - 255	4% / Is	0		IM UM(+)
38.0	Warning level I<	Byte	0 - 255	4% / Is	0		IM UM(+)
39.0	Stalled rotor level	Byte	0 - 255	4% / Is	0		IM UM(+)
40.0	Trip delay I>	Byte	0 - 255	100 ms	5		IM UM(+)
41.0	Warning delay I>	Byte	0 - 255	100 ms	5		IM UM(+)
42.0	Trip delay I<	Byte	0 - 255	100 ms	5		IM UM(+)
43.0	Warning delay I<	Byte	0 - 255	100 ms	5		IM UM(+)
44.0	Blocking delay	Byte	0 - 255	100 ms	5		IM UM(+)
45.0	Monitoring the number of starts - Permissible starts	Byte	1 - 255		1		
46.0	*Reserved*	*Byte*			*0*		
47.0	EM+ [2)] - delay	Byte	0 - 255	100 ms	0		
48.0	Truth table 1 type 3I/1O	Byte	0 - 11111111B		0		
49.0	Truth table 2 type 3I/1O	Byte	0 - 11111111B		0		
50.0	Truth table 3 type 3I/1O	Byte	0 - 11111111B		0		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
51.0	*Reserved*	*Byte*			*0*		
52.0	**Word parameters (32)**						
52.0	Motor protection - Cooling down period	Word	600 - 65535	100 ms	3000		IM UM(+)
54.0	Motor protection - Pause time	Word	0 - 65535	100 ms	0	0 = disabled	IM UM(+)
56.0	Execution time	Word	0 - 65535	100 ms	10	0 = disabled	
58.0	Monitoring the number of starts - Time range for starts	Word	0 - 65535	1 s	0		
60.0	Monitoring the number of starts - Interlocking time	Word	0 - 65535	1 s	0		
62.0	Motor stop time level >	Word	0 - 65535	1 h	0		
64.0	Timer 1 - Limit	Word	0 - 65535	100 ms	0		
66.0	Timer 2 - Limit	Word	0 - 65535	100 ms	0		
68.0	Counter 1 - Limit	Word	0 - 65535		0		
70.0	Counter 2 - Limit	Word	0 - 65535		0		
72.0	EM+ 2) - trip level	Word	30 - 40000	1 mA	1000		
74.0	EM+ 2) - warning level	Word	30 - 40000	1 mA	500		
76.0	**D-word parameters (36)**						
76.0	Operator control enables	Bit[32]	0 - 1-1B		0-0B		
80.0	Motor protection - Set current I_s1	D-word	1)	10 mA	30		IM UM(+)
84.0	Motor operating hours level >	D-word	0 - 0xFFFFFFFF	1 s	0		
88.0	*Reserved*	*D-word*			*0*		

1) Value range dependent on current range of the IM / UM and the conversion factor Bit 31 = 1, i.e. conversion factor active.

2) 3UF7510-1AA00-0 ground-fault module

3.4.2.11 Data record 131 - Basic device parameters 2 (plug binary)

Table 3-62 Data record 131 - Basic device parameters 2

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
0.0	*Reserved*	*Byte[4]*				
4.0	**Byte parameters (40)**					
4.0	BU - Output 1	Byte	0 - 255	0		
5.0	BU - Output 2	Byte	0 - 255	0		
6.0	BU - Output 3	Byte	0 - 255	0		
7.0	*Reserved*	*Byte*		*0*		
8.0	OP - LED green 1	Byte	0 - 255	0		OP OPD
9.0	OP - LED green 2	Byte	0 - 255	0		OP OPD
10.0	OP - LED green 3	Byte	0 - 255	0		OP OPD
11.0	OP - LED green 4	Byte	0 - 255	0		OP OPD
12.0	OP - LED yellow 1	Byte	0 - 255	0		OP
13.0	OP - LED yellow 2	Byte	0 - 255	0		OP
14.0	OP - LED yellow 3	Byte	0 - 255	0		OP
15.0	*Reserved*	*Byte*		*0*		
16.0	Cyclic send - Bit 0.0	Byte	0 - 255	105	Default: Status - ON<	
17.0	Cyclic send - Bit 0.1	Byte	0 - 255	106	Default: Status - Off	
18.0	Cyclic send - Bit 0.2	Byte	0 - 255	107	Default: Status - ON>	
19.0	Cyclic send - Bit 0.3	Byte	0 - 255	128	Default: Event - Overload operation	
20.0	Cyclic send - Bit 0.4	Byte	0 - 255	110	Default: Status - Interlocking time active	
21.0	Cyclic send - Bit 0.5	Byte	0 - 255	120	Default: Status - Auto mode	
22.0	Cyclic send - Bit 0.6	Byte	0 - 255	96	Default: Status - General fault	
23.0	Cyclic send - Bit 0.7	Byte	0 - 255	97	Default: Status - General warning	
24.0	OPC UA Send - Bit 1.0	Byte	0 - 255	0		
25.0	OPC UA Send - Bit 1.1	Byte	0 - 255	0		
26.0	OPC UA Send - Bit 1.2	Byte	0 - 255	0		
27.0	OPC UA Send - Bit 1.3	Byte	0 .. 255	0		
28.0	OPC UA Send - Bit 1.4	Byte	0 - 255	0		
29.0	OPC UA Send - Bit 1.5	Byte	0 - 255	0		
30.0	OPC UA Send - Bit 1.6	Byte	0 - 255	0		
31.0	OPC UA Send - Bit 1.7	Byte	0 - 255	0		
32.0	OPC UA Send - Bit 0.0	Byte	0 - 255	0		
33.0	OPC UA Send - Bit 0.1	Byte	0 - 255	0		
34.0	OPC UA Send - Bit 0.2	Byte	0 - 255	0		
35.0	OPC UA Send - Bit 0.3	Byte	0 - 255	0		
36.0	OPC UA Send - Bit 0.4	Byte	0 - 255	0		
37.0	OPC UA Send - Bit 0.5	Byte	0 - 255	0		
38.0	OPC UA Send - Bit 0.6	Byte	0 - 255	0		

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
39.0	OPC UA Send - Bit 0.7	Byte	0 - 255	0		
40.0	OPC UA Send - Bit 1.0	Byte	0 - 255	0		
41.0	OPC UA Send - Bit 1.1	Byte	0 - 255	0		
42.0	OPC UA Send - Bit 1.2	Byte	0 - 255	0		
43.0	OPC UA Send - Bit 1.3	Byte	0 - 255	0		
44.0	OPC UA Send - Bit 1.4	Byte	0 - 255	0		
45.0	OPC UA Send - Bit 1.5	Byte	0 - 255	0		
46.0	OPC UA Send - Bit 1.6	Byte	0 - 255	0		
47.0	OPC UA Send - Bit 1.7	Byte	0 - 255	0		
48.0	Monitoring PLC/PCS input	Byte	0 - 255	0		
49.0	Motor protection - Emergency start	Byte	0 - 255	60	Default: Cyclic receive - Bit 0.4	IM UM(+)
50.0	*Reserved*	*Byte*		*0*		
51.0	*Reserved*	*Byte*		*0*		
52.0	Mode selector S1	Byte	0 - 255	61	Default: Cyclic receive - Bit 0.5	
53.0	Mode selector S2	Byte	0 - 255	2	Default: Fixed level value "1"	
54.0	Control station - Local control [LC] ON<	Byte	0 - 255	0		Dependent on the control function
55.0	Control station - Local control [LC] OFF	Byte	0 - 255	0		
56.0	Control station - Local control [LC] ON>	Byte	0 - 255	0		
57.0	Control station - PLC/PCS [PN] ON<	Byte	0 - 255	56	Default: Cyclic receive - Bit 0.0	
58.0	Control station - PLC/PCS [PN] OFF	Byte	0 - 255	57	Default: Cyclic receive - Bit 0.1	
59.0	Control station - PLC/PCS [PN] ON>	Byte	0 - 255	58	Default: Cyclic receive - Bit 0.2	
60.0	Control station - PC/OPC-UA[OCM] ON<	Byte	0 - 255	0		
61.0	Control station - PC/OPC-UA[OCM] OFF	Byte	0 - 255	0		
62.0	Control station - PC/OPC-UA[OCM] ON>	Byte	0 - 255	0		
63.0	Control station - Operator panel [OP] ON<	Byte	0 - 255	0		
64.0	Control station - Operator panel [OP] OFF	Byte	0 - 255	0		
65.0	Control station - Operator panel [OP] ON>	Byte	0 - 255	0		
66.0	Control function - ON<	Byte	0 - 255	73	Default: Group control station ON<	
67.0	Control function - OFF	Byte	0 - 255	74	Default: Group control station OFF	
68.0	Control function - ON>	Byte	0 - 255	75	Default: Group control station ON>	

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
69.0	Control function - Feedback ON	Byte	0 - 255	101	Default: Status - Motor current flowing	
70.0	External fault 1 - Input	Byte	0 - 255	0		
71.0	External fault 2 - Input	Byte	0 - 255	0		
72.0	External fault 3 - Input	Byte	0 - 255	0		
73.0	External fault 4 - Input	Byte	0 - 255	0		
74.0	External fault 1 - Reset	Byte	0 - 255	0		
75.0	External fault 2 - Reset	Byte	0 - 255	0		
76.0	External fault 3 - Reset	Byte	0 - 255	0		
77.0	External fault 4 - Reset	Byte	0 - 255	0		
78.0	Cold start (TPF)	Byte	0 - 255	0		
79.0	Test 1 - Input	Byte	0 - 255	59	Default: Cyclic receive - Bit 0.3	
80.0	Test 2 - Input	Byte	0 - 255	0		
81.0	Reset 1 - Input	Byte	0 - 255	62	Default: Cyclic receive - Bit 0.6	
82.0	Reset 2 - Input	Byte	0 - 255	0		
83.0	Reset 3 - Input	Byte	0 - 255	0		
84.0	*Reserved*	*Byte*		*0*		
85.0	*Reserved*	*Byte*		*0*		
86.0	*Reserved*	*Byte*		*0*		
87.0	*Reserved*	*Byte*		*0*		
88.0	Truth table 1 3I/1O - Input 1	Byte	0 - 255	0		
89.0	Truth table 1 3I/1O - Input 2	Byte	0 - 255	0		
90.0	Truth table 1 3I/1O - Input 3	Byte	0 - 255	0		
91.0	Truth table 2 3I/1O - Input 1	Byte	0 - 255	0		
92.0	Truth table 2 3I/1O - Input 2	Byte	0 - 255	0		
93.0	Truth table 2 3I/1O - Input 3	Byte	0 - 255	0		
94.0	Truth table 3 3I/1O - Input 1	Byte	0 - 255	0		
95.0	Truth table 3 3I/1O - Input 2	Byte	0 - 255	0		
96.0	Truth table 3 3I/1O - Input 3	Byte	0 - 255	0		
97.0	*Reserved*	*Byte*		*0*		
98.0	Timer 1 - Input	Byte	0 - 255	0		
99.0	Timer 1 - Reset	Byte	0 - 255	0		
100.0	Timer 2 - Input	Byte	0 - 255	0		
101.0	Timer 2 - Reset	Byte	0 - 255	0		
102.0	Counter 1 - Input +	Byte	0 - 255	0		
103.0	Counter 1 - Input -	Byte	0 - 255	0		
104.0	Counter 1 - Reset	Byte	0 - 255	0		
105.0	Counter 2 - Input +	Byte	0 - 255	0		
106.0	Counter 2 - Input -	Byte	0 - 255	0		
107.0	Counter 2 - Reset	Byte	0 - 255	0		
108.0	Signal conditioning 1 - Input	Byte	0 - 255	0		
109.0	Signal conditioning 1 - Reset	Byte	0 - 255	0		
110.0	Signal conditioning 2 - Input	Byte	0 - 255	0		

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
111.0	Signal conditioning 2 - Reset	Byte	0 - 255	0		
112.0	Non-volatile element 1 - Input	Byte	0 - 255	0		
113.0	Non-volatile element 1 - Reset	Byte	0 - 255	0		
114.0	Non-volatile element 2 - Input	Byte	0 - 255	0		
115.0	Non-volatile element 2 - Reset	Byte	0 - 255	0		
116.0	Flashing 1 - Input	Byte	0 - 255	0		
117.0	Flashing 2 - Input	Byte	0 - 255	0		
118.0	Flashing 3 - Input	Byte	0 - 255	0		
119.0	Flicker 1 - Input	Byte	0 - 255	0		
120.0	Flicker 2 - Input	Byte	0 - 255	0		
121.0	Flicker 3 - Input	Byte	0 - 255	0		
122.0	**Analog parameters (44)**					
122.0	PLC/PCS analog input	Byte	0 - 255	16	Default: Max. current I_max	
123.0	*Reserved*	*Byte*		*0*		

3.4.2.12 Data record 132 - Extended device parameters 1

Table 3-63 Data record 132 - Extended device parameters 1

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
0.0	*Reserved*	*Byte[4]*					
4.0	**Bit parameters (17)**						
4.0	*Reserved*						
4.1	*Reserved*						
4.2	*Reserved*	*Bit*			*0*		
4.3	*Reserved*	*Bit*			*0*		
4.4	*Reserved*	*Bit*			*0*		
4.5	*Reserved*	*Bit*			*0*		
4.6	*Reserved*	*Bit*			*0*		
4.7	*Reserved*	*Bit*			*0*		
5.0	*Reserved*	*Bit*			*0*		
5.1	Voltage measuring - Type of load	Bit	0, 1		0	0 = 3-phase 1 = 1-phase	
5.2	OPD - Warnings	Bit	0, 1		0	0 = Do not display 1 = Display	
5.3	OPD - Faults	Bit	0, 1		1		
5.4	AM1 - Measuring range input	Bit	0, 1		0	0 = 0-20mA 1 = 4-20mA	AM1
5.5	AM1 - Measuring range output	Bit	0, 1		0		AM1
5.6	*Reserved*	*Bit*			*0*		
5.7	*Reserved*	*Bit*			*0*		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
6.0	Overshooting/undershooting limit 1	Bit	0, 1		0	0 = ">" (overshooting) 1 = "<" (undershoot-ing)	
6.1	Overshooting/undershooting limit 2	Bit	0, 1		0		
6.2	Overshooting/undershooting limit 3	Bit	0, 1		0		
6.3	Overshooting/undershooting limit 4	Bit	0, 1		0		
6.4	Line-to-line voltage	Bit	0, 1		0	0 = No 1 = Yes	
6.5	OPO level	Bit	0, 1		0	0 = NO contact 1 = NC contact	
6.6	Positioner response for OPO	Bit	0, 1		0	0 = CLOSED 1 = OPEN	
6.7	Star-delta - Transformer mounting	Bit	0, 1		0	0 = Delta 1 = In supply cable	
7.0	External fault 5 - Type	Bit	0, 1		0	0 = NO contact 1 = NC contact	
7.1	External fault 6 - Type	Bit	0, 1		0		
7.2	*Reserved*	*Bit*			*0*		
7.3	*Reserved*	*Bit*			*0*		
7.4	Monitoring external fault 5	Bit	0, 1		0	0 = Always 1 = Only motor ON	
7.5	Monitoring external fault 6	Bit	0, 1		0		
7.6	*Reserved*	*Bit*			*0*		
7.7	*Reserved*	*Bit*			*0*		
8.0	Calculator 2, Operating mode	Bit	0, 1		0	0 = Word 1 = D-word	
8.1	*Reserved*	*Bit*			*0*		
8.2	DM-F - Safe tripping function	Bit	0, 1		0	0 = No 1 = Yes	DM-F
8.3	DM-F - Safety-related tripping reset	Bit	0, 1		0	0 = Manual 1 = Auto	DM-F
8.4	*Reserved*						
8.5	*Reserved*	*Bit*			*0*		
8.6	*Reserved*	*Bit*			*0*		
8.7	*Reserved*	*Bit*			*0*		
9.0	DM-FL - Configuration 1	Bit	0, 1		0	Configurable parame-ters comparable with the module configura-tion	DM-FL
9.1	DM-FL - Configuration 2	Bit	0, 1		0		DM-FL
9.2	DM-FL - Configuration 3	Bit	0, 1		0		DM-FL
9.3	DM-FL - Configuration 4	Bit	0, 1		0		DM-FL
9.4	DM-FL - Configuration 5	Bit	0, 1		0		DM-FL
9.5	DM-FL - Configuration 6	Bit	0, 1		0		DM-FL
9.6	DM-FL - Configuration 7	Bit	0, 1		0		DM-FL
9.7	DM-FL - Configuration 8	Bit	0, 1		0		DM-FL

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
10.0	**Bit[2] - Parameters (21)**						
10.0	*Reserved*	*Bit[2]*					
10.2	*Reserved*	*Bit[2]*			*0*		
10.4	UVO timebase	Bit[2]	0, 1, 2		0		
10.6	UVO operating mode	Bit[2]	0, 1, 2		0	0 = Deactivated 1 = Activated	
11.0	Trip monitoring U<	Bit[2]	0, 1, 2		1	0 = ON (always) 1 = ON+ (always, not TPF) 2 = RUN (motor ON, not TPF)	UM(+)
11.2	Warning monitoring U<	Bit[2]	0, 1, 2		1		UM(+)
11.4	*Reserved*	*Bit[2]*			*0*		
11.6	*Reserved*	*Bit[2]*			*0*		
12.0	Trip monitoring 0/4-20 mA>	Bit[2]	0, 1, 2, 3		0	0 = ON (always) 1 = ON + (always, not TPF) 2 = RUN (motor ON, not TPF) 3 = RUN+ (motor ON, not TPF, startup override)	AM1
12.2	Warning monitoring 0/4-20 mA>	Bit[2]	0, 1, 2, 3		0		AM1
12.4	Trip monitoring 0/4-20 mA<	Bit[2]	0, 1, 2, 3		0		AM1
12.6	Warning monitoring 0/4-20 mA<	Bit[2]	0, 1, 2, 3		0		AM1
13.0	Monitoring limit 1	Bit[2]	0, 1, 2, 3		0		
13.2	Monitoring limit 2	Bit[2]	0, 1, 2, 3		0		
13.4	Monitoring limit 3	Bit[2]	0, 1, 2, 3		0		
13.6	Monitoring limit 4	Bit[2]	0, 1, 2, 3		0		
14.0	*Reserved*	*Bit[2]*			*0*		
14.2	*Reserved*	*Bit[2]*			*0*		
14.4	*Reserved*	*Bit[2]*			*0*		
14.6	AM1 - active inputs	Bit[2]	0, 1, 2		0	0 = 1 input 1 = 2 inputs 2 = 3 inputs	AM1
15.0	DM - Delays inputs	Bit[2]	0, 1, 2, 3	10 ms	1	Offset 6ms	DM1 DM 2
15.2	AM1 - Response for open circuit	Bit[2]	1, 2, 3		2	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	AM1
15.4	EM - Response to external ground fault	Bit[2]	1, 3		1		EM EM+
15.6	EM - response to warning of an external ground fault	Bit[2]	0, 1, 2		0		EM EM+
16.0	*Reserved*	*Bit[2]*			*0*		
16.2	*Reserved*	*Bit[2]*			*0*		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
16.4	DM-F - Test requirement response	Bit[2]	0, 1, 2		0	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	DM-F
16.6	DM-F - safety-related tripping response	Bit[2]	0, 1, 2, 3		0		DM-F
17.0	TM1 - Trip response T>	Bit[2]	1, 3		3		TM1
17.2	TM1 - Warning response T>	Bit[2]	0, 1, 2		2		TM1
17.4	TM1 - Response to a sensor fault / out of range	Bit[2]	0, 1, 2, 3		2		TM1
17.6	TM1 - Active sensors	Bit[2]	0, 1, 2		2	0 = 1 sensor 1 = 2 sensors 2 = 3 sensors	TM1
18.0	Trip response P>	Bit[2]	0, 1, 3		0	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	UM(+)
18.2	Warning response P>	Bit[2]	0, 1, 2		0		UM(+)
18.4	Trip response P<	Bit[2]	0, 1, 3		0		UM(+)
18.6	Warning response P<	Bit[2]	0, 1, 2		0		UM(+)
19.0	Trip response cos phi <	Bit[2]	0, 1, 3		0		UM(+)
19.2	Warning response cos phi <	Bit[2]	0, 1, 2		0		UM(+)
19.4	Trip response U<	Bit[2]	0, 1, 3		0		UM(+)
19.6	Warning response U<	Bit[2]	0, 1, 2		0		UM(+)
20.0	Trip response 0/4-20 mA>	Bit[2]	0, 1, 3		0		AM1
20.2	Warning response 0/4-20 mA>	Bit[2]	0, 1, 2		0		AM1
20.4	Trip response 0/4-20 mA<	Bit[2]	0, 1, 3		0		AM1
20.6	Warning response 0/4-20 mA<	Bit[2]	0, 1, 2		0		AM1
21.0	*Reserved*	*Bit[2]*			*0*		
21.2	*Reserved*	*Bit[2]*			*0*		
21.4	*Reserved*	*Bit[2]*			*0*		
21.6	*Reserved*	*Bit[2]*			*0*		
22.0	External fault 5 – Response	Bit[2]	1, 2, 3		1	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	
22.2	External fault 6 – Response	Bit[2]	1, 2, 3		1		
22.4	*Reserved*	*Bit[2]*			*0*		
22.6	*Reserved*	*Bit[2]*			*0*		
23.0	Analog-value recording - Trigger edge	Bit[2]	0, 1		0	0 = positive 1 = negative	
23.2	*Reserved*	*Bit[2]*			*0*		
23.4	*Reserved*	*Bit[2]*			*0*		
23.6	*Reserved*	*Bit[2]*			*0*		
24.0	*Reserved*	*Bit[2]*			*0*		
24.2	*Reserved*	*Bit[2]*			*0*		
24.4	*Reserved*	*Bit[2]*			*0*		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
24.6	*Reserved*	*Bit[2]*			*0*		
25.0	Timer 3 - Type	Bit[2]	0, 1, 2, 3		0	0 = With closing delay 1 = Closing delay with memory 2 = With opening delay 3 = With fleeting closing	
25.2	Timer 4 - Type	Bit[2]	0, 1, 2, 3		0		
25.4	Signal conditioning 3 - Type	Bit[2]	0, 1, 2, 3		0	0 = Non-inverting 1 = Inverting 2 = Edge rising with memory 3 = Edge falling with memory	
25.6	Signal conditioning 4 - Type	Bit[2]	0, 1, 2, 3		0		
26.0	Non-volatile element 3 - Type	Bit[2]	0, 1, 2, 3		0		
26.2	Non-volatile element 4 - Type	Bit[2]	0, 1, 2, 3		0		
26.4	Calculator 2, Operator	Bit[2]	0, 1, 2, 3		0	0 = + 1 = - 2 = * 3 = /	
26.6	*Reserved*	*Bit[2]*			*0*		
27.0	*Reserved*	*Bit[2]*			*0*		
27.2	*Reserved*	*Bit[2]*			*0*		
27.4	OPD - Operator panel display (bit 0 to 1)	Bit[2]	0 - 4		2	0 = Manual 1 = 3 s 2 = 10 s 3 = 1 min 4 = 5 min	
27.6	OPD - Operator panel display (bit 2 to 3)	Bit[2]	0 - 4		2		
28.0	**Bit[4] - Parameters (25)**						
28.0	TM1 - sensor type	Bit[3] + Bit	000B to 100B		000B	000B = PT100 001B = PT100 010B = KTY83 011B = KTY84 100B = NTC	TM1
28.4	OPD language	Bit[4]	0 - 7		1	0 = English 1 = German 2 = French 3 = Polish 4 = Spanish 5 = Portuguese 6 = Italian 7 = Finnish	

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
29.0	External fault 5 - Reset also by	Bit[4]	0 - 1111B		0101B	Bit[0] = Panel reset	
29.4	External fault 6 - Reset also by	Bit[4]	0 - 1111B		0101B	Bit[1] = Auto-reset Bit[2] = Remote reset Bit[3] = OFF command reset	
30.0	OPD - Contrast (bit 0 to 3)	Bit[4]	0 - 255	1 %	50		
30.4	OPD - Contrast (bit 4 to 7)	Bit[4]					
31.0	OPD - Profile (bit 0 to 3)	*Bit[4]*	0 - 26		*0*		
31.4	OPD - Profile (bit 4 to 7)	*Bit[4]*					
32.0	Truth table 7 type 2I/1O	Bit[4]	0 - 1111B		0		
32.4	Truth table 8 type 2I/1O	Bit[4]	0 - 1111B		0		
33.0	I_s1 conversion factor - Denominator	Bit[4]	0 - 15		0		
33.4	I_s2 conversion factor - Denominator	Bit[4]	0 - 15		0		
34.0	Hysteresis P - Cos phi - U	Bit[4]	0 - 15		5	1 %	UM(+)
34.4	Hysteresis 0/4-20 mA	Bit[4]	0 - 15		5	1 %	AM1 AM 2
35.0	Hysteresis free limits	Bit[4]	0 - 15		5	1 %	
35.4	OPD - Lighting	Bit[4]	0 - 4		2	0 = Off 1 = 3 s 2 = 10 s 3 = 1 min 4 = 5 min	
36.0	**Byte parameters (29)**						
36.0	*Reserved*	*Byte*			*0*		
37.0	EM - Delay	Byte	0 - 255	100 ms	5		EM
38.0	Trip level cos phi<	Byte	0 - 100	1 %	0		UM(+)
39.0	Warning level cos phi<	Byte	0 - 100	1 %	0		UM(+)
40.0	Trip level U<	Byte	0 - 255	8 V	0		UM(+)
41.0	Warning level U<	Byte	0 - 255	8 V	0		UM(+)
42.0	Trip level 0/4-20 mA>	Byte	0 - 255	*128	0		AM1
43.0	Warning level 0/4-20 mA>	Byte	0 - 255	*128	0		AM1
44.0	Trip level 0/4-20 mA<	Byte	0 - 255	*128	0		AM1
45.0	Warning level 0/4-20 mA<	Byte	0 - 255	*128	0		AM1
46.0	Trip delay P>	Byte	0 - 255	100 ms	5		UM(+)
47.0	Warning delay P>	Byte	0 - 255	100 ms	5		UM(+)
48.0	Trip delay P<	Byte	0 - 255	100 ms	5		UM(+)

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
49.0	Warning delay P<	Byte	0 - 255	100 ms	5		UM(+)
50.0	Trip delay cos phi<	Byte	0 - 255	100 ms	5		UM(+)
51.0	Warning delay cos phi<	Byte	0 - 255	100 ms	5		UM(+)
52.0	Trip delay U<	Byte	0 - 255	100 ms	5		UM(+)
53.0	Warning delay U<	Byte	0 - 255	100 ms	5		UM(+)
54.0	Trip delay 0/4-20 mA>	Byte	0 - 255	100 ms	5		AM1
55.0	Warning delay 0/4-20 mA>	Byte	0 - 255	100 ms	5		AM1
56.0	Trip delay 0/4-20 mA<	Byte	0 - 255	100 ms	5		AM1
57.0	Warning delay 0/4-20 mA<	Byte	0 - 255	100 ms	5		AM1
58.0	Delay limit 1	Byte	0 - 255	100 ms	5		
59.0	Delay limit 2	Byte	0 - 255	100 ms	5		
60.0	Delay limit 3	Byte	0 - 255	100 ms	5		
61.0	Delay limit 4	Byte	0 - 255	100 ms	5		
62.0	TM - Hysteresis	Byte	0 - 255	1 K	5		TM1 TM2
63.0	Max. star time	Byte	0 - 255	1 s	20	Star-delta starter	
64.0	UVO time	Byte	0 - 255	100 ms	0		
65.0	Staggering time	Byte	0 - 255	1 s	0		
66.0	Analog value recording - Sampling rate	Byte	0 - 20	5%	0		
67.0	Calculator 2, Denominator 1	Byte	0 - 255		0		
68.0	Calculator 2, Numerator 2	Byte	0 - 255		0		
69.0	Calculator 1, Denominator	Byte	0 - 255		0		
70.0	Truth table 4 type 3I/1O	Byte	0 - 11111111B		0		
71.0	Truth table 5 type 3I/1O	Byte	0 - 11111111B		0		
72.0	Truth table 6 type 3I/1O	Byte	0 - 11111111B		0		
73.0	Calculator 2, Numerator 1	Byte	-128 - 127		0		
74.0	Calculator 2, Denominator 2	Byte	-128 - 127		0		
75.0	DM-F - Test requirement level	Byte	0 - 255	1 week	0		
76.0	**Word parameters (33)**						
76.0	Analog module - Start value output	Word	0 - 65535		0	Value for 0/4mA	AM1

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
78.0	Analog Module - End value output	Word	0 - 65535		27648	Value for 20mA	AM1
80.0	TM1 - Trip level T>	Word	0 - 65535	1 K	0		TM1
82.0	TM1 - Warning level T>	Word	0 - 65535	1 K	0		TM1
84.0	Limit monitor 1 - Limit	Word	0 - 65535		0		
86.0	Limit monitor 2 - Limit	Word	0 - 65535		0		
88.0	Limit monitor 3 - Limit	Word	0 - 65535		0		
90.0	Limit monitor 4 - Limit	Word	0 - 65535		0		
92.0	Timer 3 - Limit	Word	0 - 65535	100 ms	0		
94.0	Timer 4 - Limit	Word	0 - 65535	100 ms	0		
96.0	Counter 3 - Limit	Word	0 - 65535		0		
98.0	Counter 4 - Limit	Word	0 - 65535		0		
100.0	Change-over pause	Word	0 - 65535	10 ms	0		
102.0	Analog value recording - Sam-pling rate	Word	1 - 50000	1 ms	100		
104.0	I_s1 conversion factor - Numer-ator	Word	0 - 65535		0		
106.0	I_s2 conversion factor - Numer-ator	Word	0 - 65535		0		
108.0	**D-word parameters (37)**						
108.0	Motor protection - Set current I_s2	D-word	1)	10 mA	0		
112.0	Trip level P>	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
116.0	Warning level P>	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
120.0	Trip level P<	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
124.0	Warning level P<	D-word	0 - 0xFFFFFFFF	1 W	0		UM(+)
128.0	Truth Table 9 5I/2O type - Out-put 1	Bit[32]	0 - 1-1B		0		
132.0	Truth Table 9 5I/2O type - Out-put 2	Bit[32]	0 - 1-1B		0		
136.0	Calculator 2, Offset	D-word	-0x80000000 - 0x7FFFFFFF		0		
140.0	Calculator 1, Numerator/ Offset	D-word	2x -32768 - 32767		0		

1) Value range dependent on current range of the IM/UM and the conversion factor; bit 31 = 1, i.e. conversion factor is active

3.4.2.13 Data record 133 - Extended device parameters 2 (plug binary)

Table 3-64 Data record 133 - Extended device parameters

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Information
0.0	*Reserved*	*Byte[4]*				
4.0	**Byte parameters (41)**					
4.0	DM1 - Output 1	Byte	0 - 255	0		DM1 DM-F
5.0	DM1 - Output 2	Byte	0 - 255	0		DM1 FM-F
6.0	DM2 - Output 1	Byte	0 - 255	0		DM2
7.0	DM2 - Output 2	Byte	0 - 255	0		DM2
8.0	*Reserved*	*Byte*		*0*		
9.0	*Reserved*	*Byte*		*0*		
10.0	*Reserved*	*Byte*		*0*		
11.0	*Reserved*	*Byte*		*0*		
12.0	*Reserved*					
13.0	*Reserved*					
14.0	*Reserved*					
15.0	*Reserved*					
16.0	*Reserved*					
17.0	*Reserved*					
18.0	*Reserved*					
19.0	*Reserved*					
20.0	Analog value recording - Trigger input	Byte	0 - 255	0		
21.0	*Reserved*	*Byte*		*0*		
22.0	Control station - Local control [LC] ON<<	Byte	0 - 255	0		Dependent on the control function
23.0	Control station - Local control [LC] ON>>	Byte	0 - 255	0		
24.0	Control station - PLC/PCS [PN] ON<<	Byte	0 - 255	0		
25.0	Control station - PLC/PCS [PN] ON>>	Byte	0 - 255	0		
26.0	Control station - PC/OPC UA[OCM] ON<<	Byte	0 - 255	0		
27.0	Control station - PC/OPC UA[OCM] ON<<	Byte	0 - 255	0		
28.0	Control station - Operator panels [OP] ON>>	Byte	0 - 255	0		
29.0	Control station - Operator panels [OP]<>/<<>>	Byte	0 - 255	0		
30.0	Control function - ON<<	Byte	0 - 255	0		
31.0	Control function - ON>>	Byte	0 - 255	0		
32.0	Auxiliary control input - FC	Byte	0 - 255	0		
33.0	Auxiliary control input - FO	Byte	0 - 255	0		
34.0	Auxiliary control input - TC	Byte	0 - 255	0		
35.0	Auxiliary control input - TO	Byte	0 - 255	0		
36.0	External fault 5 - Input	Byte	0 - 255	0		
37.0	External fault 6 - Input	Byte	0 - 255	0		
38.0	*Reserved*	*Byte*		*0*		
39.0	*Reserved*	*Byte*		*0*		

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Informa-tion
40.0	External fault 5 - Reset	Byte	0 - 255	0		
41.0	External fault 6 - Reset	Byte	0 - 255	0		
42.0	*Reserved*	*Byte*		*0*		
43.0	*Reserved*	*Byte*		*0*		
44.0	UVO fault	Byte	0 - 255	0		
45.0	OPO error	Byte	0 - 255	0		
46.0	Truth table 4 3I/1O - Input 1	Byte	0 - 255	0		
47.0	Truth table 4 3I/1O - Input 2	Byte	0 - 255	0		
48.0	Truth table 4 3I/1O - Input 3	Byte	0 - 255	0		
49.0	Truth table 5 3I/1O - Input 1	Byte	0 - 255	0		
50.0	Truth table 5 3I/1O - Input 2	Byte	0 - 255	0		
51.0	Truth table 5 3I/1O - Input 3	Byte	0 - 255	0		
52.0	Truth table 6 3I/1O - Input 1	Byte	0 - 255	0		
53.0	Truth table 6 3I/1O - Input 2	Byte	0 - 255	0		
54.0	Truth table 6 3I/1O - Input 3	Byte	0 - 255	0		
55.0	Truth table 7 2I/1O - Input 1	Byte	0 - 255	0		
56.0	Truth table 7 2I/1O - Input 2	Byte	0 - 255	0		
57.0	Truth table 8 2I/1O - Input 1	Byte	0 - 255	0		
58.0	Truth table 8 2I/1O - Input 2	Byte	0 - 255	0		
59.0	Truth table 9 5I/2O - Input 1	Byte	0 - 255	0		
60.0	Truth table 9 5I/2O - Input 2	Byte	0 - 255	0		
61.0	Truth table 9 5I/2O - Input 3	Byte	0 - 255	0		
62.0	Truth table 9 5I/2O - Input 4	Byte	0 - 255	0		
63.0	Truth table 9 5I/2O - Input 5	Byte	0 - 255	0		
64.0	Timer 3 - Input	Byte	0 - 255	0		
65.0	Timer 3 - Reset	Byte	0 - 255	0		
66.0	Timer 4 - Input	Byte	0 - 255	0		
67.0	Timer 4 - Reset	Byte	0 - 255	0		
68.0	Counter 3 - Input +	Byte	0 - 255	0		
69.0	Counter 3 - Input -	Byte	0 - 255	0		
70.0	Counter 3 - Reset	Byte	0 - 255	0		
71.0	Counter 4 - Input +	Byte	0 - 255	0		
72.0	Counter 4 - Input -	Byte	0 - 255	0		
73.0	Counter 4 - Reset	Byte	0 - 255	0		
74.0	Signal conditioning 3 - Input	Byte	0 - 255	0		
75.0	Signal conditioning 3 - Reset	Byte	0 - 255	0		
76.0	Signal conditioning 4 - Input	Byte	0 - 255	0		
77.0	Signal conditioning 4 - Reset	Byte	0 - 255	0		
78.0	Non-volatile element 3 - Input	Byte	0 - 255	0		
79.0	Non-volatile element 3 - Reset	Byte	0 - 255	0		
80.0	Non-volatile element 4 - Input	Byte	0 - 255	0		
81.0	Non-volatile element 4 - Reset	Byte	0 - 255	0		

Byte.Bit	Designation (PRM group)	Type	Range	Default	Note	Informa-tion
82.0	*Reserved*	*Byte*		*0*		
83.0	*Reserved*	*Byte*		*0*		
84.0	*Reserved*	*Byte*		*0*		
85.0	*Reserved*	*Byte*		*0*		
86.0	*Reserved*	*Byte*		*0*		
87.0	*Reserved*	*Byte*		*0*		
88.0	**Analog parameters (45)**					
88.0	AM1 - Output	Byte	0 - 255	0		AM1
89.0	Analog input limit 1	Byte	0 - 255	0		
90.0	Analog input limit 2	Byte	0 - 255	0		
91.0	Analog input limit 3	Byte	0 - 255	0		
92.0	Analog input limit 4	Byte	0 - 255	0		
93.0	Calculator 1, Input	Byte	0 - 255	0		
94.0	Analog value recording - Analog input	Byte	0 - 255	0		
95.0	PLC/PCS analog input 2	Byte	0 - 255	0		
96.0	PLC/PCS analog input 3	Byte	0 - 255	0		
97.0	PLC/PCS analog input 4	Byte	0 - 255	0		
98.0	Calculator 2, Input 1	Byte	0 - 255	0		
99.0	Calculator 2, Input 2	Byte	0 - 255	0		

3.4.2.14 Data record 134 - Extended device parameters 2

Table 3-65 Data record 134 - ExtendedPlus device parameters

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
0.0	**Coordination**	Byte[4]					
4.0	**Part - Bit parameters (18)**						
4.0	AM2 - Measuring range input	Bit	0, 1		0	0 = 0 - 20 mA	AM2
4.1	AM2 - Measuring range out-put	Bit	0, 1		0		AM2
4.2	Overshooting/undershooting limit 5				0		
4.3	Overshooting/undershooting limit 6				0		
4.4	*Reserved*						
4.5	*Reserved*						
4.6	*Reserved*						
4.7	*Reserved*						
5.0	*Reserved*						
5.1	*Reserved*						
5.2	*Reserved*						
5.3	*Reserved*						

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
5.4	*Reserved*						
5.5	*Reserved*						
5.6	*Reserved*						
5.7	*Reserved*						
6.0	*Reserved*						
6.1	*Reserved*						
6.2	*Reserved*						
6.3	*Reserved*						
6.4	*Reserved*						
6.5	*Reserved*						
6.6	*Reserved*						
6.7	*Reserved*						
7.0	*Reserved*						
7.1	*Reserved*						
7.2	*Reserved*						
7.3	*Reserved*						
7.4	*Reserved*						
7.5	*Reserved*						
7.6	*Reserved*						
7.7	*Reserved*						
8.0	**Part - Bit[2] parameters (22)**						
8.0	Trip monitoring 0/4-20 mA>	Bit[2]	0, 1, 2, 3		0	0 = on (always) 1 = on+ (always, not TPF) 2 = run (motor on, not TPF, startup override)	AM2
8.2	Warning monitoring 0/4-20 mA>	Bit[2]	0, 1, 2, 3		0		AM2
8.4	Trip monitoring 0/4-20 mA<	Bit[2]	0, 1, 2, 3		0		AM2
8.6	Warning monitoring 0/4-20 mA<	Bit[2]	0, 1, 2, 3		0		AM2
9.0	Monitoring limit 5	Bit[2]	0, 1, 2, 3		0		
9.2	Monitoring limit 6	Bit[2]	0, 1, 2, 3		0		
9.4	AM2 - Active inputs	Bit[2]	0, 1, 2		0	Like AM1	AM2
9.6	AM2 - Response to open circuit	Bit[2]	1, 2, 3		2	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	AM2
10.0	TM2 - Trip response T>	Bit[2]	1 , 3		3		TM2
10.2	TM2 - Warning response T>	Bit[2]	0, 1, 2		2		TM2
10.4	TM2 - Response to a sensor fault / out of range	Bit[2]	0, 1, 2, 3		2		TM2
10.6	TM2 - Active sensors	Bit[2]	0, 1, 2		2	0 = 1 sensor 1 = 2 sensors 2 = 3 sensors	TM2

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
11.0	Trip response 0/4-20 mA>	Bit[2]	0, 1, 3		0	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	AM2
11.2	Warning response 0/4-20 mA>	Bit[2]	0, 1, 2		0		AM2
11.4	Trip response 0/4-20 mA<	Bit[2]	0, 1, 3		0		AM2
11.6	Warning response 0/4-20 mA<	Bit[2]	0, 1, 2		0		AM2
12.0	Timer 5 type	Bit[2]	0, 1, 2, 3		0		
12.2	Timer 6 type	Bit[2]	0, 1, 2, 3		0		
12.4	Signal conditioner 5 type	Bit[2]	0, 1, 2, 3		0		
12.6	Signal conditioning 6 type	Bit[2]	0, 1, 2, 3		0		
13.0	Calculator 3 Operator 1	Bit[2]	0, 1, 2, 3		0	0 = +, 1 = - 2 = * 3 = /	
13.2	Calculator 3 Operator 2	Bit[2]	0, 1, 2, 3		0		
13.4	Calculator 3 Operator 3	Bit[2]	0, 1, 2, 3		0		
13.6	*Reserved*						
14.0	Calculator 4 Operator 1	Bit[2]	0, 1, 2, 3		0	0 = +, 1 = - 2 = * 3 = /	
14.2	Calculator 4 Operator 2	Bit[2]	0, 1, 2, 3		0		
14.4	Calculator 4 Operator 3	Bit[2]	0, 1, 2, 3		0		
14.6	*Reserved*						
15.0	Calculator 3 Priority 1	Bit[2]	0, 1, 2		2	0 = L, 1 = M, 2 = H	
15.2	Calculator 3 Priority 2	Bit[2]	0, 1, 2		1		
15.4	Calculator 3 Prio 3	Bit[2]	0, 1, 2		0		
15.6	*Reserved*						
16.0	Calculator 4 Prio 1	Bit[2]	0, 1, 2		2	0 = L, 1 = M, 2 = H	
16.2	Calculator 4 Prio 2	Bit[2]	0, 1, 2		1		
16.4	Calculator 4 Priority 3	Bit[2]	0, 1, 2		0		
16.6	*Reserved*						
17.0	Internal ground fault+ - Warn-ing response	Bit[2]	0, 1, 2		0	0 = Disabled 1 = Signaling 2 = Warn	UM+
17.2	DRP performance	Bit[2]	0, 3		0	0 = Disabled 3 = Tripping	UM+
18.2	*Reserved*						
18.4	*Reserved*						
18.6	*Reserved*						

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Information
19.0	*Reserved*						
19.2	*Reserved*						
19.4	*Reserved*						
19.6	*Reserved*						
20.0	*Reserved*						
20.2	*Reserved*						
20.4	*Reserved*						
20.6	*Reserved*						
21.0	*Reserved*						
21.2	*Reserved*						
21.4	*Reserved*						
21.6	*Reserved*						
22.0	**Part - Bit[4] parameters (26)**						
22.0	TM2 - sensor type	Bit[3+1]	000B to 100B		000B	Like TM1	TM2
22.4	Internal ground fault+ - Hysteresis	Bit[4]	0 ... 15	1 %	5		UM+
23.0	*Reserved*						
23.4	*Reserved*						
24.0	*Reserved*						
24.4	*Reserved*						
25.0	*Reserved*						
25.4	*Reserved*						
26.0	*Reserved*						
26.4	*Reserved*						
27.0	*Reserved*						
27.4	*Reserved*						
28.0	*Reserved*						
28.4	*Reserved*						
29.0	*Reserved*						
29.4	*Reserved*						
30.0	**Part - Byte parameters (30)**						
30.0	Trip level 0/4-20 mA >	Byte	0 - 255	*128	0		AM2
31.0	Warning level 0/4-20 mA >	Byte	0 - 255	*128	0		AM2
32.0	Trip level 0/4-20 mA <	Byte	0 - 255	*128	0		AM2
33.0	Warning level 0/4-20 mA <	Byte	0 - 255	*128	0		AM2
34.0	Trip delay 0/4-20 mA >	Byte	0 - 255	100 ms	5		AM2

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
35.0	Warning delay 0/4-20 mA >	Byte	0 - 255	100 ms	5		AM2
36.0	Trip delay 0/4-20 mA <	Byte	0 - 255	100 ms	5		AM2
37.0	Warning delay 0/4-20 mA <	Byte	0 - 255	100 ms	5		AM2
38.0	Delay limit 5	Byte	0 - 255	100 ms	5		
39.0	Delay limit 6	Byte	0 - 255	100 ms	5		
40.0	Truth table 10 type 3I/1O	Byte	0 - 11111111B			0	
41.0	Truth table 11 type 3I/1O	Byte	0 - 11111111B			0	
42.0	Internal ground fault+ - warning delay	Byte	0 ... 255	100 ms	1		UM+
43.0	Internal ground fault+ - Trip level	Word	0 ... 65535	1 mA	0	Value range dependent on current range of the UM+	UM+
44.0	Internal ground fault+ - Warning level	Word	0 ... 65535	1 mA	0	Value range dependent on current range of the UM+	UM+
45.0	DRP delay	Byte	0 ... 100	100 ms	5		UM+_TL
46.0	DRP - T bridge	Byte	0 ... 120	500 ms	0		UM+_TL
47.0	*Reserved*						
48.0	*Reserved*						
49.0	*Reserved*						
50.0	*Reserved*						
51.0	*Reserved*						
52.0	*Reserved*						
53.0	*Reserved*						
54.0	*Reserved*						
55.0	*Reserved*						
56.0	*Reserved*						
57.0	*Reserved*						
58.0	*Reserved*						
59.0	*Reserved*						
60.0	**Part - Word parameters (34)**						
60.0	AM2 - Start value output	Word	0 - 65535		0	Value for 0/4 mA	AM2

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
62.0	AM2 - End value output	Word	0 - 65535		27648	Value for 20 mA	AM2
64.0	TM2 - Trip level T>	Word	0 - 65535	1K	0		TM2
66.0	TM2 - Warning level T>	Word	0 - 65535	1K	0		TM2
68.0	Limit level 5	Word	0 - 65535		0		
70.0	Limit level 6	Word	0 - 65535		0		
72.0	Timer 5 value	Word	0 - 65535	100 ms	0		
74.0	Timer 6 value	Word	0 - 65535	100 ms	0		
76.0	Counter 5 value	Word	0 - 65535		0		
78.0	Counter 6 value	Word	0 - 65535		0		
80.0	Calculator 3 const 1	Word	0 - 65535		0		
82.0	Calculator 3 const 2	Word	0 - 65535		0		
84.0	Calculator 3 const 3	Word	0 - 65535		0		
86.0	Calculator 3 const 4	Word	0 - 65535		0		
88.0	Calculator 4 const 1	Word	0 - 65535		0		
90.0	Calculator 4 const 2	Word	0 - 65535		0		
92.0	Calculator 4 const 3	Word	0 - 65535		0		
94.0	Calculator 4 const 4	Word	0 - 65535		0		
96.0	Analog multiplexer const 1	Word	0 - 65535		0		
98.0	Analog multiplexer const 2	Word	0 - 65535		0		
100.0	Analog multiplexer const 3	Word	0 - 65535		0		
102.0	Analog multiplexer const 4	Word	0 - 65535		0		
104.0	PWM input const	Word	0 - 65535		0		
106.0	PWM input Min	Word	0 - 65535		0		
108.0	PWM input Max	Word	0 - 65535		0		
110.0	PWM duration	Word	0 - 65535	100 ms	20		
112.0	*Reserved*	Word					
114.0	*Reserved*	Word					
116.0	*Reserved*	Word					
118.0	*Reserved*	Word					
120.0	*Reserved*	Word					
122.0	*Reserved*	Word					
124.0	*Reserved*	Word					
126.0	*Reserved*	Word					
128.0	*Reserved*	Word					
130.0	*Reserved*	Word					
132.0	*Reserved*	Word					
134.0	*Reserved*	Word					
136.0	*Reserved*	Word					
138.0	*Reserved*	Word					

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
140.0	**Part - D-word parame-ters (38)**						
140.0	PE - min. pause time motor	D-word	0 - FFFFFFFF	1 ms	0		
144.0	*Reserved*	D-word					
148	**Part - Float parameters (58)**						
148.0 .. 168.0	*Reserved*	*Float*					
172.0	*Reserved*	Float					
176.0	DRP threshold	Float					UM+_TL

3.4.2.15 Data record 135 - Extended device parameters 2

Table 3-66 Data record 135 - ExtendedPlus device parameters 2

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
0.0	**Coordination**	Byte[4]					
4.0	**Part - DI byte parame-ters (42)**						
4.0	Truth table 10 3I/1O - Input 1	DI byte	0 - 255		0		
5.0	Truth table 10 3I/1O - Input 2	DI byte	0 - 255		0		
6.0	Truth table 10 3I/1O - Input 3	DI byte	0 - 255		0		
7.0	Truth table 11 3I/1O - Input 1	DI byte	0 - 255		0		
8.0	Truth table 11 3I/1O - Input 2	DI byte	0 - 255		0		
9.0	Truth table 11 3I/1O - Input 3	DI byte	0 - 255		0		
10.0	Timer 5 input	DI byte	0 - 255		0		
11.0	Timer 5 reset	DI byte	0 - 255		0		
12.0	Timer 6 input	DI byte	0 - 255		0		
13.0	Timer 6 reset	DI byte	0 - 255		0		
14.0	Counter 5 input +	DI byte	0 - 255		0		
15.0	Counter 5 input -	DI byte	0 - 255		0		
16.0	Counter 5 reset	DI byte	0 - 255		0		
17.0	Counter 6 input +	DI byte	0 - 255		0		
18.0	Counter 6 input -	DI byte	0 - 255		0		
19.0	Counter 6 reset	DI byte	0 - 255		0		
20.0	Signal conditioning 5 input	DI byte	0 - 255		0		
21.0	Signal conditioning 5 reset	DI byte	0 - 255		0		
22.0	Signal conditioning 6 input	DI byte	0 - 255		0		
23.0	Signal conditioning 6 reset	DI byte	0 - 255		0		
24.0	Analog multiplexer S1	DI byte	0 - 255		0		
25.0	Analog multiplexer S2	DI byte	0 - 255		0		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
26.0	*Reserved*						
27.0	*Reserved*						
28.0	*Reserved*						
29.0	*Reserved*						
30.0	*Reserved*						
31.0	*Reserved*						
32.0	*Reserved*						
33.0	*Reserved*						
34.0	*Reserved*						
35.0	*Reserved*						
36.0	*Reserved*						
37.0	*Reserved*						
38.0	*Reserved*						
39.0	*Reserved*						
40.0	*Reserved*						
41.0	*Reserved*						
42.0	*Reserved*						
43.0	*Reserved*						
44.0	*Reserved*						
45.0	*Reserved*						
46.0	*Reserved*						
47.0	*Reserved*						
48.0	*Reserved*						
49.0	*Reserved*						
50.0	*Reserved*						
51.0	*Reserved*						
52.0	*Reserved*						
53.0	*Reserved*						
54.0	*Reserved*						
55.0	*Reserved*						
56.0	*Reserved*						
57.0	*Reserved*						
58.0	*Reserved*						
59.0	*Reserved*						
60.0	*Reserved*						
61.0	*Reserved*						
62.0	*Reserved*						
63.0	*Reserved*						
64.0	**Part - AI byte parameters (46)**						
64.0	AM2 - Output	AI byte	0 - 255		0		AM2
65.0	SPS/PLS_analog input 5	AI byte	0 - 255		0		

Byte.Bit	Designation (PRM group)	Type	Range	Unit	Default	Note	Informa-tion
66.0	SPS/PLS_analog input 6	AI byte	0 - 255		0		
67.0	SPS/PLS_analog input 7	AI byte	0 - 255		0		
68.0	SPS/PLS_analog input 8	AI byte	0 - 255		0		
69.0	SPS/PLS_analog input 9	AI byte	0 - 255		0		
70.0	Analog input limit 5	AI byte	0 - 255		0		
71.0	Analog input limit 6	AI byte	0 - 255		0		
72.0	Calculator 1 Input 1	AI byte	0 - 255		0		
73.0	Calculator 1 Input 2	AI byte	0 - 255		0		
74.0	Calculator 1 Input 3	AI byte	0 - 255		0		
75.0	Calculator 1 Input 4	AI byte	0 - 255		0		
76.0	Calculator 2 Input 1	AI byte	0 - 255		0		
77.0	Calculator 2 Input 2	AI byte	0 - 255		0		
78.0	Calculator 2 Input 3	AI byte	0 - 255		0		
79.0	Calculator 2 Input 4	AI byte	0 - 255		0		
80.0	Analog multiplexer input 1	AI byte	0 - 255		0		
81.0	Analog multiplexer input 2	AI byte	0 - 255		0		
82.0	Analog multiplexer input 3	AI byte	0 - 255		0		
83.0	Analog multiplexer input 4	AI byte	0 - 255		0		
84.0	PWM input	AI byte	0 - 255		0		
85.0	*Reserved*	AI byte					
86.0	*Reserved*	AI byte					
87.0	*Reserved*	AI byte					
88.0	*Reserved*	AI byte					
89.0	*Reserved*	AI byte					
90.0	*Reserved*	AI byte					
91.0	*Reserved*	AI byte					
92.0	*Reserved*	AI byte					
93.0	*Reserved*	AI byte					
94.0	*Reserved*	AI byte					
95.0	*Reserved*	AI byte					
96.0	*Reserved*	AI byte					
97.0	*Reserved*	AI byte					
98.0	*Reserved*	AI byte					
99.0	*Reserved*	AI byte					
100.0	**Part - FII byte parameters (62)**						
100.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		
101.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		
102.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		
103.0	PLC / PCS analog FI input	FII byte	0 ... 255		0		
107 ... 113	*Reserved*						

3.4.2.16 Data record 139 - Marking

For external faults, limit monitors, and monitoring functions of the temperature and analog modules, user-specific texts can be configured for marking.

You can access the following texts via data record 139:

- External fault 1 to 6 (status information, warnings, and faults)
- Limit 1 to 4 (status information)
- TM1 warnings T> / trip T> (status information, warnings, and faults)
- AM1 warning/tripping 0/4 - 20 mA<> (status information, warnings and faults).

Can be parameterized to have various meanings, e.g. fill level >, bearing hot, etc. To simplify diagnostics, these texts can be saved in the device. These can be created, read out and displayed, for example, with **SIMOCODE ES**. The texts do not contain any functions.

Note

Changing the marking

Each change to the marking requires that the communication interface be restarted when the web server is active. A new start interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Table 3-67 Data record 139 - Marking

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	
4.0	*Reserved*	*Byte[6]*	
10.0	Marking - External fault 1	Byte[10]	
20.0	Marking - External fault 2	Byte[10]	
30.0	Marking - External fault 3	Byte[10]	
40.0	Marking - External fault 4	Byte[10]	
50.0	Marking - External fault 5	Byte[10]	
60.0	Marking - External fault 6	Byte[10]	
70.0	*Reserved*	*Byte[10]*	
80.0	*Reserved*	*Byte[10]*	
90.0	Marking limit 1	Byte[10]	
100.0	Marking limit 2	Byte[10]	
110.0	Marking limit 3	Byte[10]	
120.0	Marking limit 4	Byte[10]	
130.0	Marking - TM warning T>	Byte[10]	
140.0	Marking - TM trip T>	Byte[10]	
150.0	Marking - Warning 0/4-20 mA>	Byte[10]	
160.0	Marking - Warning 0/4-20 mA<	Byte[10]	
170.0	Marking - Trip 0/4-20 mA>	Byte[10]	

Byte.Bit	Designation	Type	Information
180.0	Marking - Trip 0/4-20 mA<	Byte[10]	
190.0	*Reserved*	*Byte[10]*	

3.4.2.17 Data record 140 - Marking 2

For limit monitors, and monitoring functions of the temperature and analog modules, user-specific texts can be configured for marking.

You can access the following texts via data record 140:

- Limit 5 and 6
- TM2 warnings T> / trip T>
- AM2 warning / trip 0/4-20mA<>.

Note

Changing the marking

Each change to the marking requires that the communication interface be restarted when the web server is active. A new start interrupts all Ethernet and PROFINET links and reestablishes them afterward.

Table 3-68 Data record 140 - Marking 2

Byte.Bit	Designation	Type	Information
0.0	Coordination	Byte[4]	
4.0	*Reserved*		
10.0	Marking limit 5	Byte[10]	
20.0	Marking limit 6	Byte[10]	
30.0	Marking - TM2 warning T>	Byte[10]	
40.0	Marking - TM2 trip T>	Byte[10]	
50.0	Marking - Warning 0/4-20 mA>	Byte[10]	
60.0	Marking - Warning 0/4-20 mA<	Byte[10]	
70.0	Marking - Trip 0/4-20 mA>	Byte[10]	
80.0	Marking - Trip 0/4-20 mA>	Byte[10]	
90.0	*Reserved*	*Byte[110]*	

3.4.2.18 Data record 160 - Communication parameters PNIO 1

Table 3-69 Data record 160 - Communication parameters PNIO 1

Byte.Bit	Designation	Type	Information
0.0	Coordination	Byte[4]	GG3(+), GG3 GP
4.0	Data structure header - data structure length	Word	
6.0	Data structure header - Start-Pos	Word	
8.0	*Reserved*		
10.0	Communication parameter header PROFINET IO	Byte[10]	
20,0	Block structure PROFINET IO - Segment	Byte[180]	

3.4.2.19 Data record 161 - Communication parameters PNIO 2

Table 3-70 Data record 161 - Communication parameters PNIO 2

Byte.Bit	Designation	Type	Information
0.0	Coordination	Byte[4]	GG3(+), GG3 GP
4.0	Data structure header - data structure length	Word	
6.0	Data structure header - Start-Pos	Word	
8.0	*Reserved*		
10.0	Block structure PROFINET IO - Segment 2	Byte[120]	

3.4.2.20 Data record 165 - Identification

You can access the following identifiers stored in the device:

- Plant identifier
- Location designation
- Installation date
- Comment.

Table 3-71 Data record 165 - Identification

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	
4.0	Plant identifier	Byte[32]	
36.0	Location designation	Byte[22]	
58.0	Date	Byte[16]	
74.0	*Reserved*	*Byte[38]*	
112.0	Comment	Byte[54]	

3.4.2.21 Data record 224 - Password protection

Description

- Password protection ON
  If the data record is received with this control flag, the password protection is activated and the password applied. If "Password protection on" and the password are not identical at the time of receipt, the event "Event - Wrong password" is set and no change will be made.
- Password protection OFF
  If the data record is received with this control flag, the password protection is deactivated. If the password is incorrect, the event "Event - Wrong password" is set and no change is made.

Table 3-72 Data record 224 - Password protection

Byte.Bit	Designation	Type	Information
0.0	*Reserved*	*Byte[4]*	
4.0	Control flag: 0 = Password protection off, 1 = Password protection on	Bit	
4.1	*Reserved*	*Bit[31]*	
8.0	Password	Byte[8]	
16.0	*Reserved*	*Byte[8]*	

3.4.2.22 I&M data

I&M data overview

The following I&M data are supported:

Number	Name	Comment
I&M0 (Page 265)	Device identification	This is stored in the device on initialization

I&M1 (Page 265)	Equipment identifier	These are entered in the engineering system
I&M2 (Page 266)	Installation	
I&M3 (Page 267)	Description	

Data set 231: I&M0 - device identification

Only read (r) access to the device identification (I&M0) is possible.

Byte	Data length	Content
0	10 bytes	I&M header

Byte	Data length	Content	Meaning	Access
10	2 bytes	MANUFACTURER_ID	42 = SIEMENS manufacturer identification	r
12	20 bytes	ORDER_ID	Order number	r
32	16 bytes	SERIAL_NUMBER	Serial number	r
48	2 bytes	HARDWARE_REVISION	Revision level	r
50	4 bytes	SOFTWARE_REVISION	Firmware version	r
54	2 bytes	REV_COUNTER	Provides information about the parameterized changes on the device.	r
56	2 bytes	PROFILE_ID	Provides information about the profile supported by the device and the device family belonging to the device.	r
58	2 bytes	PROFILE_SPECIFIC_TYPE	Used to supplement the object "PROFILE_ID" and contains further information on the profile.	r
60	2 bytes	IM_VERSION	Provides information about the version of the identification files (0x0101 = Version 1.1).	r
62	2 bytes	IM_SUPPORTED	Provides information about the available identification files (Index 2 to 4).	r

Data set 232: I&M1 - equipment identifier

Read (r) and write (w) access to the equipment identifier (I&M1) is possible.

Note

Validity of the write access

SIMOCODE pro checks the validity of the write access. The ASCII characters 0x20 - 0x7E are accepted. If SIMOCODE pro does not accept the data of the write access, it responds with a negative acknowledgment.

Byte	Data format	Meaning
0 ... 9	-	I&M header
9	-	Transfer the value 0x00 for writing the data set for byte 9.

Byte	Data length	Content	Meaning	Access
10	32 bytes	TAG_FUNCTION	Plant identifier Fill unused positions with blanks (0x20).	r/w
42	22 bytes	TAG_LOCATION	Location designation Fill unused positions with blanks (0x20).	r/w

Data set 233: I&M2 - installation

Read (r) and write (w) access to the installation (I&M2) is possible.

Note

Validity of the write access

SIMOCODE checks the validity of the write access. The accepted display formats are "YYYY-MM-DD" (year-month-day) and "YYYY-MM-DD HH:MM" (year-month-day hour:minute). If SIMOCODE does not accept the data of the write access, the SIMOCODE responds with a negative acknowledgment.

- YYYY (year): 0001 - 9999
- MM (month): 01 - 12
- DD (day): 01 - 31 (depending on month)
- HH (hour): 00 - 23
- MM (minute): 00 - 59

Byte	Data format	Meaning
0 ... 9	-	I&M header
9	-	Transfer the value 0x00 for writing the data set for byte 9.

Byte	Data length	Content	Meaning	Access
10	16 bytes	INSTALLATION_DATE	Installation date Fill unused positions with blanks (0x20).	r/w
26	38 bytes	RESERVED	-	r

Data set 234: I&M3 - description

Read (r) and write (w) access to the description (I&M3) is possible.

Note

Validity of the write access

SIMOCODE checks the validity of the write access. The ASCII characters 0x20 - 0x7E are accepted. If SIMOCODE does not accept the data of the write access, the SIMOCODE responds with a negative acknowledgment.

Byte	Data format	Meaning
0 ... 9	-	I&M header
9	-	Transfer the value 0x00 for writing the data set for byte 9.

Byte	Data length	Content	Meaning	Access
10	32 bytes	DESCRIPTOR	Individual additional information and explanations. Fill unused positions with blanks (0x20).	r/w

3.5 Modbus data tables

3.5.1 General information

3.5.1.1 Memory image

Hexadecimal address	Chapter
0x0000	See Process image output - command data (Page 270)
0x0400	See Process image input - monitoring data (Page 270)
0x0800	See Measured values (Page 271)
0x0C00	See Display and statistical data (Page 273)
0x1C00	See Device diagnostics (Page 274)
0x2100	See Error memory (Page 282)
0x2200	See Event memory (Page 283)
0x2A80	See Trace data (Page 284)
0x4000	See I&M0 - device identification (Page 284)
0x4020	See I&M1 data (Page 285)
0x4040	See I&M2 - Installation date (Page 285)
0x4060	See I&M3 - Comment (Page 286)
0x4180	See Basic device parameter 1 (Page 286)
0x4380	See Extended device parameters 1 (Page 293)
0x4880	See Marking (Page 305)

3.5.1.2 Byte arrangement

Byte arrangement

When data longer than one byte is stored, the bytes are arranged as follows ("big endian"):

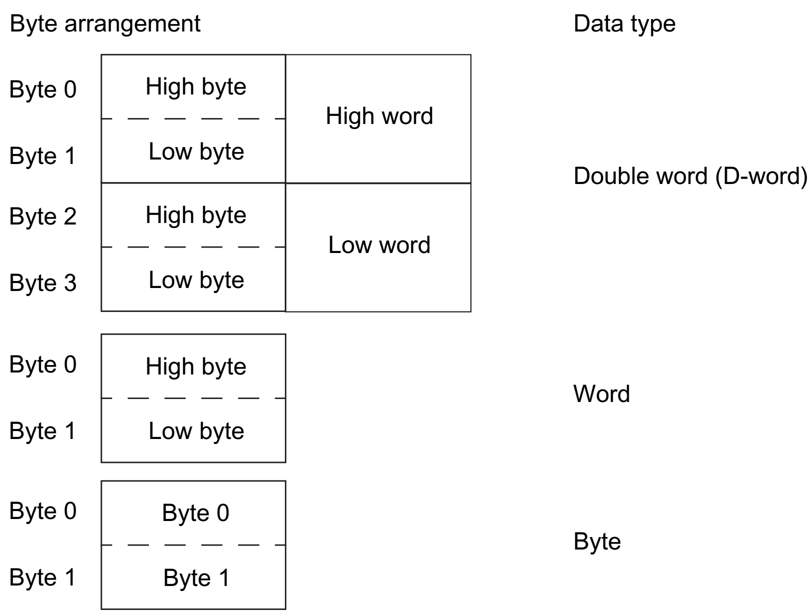


Figure 3-6 Byte arrangement in "big endian" format

3.5.1.3 Specifications

The following specifications apply in the tables:

Table 3-73 Table specifications (example)

Register address *)	Identifier	Type	Area	Units	Access ***)	Info
15	*Reserved **)*	*Byte[4] **)*			*R*	
16	Max. current I_max	Word	0 ... 65535	1 % / I_s	R	BU

*) The values given are decimal values

**) Items in italics are not relevant (reserved) and must be filled with "0" when written to

Parameters that can be changed during operation

BU: Entry for SIMOCODE Modbus basic unit

***) Access: R: Read (access); W: Write (access); R/W: Read Write (access)

3.5.2 Modbus RTU data tables

3.5.2.1 Process image output - command data

The command data can be written via the register memory area with the function codes 06 and 16, or via the coil memory area with function codes 05 and 15.

The process image output and the process image input can also be accessed via function code 23 as a combined write/read access operation.

Read access is possible from the register memory area with function codes 03 and 04, or the coil memory area with function codes 01 and 02.

Max. data length per access: 2 registers, 16 coils.

Table 3-74 Process image output - command data

Register address	high/low	Coil address	Type	Description	Default value	Access
0x0000	low	0x0000	Bit	Cyclic receive - bit 0.0	Control station - PLC/PCS [DP] ON<	r/w
		0x0001	Bit	Cyclic receive - bit 0.1	Control station - PLC/PCS [DP] OFF	r/w
		0x0002	Bit	Cyclic receive - bit 0.2	Control station - PLC/PCS [DP] ON>	r/w
		0x0003	Bit	Cyclic receive - bit 0.3	Test 1	r/w
		0x0004	Bit	Cyclic receive - bit 0.4	Motor protection emergency start	r/w
		0x0005	Bit	Cyclic receive - bit 0.5	Mode selector S1	r/w
		0x0006	Bit	Cyclic receive - bit 0.6	Reset 1	r/w
		0x0007	Bit	Cyclic receive - bit 0.7	Unassigned	r/w
	high	0x0008	Bit	Cyclic receive - bit 1.0	Unassigned	r/w
		0x0009	Bit	Cyclic receive - bit 1.1	Unassigned	r/w
		0x000A	Bit	Cyclic receive - bit 1.2	Unassigned	r/w
		0x000B	Bit	Cyclic receive - bit 1.3	Unassigned	r/w
		0x000C	Bit	Cyclic receive - bit 1.4	Unassigned	r/w
		0x000D	Bit	Cyclic receive - bit 1.5	Unassigned	r/w
		0x000E	Bit	Cyclic receive - bit 1.6	Unassigned	r/w
		0x000F	Bit	Cyclic receive - bit 1.7	Unassigned	r/w
0x0001			Word	Cyclic receive - Analog value	Unassigned	r/w

3.5.2.2 Process image input - monitoring data

Access to the monitoring data is possible from the register memory area with function codes 03 and 04, or the coil memory area with function codes 01 and 02.

Max. data length per access: 5 registers, 16 coils.

The process image output and the process image input can also be accessed via function code 23 as a combined write/read access operation.

Table 3-75 Process image input - monitoring data

Register address	high/low	Coil address	Type		Designation		Default value	Access
0x0400	low	0x0400	Bit		Cyclic send - bit 0.0		Status - On<	r
		0x0401	Bit		Cyclic send - bit 0.1		Status - Off	r
		0x0402	Bit		Cyclic send - bit 0.2		Status - On>	r
		0x0403	Bit		Cyclic send - bit 0.3		Event - overload operation	r
		0x0404	Bit		Cyclic send - bit 0.4		Status - Interlocking time active	r
		0x0405	Bit		Cyclic send - bit 0.5		Status - Remote mode	r
		0x0406	Bit		Cyclic send - bit 0.6		Status - group fault	r
		0x0407	Bit		Cyclic send - bit 0.7		Status - group warning	r
	high	0x0408	Bit		Cyclic send - bit 1.0		Unassigned	r
		0x0409	Bit		Cyclic send - bit 1.1		Unassigned	r
		0x040A	Bit		Cyclic send - bit 1.2		Unassigned	r
		0x040B	Bit		Cyclic send - bit 1.3		Unassigned	r
		0x040C	Bit		Cyclic send - bit 1.4		Unassigned	r
		0x040D	Bit		Cyclic send - bit 1.5		Unassigned	r
		0x040E	Bit		Cyclic send - bit 1.6		Unassigned	r
		0x040F	Bit		Cyclic send - bit 1.7		Unassigned	r
0x0401			Word	Float	PLC/ PCS analog input 1	PLC / PCS analog FI input 1	Max. current I_max	r
0x0402			Word		PLC/PCS analog. Input 2		Unassigned	r
0x0403			Word	Float	PLC/PCS analog. Input 3	PLC / PCS analog FI input 2	Unassigned	r
0x0404			Word		PLC/PCS analog. Input 4		Unassigned	r

3.5.2.3 Measured values

Table 3-76 Measured values

Input/holding register		Designation	Type	Range	Unit	Access 5)	Info
Address offset	high/low						
0x0800		*Reserved*	*Byte[2]*			*r*	
0x0801		*Reserved*	*Byte[2]*			*r*	
0x0802	high	Thermal motor model	Byte	0 - 255	See 2)	r	
	low	Phase unbalance	Byte	0 - 100	1 %	r	
0x0803	high	Cos phi	Byte	0 - 100	1 %	r	
	low	*Reserved*	*Byte[1]*			*r*	

Input/holding register		Designation	Type	Range	Unit	Access 5)	Info
Address offset	**high/low**						
0x0804		*Reserved*	*Byte[2]*			*r*	
0x0805		*Reserved*	*Byte[2]*			*r*	
0x0806		Max. current I_max	Word	0 - 65535	1 % / I_s	r	
0x0807		Current I_L1	Word	0 - 65535	1 % / I_s	r	
0x0808		Current I_L2	Word	0 - 65535	1 % / I_s	r	
0x0809		Current I_L3	Word	0 - 65535	1 % / I_s	r	
0x080A		Last trip current	Word	0 - 65535	1 % / I_s	r	
0x080B		Time to trip	Word	0 - 65535	100 ms	r	
0x080C		Cooling down period	Word	0 - 65535	100 ms	r	
0x080D		Voltage U_L1	Word	0 - 65535	1 V	r	
0x080E		Voltage U_L2	Word	0 - 65535	1 V	r	
0x080F		Voltage U_L3	Word	0 - 65535	1 V	r	
0x0810		AM1 - output	Word	0 - 32767	See 1)	r	
0x0811		AM1 - input 1	Word	0 - 32767		r	
0x0812		AM1 - input 2	Word	0 - 32767		r	
0x0813		*Reserved*	*Word*	*0 - 32767*		*r*	
0x0814		TM1 - Temperature	Word	0 - 65535	1 K see 3)	r	
0x0815		TM1 - temperature 1	Word	0 - 65535		r	
0x0816		TM1 - temperature 2	Word	0 - 65535		r	
0x0817		TM1 - temperature 3	Word	0 - 65535		r	
0x0818		EM+ 4) - ground-fault current	Word	0 - 65535		r	
0x0819		EM+ 4) - last tripping current	Word	0 - 65535		r	
0x081A		Active power P	D-word	0 - 0xFFFFFFFF	1 W	r	
0x081C		Apparent power S	D word	0 - 0xFFFFFFFF	1 VA	r	
0x0842		Frequency	Word	0 - 65535	0.01 Hz	r	from E03
0x0848		Current I_max_A_F	Float		1 A	r	from E03
0x084A		Current I_avg_A_F	Float		1 A	r	from E03
0x084C		Current I_L1_A_F	Float		1 A	r	from E03
0x084E		Current I_L2_A_F	Float		1 A	r	from E03
0x0850		Current I_L3_A_F	Float		1 A	r	from E03
0x0852		Active power P_F	Float		1 W	r	from E03
0x0854		Apparent power S	Float		1 VA	r	from E03
0x0856		Voltage UL1_F	Float		1 V	r	from E03
0x0858		Voltage UL2_F	Float		1 V	r	from E03
0x085A		Voltage UL3_F	Float		1 V	r	from E03
0x085C		Cos phi_F	Float			r	from E03
0x085E		Frequency_F	Float		1 Hz	r	from E03

1) S7 format: 0/4 mA = 0; 20 mA = 27648

2) Representation of the "Thermal motor model": Value related to symmetrical trip level, representation in steps of 2 % in bits 6 ...0 (range 0 to 254 %), bit 7 shows unbalance (fixed level 50 %)

3) Representation in Kelvin

4) 3UF7510-1AA00-0 ground-fault module

5) r/w: Value is read/write; r: Value is read-only

3.5.2.4 Display and statistical data

Read access to the display and statistical data is possible from the register memory area with function codes 03 and 04.

Individual statistical data can be written via the register memory area with function codes 06 and 16, and be reset, for example.

Max. data length per access: 34 registers.

Table 3-77 Display and statistical data

Input/holding register		**Designation**	**Type**	**Range**	**Unit**	**Access** [1)]	**Info**
Address	**high/low**						
0x0C00		Coordination	Byte[4]			r	
0x0C02	high	Permissible starts - actual value	Byte	0 .. 255		r/w	
	low	DM-F - Time until test requirement	Byte	0 .. 255	1 week	r	
0x0C03		*Reserved*	*Byte[2]*			*r*	
0x0C04		Number of parameterizations	Word	0 .. 65535		r	
0x0C05		Number of overload trips	Word	0 .. 65535		r/w	
0x0C06		Number of internal overload trips	Word	0 .. 65535		r	
0x0C07		Motor stop time	Word	0 .. 65535	1 h	r/w	
0x0C08		Timer 1 actual value	Word	0 .. 65535	100 ms	r	
0x0C09		Timer 2 actual value	Word	0 .. 65535	100 ms	r	
0x0C0A		Timer 3 actual value	Word	0 .. 65535	100 ms	r	
0x0C0B		Timer 4 actual value	Word	0 .. 65535	100 ms	r	
0x0C0C		Counter 1 actual value	Word	0 .. 65535		r	
0x0C0D		Counter 2 actual value	Word	0 .. 65535		r	
0x0C0E		Counter 3 actual value	Word	0 .. 65535		r	
0x0C0F		Counter 4 actual value	Word	0 .. 65535		r	
0x0C10		Calculator 1 Output	Word	0 .. 65535		r	
0x0C11		Calculator 2 Output	Word	0 .. 65535		r	
0x0C12		*Reserved*	*Word[2]*			*r*	

Input/holding register		Designation	Type	Range	Unit	Access 1)	Info
Address	high/low						
0x0C14		Motor operating hours	D word	0 .. 0xFFFFFFFF	1 s	r/w	
0x0C16		Internal motor operating hours	D word	0 .. 0xFFFFFFFF	1 s	r	
0x0C18		Device operating hours	D word	0 .. 0xFFFFFFFF	1 s	r	
0x0C1A		Number of starts	D word	0 .. 0xFFFFFFFF		r/w	
0x0C1C		Number of internal starts CW	D word	0 .. 0xFFFFFFFF		r	
0x0C1E		Number of internal starts CCW	D word	0 .. 0xFFFFFFFF		r	
0x0C20		Energy W	D word	0 .. 0xFFFFFFFF	1 kWh	r/w	
0x0C22		Energy W_F	Float		1 kWh	r	from E03

1) r/w: Value is read/write; r: Value is read-only

3.5.2.5 Device diagnostics

Read-only access to the device diagnostics is possible from the register memory area with function codes 03 and 04, or the coil memory area with function codes 01 and 02.

Max. data length per access: 16 registers.

Table 3-78 Device diagnostics

Input/holding register		**Type**	**Discrete input / coil address**	**Identifier**	**Access** [1]
Address	**high/low**				
0x1C00	low	Bit	*0x1C00*	*Reserved*	*r*
			0x1C01	*Reserved*	*r*
			0x1C02	*Reserved*	*r*
			0x1C03	*Reserved*	*r*
			0x1C04	*Reserved*	*r*
			0x1C05	*Reserved*	*r*
			0x1C06	*Reserved*	*r*
			0x1C07	*Reserved*	*r*
	high	Bit	0x1C08	Status - group fault	r
			0x1C09	Status - General warning	r
			0x1C0A	Status - Device	r
			0x1C0B	Status - Bus	r
			0x1C0C	Status - PLC/PCS	r
			0x1C0D	Status - Current flowing	r
			0x1C0E	Status - PE command Start_Pause pending	r
			0x1C0F	Status - PE energy saving mode active	r
0x1C01	low	Bit	0x1C10	Status - On<<	r
			0x1C11	Status - On<	r
			0x1C12	Status - Off	r
			0x1C13	Status - On>	r
			0x1C14	Status - On>>	r
			0x1C15	Status - Start active	r
			0x1C16	Status - Interlocking time active	r
			0x1C17	Status - Change-over pause active	r
	high	Bit	0x1C18	Status - Runs in open direction	r
			0x1C19	Status - Runs in close direction	r
			0x1C1A	Status - FC	r
			0x1C1B	Status - FO	r
			0x1C1C	Status - TC	r
			0x1C1D	Status - TO	r
			0x1C1E	Status - Cold run TPF	r
			0x1C1F	Status - OPO	r

Input/holding register		Type	Discrete input / coil address	Identifier	Access 1)
Address	high/low				
0x1C02	low	Bit	0x1C20	Status - Auto mode	r
			0x1C21	Status - Emergency start executed	r
			0x1C22	Status - Cooling down period active	r
			0x1C23	Status - Pause time active	r
			0x1C24	Status - Device test active	r
			0x1C25	Status - Phase sequence 1-2-3	r
			0x1C26	Status - Phase sequence 3-2-1	r
			0x1C27	Status - DM-F enabling circuit	r
	high	Bit	0x1C28	Event - Overload operation	r
			0x1C29	Event - Unbalance	r
			0x1C2A	Event - Overload	r
			0x1C2B	Event - overload + phase failure	r
			0x1C2C	Event - Internal ground fault	r
			0x1C2D	Event - External ground fault	r
			0x1C2E	Event - external ground fault warning	r
			0x1C2F	Event - Thermistor overload	r
0x1C03	low	Bit	0x1C30	Event - Thermistor short-circuit	r
			0x1C31	Event - Thermistor open circuit	r
			0x1C32	Event - TM warning T>	r
			0x1C33	Event - TM trip T>	r
			0x1C34	Event - TM sensor fault	r
			0x1C35	Event - TM out of range	r
			0x1C36	Event - EM+ open circuit	r
			0x1C37	Event - EM+ short-circuit	r
	high	Bit	0x1C38	Event - Warning I>	r
			0x1C39	Event - Warning I<	r
			0x1C3A	Event - Warning P>	r
			0x1C3B	Event - Warning P<	r
			0x1C3C	Event - Warning cos phi<	r
			0x1C3D	Event - Warning U<	r
			0x1C3E	Event - Warning 0/4 - 20mA>	r
			0x1C3F	Event - Warning 0/4 - 20mA<	r

Input/holding register		Type	Discrete input / coil address	Identifier	Access 1)
Address	high/low				
1x1C04	low	Bit	0x1C40	Event - Trip I>	r
			0x1C41	Event - Trip I<	r
			0x1C42	Event - Trip P>	r
			0x1C43	Event - Trip P<	r
			0x1C44	Event - Trip cos phi<	r
			0x1C45	Event - Trip U<	r
			0x1C46	Event - Trip 0/4-20 mA> 1	r
			0x1C47	Event - Trip 0/4-20 mA< 1	r
	high	Bit	0x1C48	Event - Stalled rotor	r
			0x1C49	*Reserved bit[1]*	r
			0x1C4A	*Reserved bit[1]*	r
			0x1C4B	Event - No start permitted	r
			0x1C4C	Event - No. of starts >	r
			0x1C4D	Event - Just one start possible	r
			0x1C4E	Event - Motor operating hours >	r
			0x1C4F	Event - Motor stop time >	r
0x1C05	low	Bit	0x1C50	Event - Limit 1	r
			0x1C51	Event - Limit 2	r
			0x1C52	Event - Limit 3	r
			0x1C53	Event - Limit 4	r
			0x1C54	Event - External fault 1	r
			0x1C55	Event - External fault 2	r
			0x1C56	Event - External fault 3	r
			0x1C57	Event - External fault 4	r
	high	Bit	0x1C58	Event - External fault 5	r
			0x1C59	Event - External fault 6	r
			0x1C5A	*Reserved event - External fault 7*	*r*
			0x1C5B	*Reserved event - External fault 8*	*r*
			0x1C5C	Event - AM1 open circuit	r
			0x1C5D	Event - DM-F safety-related tripping	r
			0x1C5E	Event - DM-F - Test requirement	r
			0x1C5F	*Reserved*	*r*

Input/holding register		Type	Discrete input / coil address	Identifier	Access 1)
Address	high/low				
0x1C06	low	Bit	0x1C60	Event - timestamp function active + ok	r
			0x1C61	*Reserved*	*r*
			0x1C62	Event - DM-FL safety ok	r
			0x1C63	*Reserved*	*r*
			0x1C64	Event - Configured operator panel missing	r
			0x1C65	Event - Module not supported	r
			0x1C66	Event - module voltage missing	r
			0x1C67	*Reserved*	r
	high	Bit	0x1C68	Event - memory module read in	r
			0x1C69	Event - memory module programmed	r
			0x1C6A	Event - Memory module erased	r
			0x1C6B	*Reserved*	*r*
			0x1C6C	Event - Initialization module read in	r
			0x1C6D	Event - Initialization module programmed	r
			0x1C6E	Event - Initialization module cleared	r
			0x1C6F	Event - Addressing plug read in	r
0x1C07	low	Bit	0x1C70	Event - startup parameter block active	r
			0x1C71	Event - parameter changes not allowed in the current operating state	r
			0x1C72	Event - Device does not support the required functions	r
			0x1C73	Event - Bad parameter	r
			0x1C74	Event - Password wrong	r
			0x1C75	Event - Password protection active	r
			0x1C76	Event - Factory settings	r
			0x1C77	Event - Parameterization active	r
	high	Bit	0x1C78	Event - Prm error number	r
			0x1C79	Event - Prm error number	r
			0x1C7A	Event - Prm error number	r
			0x1C7B	Event - Prm error number	r
			0x1C7C	Event - Prm error number	r
			0x1C7D	Event - Prm error number	r
			0x1C7E	Event - Prm error number	r
			0x1C7F	Event - Prm error number	r

Input/holding register		Type	Discrete input / coil address	Identifier	Access [1)]
Address	high/low				
0x1C08	low	Bit	0x1C80	Event - DM-FL configuration operation	r
			0x1C81	Event - DM-FL actual and set configuration are different	r
			0x1C82	Event - DM-FL waiting for start-up test	r
			0x1C83	*Reserved*	*r*
			0x1C84	Event - initialization module write-protected, parameter changes not allowed	r
			0x1C85	Event - memory module write-protected	r
			0x1C86	Event - initialization module write-protected	r
			0x1C87	Event - initialization module ident. data write protected	r
	high	Bit	0x1C88	Warning - overload operation	r
			0x1C89	Warning - Unbalance	r
			0x1C8A	Warning - Overload	r
			0x1C8B	Warning - Overload + phase failure	r
			0x1C8C	Warning - Internal ground fault	r
			0x1C8D	Warning - external ground fault	r
			0x1C8E	*Reserved*	*r*
			0x1C8F	Warning - Thermistor overload	r
0x1C09	low	Bit	0x1C90	Warning - Thermistor short circuit	r
			0x1C91	Warning - Thermistor open circuit	r
			0x1C92	Warning - TM1 warning T >	r
			0x1C93	*Reserved*	*r*
			0x1C94	Warning - TM1 sensor fault	r
			0x1C95	Warning - TM1 out of range	r
			0x1C96	Warning - EM+ open circuit	r
			0x1C97	Warning - EM+ short circuit	r
	high	Bit	0x1C98	Warning - Warning I>	r
			0x1C99	Warning - Warning I<	r
			0x1C9A	Warning - Warning P>	r
			0x1C9B	Warning - Warning P<	r
			0x1C9C	Warning - Warning cos phi<	r
			0x1C9D	Warning - Warning U<	r
			0x1C9E	Warning - Warning 0/4 - 20mA>	r
			0x1C9F	Warning - Warning 0/4 - 20mA<	r

Input/holding register		Type	Discrete input / coil address	Identifier	Access [1)]
Address	high/low				
0x1C0A	low	Bit	0x1CA0	Warning - Stalled rotor	r
			0x1CA1	*Reserved*	*r*
			0x1CA2	*Reserved*	*r*
			0x1CA3	Warning - No start possible	r
			0x1CA4	Warning - Number of starts >	r
			0x1CA5	Warning - Just one start possible	r
			0x1CA6	Warning - Motor operating hours>	r
			0x1CA7	Warning - Motor stop time >	r
	high	Bit	0x1CA8	Warning - External fault 1	r
			0x1CA9	Warning - External fault 2	r
			0x1CAA	Warning - External fault 3	r
			0x1CAB	Warning - External fault 4	r
			0x1CAC	Warning - External fault 5	r
			0x1CAD	Warning - External fault 6	r
			0x1CAE	*Reserved warning - External fault 7*	*r*
			0x1CAF	*Reserved warning - External fault 8*	*r*
0x1C0B	low	Bit	0x1CB0	Warning - AM1 open circuit	r
			0x1CB1	Warning - DM-F safety-related tripping	r
			0x1CB2	Warning - DM-F test requirement	r
			0x1CB3	*Reserved*	*r*
			0x1CB4	*Reserved*	*r*
			0x1CB5	*Reserved*	*r*
			0x1CB6	Warning - DM-F feedback circuit	r
			0x1CB7	Warning - DM-FL simultaneity	r
	high	Bit	0x1CB8	Fault - HW fault basic unit	r
			0x1CB9	Fault - Module fault	r
			0x1CBA	Fault - Temporary components	r
			0x1CBB	Fault - Configuration error	r
			0x1CBC	Fault - Parameterization	r
			0x1CBD	Fault - Bus	r
			0x1CBE	Fault - PLC/PCS	r
			0x1CBF	*Reserved*	*r*

Input/holding register		Type	Discrete input / coil address	Identifier	Access [1)]
Address	high/low				
0x1C0C	low	Bit	0x1CC0	Fault - execution ON command	r
			0x1CC1	Fault - execution STOP command	r
			0x1CC2	Fault - Feedback (FB) ON	r
			0x1CC3	Fault - Feedback (FB) OFF	r
			0x1CC4	Fault - Stalled positioner	r
			0x1CC5	Fault - Double 0	r
			0x1CC6	Fault - Double 1	r
			0x1CC7	Fault - End position	r
	high	Bit	0x1CC8	Fault - Antivalence	r
			0x1CC9	Fault - Cold run (TPF) error	r
			0x1CCA	Fault - power failure (UVO)	r
			0x1CCB	Fault - Operational Protection Off (OPO)	r
			0x1CCC	*Reserved*	*r*
			0x1CCD	*Reserved*	*r*
			0x1CCE	*Reserved*	*r*
			0x1CCF	*Reserved*	*r*
0x1C0D	low	Bit	*0x1CD0*	*Reserved*	*r*
			0x1CD1	Fault - unbalance	r
			0x1CD2	Fault - overload	r
			0x1CD3	Fault - overload + phase failure	r
			0x1CD4	Fault - int. ground fault	r
			0x1CD5	Fault - ext. ground fault	r
			0x1CD6	*Reserved*	*r*
			0x1CD7	Fault - thermistor overload	r
	high	Bit	0x1CD8	Fault - thermistor short circuit	r
			0x1CD9	Fault - thermistor open circuit	r
			0x1CDA	*Reserved*	*r*
			0x1CDB	Trip - TM1 trip T>	r
			0x1CDC	Trip - TM1 sensor fault	r
			0x1CDD	Trip - TM1 out of range	r
			0x1CDE	Fault - EM+ open circuit	r
			0x1CDF	Fault - EM+ short circuit	r

Input/holding register		Type	Discrete input / coil address	Identifier	Access [1)]
Address	**high/low**				
0x1C0E	low	Bit	0x1CE0	Fault - trip I>	r
			0x1CE1	Fault - trip I<	r
			0x1CE2	Fault - trip P>	r
			0x1CE3	Fault - trip P<	r
			0x1CE4	Fault - trip cos phi<	r
			0x1CE5	Fault - trip U<	r
			0x1CE6	Fault - Trip 0/4 - 20mA>	r
			0x1CE7	Fault - Trip 0/4 - 20mA<	r
	high	Bit	0x1CE8	Fault - stalled rotor	r
			0x1CE9	*Reserved*	*r*
			0x1CEA	*Reserved*	*r*
			0x1CEB	*Reserved*	*r*
			0x1CEC	Fault - Number of starts >	r
			0x1CED	*Reserved*	*r*
			0x1CEE	*Reserved*	*r*
			0x1CEF	*Reserved*	*r*
0x1C0F	low	Bit	0x1CF0	Fault - External fault 1	r
			0x1CF1	Fault - External fault 2	r
			0x1CF2	Fault - External fault 3	r
			0x1CF3	Fault - External fault 4	r
			0x1CF4	Fault - External fault 5	r
			0x1CF5	Fault - External fault 6	r
			0x1CF6	*Reserved fault - External fault 7*	*r*
			0x1CF7	*Reserved fault - External fault 8*	*r*
	high	Bit	0x1CF8	Fault - AM1 open circuit	r
			0x1CF9	Fault - test trip	r
			0x1CFA	Fault - DM-F safety-related tripping	r
			0x1CFB	Fault - DM-F wiring	r
			0x1CFC	Fault - DM-FL cross circuit	r
			0x1CFD	*Reserved*	*r*
			0x1CFE	*Reserved*	*r*
			0x1CFF	*Reserved*	*r*

1) r/w: Value is read/write; r: Value is read-only

3.5.2.6 Error memory

Read-only access to the error memory is possible via function codes 03 and 04 .

Max. data length per access: 63 registers.

Table 3-79 Error buffer

Input register		Entry	Designation[1)]	Type	Units	Access [2)]
Address	high/low					
0x2100		1	Time stamp	D word	1 s	r
0x2102	high		Entry - Type	Byte		r
	low		Entry - Info	Byte		r
0x2103		2	Time stamp	D word	1 s	r
0x2105	high		Entry - Type	Byte		r
	low		Entry - Info	Byte		r
...			...			r
0x213C		21	Time stamp	D word	1 s	r
0x213E	high		Entry - Type	Byte		r
	low		Entry - Info	Byte		r

1) The meaning of the error events can be found in the table "Alarm, fault, and system events, PROFIBUS error handling" in the SIMOCODE pro system manual.

2) r/w: Value is read/write; r: Value is read-only

3.5.2.7 Event memory

Read-only access to the event memory is possible via function codes 03 and 04.

Max. data length per access: 84 registers.

Table 3-80 Event memory

Input/holding register		Entry	Identifier	Type	Units	Access [2)]
Address	high/low					
0x2200		1	Time stamp	D word	1 s	r
0x2202	high		Entry - Type	Byte		r
	low		Entry - Info (part 1) [1)]	Byte		r
0x2203	high/low		Entry - Info (part 2) [1)]	Byte[2]		r
0x2204		2	Time stamp	D word	1 s	r
0x2206	high		Entry - Type	Byte		r
	low		Entry - Info (part 1) [1)]	Byte		r
0x2207	high/low		Entry - Info (part 2) [1)]	Byte[2]		r
0x2208		3	Time stamp	D word	1 s	r
0x220A	high		Entry - Type	Byte		r
	low		Entry - Info (part 1) [1)]	Byte		r
0x220B			Entry - Info (part 2) [1)]	Byte[2]		r
			...			r

Input/holding register		Entry	Identifier	Type	Units	Access 2)
Address	high/low					
0x2250		21	Time stamp	D word	1 s	r
0x2252	high		Entry - Type	Byte		r
	low		Entry - Info (part 1) 1)	Byte		r
0x2253	high/low		Entry - Info (part 2) 1)	Byte[2]		r

1) Entry - Info consists of a total of 3 bytes distributed across two register addresses respectively.

The following applies for the data set length: SIMOCODE pro V basic unit Modbus RTU: 168 byte

2) r/w: Value is read/write; r: Value is read-only

3.5.2.8 Trace data

Read-only access to the trace data is possible via function codes 03 and 04.

Max. data length per access: 63 registers.

Table 3-81 Trace data

Input/holding register			Identifier	Type	Range	Access 1)
Address	high/low byte; bit position	Bit				
0x2A80			StartPos	Word	0	r
0x2A81	high		Channel No.	Byte	0 ... 59	r
	low	0	Trace status - Trace recording in progress	Bit	0, 1	r
		1	Trace status - Trigger event occurred	Bit	0, 1	r
		2-7	*Reserved*	*Bit[6]*	*0*	*r*
0x2A82			Measured value (0)	Word	0 ... 65535	r
0x2A83			Measured value (1)	Word	0 ... 65535	r
...			...	Word	0 ... 65535	r
0x2ABD			Measured value (59)	Word	0 ... 65535	r

1) r/w: Value is read/write; r: Value is read-only

3.5.2.9 I&M0 - device identification

Read-only access to the I&M0 device identification is possible via function codes 03 and 04.

Max. data length per access: 32 registers.

Table 3-82 I&M (device identification)

Input register Address	Content	Size	Coding (H)	Access 1)
0x4000	RESERVED	10 byte	0x00, ... 0x00	r
0x4005	MANUFACTURER_ID	2 bytes	42 = 0x002A (SIEMENS AG)	r
0x4006	ORDER_ID	20 byte	"3UF7 ..."	r
0x4010	SERIAL_NUMBER	16 byte	ASCII	r
0x4018	HARDWARE_REVISION	2 bytes		r
0x4019	SOFTWARE_REVISION	4 byte	Va.b.c	r
0x401B	REVISION_COUNTER	2 bytes	0x0000	r
0x401C	PROFILE_ID	2 bytes	0x5E10 = VA, GG3 = 0	r
0x401D	PROFILE_SPECIFIC_TYPE	2 bytes	0x1039 = GG2_MBR	r
0x401E	IM_VERSION	2 bytes	0x0101 (V1.1)	r
0x401F	IM_SUPPORTED	2 bytes	0x000E	r

Data record length: 64 bytes

1) r/w: Value is read/write; r: Value is read-only

3.5.2.10 I&M1 data

Read access to the I&M1 data is possible via function codes 03 and 04. Write access is possible via function codes 06 and 16.

Max. data length per access: 32 registers.

Table 3-83 I&M1D data

Input/holding register Address	Content	Size	Access 1)
0x4020	*Reserved*	*10 byte*	*r*
0x4025	Plant identifier	32 byte	r/w
0x4035 ... 0x403F	Location designation	22 byte	r/w

Access to these designations via Modbus: read/write

1) r/w: Value is read/write; r: Value is read-only

3.5.2.11 I&M2 - Installation date

Read access to the I&M2 data is possible via function codes 03 and 04. Write access is possible via function codes 06 and 16.

Max. data length per access: 13 registers.

Table 3-84 I&M2 - Installation date

Input/holding register	Content	Size	Access [1]
Address			
0x4040	*Reserved*	*10 byte*	*r*
0x4045	Date	16 byte	r/w

1) Access to the installation date via Modbus: read/write

3.5.2.12 I&M3 - Comment

Read access to the I&M3 data is possible via function codes 03 and 04. Write access is possible via function codes 06 and 16.

Max. data length per access: 32 registers.

Table 3-85 I&M3 - Comment

Input/holding register	Content	Size	Access [1]
Address			
0x4060	*Reserved*	*10 byte*	*r*
0x4065 ... 0x407F	Comments	54 byte	r/w

1) Access to the comment via Modbus: read/write

3.5.2.13 Basic device parameter 1

Read access to the device parameters is possible from the register memory area with function codes 03 and 04.

Individual parameter data (marked with the motor symbol in the "Info" column) can be written via Modbus RTU via the register memory area with function codes 06 and 16. This function can be used to adjust settings such as the rated motor current during operation of the motor.

Max. data record length per access: 46 registers.

The "SIMOCODE ES (TIA Portal)" software is nonetheless required for full parameterization of the SIMOCODE pro V Modbus devices (see also Chapter "Commissioning with Modbus RTU" in the SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957)).

Table 3-86 Basic device parameter 1

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access [1]
Address	**high/low**	**Bit**								
0x4180			**Coordination**	Byte[4]						r
0x4182			**Device configuration**	Byte[8]						r

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access 1)
Address	**high/low**	**Bit**								
0x4186	high	0	No configuration fault due to OP	Bit	0, 1		0			r
		1	Startup parameter block active	Bit	0, 1		0			r
		2	TEST/RESET buttons blocked	Bit	0, 1		0			r
		3	Bus and PLC/PCS - Reset	Bit	0, 1		0	0 = Manual 1 = Auto		r
		4	*Reserved*	*Bit*			*0*			*r*
		5	*Reserved*	*Bit*			*0*			*r*
		6	*Reserved*	*Bit*			*0*			*r*
		7	*Reserved*	*Bit*			*0*			*r*
	low	0	Diagnostics for process events	Bit	0, 1		0			r
		1	Diagnostics for process warnings	Bit	0, 1		1			r
		2	Diagnostics for process faults	Bit	0, 1		1			r
		3	Diagnostics for device faults	Bit	0, 1		1			r
		4	*Reserved*	*Bit*			*0*			*r*
		5	*Reserved*	*Bit*			*0*			*r*
		6	Bus monitoring	Bit	0, 1		1			r
		7	PLC/PCS monitoring	Bit	0, 1		1			r

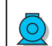
Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access 1)
Address	high/low	Bit								
0x4187	high	0	Motor protection - Type of load	Bit	0, 1		0	0 = 3-phase 1 = 1-phase		r
		1	Motor protection - Reset	Bit	0, 1		0	0 = Manual 1 = Auto		r
		2	*Reserved*	*Bit*			*0*			*r*
		3	Save change-over command	Bit	0, 1		0			r
		4	Non-maintained command mode	Bit	0, 1		0			r
		5	Cold start level (TPF)	Bit	0, 1		0	0 = NO contact 1 = NC contact		r
		6	Type of consumer load	Bit	0, 1		0	0 = Motor 1 = ohmic load		r
		7	*Reserved*	*Bit*			*0*			*r*
	low	0	External fault level 1	Bit	0, 1		0	0 = NO contact 1 = NC contact		r
		1	External fault level 2	Bit	0, 1		0			r
		2	External fault level 3	Bit	0, 1		0			r
		3	External fault level 4	Bit	0, 1		0			r
		4	Monitoring external fault 1	Bit	0, 1		0	0 = Always 1 = Only motor ON		r
		5	Monitoring external fault 2	Bit	0, 1		0			r
		6	Monitoring external fault 3	Bit	0, 1		0			r
		7	Monitoring external fault 4	Bit	0, 1		0			r
			Part - Bit[2] parameter							

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access 1)
Address	high/low	Bit								
0x4188	high	0-1	Thermistor - Overload response	Bit[2]	1, 2, 3		3	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping		r
		2-3	Thermistor - Response to sensor fault	Bit[2]	0, 1, 2, 3		2			r
		4-5	Internal ground fault - Response	Bit[2]	0, 1, 2, 3		0			r
		6-7	Motor protection - Overload response	Bit[2]	0, 1, 2, 3		0			r
	low	0-1	Motor protection - Overload response	Bit[2]	0, 1, 2		2			r
		2-3	Motor protection - Response to unbalance	Bit[2]	0, 1, 2, 3		2			r
		4-5	Trip response I>	Bit[2]	0, 1, 3		0			r
		6-7	Warning response I>	Bit[2]	0, 1, 2		0			r
0x4189	high	0-1	Trip response I<	Bit[2]	0, 1, 3		0			r
		2-3	Warning response I<	Bit[2]	0, 1, 2		0			r
		4-5	Response to stalled rotor	Bit[2]	0, 1, 2, 3		0			r
		6-7	EM+ - Response to sensor fault	Bit[2]	0, 1, 2, 3		0			r
	low	0-1	Response to number of starts >	Bit[2]	0, 1, 2, 3		0			r
		2-3	Response to early warning number of starts >	Bit[2]	0, 1, 2		0			r
		4-5	Motor operating hours response >	Bit[2]	0, 1, 2		0			r
		6-7	Motor stop time response >	Bit[2]	0, 1, 2		0			r
0x418A	high	0-1	External fault response 1	Bit[2]	1, 2, 3		1			r
		2-3	External fault response 2	Bit[2]	1, 2, 3		1			r
		4-5	External fault response 3	Bit[2]	1, 2, 3		1			r
		6-7	External fault response 4	Bit[2]	1, 2, 3		1			r
	low	0-1	*Reserved*	*Bit[2]*			*0*			r

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access 1)
Address	high/low	Bit								
		2-3	Delay for BU inputs	Bit[2]	0 ... 3	10 ms	1	Offset 6 ms		r
		4-5	Timer 1 - type	Bit[2]	0, 1, 2, 3		0	0 = With closing delay 1 = Closing delay with memory 2 = With OFF delay 3 = With fleeting closing		r
		6-7	Timer 2 - type	Bit[2]	0, 1, 2, 3		0			r
0x418B	high	0-1	Signal conditioning 1 - type	Bit[2]	0, 1, 2, 3		0	0 = Non-inverting 1 = Inverting 2 = Edge rising with memory 3 = Edge falling with memory		r
		2-3	Signal conditioning 2 - type	Bit[2]	0, 1, 2, 3		0			r
		4-5	Non-volatile element 1 - type	Bit[2]	0, 1, 2, 3		0			r
		6-7	Non-volatile element 2 - type	Bit[2]	0, 1, 2, 3		0			r
	low	0-1	EM+ - monitoring	Bit[2]	0, 1, 2, 3		0	0 = on 1 = on+ 2 = run 3 = run+		r
		2-3	EM+ - monitoring warning	Bit[2]	0, 1, 2, 3		0			r
		4-5	*Reserved*	*Bit[2]*			*0*			*r*
		6-7	*Reserved*	*Bit[2]*			*0*			*r*
			Part - Bit[4] parameters							r
0x418C	high		Reset response external fault 1	Bit[4]	0 ... 1111B		0101B	Bit[0] = Panel reset Bit[1] = Auto reset Bit[2] = Remote reset Bit[1] = OFF command reset		r
			Reset response external fault 2	Bit[4]	0 ... 1111B		0101B			r
	low		Reset response external fault 3	Bit[4]	0 ... 1111B		0101B			r
			Reset response external fault 4	Bit[4]	0 ... 1111B		0101B			r
0x418D	high	0-3	Hysteresis current levels	Bit[4]	0 ... 15	1 %	5			r
		4-7	EM+ - hysteresis	Bit[4]	0 ... 15	1 %	5			r
	low		*Reserved*	*Bit[4]*			*0*			*r*
			Reserved	*Bit[4]*			*0*			*r*
			Part - Byte parameters							

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access 1)
Address	high/low	Bit								
0x418E	high		Internal ground fault - Delay	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w
	low		Motor protection - Class	Byte	5, 10 ... 35, 40		10			r/w
0x418F	high		Motor protection - Delay with overload operation	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w
	low		Motor protection - Unbalance level	Byte	0 ... 100	1 %	40		IM UM(+)	r/w
0x4190	high		Motor protection - Delay with unbalance	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w
	low		Interlocking time	Byte	0 ... 255	1 s	0			r/w
0x4191	high		FB time	Byte	0 ... 255	100 ms	5	0 = Disabled		r/w
	low		Trip level I>	Byte	0 ... 255	4 % / I_s	0		IM UM(+)	r/w
0x4192	high		Warning level I>	Byte	0 ... 255	4 % / I_s	0		IM UM(+)	r/w
	low		Trip level I<	Byte	0 ... 255	4 % / I_s	0		IM UM(+)	r/w
0x4193	high		Warning level I<	Byte	0 ... 255	4 % / I_s	0		IM UM(+)	r/w
	low		Stalled rotor level	Byte	0 ... 255	4 % / I_s	0		IM UM(+)	r/w
0x4194	high		Trip delay I>	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w
	low		Warning delay I>	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w
0x4195	high		Trip delay I<	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w
	low		Warning delay I<	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access 1)
Address	high/low	Bit								
0x4196	high		Blocking delay	Byte	0 ... 255	100 ms	5		IM UM(+)	r/w
	low		Monitoring the number of starts - Permissible starts	Byte	1 ... 255		1			r/w
0x4197	high		*Reserved*	*Byte*			*0*			
	low		EM+ - warning delay	Byte	0 ... 255	100 ms	1			r/w
0x4198	high		Truth table 1 type 3I/1O	Byte	0 ... 11111111B		0			r
	low		Truth table 2 type 3I/1O	Byte	0 ... 11111111B		0			r
0x4199	high		Truth table 3 type 3I/1O	Byte	0 ... 11111111B		0			r
	low		*Reserved*	Byte			0			r
			Part - Word parameters							
0x419A			Motor protection - Cooling down period	Word	600 ... 65535	100 ms	3000		IM UM(+)	r/w
0x419B			Motor protection - Pause time	Word	0 ... 65535	100 ms	0	0 = Disabled	IM UM(+)	r/w
0x419C			Execution time	Word	0 ... 65535	100 ms	10	0 = Disabled		r/w
0x419D			Monitoring the number of starts - Time range for starts	Word	0 ... 65535	1 s	0			r/w
0x419E			Monitoring the number of starts - Interlocking time	Word	0 ... 65535	1 s	0			r/w
0x419F			Motor stop time level >	Word	0 ... 65535	1 h	0			r/w
0x41A0			Timer 1 value	Word	0 ... 65535	100 ms	0			r/w
0x41A1			Timer 2 value	Word	0 ... 65535	100 ms	0			r/w
0x41A2			Counter 1 value	Word	0 ... 65535		0			r/w
0x41A3			Counter 2 value	Word	0 ... 65535		0			r/w
0x41A4			EM+ - trip level	Word	30 ... 40000	1 mA	1000			r/w
0x41A5			EM+ - warning level	Word	30 ... 40000	1 mA	500			r/w

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Info	Access 1)
Address	high/low	Bit								
			Part - D word parameter							
0x41A6			Operator control enables	Bit[32]	0 ... 1 ... 1B		0 ... 0B			r
0x41A8			Motor protection - Set current Is1 2)	D word		10 mA	30		IM UM(+) 	r/w
0x41AA			Motor operating hours level >	D word	0 ... 0xFFFFFFFF	1 s	0			r/w
0x41AC			*Reserved*	*D-word*			*0*			*r*

1) r/w: Value is read/write; r: Value is read-only

2) Bit 15 = 1 → Transformation ratio active

3.5.2.14 Extended device parameters 1

Read access to the device parameters is possible from the register memory area with function codes 03 and 04.

Individual parameter data (marked with the motor symbol in the "Info" column) can be written via Modbus RTU via the register memory area with function codes 06 and 16. This function can be used to adjust settings such as the rated motor current during operation of the motor.

The "SIMOCODE ES (TIA Portal)" software is nonetheless required for full parameterization of the SIMOCODE pro V Modbus devices (see also Chapter "Commissioning with Modbus RTU" in the SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957)).

Max. data length per access: 72 registers.

Table 3-87 Extended device parameters 1

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access 1)	Info
Address	high/low	Bit								
0x4380			**Coordination**	Byte[4]					r	
			Part - Bit parameters							

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access 1)	Info
Address	high/low	Bit								
0x4382	high	0	3UF50 compatibility mode	Bit	0, 1		0		r	
		1	3UF50 operating mode	Bit	0, 1		0	0 = DPV0 1 = DPV1	r	
		2	*Reserved*	*Bit*			*0*		r	
		3	*Reserved*	*Bit*			*0*		r	
		4	*Reserved*	*Bit*			*0*		r	
		5	*Reserved*	*Bit*			*0*		r	
		6	*Reserved*	*Bit*			*0*		r	
		7	*Reserved*	*Bit*			*0*		r	
	low	0	*Reserved*	*Bit*			*0*		r	
		1	Voltage measuring - Type of load	Bit	0, 1		0	0 = 3-phase 1 = 1-phase	r	
		2	OPD - Warnings	Bit	0, 1		0	0 = Do not display 1 = Display	r	from E03
		3	OPD - Faults	Bit	0, 1		1			
		4	AM1 - Measuring range input	Bit	0, 1		0	0 = 0 ... 20 mA 1 = 4 ... 20 mA	r	
		5	AM1 - Measuring range Output	Bit	0, 1		0		r	
		6	*Reserved*	*Bit*			*0*		*r*	
		7	*Reserved*	*Bit*			*0*		*r*	

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access [1)]	Info
Address	high/low	Bit								
0x4383	high	0	Overshooting/ undershooting limit 1	Bit	0, 1		0	0 = > (overshooting) 1 = < (undershooting)	r	
		1	Overshooting/ undershooting limit 2	Bit	0, 1		0		r	
		2	Overshooting/ undershooting limit 3	Bit	0, 1		0		r	
		3	Overshooting/ undershooting limit 4	Bit	0, 1		0		r	
		4	Line-to-line voltage	Bit	0, 1		0	0 = No 1 = Yes	r	
		5	OPO level	Bit	0, 1		0	0 = NO contact 1 = NC contact	r	
		6	Positioner response for OPO	Bit	0, 1		0	0 = CLOSED 1 = OPEN	r	
		7	Star-delta - Transformer mounting	Bit	0, 1		0	0 = Delta 1 = In supply cable	r	
	low	0	External fault level 5	Bit	0, 1		0	0 = NO contact 1 = NC contact	r	
		1	External fault level 6	Bit	0, 1		0		r	
		2	*Reserved*	*Bit*			*0*		*r*	
		3	*Reserved*	*Bit*			*0*		*r*	
		4	Monitoring external fault 5	Bit	0, 1		0	0 = Always 1 = Only motor ON	r	
		5	Monitoring external fault 5	Bit	0, 1		0		r	
		6	*Reserved*	*Bit*	*0, 1*		*0*		r	
		7	*Reserved*	*Bit*	*0, 1*		*0*		r	

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access 1)	Info
Address	high/low	Bit								
0x4384	high	0	Calculator 2 - Operating mode	Bit	0, 1		0	0 = Word 1 = D word	r	
		1	*Reserved*	*Bit*			*0*		*r*	
		2	DM-F - Safe tripping function	Bit	0, 1		0	0 = No 1 = Yes	r	
		3	DM-F - Safety-related tripping reset	Bit	0, 1		0	0 = Manual 1 = Auto	r	
		4	Time stamping active	Bit	0, 1		0		r	
		5	*Reserved*	*Bit*			*0*		*r*	
		6	*Reserved*	*Bit*			*0*		*r*	
		7	*Reserved*	*Bit*			*0*		*r*	
	low	0	DM-FL - Configuration 1	Bit	0, 1		0	Configurable parameters comparable with the module configuration	r	
		1	DM-FL - Configuration 2	Bit	0, 1		0		r	
		2	DM-FL - Configuration 3	Bit	0, 1		0		r	
		3	DM-FL - Configuration 4	Bit	0, 1		0		r	
		4	DM-FL - Configuration 5	Bit	0, 1		0		r	
		5	DM-FL - Configuration 6	Bit	0, 1		0		r	
		6	DM-FL - Configuration 7	Bit	0, 1		0		r	
		7	DM-FL - Configuration 8	Bit	0, 1		0		r	
			Part - Bit[2] parameter						r	

Input/holding register			Designation	Type	Range	Unit	De-fault	Comments	Access 1)	Info
Address	**high/low**	**Bit**								
0x4385	high	0-1	3UF50 basic type	Bit[2]	0, 1, 2		0		r	
		2-3	*Reserved*	*Bit[2]*			*0*		r	
		4-5	UVO timebase	Bit[2]	0, 1, 2		0	0 = 100 ms 1 = 1 s 2 = 10 s	r	
		6-7	UVO operating mode	Bit[2]	0, 1, 2		0	0 = Disabled 1 = Device connected to voltage (reserved) 2 = Voltage fails	r	
	low	0-1	Trip monitoring U<	Bit[2]	0, 1, 2		1	0 = ON (always) 1 = ON+ (always, not TPF) 2 = RUN (motor ON, not TPF)	r	
		2-3	Warning monitoring U <	Bit[2]	0, 1, 2		1		r	
		4-5	*Reserved*	*Bit[2]*			*0*		*r*	
		6-7	Reserved	*Bit[2]*			*0*		*r*	
0x4386	high	0-1	Trip monitoring 0/4-20mA >	Bit[2]	0, 1, 2, 3		0		r	
		2-3	Warning monitoring 0/4-20mA >	Bit[2]	0, 1, 2, 3		0		r	
		4-5	Trip monitoring 0/4-20mA <	Bit[2]	0, 1, 2, 3		0		r	
		6-7	Warning monitoring 0/4-20mA <	Bit[2]	0, 1, 2, 3		0		r	
	low	0-1	Monitoring limit 1	Bit[2]	0, 1, 2, 3		0		r	
		2-3	Monitoring limit 2	Bit[2]	0, 1, 2, 3		0		r	
		4-5	Monitoring limit 3	Bit[2]	0, 1, 2, 3		0		r	
		6-7	Monitoring limit 4	Bit[2]	0, 1, 2, 3		0		r	

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access [1)]	Info
Address	**high/low**	**Bit**								
0x4387	high	*0-1*	*Reserved*	*Bit[2]*			*0*		*r*	
		2-3	*Reserved*	*Bit[2]*			*0*		*r*	
		4-5	*Reserved*	*Bit[2]*			*0*		*r*	
		6-7	AM1 - active inputs	Bit[2]	0, 1, 2		0	0 = 1 input 1 = 2 inputs 2 = 3 inputs	r	
	low	0-1	DM - Input delay	Bit[2]	0 ... 3	10 ms	1	Offset 6 ms	r	
		2-3	AM1 - Response to open circuit	Bit[2]	1, 2, 3		2	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	*r*	
		4-5	EM - response to an external ground fault	Bit[2]	1, 3		1		r	
		6-7	EM - response to warning of an external ground fault	Bit[2]	0, 1, 2		0		r	
0x4388	high	0-1	*Reserved*	*Bit[2]*			*0*		*r*	
		2-3	*Reserved*	*Bit[2]*			*0*		*r*	
		4-5	DM-F - Test requirement response	Bit[2]	0, 1, 2		0		r	
		6-7	DM-F - safety-related tripping response	Bit[2]	0, 1, 2, 3		0		r	
	low	0-1	TM1 - Trip response T>	Bit[2]	1, 3		3		r	
		2-3	TM1 - Warning response T>	Bit[2]	0, 1, 2		2		r	
		4-5	TM1 - Response to a sensor fault / out of range	Bit[2]	0, 1, 2, 3		2		r	
		6-7	TM1 - active sensors	Bit[2]	0, 1, 2		2*)	0 = 1 sensors 1 = 2 sensors 2 = 3 sensors	r	

Input/holding register			Designation	Type	Range	Unit	De-fault	Comments	Access [1)]	Info
Address	**high/low**	**Bit**								
0x4389	high	0-1	Trip response P>	Bit[2]	0, 1, 3		0	0 = Disabled 1 = Signaling 2 = Warn 3 = Tripping	r	
		2-3	Warning response P>	Bit[2]	0, 1, 2		0			
		4-5	Trip response P<	Bit[2]	0, 1, 3		0		r	
		6-7	Warning response P<	Bit[2]	0, 1, 2		0		r	
	low	0-1	Trip response cos phi <	Bit[2]	0, 1, 3		0		r	
		2-3	Warning response cos phi <	Bit[2]	0, 1, 2		0		r	
		4-5	Trip response U<	Bit[2]	0, 1, 3		0		r	
		6-7	Warning response U<	Bit[2]	0, 1, 2		0		r	
0x438A	high	0-1	Trip response 0/4-20 mA >	Bit[2]	0, 1, 3		0		r	
		2-3	Warning response 0/4-20 mA >	Bit[2]	0, 1, 2		0		r	
		4-5	Trip response 0/4-20 mA <	Bit[2]	0, 1, 3		0		r	
		6-7	Warning response 0/4-20 mA <	Bit[2]	0, 1, 2		0		r	
	low	*0-1*	*Reserved*	*Bit[2]*			*0*		*r*	
		2-3	*Reserved*	*Bit[2]*			*0*		*r*	
		4-5	*Reserved*	*Bit[2]*			*0*		*r*	
		6-7	*Reserved*	*Bit[2]*			*0*		*r*	
0x438B	high	0-1	External fault response 5	Bit[2]	1, 2, 3		1		r	
		2-3	External fault response 6	Bit[2]	1, 2, 3		1		r	
		4-5	*Reserved*	*Bit[2]*			*0*		*r*	
		6-7	*Reserved*	*Bit[2]*			*0*		*r*	
	low	0-1	Trace - Trigger edge	Bit[2]	0, 1		0	0 = positive 1 = negative	r	
		2-3	*Reserved*	*Bit[2]*			*0*		*r*	
		4-5	*Reserved*	*Bit[2]*			*0*		*r*	
		6-7	*Reserved*	*Bit[2]*			*0*		*r*	

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access 1)	Info
Address	high/low	Bit								
0x438C	high	*0-1*	*Reserved*	*Bit[2]*			*0*		*r*	
		2-3	*Reserved*	*Bit[2]*			*0*		*r*	
		4-5	*Reserved*	*Bit[2]*			*0*		*r*	
		6-7	*Reserved*	*Bit[2]*			*0*		*r*	
	low	0-1	Timer 3 - type	Bit[2]	0, 1, 2, 3		0	0 = With closing delay 1 = Closing delay with memory 2 = With OFF delay 3 = With fleeting closing	r	
		2-3	Timer 4 - type	Bit[2]	0, 1, 2, 3		0		r	
		4-5	Signal conditioning 3 - type	Bit[2]	0, 1, 2, 3		0	0 = Non-inverting 1 = Inverting 2 = Edge rising with memory 3 = Edge falling with memory	r	
		6-7	Signal conditioning 4 - type	Bit[2]	0, 1, 2, 3		0		r	
0x438D	high	0-1	Non-volatile element 3 - type	Bit[2]	0, 1, 2, 3		0		r	
		2-3	Non-volatile element 4 - type	Bit[2]	0, 1, 2, 3		0		r	
		4-5	Calculator 2 - Operator	Bit[2]	0, 1, 2, 3		0		r	
		6-7	*Reserved*	*Bit[2]*			*0*		*r*	
	low	0-1	*Reserved*	*Bit[2]*			*0*		*r*	
		2-3	*Reserved*	*Bit[2]*			*0*		*r*	
		4-5	OPD - Operator panel display (bit 0 ... 1)	Bit[2]	0 ... 4		2	0 = Manual 1 = 3 s 2 = 10 s 3 = 1 min 4 = 5 min	r	from E0 3
		6-7	OPD - Operator panel display (bit 2 ... 3)	Bit[2]					r	
			Part - Bit[4] parameters						r	

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access 1)	Info
Address	high/low	Bit								
0x438E	high	0-2	TM1 - sensor type	Bit[3]	000B to 100B		000B	000B = PT100 001B = PT1000 010B = KTY83 011B = KTY84 100B = NTC	r	
			Reserved	*Bit*					*r*	
		4-7	OPD - Language	Bit[4]	0 ... 15		0		r	from E03
	low	0-3	Reset response external fault 5	Bit[4]	0 ... 1111B		0101B	Bit[0] = Panel reset Bit[1] = Auto reset Bit[2] = Remote reset Bit[3] = OFF command reset	r	
		4-7	Reset response external fault 6	Bit[4]	0 ... 1111B		0101B		r	
0x438F	high	0-3	OPD - Contrast (bit 0 ... 3)	Bit[4]	0 ... 255	1 %	50		r	from E03
		4-7	OPD - Contrast (bit 4 ... 7)	Bit[4]					r	
	low	0-3	OPD - Profile (bit 0 ... 3)	Bit[4]	0 ... 33		0		r	
		4-7	OPD - Profile (bit 4 ... 7)	Bit[4]					r	
0x4390	high	0-3	Truth table 7 type 2I/1O	Bit[4]	0 ... 1111B		0		r	
		4-7	Truth table 8 type 2I/1O	Bit[4]	0 ... 1111B		0		r	
	low	0-3	Is1 conversion factor - Denominator	Bit[4]	0 ... 15		0		r	
		4-7	Is2 conversion factor - Denominator	Bit[4]	0 ... 15		0		r	
0x4391	high	0-3	Hysteresis P - cos phi - U	Bit[4]	0 ... 15	1 %	5		r	
		4-7	Hysteresis 0/4-20 mA	Bit[4]	0 ... 15	1 %	5		r	
	low	0-3	Hysteresis free limits	Bit[4]	0 ... 15	1 %	5		r	
		4-7	OPD - Lighting	Bit[4]	0 ... 4		2	0 = OFF 1 = 3 s 2 = 10 s 3 = 1 min 4 = 5 min	r	from E03
			Part - Byte parameters							

Input/holding register			**Designation**	**Type**	**Range**	**Unit**	**De-fault**	**Comments**	**Access** [1)]	**Info**
Address	**high/low**	**Bit**								
0x4392	high			*Byte*					*r*	
	low		EM - Delay	Byte	0 ... 255	100 ms	5		r/w	EM
0x4393	high		Trip level cos phi<	Byte	0 ... 100	1 %	0		r/w	UM
	low		Warning level cos phi<	Byte	0 ... 100	1 %	0		r/w	UM
0x4394	high		Trip level U<	Byte	0 ... 255	8 V	0		r/w	UM
	low		Warning level U<	Byte	0 ... 255	8 V	0		r/w	UM
0x4395	high		Trip level 0/4-20 mA>	Byte	0 ... 255	*128	0		r/w	AM1
	low		Warning level 0/4-20mA>	Byte	0 ... 255	*128	0		r/w	AM1
0x4396	high		Trip level 0/4-20 mA<	Byte	0 ... 255	*128	0		r/w	AM1
	low		Warning level 0/4-20mA>	Byte	0 ... 255	*128	0		r/w	AM1
0x4397	high		Trip delay P>	Byte	0 ... 255	100 ms	5		r/w	UM
	low		Warning delay P>	Byte	0 ... 255	100 ms	5		r/w	UM
0x4398	high		Trip delay P<	Byte	0 ... 255	100 ms	5		r/w	UM
	low		Warning delay P<	Byte	0 ... 255	100 ms	5		r/w	UM
0x4399	high		Trip delay cos phi<	Byte	0 ... 255	100 ms	5		r/w	UM
	low		Warning delay cos phi<	Byte	0 ... 255	100 ms	5		r/w	UM

Input/holding register Address	high/low	Bit	Designation	Type	Range	Unit	Default	Comments	Access [1]	Info
0x439A	high		Trip delay U<	Byte	0 ... 255	100 ms	5		r/w	UM
	low		Warning delay U<	Byte	0 ... 255	100 ms	5		r/w	UM
0x439B	high		Trip delay 0/4-20 mA>	Byte	0 ... 255	100 ms	5		r/w	AM1
	low		Warning delay 0/4-20 mA>	Byte	0 ... 255	100 ms	5		r/w	AM1
0x439C	high		Trip delay 0/4-20 mA<	Byte	0 ... 255	100 ms	5		r/w	AM1
	low		Warning delay 0/4-20 mA<	Byte	0 ... 255	100 ms	5		r/w	AM1
0x439D	high		Delay limit 1	Byte	0 ... 255	100 ms	5		r/w	
	low		Delay limit 2	Byte	0 ... 255	100 ms	5		r/w	
0x439E	high		Delay limit 3	Byte	0 ... 255	100 ms	5		r/w	
	low		Delay limit 3	Byte	0 ... 255	100 ms	5		r/w	
0x439F	high		TM - Hysteresis	Byte	0 ... 255	1 K	5		r	
	low		Max. star time	Byte	0 ... 255	1 s	20		r	
0x43A0	high		UVO time	Byte	0 ... 255	100 ms, 1 s, 10 s	0		r	
	low		Staggering time	Byte	0 ... 255	1 s	0		r	
0x43A1	high		Trace - Pre-trigger	Byte	0 ... 20	5%	0		r	
	low		Calculator 2 - Denominator 1	Byte	0 ... 255		0		r	
0x43A2	high		Calculator 2 - Numerator 2	Byte	0 ... 255		0		r	
	low		Calculator 1 - Denominator	Byte	0 ... 255		0		r	
0x43A3	high		Truth table 4 type 3I/1O	Byte	0 ... 11111111B		0		r	
	low		Truth table 5 type 3I/1O	Byte	0 ... 11111111B		0		r	

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access [1)]	Info
Address	high/low	Bit								
0x43A4	high		Truth table 6 type 3I/1O	Byte	0 ... 111 11111B		0		r	
	low		Calculator 2 - Numerator 1	Byte	-128 ... 127		0		r/w	
0x43A5	high		Calculator 2 - Denominator 2	Byte	-128 ... 127		0		r/w	
	low		DM-F - Test requirement level	Byte	0 ... 255	Week	0		r/w	
			Part - Word parameters						r/w	
0x43A6			AM1 - Start value output	Word	0 ... 65535		0	Value for 0/4 mA	r/w	AM1
0x43A7			AM1 - End value output	Word	0 ... 65535		27648	Value for 20 mA	r/w	AM1
0x43A8			TM1 - Trip level T>	Word	0 ... 65535	1 K	0		r/w	TM1
0x43A9			TM1 - Warning level T>	Word	0 ... 65535	1 K	0		r/w	TM1
0x43AA			Limit level 1	Word	0 ... 65535		0		r/w	
0x43AB			Limit level 2	Word	0 ... 65535		0		r/w	
0x43AC			Limit level 3	Word	0 ... 65535		0		r/w	
0x43AD			Limit level 4	Word	0 ... 65535		0		r/w	
0x43AE			Timer 3 - value	Word	0 ... 65535	100 ms	0		r	
0x43AE			Timer 4 - value	Word	0 ... 65535	100 ms	0		r	
0x43B0			Counter 3 - value	Word	0 ... 65535		0		r/w	
0x43B1			Counter 4 - value	Word	0 ... 65535		0		r/w	
0x43B2			Change-over pause	Word	0 ... 65535	10 ms	0		r/w	
0x43B3			Trace - Sampling period	Word	1 ... 50000	1 ms	100		r/w	
0x43B4			Is1 - Conversion factor - Numerator	Word	0 ... 65535	1/8	0		r/w	
0x43B5			Is2 - Conversion factor - Numerator	Word	0 ... 65535	1/8	0		r/w	

Input/holding register			Designation	Type	Range	Unit	Default	Comments	Access 1)	Info
Address	high/low	Bit								
			Part - D word parameter							
0x43B6			Motor protection - Set current Is2	D word		10 mA	0		r	
0x43B8			Trip level P>	D word	0 ... 0xFFFFFFFF	1 W	0		r/w	
0x43BA			Warning level P>	D word	0 ... 0xFFFFFFFF	1 W	0		r/w	
0x43BC			Trip level P<	D word	0 ... 0xFFFFFFFF	1 W	0		r/w	
0x43BE			Warning level P<	D word	0 ... 0xFFFFFFFF	1 W	0		r/w	
0x43C0			Truth table 9 5I/2O type - Output 1	Bit[32]	0 ... 1 ... 1B		0		r	
0x43C2			Truth table 9 5I/2O type - Output 2	Bit[32]	0 ... 1 ... 1B		0		r	
0x43C4			Calculator 2 - Offset	D word	-0x80000000 ... 0x7FFFFFFF		0		r	
0x43C6 ... 0x43C7			Calculator 1 - Numerator/Offset	D word	2x -32768 ... 32767		0		r	

1) r/w: Value is read/write; r: Value is read-only

3.5.2.15 Marking

Read access to the labeling is possible via function codes 03 and 04. Write access is possible via function codes 06 and 16.

Max. data length per access: 100 registers.

Table 3-88 Marking

Input/holding register		Identifier	Type	Access 1)
Address	high/low			
0x4880		Coordination	Byte[4]	r
0x4882		*Reserved*	*Byte[6]*	*r/w*
0x4885		Marking - external fault 1	Byte[10]	r/w
0x488A		Marking external fault 2	Byte[10]	r/w
0x488F		Marking external fault 3	Byte[10]	r/w
0x4894		Marking external fault 4	Byte[10]	r/w
0x4899		Marking external fault 5	Byte[10]	r/w
0x489E		Marking external fault 6	Byte[10]	r/w
0x48A3		*Reserved*	*Byte[10]*	*r/w*

Input/holding register		Identifier	Type	Access [1]
Address	high/low			
0x48A8		*Reserved*	*Byte[10]*	*r/w*
0x48AD		Marking limit 1	Byte[10]	r/w
0x48B2		Marking limit 2	Byte[10]	r/w
0x48B7		Marking limit 3	Byte[10]	r/w
0x48BC		Marking limit 4	Byte[10]	r/w
0x48C1		Marking TM1 warning T >	Byte[10]	r/w
0x48C6		Marking TM1 trip T >	Byte[10]	r/w
0x48CB		Marking warning 0/4-20mA >	Byte[10]	r/w
0x48D0		Marking warning 0/4-20mA <	Byte[10]	r/w
0x48D5		Trip marking 0/4-20mA >	Byte[10]	r/w
0x48DA		Trip marking 0/4-20mA <	Byte[10]	r/w
0x48DF		*Reserved*	*Byte[10]*	*r/w*

Data record length: 200 bytes

1) Access to the marking via Modbus: read/write

3.6 EtherNet/IP data tables

3.6.1 Supported objects

The following CIP (Common Industrial Protocol) objects and SIMOCODE objects are supported:

Table 3-89 Device profile - supported objects

Object name	Object class	CIP objects	SIMOCODE objects	Object length
Identity object (Page 307)	0x0001	X		
Message Router object (Page 308)	0x0002	X		
Assembly object (Page 308)	0x0004	X		
Connection Manager object (Page 318)	0x0006	X		
Control Supervisor object	0x0029	X		
DLR object	0x0047	X		
QoS object	0x0048	X		
Device Diagnosis object (Page 318)	0x0096		X	46 bytes
Measurement object (Page 319)	0x0097		X	240 bytes
Statistical Data object (Page 321)	0x0098		X	228 bytes
Motor Parameter object (Page 323)	0x0099		X	116 bytes

Object name	Object class	CIP objects	SIMOCODE objects	Object length
TCP/IP Interface object (Page 324)	0x00F5	X		
Ethernet Link object (Page 325)	0x00F6	X		
Overload object	0x002C	X		

3.6.2 Identity object

The following information applies to the Identity object of the SIMOCODE pro V EtherNet/IP device:

- Class code: 0x0001
- Class attributes: 1, 2, 3
- Number of instances: 1

Table 3-90 Attributes of instance 1 for the Identity object

Attribute ID	Access	Name	Data type	Value / comment
1	Get	Manufacturer	UINT	1251
2	Get	Device Type	UINT	0x03
3	Get	Product Code	UINT	2000
4	Get	Revision	STRUCT of	Device revision level
		Major Revision	USINT	
		Minor Revision	USINT	
5	Get	Device_Status	WORD	Defined in the "Device_Status" definition table below
6	Get	Serial number	UDINT	Device serial number
7	Get	Product Name	SHORT_STRING	SIMOCODE pro V EIP

Table 3-91 Device_Status definitions for the Identity object

Bit (s)	Query	Definition
0	Ownership	0 = Not owned 1 = Device has an owner
	I/O communication is active	Always 0
2	Configured	0 = Device still in delivery state 1 = Configuration changed
3	Reserved	
4, 5, 6, 7	Extended device status	Not supported
8	Minor rectifiable fault/error	Not supported
9	Minor non-rectifiable fault/error	Not supported

Bit (s)	Query	Definition
10	Serious rectifiable fault/error	Serious problem with configuration such as module fault, configuring error, parameterization error, temporary components fault
11	Serious non-rectifiable fault/error	Serious device fault, e.g. basic unit hardware fault
12 - 15	Reserved	Always 0

Table 3-92 **General services for the Identity object**

Service code	Available service		Service designation	Description
	Class	Instance		
0x01	No	Yes	Get_Attributes_All	Supplies contents of all attributes
0x0E	No	Yes	Get_Attribute_Single	Supplies contents of one attribute

Table 3-93 Class attributes

Attribute ID	Access	Description	Data type
1	Get	Revision	UINT
2	Get	Max Instance	UINT
3	Get	Num of Instances	UINT

3.6.3 Message Router object

The Message Router object is defined by CIP. It does not possess any class or instance attributes, but simply transfers explicit messages to the relevant objects.

3.6.4 Assembly object

The following information applies to the Assembly object of the SIMOCODE pro V EtherNet/IP device:

- Class code: 0x04
- Class attributes: 1, 2, 3
- Number of instances: 13

Instance 2: Output assembly basic overload from ODVA Profile

The tables below describe in each case the format of attribute 3 of the relevant assembly instance.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Fault Reset	Reserved	Reserved

Instance 50: Input assembly basic overload from ODVA Profile

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Faulted / Trip

Instance 51: Input assembly extended overload from ODVA Profile

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Warning	Faulted / Trip

Instance 100: Output assembly SIMOCODE basic type 1

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. receive byte 0 - bit 0.7	Cycl. receive byte 0 - bit 0.6	Cycl. receive byte 0 - bit 0.5	Cycl. receive byte 0 - bit 0.4	Cycl. receive byte 0 - bit 0.3	Cycl. receive byte 0 - bit 0.2	Cycl. receive byte 0 - bit 0.1	Cycl. receive byte 0 - bit 0.0
1	Cycl. receive byte 1 - bit 1.7	Cycl. receive byte 1 - bit 1.6	Cycl. receive byte 1 - bit 1.5	Cycl. receive byte 1 - bit 1.4	Cycl. receive byte 1 - bit 1.3	Cycl. receive byte 1 - bit 1.2	Cycl. receive byte 1 - bit 1.1	Cycl. receive byte 1 - bit 1.0
2 ... 3	Cycl. receive byte 2/3 - analog value 1							

The values passed to SIMOCODE pro via instance 100 can be processed further in the SIMOCODE ES (TIA Portal) software.

Corresponding function blocks in the SIMOCODE ES (TIA Portal) charts:

Default settings of cyclic receive and send data: See Assignment of cyclic receive and send data for predefined control functions (Page 115).

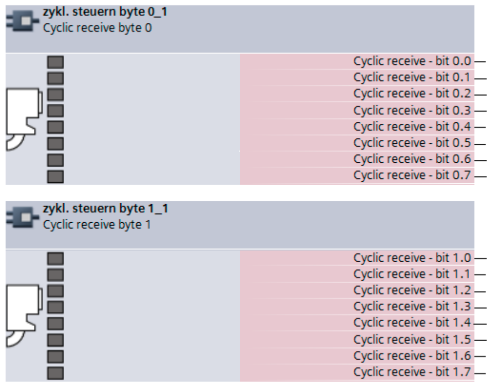
Instance 101: Output assembly SIMOCODE basic type 2

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. receive byte 0 - bit 0.7	Cycl. receive byte 0 - bit 0.6	Cycl. receive byte 0 - bit 0.5	Cycl. receive byte 0 - bit 0.4	Cycl. receive byte 0 - bit 0.3	Cycl. receive byte 0 - bit 0.2	Cycl. receive byte 0 - bit 0.1	Cycl. receive byte 0 - bit 0.0
1	Cycl. receive byte 1 - bit 1.7	Cycl. receive byte 1 - bit 1.6	Cycl. receive byte 1 - bit 1.5	Cycl. receive byte 1 - bit 1.4	Cycl. receive byte 1 - bit 1.3	Cycl. receive byte 1 - bit 1.2	Cycl. receive byte 1 - bit 1.1	Cycl. receive byte 1 - bit 1.0

The values passed to SIMOCODE pro via instance 101 can be processed further in the SIMOCODE ES (TIA Portal) software.

Corresponding function blocks in the SIMOCODE ES (TIA Portal) charts:



Default settings of cyclic receive and send data: See Assignment of cyclic receive and send data for predefined control functions (Page 115).

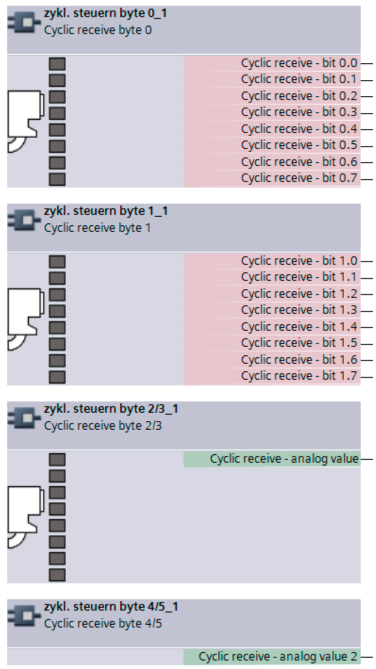
Instance 102: Output assembly SIMOCODE basic type 3

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. receive byte 0 - bit 0.7	Cycl. receive byte 0 - bit 0.6	Cycl. receive byte 0 - bit 0.5	Cycl. receive byte 0 - bit 0.4	Cycl. receive byte 0 - bit 0.3	Cycl. receive byte 0 - bit 0.2	Cycl. receive byte 0 - bit 0.1	Cycl. receive byte 0 - bit 0.0
1	Cycl. receive byte 1 - bit 1.7	Cycl. receive byte 1 - bit 1.6	Cycl. receive byte 1 - bit 1.5	Cycl. receive byte 1 - bit 1.4	Cycl. receive byte 1 - bit 1.3	Cycl. receive byte 1 - bit 1.2	Cycl. receive byte 1 - bit 1.1	Cycl. receive byte 1 - bit 1.0
2, 3	Cycl. receive byte 2/3 - analog value 1							
4, 5	Cycl. receive byte 4/5 - analog value 2							

The values passed to SIMOCODE pro via instance 102 can be processed further in the SIMOCODE ES (TIA Portal) software.

Corresponding function blocks in the SIMOCODE ES (TIA Portal) charts:



Default settings of cyclic receive and send data for predefined control functions: See Assignment of cyclic receive and send data for predefined control functions (Page 115).

Instance 120: Configuration assembly

Configuring of devices using a "Configuration assembly" is not supported by SIMOCODE. Devices are parameterized by means of the SIMOCODE ES (TIA Portal) parameterization software.

Integrating a SIMOCODE device as a "Generic Ethernet module" into the Rockwell Studio 5000 environment:

For this purpose, the "Configuration assembly" with the instance 120 and the length 0 must be specified as well:

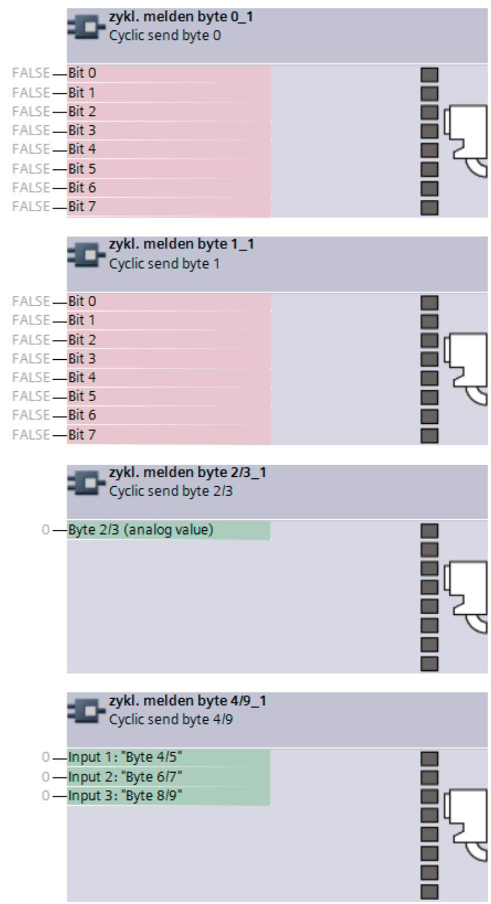
Instance 150: Input assembly SIMOCODE basic type 1

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. send byte 0 - bit 0.7	Cycl. send byte 0 - bit 0.6	Cycl. send byte 0 - bit 0.5	Cycl. send byte 0 - bit 0.4	Cycl. send byte 0 - bit 0.3	Cycl. send byte 0 - bit 0.2	Cycl. send byte 0 - bit 0.1	Cycl. send byte 0 - bit 0.0
1	Cycl. send byte 1 - bit 1.7	Cycl. send byte 1 - bit 1.6	Cycl. send byte 1 - bit 1.5	Cycl. send byte 1 - bit 1.4	Cycl. send byte 1 - bit 1.3	Cycl. send byte 1 - bit 1.2	Cycl. send byte 1 - bit 1.1	Cycl. send byte 1 - bit 1.0
2 ... 3	Cycl. send byte 2/3 - analog value 1				Cycl. analog float input 1			
4 ... 5	Cycl. send byte 4/5 - analog value 2							

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
6 … 7	Cycl. send byte 6/7 - analog value 3				Cycl. analog float input 2			
8 … 9	Cycl. send byte 8/9 - analog value 4							

The bit and analog values signaled by SIMOCODE pro to the control system via instance 150 can be freely assigned in the SIMOCODE ES (TIA Portal) software. Corresponding function blocks in the SIMOCODE ES (TIA Portal) charts:



Default settings of cyclic receive and send data: See Assignment of cyclic receive and send data for predefined control functions (Page 115).

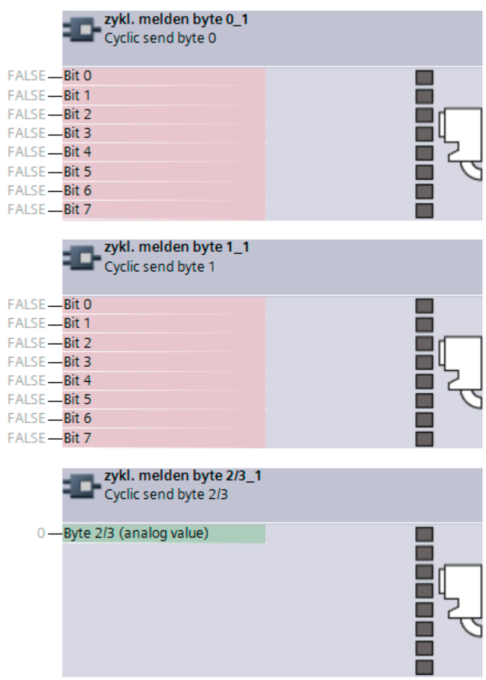
Instance 151: Input assembly SIMOCODE basic type 2

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. send byte 0 - bit 0.7	Cycl. send byte 0 - bit 0.6	Cycl. send byte 0 - bit 0.5	Cycl. send byte 0 - bit 0.4	Cycl. send byte 0 - bit 0.3	Cycl. send byte 0 - bit 0.2	Cycl. send byte 0 - bit 0.1	Cycl. send byte 0 - bit 0.0
1	Cycl. send byte 1 - bit 1.7	Cycl. send byte 1 - bit 1.6	Cycl. send byte 1 - bit 1.5	Cycl. send byte 1 - bit 1.4	Cycl. send byte 1 - bit 1.3	Cycl. send byte 1 - bit 1.2	Cycl. send byte 1 - bit 1.1	Cycl. send byte 1 - bit 1.0
2 ... 3	Cycl. send byte 2/3 - analog value 1							

The bit and analog values signaled by SIMOCODE pro to the control system via instance 151 can be freely assigned in the SIMOCODE ES (TIA Portal) software.

Corresponding function blocks in the SIMOCODE ES (TIA Portal) charts:



Default settings of cyclic receive and send data: See Assignment of cyclic receive and send data for predefined control functions (Page 115).

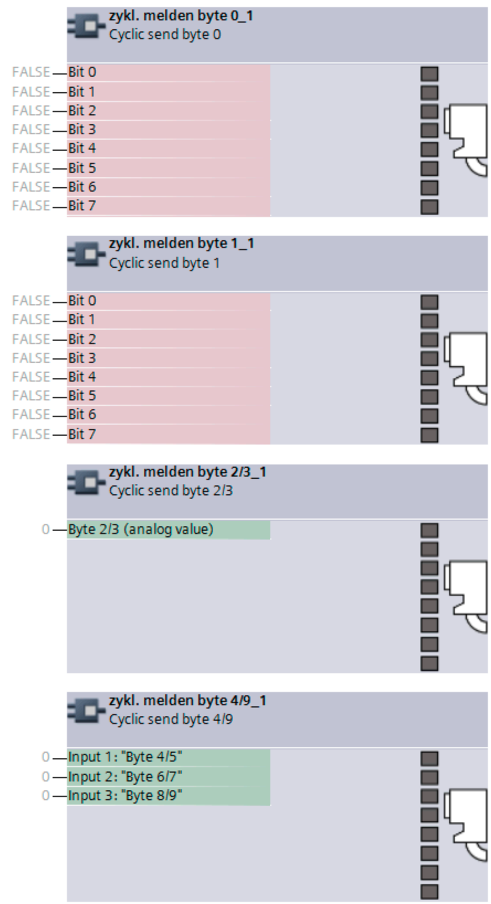
Instance 152: Input assembly SIMOCODE basic type 3

The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. send byte 0 - bit 0.7	Cycl. send byte 0 - bit 0.6	Cycl. send byte 0 - bit 0.5	Cycl. send byte 0 - bit 0.4	Cycl. send byte 0 - bit 0.3	Cycl. send byte 0 - bit 0.2	Cycl. send byte 0 - bit 0.1	Cycl. send byte 0 - bit 0.0
1	Cycl. send byte 1 - bit 1.7	Cycl. send byte 1 - bit 1.6	Cycl. send byte 1 - bit 1.5	Cycl. send byte 1 - bit 1.4	Cycl. send byte 1 - bit 1.3	Cycl. send byte 1 - bit 1.2	Cycl. send byte 1 - bit 1.1	Cycl. send byte 1 - bit 1.0
2 … 3	Cycl. send byte 2/3 - analog value 1				Cycl. analog float input 1			
4 … 5	Cycl. send byte 4/5 - analog value 2							
6 … 7	Cycl. send byte 6/7 - analog value 3				Cycl. analog float input 2			
8 … 9	Cycl. send byte 8/9 - analog value 4							
10 … 11	Cycl. send byte 8/9 - analog value 5				Cycl. analog float input 3			
12 … 13	Cycl. send byte 8/9 - analog value 6							
14 … 15	Cycl. send byte 8/9 - analog value 7				Cycl. analog float input 4			
16 … 17	Cycl. send byte 8/9 - analog value 8							
18 … 19	Cycl. send byte 8/9 - analog value 9							

The bit and analog values signaled by SIMOCODE pro to the control system via instance 152 can be freely assigned in the SIMOCODE ES (TIA Portal) software.

Corresponding function blocks in the SIMOCODE ES (TIA Portal) charts:



Default settings of cyclic receive and send data: See Assignment of cyclic receive and send data for predefined control functions (Page 115).

Instance 153: Input assembly SIMOCODE basic type 4

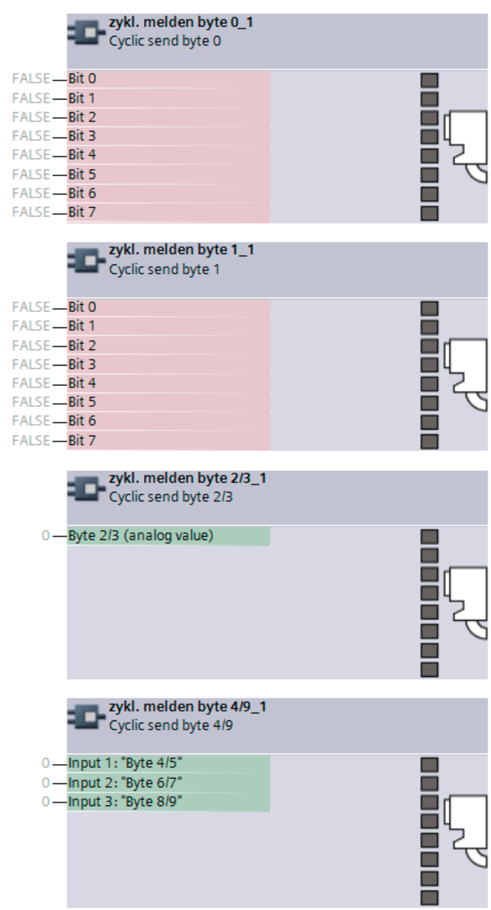
The table below describes the format of attribute 3:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Cycl. send byte 0 - bit 0.7	Cycl. send byte 0 - bit 0.6	Cycl. send byte 0 - bit 0.5	Cycl. send byte 0 - bit 0.4	Cycl. send byte 0 - bit 0.3	Cycl. send byte 0 - bit 0.2	Cycl. send byte 0 - bit 0.1	Cycl. send byte 0 - bit 0.0
1	Cycl. send byte 1 - bit 1.7	Cycl. send byte 1 - bit 1.6	Cycl. send byte 1 - bit 1.5	Cycl. send byte 1 - bit 1.4	Cycl. send byte 1 - bit 1.3	Cycl. send byte 1 - bit 1.2	Cycl. send byte 1 - bit 1.1	Cycl. send byte 1 - bit 1.0
2 ... 3	Cycl. send byte 2/3 - analog value 1				Cycl. analog float input 1			
4 ... 5	Cycl. send byte 4/5 - analog value 2							
6 ... 7	Cycl. send byte 6/7 - analog value 3				Cycl. analog float input 2			
8 ... 9	Cycl. send byte 8/9 - analog value 4							

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
10 ... 11	Cycl. send byte 8/9 - analog value 5				Cycl. analog float input 3			
12 ... 13	Cycl. send byte 8/9 - analog value 6							
14 ... 15	Cycl. send byte 8/9 - analog value 7				Cycl. analog float input 4			
16 ... 17	Cycl. send byte 8/9 - analog value 8							
18 ... 19	Cycl. send byte 8/9 - analog value 9							
20 ... 259	Data of the Measurement object: See Measurement object (Page 319).							
260 ... 487	Data of the Statistical Data object: See Statistical Data object (Page 321).							

The bit and analog values signaled by SIMOCODE pro to the control system via instance 153 can be freely assigned in the SIMOCODE ES (TIA Portal) software.

Corresponding function blocks in the SIMOCODE ES (TIA Portal) charts:



Default settings of cyclic receive and send data: See Assignment of cyclic receive and send data for predefined control functions (Page 115).

General services for the Assembly object

Service code	Available service		Service designation	Description
	Class	Instance		
0x0E	Yes	Yes	Get_Attribute_Single	Supplies contents of one attribute
0x10	No	Yes	Set_Attribute_Single	Changes an attribute value

Class attributes for the Assembly object

Attribute ID	Access	Description	Data type
1	Get	Revision	UINT
2	Get	Max Instance	UINT
3	Get	Num of Instances	UINT

3.6.5 Connection Manager object

The following information applies to the Connection Manager object of the SIMOCODE pro V EtherNet/IP device:

- Class code: 0x06
- Class attributes: 0
- Number of instances: 1

The instance attributes are defined according to Volume 1 of the CIP Specification.

All instance attributes that are defined as "required" in this specification are supported.

Table 3-94 **General services for the Connection Manager object**

Service code	Available service		Service designation	Description
	Class	Instance		
0x0E	No	Yes	Get_Attribute_Single	Supplies contents of one attribute
0x10	No	Yes	Set_Attribute_Single	Changes an attribute value

3.6.6 Device Diagnosis object

The Device Diagnosis object supplies information about the current status of the device. This object contains details of all fault messages, warnings and events that relate to the relevant SIMOCODE device.

- Class code: 0x0096
- Class attributes: 0

- Number of instances: 1
- Object length: 46 bytes

Table 3-95 **General services for the Device Diagnosis object**

Service code	Available service		Service designation	Description
	Class	Instance		
0x01	No	Yes	Get_Attributes_All	Supplies contents of all attributes
0x0E	No	Yes	Get_Attribute_Single	Supplies contents of one attribute

Table 3-96 Attributes of instance 1 for the Diagnosis object

Attribute ID	Access	Designation	Data type
1	Get	Diagnostic bits	Byte[46]

Details of the meaning of individual diagnostic bits can be found in Chapter Data record 92 - Device diagnostics (Page 220).

Note

Functional Example of EtherNet/IP

A functional example of EtherNet/IP in the Industry Online Support provides this information as a preprogrammed, user-defined data type for the Rockwell Studio 5000 environment.

3.6.7 Measurement object

The Measurement object supplies the latest measurements of quantities such as current, voltage, output, cos phi, etc. of the SIMOCODE pro V EtherNet/IP device.

- Class code: 0x0097
- Class attributes: 0
- Number of instances: 1
- Object length: 240 bytes

Table 3-97 **General services for the Measurement object**

Service code	Available service		Service designation	Description
	Class	Instance		
0x01	No	Yes	Get_Attributes_All	Supplies contents of all attributes
0x0E	No	Yes	Get_Attribute_Single	Supplies contents of one attribute

Table 3-98 **Attributes of instance 1 for the Measurement object**

Attribute ID	Access	Designation	Data type	Range	Unit
1	Get	Thermal motor model	INT		See 2)
2	Get	Phase unbalance	SINT	0 .. 127	1 %
3	Get	Cos φ	SINT	0 .. 127	1 %
4..8	*Get*	*Reserved*	*INT[5]*		
9	Get	Max. current I_max	INT	0 .. 32767	1 % / I_s
10	Get	Current I_L1	INT	0 .. 32767	1 % / I_s
11	Get	Current I_L2	INT	0 .. 32767	1 % / I_s
12	Get	Current I_L3	INT	0 .. 32767	1 % / I_s
13	Get	Last trip current	INT	0 .. 32767	1 % / I_s
14	Get	Time to trip	DINT		100 ms 6)
15	Get	Recovery time	DINT		100 ms
16	Get	Voltage U_L1	INT	0 .. 32767	1 V
17	Get	Voltage U_L2	INT	0 .. 32767	1 V
18	Get	Voltage U_L3	INT	0 .. 32767	1 V
19	Get	AM1 - output	INT	0 .. 32767	See 1)
20	Get	AM1 - input	INT	0 .. 32767	
21	Get	AM1 - input 2	INT	0 .. 32767	
22	*Get*	*Reserved*	*INT*		
23	Get	TM1 - temperature	INT	0 .. 32767	1 K see 3)
24	Get	TM1 - temperature 1	INT	0 .. 32767	1 K see 3)
25	Get	TM1 - temperature 2	INT	0 .. 32767	1 K see 3)
26	Get	TM1 - temperature 3	INT	0 .. 32767	1 K see 3)
27	*Get*	*Reserved*	*INT*		
28	Get	EM+ - ground fault current	DINT		1 mA
29	Get	EM+ - last trip current	DINT		1 mA
30	Get	Active power P	DINT	0..0x7FFFFFFF	1 W
31	Get	Apparent power S	DINT	0..0x7FFFFFFF	1 VA
32	*Get*	*Reserved*	*DINT*		
33..39	*Get*	*Reserved*	*DINT[7]*		
40..63	*Get*	*Reserved*	*INT[24]*		
64	Get	AM2 - output	INT	0 .. 32767	See 1)
65	Get	AM2 - input	INT	0 .. 32767	
66	Get	AM2 - input 2	INT	0 .. 32767	
67	*Get*	*Reserved*	*INT*		
68	Get	TM2 - temperature	INT	0 .. 32767	1 K see 3)
69	Get	TM2 - temperature 1	INT	0 .. 32767	1 K see 3)
70	Get	TM2 - temperature 2	INT	0 .. 32767	1 K see 3)
71	Get	TM2 - temperature 3	INT	0 .. 32767	1 K see 3)
72	Get	Frequency	INT	0 .. 32767	0.01 Hz
73	Get		INT		
74	*Get*	*Reserved*	*DINT*		

Attribute ID	Access	Designation	Data type	Range	Unit
75	*Get*	*Reserved*	*DINT*		
76	*Get*	*Reserved*	*DINT*		
77	Get	Current I_max_A_F	REAL		1 A
78	Get	Current I_avg_A_F	REAL		1 A
79	Get	Current I_L1_A_F	REAL		1 A
80	Get	Current I_L2_A_F	REAL		1 A
81	Get	Current I_L3_A_F	REAL		1 A
82	Get	Active power P_F	REAL		1 W
83	Get	Apparent power S_F	REAL		1 VA
84	Get	Voltage UL1_F	REAL		1 V
85	Get	Voltage UL2_F	REAL		1 V
86	Get	Voltage UL3_F	REAL		1 V
87	Get	Cos phi_F	REAL		1
88	Get	Frequency_F	REAL		1 Hz
89..90	*Get*	*Reserved*	*REAL[2]*		

1) S7 format:

0/4 mA = 0

20 mA = 27648

2) Representation of the "Thermal motor model":

Value always refers to symm. Trip level, representation in 2 % increments in bits 6 ... 0 (range 0 to 254 %), bit 7 shows unbalance (fixed level 50 %).

3) Representation in Kelvin.

3.6.8 Statistical Data object

The Statistical Data object supplies the statistical data (such as operating hours, number of overload trips, number of starts, etc.) of the SIMOCODE pro V EtherNet/IP device.

- Class code: 0x0098
- Class attributes: 0
- Number of instances: 1
- Object length: 228 bytes

Table 3-99 **General services for the Statistical Data object**

Service code	Available service		Service designation	Description
	Class	Instance		
0x01	No	Yes	Get_Attributes_All	Supplies contents of all attributes
0x0E	No	Yes	Get_Attribute_Single	Supplies contents of one attribute

Table 3-100 **Attributes of instance 1 for the Statistical Data object**

Attribute ID	Access	Designation	Data type	Range	Unit
1	Get	Permissible starts - actual value	INT	0 - 255	
2	Get	DM-F - Time until test required	INT	0 - 255	1 week
3	Get	*Reserved*	*DINT*		
4	Get	Number of parameterizations	DINT	0 - 65535	
5	Get	Number of overload trips	DINT	0 - 65535	
6	Get	Int. number of overload trips	DINT	0 - 65535	
7	Get	Motor stop time	DINT	0 - 65535	1 h
8	Get	Timer 1 actual value	DINT	0 - 65535	100 ms
9	Get	Timer 2 actual value	DINT	0 - 65535	100 ms
10	Get	Timer 3 actual value	DINT	0 - 65535	100 ms
11	Get	Timer 4 actual value	DINT	0 - 65535	100 ms
12	Get	Counter 1 actual value	DINT	0 - 65535	
13	Get	Counter 2 actual value	DINT	0 - 65535	
14	Get	Counter 3 actual value	DINT	0 - 65535	
15	Get	Counter 4 actual value	DINT	0 - 65535	
16	Get	Calculator 1 Output	DINT	0 - 65535	
17	Get	Calculator 2 Output	DINT	0 - 65535	
18..19	Get	*Reserved*	*DINT[2]*		
20	Get	Motor operating hours	DINT	0..0x7FFFFFFF	1 s
21	Get	Int. Motor operating hours	DINT	0..0x7FFFFFFF	1 s
22	Get	Device operating hours	DINT	0..0x7FFFFFFF	1 s
23	Get	Number of starts	DINT	0..0x7FFFFFFF	
24	Get	Int. number of starts CW	DINT	0..0x7FFFFFFF	
25	Get	Int. number of starts CCW	DINT	0..0x7FFFFFFF	
26	Get	Energy W	DINT	0..0x7FFFFFFF	1 kWh
27	Get	Energy W_F	REAL		1 kWh
28	Get	*Reserved*	*DINT*		
29..34	Get	*Reserved*	*DINT[6]*		
35..50	Get	*Reserved*	*INT[16]*		
51	Get	Timer 5 actual value	DINT	0 - 65535	100 ms
52	Get	Timer 6 actual value	DINT	0 - 65535	100 ms
53	Get	Counter 5 actual value	DINT	0 - 65535	
54	Get	Counter 6 actual value	DINT	0 - 65535	
55	Get	Calculator 1 Output	DINT	0 - 65535	
56	Get	Calculator 2 Output	DINT	0 - 65535	
57	Get	Analog multiplexer output	DINT	0 - 65535	
58..66	Get	*Reserved*	*DINT[9]*		

3.6.9 Motor Parameter object

Selected device parameters of the SIMOCODE pro V EtherNet/IP device can be read or written via the Motor Parameter object. This allows the device parameters to be adjusted via the controller or a connected control system.

- Class code: 0x0099
- Class attributes: 0
- Number of instances: 1
- Object length: 116 bytes

Table 3-101 **General services for the Motor Parameter object**

Service code	Available service		Service designation	Description
	Class	Instance		
0x0E	No	Yes	Get_Attribute_Single	Supplies contents of one attribute
0x10	No	Yes	Set_Attribute_Single	Changes an attribute value

Table 3-102 **Attributes of instance 1 for the Motor Parameter object**

Attribute ID	Access	Designation	Data type	Range of values	Unit
1	Get/ Set	Motor protection - set current Is1	LINT	1)	10 mA
2	Get/ Set	Motor protection - set current Is2	LINT	1)	10 mA
3	Get/ Set	Motor protection - class	SINT	5, 7, 10, 15, 20, 25, 30, 35, 40	
4	*Get*	*Reserved*	*SINT*		
5	*Get*	*Reserved*	*INT*		
6	Get/ Set	Trip level I>	INT	0 .. 255	4% / I_s
7	Get/ Set	Warning level I>	INT	0 .. 255	4% / I_s
8	Get/ Set	Trip level I<	INT	0 .. 255	4% / I_s
9	Get/ Set	Warning level I<	INT	0 .. 255	4% / I_s
10	Get/ Set	Stalled rotor level	INT	0 .. 255	4% / I_s
11	Get/ Set	Trip level U<	INT	0 .. 255	8 V
12	Get/ Set	Warning level U<	INT	0 .. 255	8 V
13	Get/ Set	Trip level cos phi<	SINT	0 .. 100	1 %
14	Get/ Set	Warning level cos phi<	SINT	0 .. 100	1 %
15	Get/ Set	Trip level P>	DINT	0..0xFFFFFFFF	1 W
16	Get/ Set	Warning level P>	DINT	0..0xFFFFFFFF	1 W
17	Get/ Set	Trip level P<	DINT	0..0xFFFFFFFF	1 W
18	Get/ Set	Warning level P<	DINT	0..0xFFFFFFFF	1 W
19	Get/ Set	EM+ - trip level	DINT	30 .. 40000	1 mA
20	Get/ Set	EM+ - warning level	DINT	30 .. 40000	1 mA
21	Get/ Set	TM1 - trip level T>	DINT	0 .. 65535	1 K

Attribute ID	Access	Designation	Data type	Range of values	Unit
22	Get/ Set	TM1 - warning level T>	DINT	0 .. 65535	1 K
23	Get/ Set	TM2 - trip level T>	DINT	0 .. 65535	1 K
24	Get/ Set	TM2 - warning level T>	DINT	0 .. 65535	1 K
25	Get/ Set	Trip level 0/4-20 mA> 1	INT	0 .. 255	*128
26	Get/ Set	Warning level 0/4-20 mA> 1	INT	0 .. 255	*128
27	Get/ Set	Trip level 0/4-20 mA< 1	INT	0 .. 255	*128
28	Get/ Set	Warning level 0/4-20 mA< 1	INT	0 .. 255	*128
29	Get/ Set	Trip level 0/4-20 mA> 2	INT	0 .. 255	*128
30	Get/ Set	Warning level 0/4-20 mA> 2	INT	0 .. 255	*128
31	Get/ Set	Trip level 0/4-20 mA< 2	INT	0 .. 255	*128
32	Get/ Set	Warning level 0/4-20 mA< 2	INT	0 .. 255	*128
33	Get/ Set	Limit level 1	DINT	0 .. 65535	
34	Get/ Set	Limit level 2	DINT	0 .. 65535	
35	Get/ Set	Limit level 3	DINT	0 .. 65535	
36	Get/ Set	Limit level 4	DINT	0 .. 65535	
37	Get/ Set	Limit level 5	DINT	0 .. 65535	
38	Get/ Set	Limit level 6	DINT	0 .. 65535	

1) Value range dependent on current range of the IM / UM and the conversion factor

3.6.10 TCP/IP Interface object

The TCP/IP Interface object provides the mechanism for configuring the TCP/IP network interface of the SIMOCODE pro V EtherNet/IP device.

The configured elements include, for example, the IP address, the network mask, the gateway address and the host name of the device.

- Class code: 0x00F5
- Class attributes: 1, 2, 3
- Number of instances: 1

The instance attributes are defined according to Volume 2 of the CIP Specification. All instance attributes that are defined as "required" in this specification are supported.

Table 3-103 **General services for the TCP/IP Interface object**

Attribute ID	Available service		Service designation	Description
	Class	Service		
0x01	No	Yes	Get_Attributes_All	Supplies contents of all attributes
0x0E	No	Yes	Get_Attribute_Single	Supplies contents of one attribute
0x10	No	Yes	Set_Attribute_Single	Changes an attribute value

Table 3-104 Class attributes

Attribute ID	Service	Data type	Name
1	Get	UINT	Revision
2	Get	UINT	Max Instance
3	Get	UINT	Num of Instances

3.6.11 Ethernet Link object

The Ethernet Link object stores link-specific counters and status information for an IEEE 802.3 communication interface.

- Class code: 0x00F6
- Class attributes: 0
- Number of instances: 3

The instance attributes are defined according to Volume 2 of the CIP Specification.

All instance attributes that are defined as "required" in this specification are supported.

Table 3-105 **General services for the EtherNet Link object**

Attribute ID	Available service		Service designation	Description
	Class	Service		
0x01	No	Yes	Get_Attributes_All	Supplies contents of all attributes
0x0E	No	Yes	Get_Attributes_Single	Supplies contents of one attribute
0x10	No	Yes	Set_Attributes_Single	Changes an attribute value
0x4C	No	Yes	Get_and_Clear	Receive attribute and set to 0

List of abbreviations A

A.1 List of abbreviations

See SIMOCODE pro – System Manual (https://support.industry.siemens.com/cs/ww/en/view/109743957).

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