SIEMENS

SIMATIC S5

PMC/LS-B:
Status, Standardbilder und Objekte

PMC/LS-B:
Status, Standard Displays and Objects

Beschreibung

Description

C79000-G8574-C744-01

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C79000-H8574-C744-01

SIEMENS

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Status, Standard Displays and Objects

Description

C79000-B8576-C744-01

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Introduction

What you ought to know!

This manual is part of a user documentation organized in modules. The PMC system consists of several partial functions which can be used together or separately. The functions of the PMC system are described in separate manuals which, in some cases, build on each other.

The manuals listed in the table below describe the PMC system from the point of view of the programmable controller.

Manual Title	Required Manuals	Purpose and Contents
PMC/LS-B: Communications System (Corresponds to KOM-OS)	None	Basic description of the PMC software in the programmable controller Communication for operating and monitoring
PMC/LS-B: Message Function	PMC/LS-B: Communications System	Description of the PMC message system
PMC/LS-B: Status, Standard Displays and Objects	PMC/LS-B: Communications System PMC/LS-B: Message Function	Description of the PMC objects, object types, displays and status processing; reference of the standard displays and object types
PMCPRO or K OMOSPRO	PMC/LS-B: Communications System	Programming the data structure in the PLC using the PMCPRO software
PMC_581	PMC/LS-B: Communications System	Description of the PMC user interface for higher level languages

Setup of the Manual

The individual sections of the manual are self-contained and contain as few cross references to other sections as possible. To the extent possible, each section builds on the material contained in preceding sections and does not cover material contained in later sections.

Section1

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Emphasis of Important Notes

In this manual, the pictogram shown below is used to indicate precautions which, when not adhered to, can cause damage.

> ⚠ **Caution**
>
> Indicates that property damage can result if appropriate measures are not taken.

☞ Indicates important information requiring particular attention.

Abbreviations Abbreviations which are not part of everyday usage are written out in full the first time they appear.

Cross references Cross references to parts of other sections are not made unless the repetition of facts would require too much space and it can be assumed that the description at another location is sufficient. Only the section number (e.g., → section 4.2.1) is provided for cross references to parts of other sections.

1 Scope of Delivery

The PMC objects, status processing and standard displays package is stored on the enclosed disk.

The files are arranged in several catalogues:

Catalogue PMC_NORA:

Standard displays and display elements for displaying the PMC objects.

The PMC_NORA catalogue is further subdivided into the following subcatalogues:

- BEREICH: Area display
- BOXEN: Graphics boxes
- MELD: Message programming
- NORA_SBB: Standard displays
- TASTEN: Key sets
- UEBERSI: Overview displays
- ZUSTAND: Status indicators

Catalogue PMC_DATA

PMC object data structures and examples for implementing user object functions with their callup interfaces in the user program.

File:

- DRIVERST.S5D

Catalogue PMC_STAT

PMC standard function blocks

Files:

- STA941ST.S5D/S5B (for CPU 941 to CPU 943)
- STA945ST.S5D/S5B (for CPU 945)
- STA944ST.S5D/S5B (for CPU 944)
- STA928ST.S5D/S5B (for CPU 928)
- STA946ST.S5D/S5B (for CPU 946/947)
- STA948ST.S5D/S5B (for CPU 948)

The PMC status processing is composed of function blocks and data blocks.

Function blocks

FB STATUS
FB S-ANLAUF (FB 209)
FB STATQUIT (FB 222)
FB STATMELD (FB 223)

Data blocks

DB OBJ-STAT
DB STAT-DIS

FB STATUS, DB OBJ-STAT and DB STAT-DIS are generated by PMCPRO (any number can be assigned).

2 PMC Object Definition

2.1 General Concept

The general concept of PMC is based on the PMC objects. The PMC objects are formed in the programmable controller by object data blocks (DB).

All variable data of a measuring or control function of the automation program are contained in an object data block:

- Inputs
- Outputs
- Parameters
- Auxiliary variables for operating and observing

The object data block is connected through the process via an automation function (object function block).

All PMC functions are based on the object data blocks (PMC objects). Each measuring and control function can be made accessible to the PMC function through an object DB.

The associated process displays for visualization which access the data structure of the PMC objects, stand in close connection with the PMC objects.

A distinction is made between the standard objects and the user-specific objects.

Standard objects

The structure of the object DBs is already determined for a large number of measuring and control functions (object types). Finished standard displays can be used for visualization for these functions.

User-specific objects

For user-specific automation functions, the structure of the PMC object can be designed freely. The associated display for visualizing is programmed according to the selected object structure.

A distinction is made in PMC between objects and object types:

Object types determine the data structure for a certain type of measuring or control function.

A PMC object refers to a concrete measuring or control function and takes over the data structure of the corresponding object type.

Up to 200 objects can be programmed for each SIMATIC-CPU (up to 750 objects with CPU 946/947).

The user programs the relations between:

OBJECT DB, OBJECT NUMBER and OBJECT TYPE

by means of PMCPRO.

PMCPRO tests whether the stated object types are present in PMC. In the case of faulty programming, the entries are rejected with a corresponding error message. It is possible to define own user objects with PMCPRO (for CPU 945, 946/7, 948 up to 750 objects).

2.2 PMC Objects

2.2.1 Data Structure

The object data block always includes the following information:

- Name of the object
- Object-specific information
- Status information

The name of the object consists of 16 ASCII characters, arranged in 2 lines of 8 ASCII characters each.

Object-specific information covers operatable and observable process variables including additional information such as dimension of the process variables and standardization parameters.

The purpose of status information is to indicate an irregular status of an object. The status information is filed in the form of a status byte:

X	SF	RES	X	H	L	HH	LL

Alarm/Warning	HH:	Infringing an upper alarm limit
	H:	Infringing an upper warning limit
	L:	Infringing a lower warning limit
	LL:	Infringing a lower alarm limit
Control system	SF:	Control system fault

The status information does not serve to display operating statuses.

Meaning of the bits X and RES:

X: not reserved

RES: reserved bit. This bit may not be changed by a user function!

Not all object types have all status information. The corresponding status bits are not supplied by the object function in these cases. An object with switching function, for instance, has no alarm or warning limits.

2.2.2 Object Operation

Operator-controllable objects and also not operator-controllable objects can be defined in PMC. Not operator-controllable objects serve exclusively for preparation for visualization.

Object data are divided generally into operating data and observation data.

Observation data always indicate the value processed by the object. Operating data can flow back again as observation values only after processing by an object function. This guarantees that those operating values which are actually processed by the corresponding object function in the automation program are displayed by observation.

Example: Only the actual setpoint processed by a controller is displayed.

Operating concepts

- Operator control via operator control bit:
  An operator control bit exists for operator control of object parameters. The transferred parameters are activated firstly by setting the operator control bit. Both single parameters can have an operator control bit and parameter groups a common operator control bit.
- Direct operator control:
  Object values are written directly into the associated storage cells on direct operator control and further processed immediately without further activation. The value transfer is not synchronized to a certain time in contrast to operator control with operator control bit.
- Identification of the operator control by the object function:
  An operator control value number and the associated operator control value are written into always unchanging storage cells. The object function itself registers the operator control performed and takes over the operator control value. The operator control value is processed depending upon the operator control value number.

2.2.3 Overview of the Predefined Object Types

A large number of object types is already defined for PMC. Standard displays for visualization and function blocks which perform the measuring and control functions in the programmable controller exist for these object types.

Type No.	Function	Block type designation
01	Continuous controller "R64"	RegR64K
02	Step controller "R64"	RegR64S
03	Measuring points "R64"	MPR64
04	Continuous controller "Standard"	SRS_S
05	Step controller "Standard"	SRS_K
06	Continuous controller "IP 260"	IP260_K
07	Step controller "IP 260"	IP260_S
08	Measured values	MW
09	Dosing counter	DOS
10	Individual control element "Motor 2 loops"	Mot_2K
11	Individual control element "Reversing drive"	Mot_W
12	Individual control element "Motor 2 speed controlled"	Mot_2ns
13	Individual control element "Motor 2 speed automatic"	Mot_2na
14	Individual control element "Motor delta/star"	Mot_dx
15	Individual control element "Valve 2 loops"	V_2k
16	Individual control element "Slide valve"	Schieb
17	Individual control element "Switchgear"	Schalt
18	Individual control element "Slide valve function with ESB"	SchiebE
19	Analog value display with limit value monitoring	Analog
20	Binary function	Bin
21	Control S5-115U "Continuous"	Reg115K
22	Control S5-115U "Step"	Reg115S
23	Modular controller "Continuous"	ModRegK
24	Modular controller "Step"	ModRegS

Overview of the most important data of the PMC object types:

Type No.	Block type	Status-information	Position of the status DW	Operator control method	Operator control value number	Operator control value
01	RegR64K	A/W	255	2		
02	RegR64S	A/W	255	2		
03	MPR64	A/W	255	1		
04	SRS_S	A/W/SF	9	3	DW0	DW1
05	SRS_K	A/W/SF	9	3	DW0	DW1
06	IP260_K	SF	133	2		
07	IP260_S	SF	133	2		
08	MW	SF	8	2		
09	DOS	SF	58	2		
10	Mot_2K	SF	9	2		
11	Mot_W	SF	9	2		
12	Mot_2ns	SF	9	2		
13	Mot_2na	SF	9	2		
14	Mot_dx	SF	9	2		
15	V_2k	SF	9	2		
16	Schieb	SF	9	2		
17	Schalt	SF	9	2		
18	SchiebE	SF	9	2		
19	Analog	A/W/SF	15	1		
20	Bin	SF	8	2		
21	Reg115K	A/W/SF	188	2		
22	Reg115S	A/W/SF	188	2		
23	ModRegK	A/W/SF	87	2		
24	ModRegS	A/W/SF	87	2		

Explanations of the table

Status information

A: Display and acknowledgement for alarm above and alarm below

W: Display and acknowledgement for warning above and warning below

SF: Display and acknowledgement for control system fault

Operator control method

1: Direct value operator control

2: Operator control with operator control bit

3: Operator control with operator control value and operator control value number

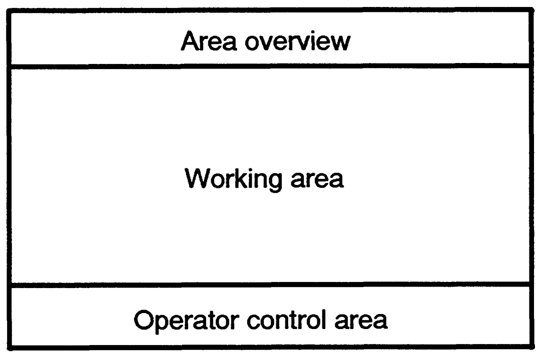
2.3 Standard Displays

The purpose of standard displays is to visualize PMC objects in the process control interface of the operator station. The following principles simplify process control:

- high recognition value by using the same symbolism
- same function means same display
- same function means same operator control concept

2.3.1 Screen Subdivision

The screen contents of a process display are divided into three areas:



Area overview

The area overview provides the user an overview of all areas. In hierarchic systems, the names of the areas and the associated status information (alarm, warning, fault) are normally displayed as area-specific group displays.

The message line in which arriving and departing as well as acknowledgement messages are displayed, can display a further part of the area overview.

Working area

The different process displays are opened up in the working area.

The process displays offer inter alia the following possibilities:

- Window technique with overlapping displays
- Operator control possibility via value input fields
- Display selection of lower ranking detail displays

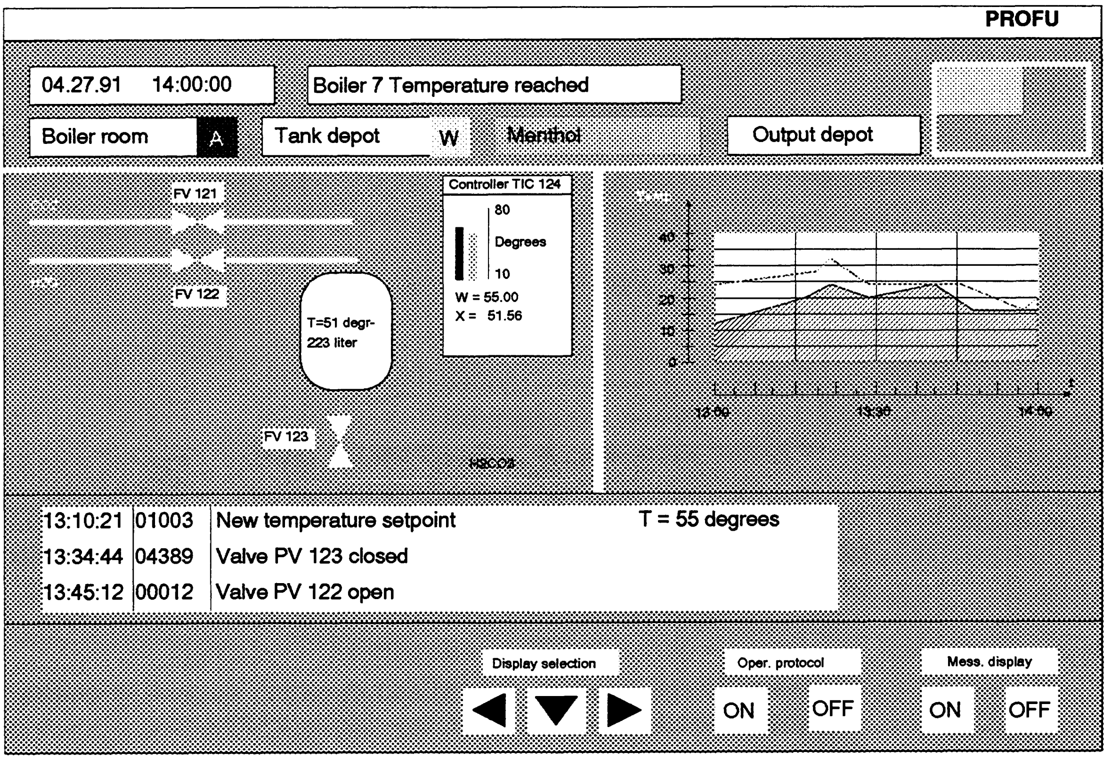
In the process displays, a distinction is made between standardized displays (NORA) and free displays (FRANZ).

Operator control area

The operator control area has the following tasks:

- Display selection by branching in a hierarchic selection structure
- Selection of the central message display
- Calling up the operator control strips for the active process display (password protection possible)
- Setting the system time
- Quitting process control

Example of screen division (free user display):

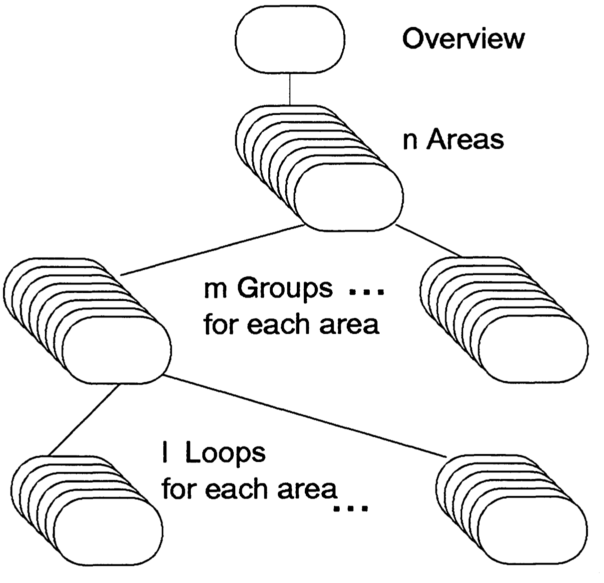


2.3.2 Standardized Operator Guidance

The components of standardized operator control are process displays in the form of standardized displays and a hierarchic selection function with fixed structure for the process displays.

The display hierarchy isdivided into: in:

- Overview display
- Area display
- Group display
- Loop display



Several areas can be selected from the overview display. One area in each case gives the possibility of selecting between several groups. One group contains several loops.

The displays have their own structure and contents in each level of the hierarchy.

2.3.3 Displays of the Grouping Levels

For the displays of the standardized indications, the following applies in the display of process statuses:

- Normal statuses are displayed covered, are not conspicuous
- critical or extraordinary statuses are displayed conspicuously and emphasized even stronger by flashing (alarms, warnings, pending messages).

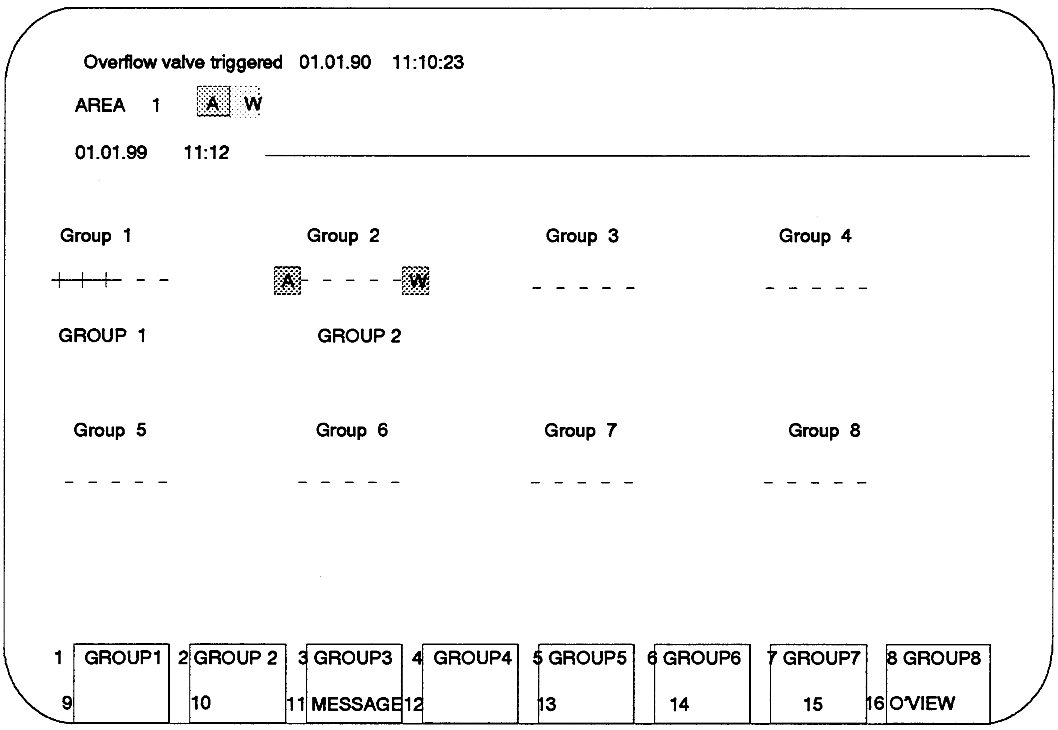
2.3.3.1 Overview Display

The overview display can be designed freely by the user.

2.3.3.2 Area Display

The area display covers the most important information on the status of the visualized objects:

Example for an area display:



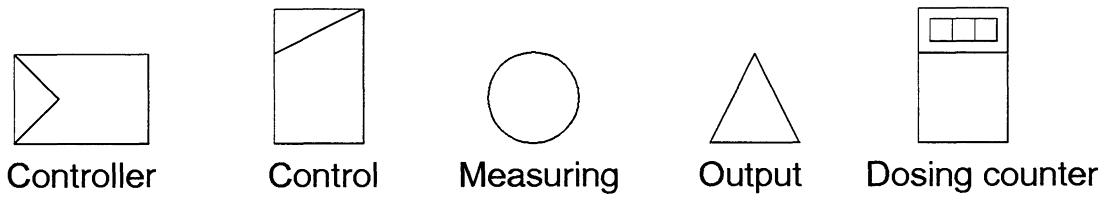
The area display enables a fault or an alarm to be detected in which case the single object concerned can already be localized.

The associated single objects are represented with an information field under each group.

Possible operator controls in the area display are:

- Selection of detailed displays (groups)
- Selection of free process displays
- Selection of message displays
- Return to the overview

Measuring and control functions are displayed by standardized symbols in the area display:

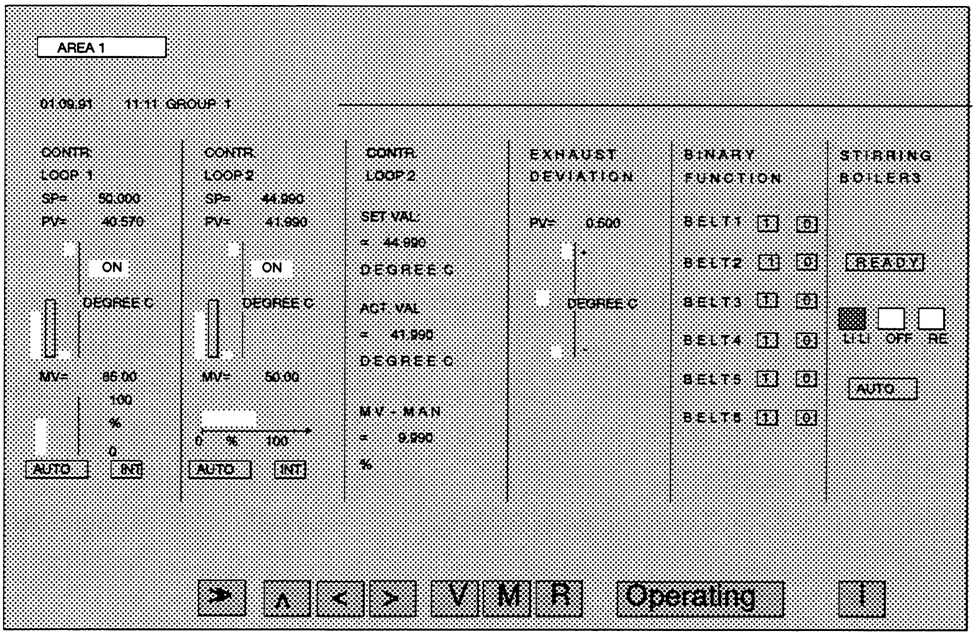


2.3.3.3 Group Display

The group display summarizes the most important information on the visualized objects:

- Operating statuses
- Process values as bars
- Value display with dimension
- Status of the objects
- Names of the objects

Example for a group display:



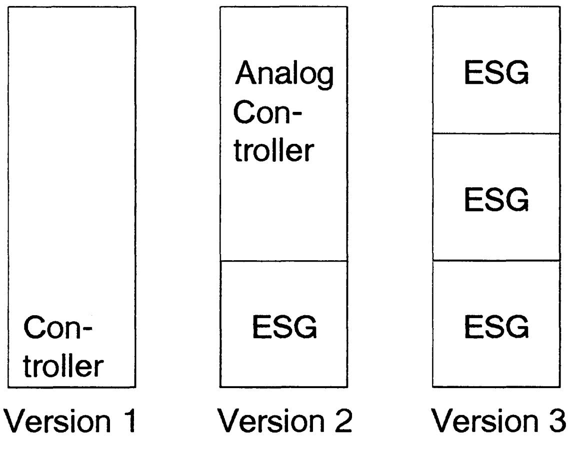
Possible operator controls in the group display:

- Value settings (e.g. manual value, setpoint)
- Operating mode switch-over (e.g. manual/auto, on/off)
- Change into another display

It is possible to branch from the group display into the following displays:

- associated overview display
- associated area display
- other group
- lower ranking loop
- process displays
- message display

7 object columns can be displayed in a group display. An object column can be divided into 3 different versions:



Version 1 Display of a complete controller

Version 2 Display of a controller or of an analog value and a series connected individual control element (ESG) (e.g. valve).

Version 3 Display of 3 individual control elements (ESG) in one object column.

Up to 21 individual objects can be displayed in the group display (7 object columns with version 3: 7*3 = 21).

Object display in the group display:

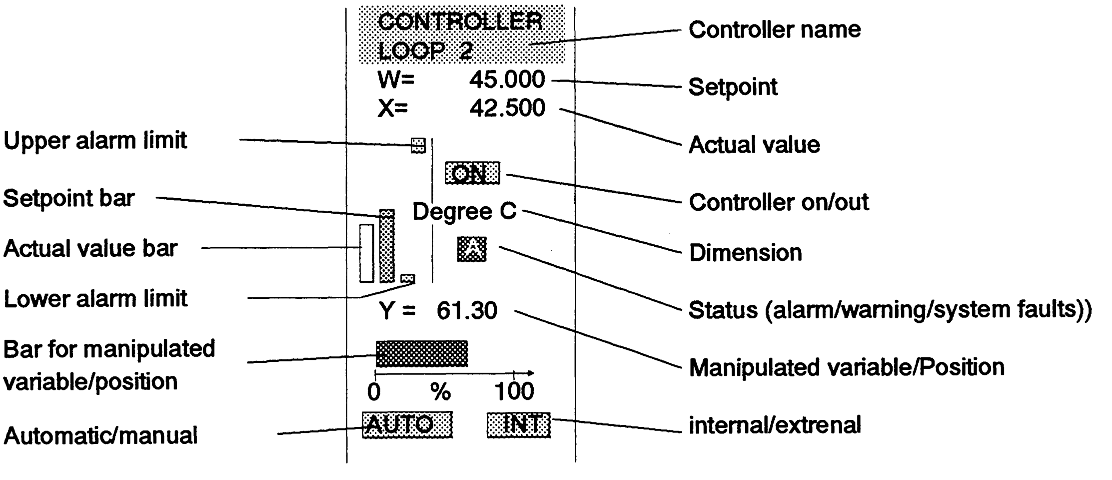
- Process values such as setpoint, actual value and manipulated variable are displayed as bars **and** as value stating the dimension
- Limit values are visualized as bars
- Operating statuses (e.g. on/off, auto/manual, ext/int) are implemented as dynamic fields.

  For example, the following relation can apply for a dynamic field:

Bit AUTO = 1:	AUTO
Bit AUTO = 0:	MANUAL

- The name of the object serves for assigning the standardized display to the plant

Example for an object display in the group display:

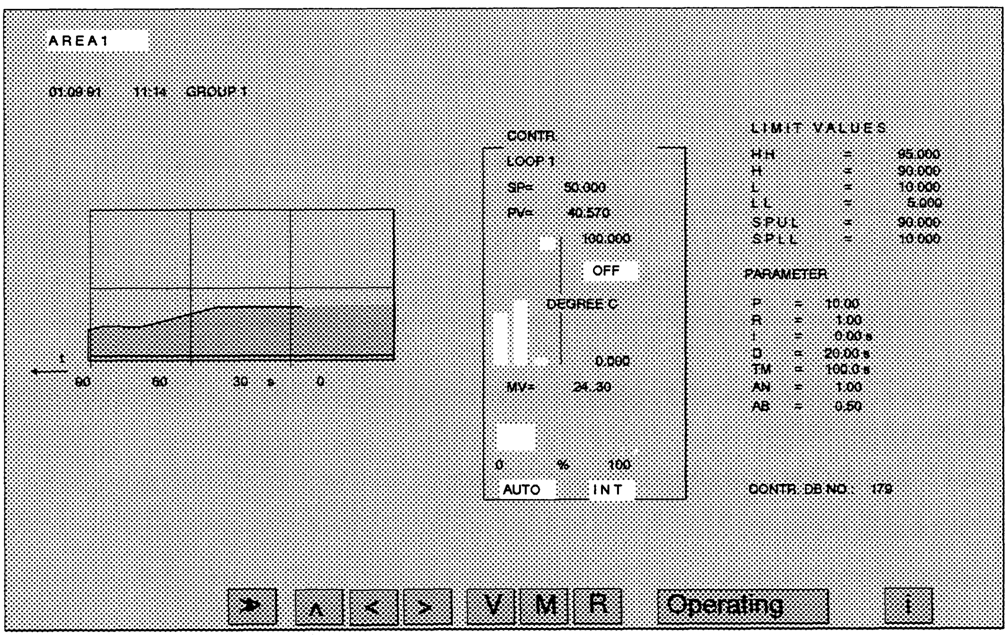


2.3.3.4 Loop Display

The loop display offers the most accurate object display in the hierarchy of the standardized displays. All data of the visualized object are displayed.

The loop display exists only for extensive objects such as controllers, analog value monitors, dosers etc. The displayed values are operator-controllable corresponding to their function.

Example for a loop display:



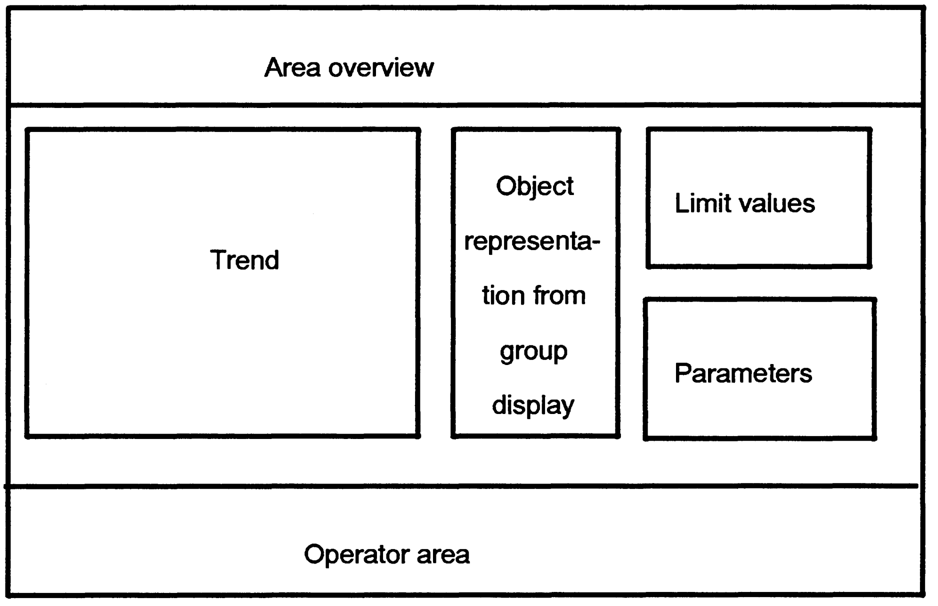
Possible operator controls in the loops display:

Value settings
- Setpoint
- Manual value
- Parameters
- Setting the limits

Operating modes
- Manual/Auto
- On/Off

Display change into
- associated overview display
- associated area display
- associated group display
- other loop display of the same group
- process displays
- message display

Example for the subdivision into a loop display:



The loop display consists essentially of the display of the object which corresponds to the object display in the group display.

The following can also be contained in the loop display:

- Block with parameters
- Block with limit values
- Block with trend curves

Parameters

For instance, the control parameters of a controller object are displayed in the parameter block.

In general, all parameters are operator-controllable. In practice, implementation of operator control via password is customary for safety reasons.

Example for a parameter block

PARAMETER		
P	=	10.00
R	=	1.00
I	=	0.00 sec
D	=	20.00 sec
TM	=	100.0 sec
AN	=	1.00
AB	=	0.50

Parameters for controllers:

- KP: Proportional coefficient
- TN: Integral-action time
- TV: Derivative action time

Additional parameters for step controllers

- TM: Runtime of the actuated valve
- AN: Start value of dead band
- AB: End value of dead band

Limit values

The predetermined limits applying for status monitoring stand in the limit value block.

All limit values are generally operator-controllable. In practice, implementation of operator control via password is customary for safety reasons.

Example for a limit value block:

LIMITS		
HH	=	95.000
H	=	90.000
L	=	10.000
LL	=	5.000
SPUL	=	90.000
SPLL	=	10.000

For instance, limit values of an object for a controller are:

- HH: Upper danger limit
- H: Upper warning limit
- L: Lower warning limit
- LL: Lower danger limit
- SPUL: Upper limit of the setpoint
- SPLL: Lower limit of the setpoint

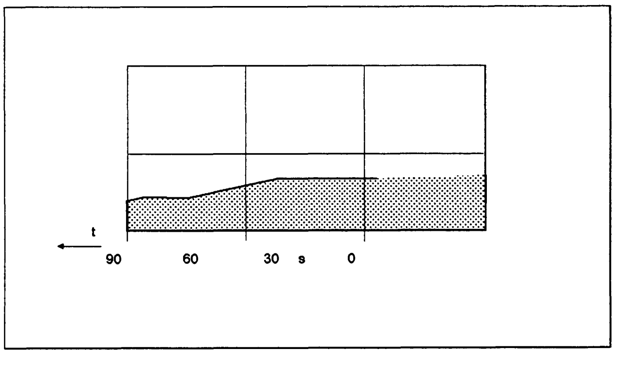
In continuous controllers, there are the following real limitations:

- MVUL: upper value of manipulated variable limitation
- MVLL: lower value of manipulated variable limitation

Trend curves

Trend curves are supplied from the measured value archive of the operators unit. As a rule, process variables (setpoint, actual value and/or manipulated variable) are displayed as trend values.

Example for a trend curve:



2.4 User-Specific Objects and Displays

PMC objects can be defined freely for functions of the automation program for which no predefined PMC object types exist.

Freely defined PMC objects can be reused as macros like the predefined standard object types.

Object definitions take place in three places:

- in the programmable controller
- in PMCPRO
- in COROS LS-B

Programmable controller

- Definition of a data structure including status byte
- Writing an object function which executes the automation function and knows corresponding control value processing.

  The working data area of the object function is the object data structure or the object data block.

PMCPRO

- Object type determination in the status processing

COROS LS-B

- Input of the data structure in KOMED as object parameter
- Production of standard display blocks

3 Status Processing

3.1 General

Under status signals are understood the events which lead to status displays requiring acknowledgement at the level of operator control and observation.

A distinction is made between the following types of status signals:

Alarm/Warning	HH:	Infringing an upper alarm limit
	H:	Infringing an upper warning limit
	L:	Infringing a lower warning limit
	LL:	Infringing a lower alarm limit
Control system	SF:	Control system fault

The actual monitoring function is at the level of the measuring and control functions of the user program. The result of the monitoring function is filed in the object data block.

The PMC status processing performs the following tasks:

- Cyclical enquiry of the monitoring signals from the object data blocks
- Administration of separate signals for control system fault, alarm/warning, as well as the acknowledgement information for each object
- Facilitating the selective suppression of the status signals via a user function (status suppression)

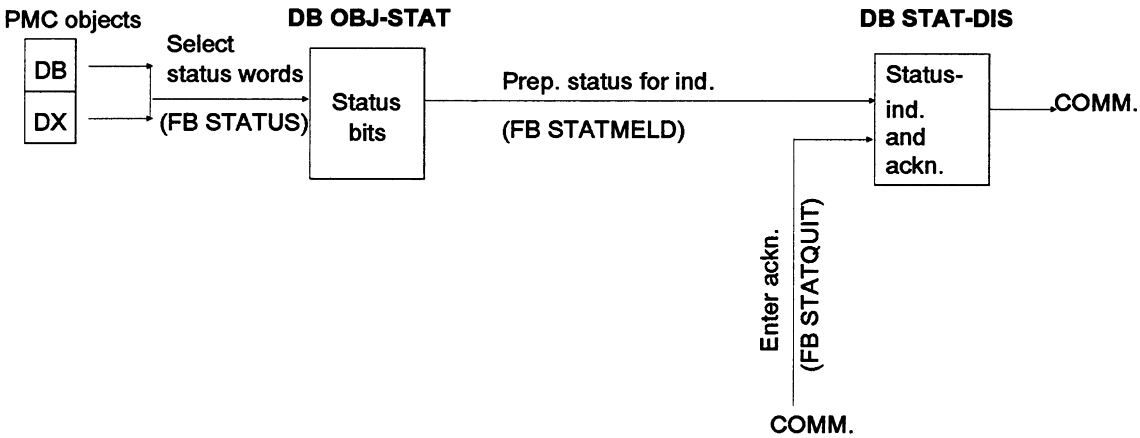
It is guaranteed by the PMC definitions that a general signalling and acknowledgement concept is created.

If the operator control and observation function of an object is multiple programmed (e.g. locally and centrally), it is ensured that an event does not have to be acknowledged several times.

3.2 Status Monitoring

The status signals form the PMC objects are transferred into a DB OBJ-STAT cyclically by the PMC program block FB STATUS.

Depending upon the object type, a control system fault signal or an alarm/warning signal is transmitted.



The following information is filed object-specifically in the DB OBJ-STAT

HH:	Upper alarm limit infringed
LL:	Lower alarm limit infringed
H:	Upper warning limit infringed
L	Lower warning limit infringed
SF:	Control system fault
SSU:	Status suppression

The data from the data block DB OBJ-STAT are processed by the function block FB STATMELD for display in the O+M unit and filed in the data block DB STAT-DIS.

Possible number of objects for status monitoring:

Up to 200 PMC objects can be monitored with the status monitoring. When the SIMATIC PC 155U with the CPU 946/947 is used, up to 750 PMC objects can be monitored for status.

The data blocks DB OBJ-STAT and DB STAT-DIS administer a maximum of 250 objects. They must therefore be set up several times if necessary (3 times for 750 objects). The status of up to 750 PMC objects can be monitored while using CPU 945, 946/7, 948.

The structure of an object word in the DB STAT-DIS is displayed below:

Acknowledgement byte								**Display byte**							
X	A S F	X	X	A H	A L	A H H	A L L	X	S F	S S U	X	H	L	H H	L L

**Acknow-
ledgement byte**

ASF Acknowledgement for fault
AH Acknowledgement of warning, upper limit
AL Acknowledgement of warning, lower limit
AHH Acknowledgement of alarm, upper limit
ALL Acknowledgement of alarm, lower limit

Display byte

SF Fault queued
SSU Status suppression
H Warning, upper limit, queued
L Warning, lower limit, queued
HH Alarm, upper limit, queued
LL Alarm, lower limit, queued

In the acknowledgement byte:

Bit value 0 — means status is not acknowledged. The indication of the status in the O+M unit is flashing.

Bit value 1 — means status is acknowledged. The indication of the status in the O+M unit is static.

The status display is updated due to the following events:

- A 0/1 change of HH, LL, H, L or SF in the DB OBJ-STAT causes HH, LL, H, L or SF to be set in the DB STAT-DIS and resetting of the acknowledgement bit AHH, ALL, AH, AL or ASF.
- The acknowledgement bits in the DB STAT-DIS are set according to the acknowledgement information.
- The signal STU is set in the DB OBJ-STAT according to the status.

If at least one object status has changed, then the contents of the DB STAT-DIS are processed and transmitted as status telegram. The status telegram contains the entire status of all objects. Transmission is made through the programmed communication channels to those operator stations which have registered for the PMC function of status. The status telegram contains the complete status information of a segment. The size of a segment depends on the communication media applied.

With the status telegram, the operator station has all information on the status indications to be displayed.

The following are programmed with PMCPRO for status processing:

- Object numbers
- Object type
- Object data block
- Selection of the communication channels for the status transmission

3.3 Status Messages

Apart from the PMC functions of status processing, a status change can also be processed as status message.

Status messages are generated in the O+M system. The status message is acknowledged in the O+M unit and is sent to the corresponding programmable controller and forwarded through the PMC message processing system to all connected communication partners.

Message texts can be programmed for status messages in the same way as for status signals.

3.4 Status Suppression

On startup of the plant or defined changes of the working area, it is also desirable that the corresponding status signal does not display a fault of the plant due to the calculated or predictable limit value infringements.

PMC offers the possibility of activating a status suppression.

Two types of status suppression are possible:

selective	For each individual PMC object, the status suppression can be activated independently.
central	Switching out the entire status monitoring at a central point. In the case of central status suppression, a system message is sent. Central status suppression is intended for the starting and test phase of the automation system.

In the case of selective status suppression, the following steps are performed:

- Setting the bit STU to 1 (= status suppression active)
- Resetting the status word concerned in the DB STAT-DIS (corresponds to: no status signal pending). Possibly pending status signals are declared invalid.
- Sending a message "Status suppression active" with the status of arrived
- The disabled status word is no longer updated

Resetting selective status suppression:

- Activating status monitoring for the object concerned
- Resumption of display updating
- Sending a message "Status suppression active" with the status of departed

In the case of central status suppression, a bit is set in the DB STAT.IND (DW 1) and a system message "central status suppression active" is generated with the status of arrived.

After the central status suppression is reset, a system message "central status suppression reset" is generated.

3.5 Status Acknowledgement

In status acknowledgement, a distinction is made between acknowledgement of status messages and acknowledgement in status processing:

Acknowledgement of status messages	Acknowledgement takes place in the message system. The reported status exclusively is acknowledged.
Acknowledgement in status processes	All status messages assigned to the relevant object are acknowledged.

If a status change for the object concerned occurs while an acknowledgement is being processed, then the acknowledgement does not refer to the new status but to the indicated status at the time of the acknowledgement.

The acknowledgement entry in the data block DB STAT-DIS is always reset at each entry of a new status.

Acknowledgement in status processing results in a status acknowledgement telegram with the following information:

- Number of the object
- Status displayed at the time of acknowledgement

3.6 Data Blocks

3.6.1 DB OBJ-STAT

DW 0	KM	Change flag
DW 1	KM	Central status suppression
DW 2		free
DW 3		free
DW 4		free
DW 5		free
DW 6	KM	Status of object 1
DW 7	KM	Status of object 2
		⋮
DW n+5	KM	Status of object n

re DW 0 — Bit 0 = 1 : A change has occurred

re DW 1 — Bit 15 = 1 : Status suppression is active for all objects

Status of the objects

Bit 0 = 1 : Lower alarm limit infringed
Bit 1 = 1 : Upper alarm limit infringed
Bit 2 = 1 : Lower warning limit infringed
Bit 3 = 1 : Upper warning limit infringed
Bit 6 = 1 : Control system fault pending
Bit 15 = 1 : Status suppression active

The length of the DB OBJ-STAT is in accordance with the number of programmed objects.

The DB OBJ-STAT administers a maximum of 250 objects. If more than 250 objects are monitored, the data block must be set up several times (3 times for the maximum number of 750 objects).

Monitoring more than 200 objects is possible only with CPU945, 946/7 and 948.

3.6.2 DB STAT-DIS

The data block DB STAT-DIS contains all status indications of the objects in the form of the status telegram.

DL 0	KH	Telegram type identifier 37H
DR 0	KH	Telegram body length (max. DW No.)
DW 1	KM	Central status suppression and offset
DL 2	KH	1/100 seconds
DR 2	KH	Seconds
DL3	KH	Minutes
DR 3	KH	Hours
DL 4	KH	Day
DR 4	KH	Month
DL 5	KH	Year
DR 5	KH	0
DW 6	KM	Status display of object 1
DW 7	KM	Status display of object 2
		⋮
DW n+5	KM	Status display of object n

re DW 1

Bit 15 = 1 : Status suppression is active for all objects

All other bits of DW1 indicate the offset for the status area.

DL2 to DR5

Time and date of status acquisition
Format: BCD

Status indication of the objects

Bit 0 = 1 : Lower alarm limit infringed (LL)
Bit 1 = 1 : Upper alarm limit infringed (HH)
Bit 2 = 1 : Lower warning limit infringed (L)
Bit 3 = 1 : Upper warning limit infringed (LL)
Bit 5 = 1 : Status suppression active (SSU)
Bit 6 = 1 : Control system fault pending (SF)
Bit 8 = 1 : Acknowledgement for lower alarm limit (ALL)
Bit 9 = 1 : Acknowledgement for upper alarm limit (AHH)
Bit 10 = 1 : Acknowledgement for lower warning limit (AL)
Bit 11 = 1 : Acknowledgement for upper warning limit (AH)
Bit 14 = 1 : Acknowledgement for control system fault (ASF)

The length of the DB STAT-DIS is in accordance with the number of programmed objects.

The DB STAT-DIS administers a maximum of 250 objects. If more than 250 objects are monitored, the data block must be set up several times (3 times for the maximum number of 750 objects.

Monitoring more than 200 objects is possible only with CPU945, 946/7 and 948.

In data word 0, the DB STAT-DIS contains the head of the status telegram. This enables the FB PUT to send the DB STAT-DIS unchanged as status telegram to all registered operator stations.

The value 37H signals to the FB PUT that a telegram ready for sending is standing by. If the FB PUT has executed the transmission, FB PUT writes the value FFH in DL 0.

3.7 Function and Program Blocks

3.7.1 FB STATUS

Block number	Programmable with PMCPRO
Presetting	FB 1
Callup	The FB STATUS is called up unconditionally in the PB COMMUN (SPA FB).
Transfer parameters	none
Description	The FB STATUS is generated with PMCPRO. It transfers the status words of the PMC objects into the DB OBJ-STAT.
Contained FB/PB calls	none
Data blocks used	DB OBJ-STAT, object DBs
Flags used	Scratchpad flags in the area FY 200 - 255

3.7.2 FB STATMELD

Block number FB 223

Callup The FB STATMELD is called up unconditionally in the PB COMMUN (SPA FB).

Transfer parameters The DB PMC-KON contains the parameters to be processed.

Description The FB STATMELD compares the entries in the DB OBJ-STAT and DB STAT-DIS object by object and determines from these the new status indication which is entered in the DB STAT-DIS

Status changes and acknowledgements are also entered in the DB M-NUMBER, in which case the "Status message" bit is set.

Contained FB/PB calls none

Data blocks used DB PMC-KON, DB OBJ-STAT, DB STAT-DIS

Flags used Scratchpad flags in the area FY 200 - 255

3.7.3 FB STATQUIT

Block number	FB 222
Callup	The FB STATQUIT is called up in the FB INTERPRE, if a status acknowledgement telegram has arrived.
Transfer parameters	The DB PMC-KON contains the parameters to be processed.
Description	The FB STATMELD enters the acknowledgement information in the DB STAT-DIS.
Contained FB/PB calls	none
Data blocks used	DB PMC-KON, DB STAT-DIS
Flags used	Scratchpad flags in the area FY 200 - 255

3.7.4 FB S-ANLAUF

Block number	FB 209
Callup	The FB S-ANLAUF is called up unconditionally in the PB STARTUP (SPA FB).
Transfer parameters	The DB PMC-KON contains the parameters to be processed.
Description	The task of the FB S-ANLAUF is the generation and default selection of the data blocks DB OBJ-STAT and DB STAT-DIS in the suitable length.
Contained FB/PB calls	none
Data blocks used	DB PMC-KON, DB PMC-VAR, DB OBJ-STAT, DB STAT-DIS
Flags used	Scratchpad flags in the area FY 200 - 255

4 Functional Descriptions

The predefined object types with their functionality for the programmable controller are described in this chapter.

Several object types belonging to one subject are summarized in the common subchapters.

4.1 R64 Controller Structures (Object Type 1 to 3)

Object type 1
Object type 2

Object type 3	Measuring points of the R64 controller The measuring points of the R64 serve for visualization of the most important controller characteristics. The controller status is held as status information.

Control systems with a maximum of 64 individual control loops can be assembled with the controller structure R64 for the CPUs 928/928B. The R64 is of very compact structure, i.e. all important functions are already contained in the controller and can thus be programmed simply by switching the individual partial functions in and out.

The controllers can be used as quasi-continuous (Conti) controllers and as step controllers for integrating final controlling elements. The parameterizing package COM REG is used for parameterization.

The controller is called up automatically by the operating system of the CPU via the parameterization in the controller list (DB 2).

Functions of the R64

Setpoint sequence

A setpoint curve is generated from 1 to 10 interpolation points. Here it is possible to select between a step-shaped and a linearly interpolated course of the curve. The generated profile is repeated periodically.

When one interpolation point is input, a constant setpoint is output.

Ramp-function generator

The ramp-function generator generates for a setpoint step change at the input an output signal changing ramp-shaped up to the wanted setpoint. The course can be influenced by high-, low- and cancel-keying.

In the case of manual/automatic change-overs as well as on new start/restart, the ramp-function generator starts at the current actual value.

Smoothing

A first-ordered time delay is simulated for smoothing an analog variable. For manual/automatic change-over as well as new start/restart, the smoothing starts in the setpoint branch at the current actual value.

Polygon

This function can be defined through up to 10 value pairs and filed in a table. The abscissa values are equidistant. There is linear interpolation between the values. The function value is equal to the first value below the first value and equal to the last value above the last value.

Plausibility check

Disturbances which exceed an inputtable value are suppressed with this module. If a deviation is present longer than three sampling periods, then the input value is interpreted as valid. The output value is brought up to the input value with a power function or set immediately to the input value.

PID controller

The connection between the system deviation and the manipulated variable of the continuous controller is simulated by a quasi-continuous PID controller by calculating a positioning increment from the system deviation. The manipulated variable is output as sum of the previously formed increments.

Due to the parallel structure of the controller, the controller factor R, the integral-action time I and the derivative action time D can be set separately in each case. In addition, the proportional coefficient P, which is valid for all three parallel branches, can still be parameterized.

The branches of the PID controller can be switched off individually.

Changing over between the operating modes is performed via control bits.

Pulse interval output

A pulse shaper stage converts the calculated quasi-continuous positioning signal into binary signals for controllers with two-step or three-step output. Pulse length modulation is performed. Pulses are output if an inputtable response value is exceeded.

In the case of a three-step controller, final controlling elements acting differently can be corrected with an adaption factor.

Step controller

The step controller has three-step behaviour and can act only together with a motor driven final controlling element (=integrator). The system deviation firstly runs through a dead band with hysteresis, in order to mask out small control deviations and so that the positioning device is not unnecessarily loaded. The dead band is symmetrical around the zero point. A positioning increment is formed from the output size of this dead band.

Pulse shaper stage

The number of actuating pulses calculated by the step controller is converted by the pulse shaper stage into two binary signals for actuating a motor driven final controlling element (e.g. for opening and closing a servo-valve).

The minimum pulse duration can be selected (<= sampling time), shorter pulse times are stored.

Limit monitor

Controller values can be checked for a maximum of six limit values in two freely connectable limit monitors. Limit value infringements are signalled by corresponding bits.

Moreover, two permanently connected limit monitors can be integrated in the controller structure.

4.2 Standard Controller Interface (Object Type 4 and 5)

The object types 4 and 5 describe a standardized interface for compact controller structures. The interface corresponds to the coupling of SIPART DR compact controllers to the SIMATIC S5 through the SIPART SW S5 coupling software.

Arbitrary control functions can be imaged on the standardized data structure via the object types 4 and 5. An advantage of the standardized interface is the memory-optimal compact structure.

Operating controll values is implemented via operator values and operator value numbers. After operator control is completed, the corresponding operator value number is reset in the data block.

☞ The software package SIPART S5 can be used for supplying the object types 4 and 5.

4.3 Control Module IP 260 (Object Type 6 and 7)

The object types 6 and 7 describe the control module IP260.

Functions of the control module

The control module IP 260 is a single-channel controller as intelligent peripheral module in the SIMATIC S5 spectrum. It can be used for different control tasks such as controlling pressure, flow etc.

The central processor unit of the programmable controller is relieved in time and the control function is maintained even on failure of the central unit by the use of an intelligent peripheral module (IP). To increase the availability, a second IP 260, which takes over the control smoothly on failure of an IP 260, can be used in master/slave mode.

The process signals required for control are acquired through 4 analog input channels. Additional digital information such as controller disable, preferential mode and limit switches are read-in and evaluated through 4 digital inputs.

The module and the control system are controlled in a microprocessor. The controller is implemented in the firmware of the module as PID controller.

The following controller types can be parameterized:

- Continuous controller with analog manipulated variable output
- Continuous controller with pulse output
- Step controller with positioning increment output

The calculated manipulated variable is output to the process according to the type of controller either through two positioning outputs digitally or through the analog output.

Two further digital outputs are provided for indicating the ready status (controller ready) and for exceeding limit values.

A serial interface is available for connection of a programming unit for the parameterization of the module on startup.

O+M interface of the IP 260

The object data block is the data block DB IP260, to which the following characteristics are added:

- Object name
- Status strip
- Operator bit strip

Certain operator bits are set for operator control of the module and a command input is made in DW 1 and DW 2 by program. Calling up the FB PER:REG (FB 170) transfers the operator-controlled parameters to the IP 260 module.

For the cyclical monitoring of the IP 260, the controller characteristics must be transferred into the object data block for monitoring the module by calling up the FB 170.

Please refer to the IP 260 manual for further information on operating the controller module.

Generating the status byte

The status byte is generated by the FB 131 with the following command sequence (Example):

```
FB 131                      D:DRIVE1ST.S5D                 LEN=27
                                                            PAGE 1
SEGMENT 1         0000
NAME :STA260
BEZ:DBRE E/A/D/B/T/Z: B

0008     :B   =DBRE
0009     :L   DW 110        Indicator word
000A     :L   KH  000F
000C     :UW
000D     :T   MW 249
000E     :L   DR  111
000F     :T   MB  251
0010     :O   M   251.4
0011     :O   M   251.5
0012     :=   M   250.6     Generate fault
0013     :L   MB  250
0014     :T   DR  133       Status word
0015     :BE
```

4.4 Analog Measured Values (Object Type 8)

The object type 8 describes a standardized file for analog process variables. The display of up to 5 words is possible for visualization.

The measured values must be read and standardized by the user. The value display is in fixed point. The extension parameter indicates the number of places after the decimal point.

The output values are provided with a value designation (name) and a dimension statement.

Value operator control of the visualized measured values is not intended.

The measured value supply is provided by calling up the PB ERFASS (Example):

```
PB 213                          D:DRIVERST.S5D                 LEN=18
                                                               PAGE 1
SEGMENT1     0000  Standardize/monitor value
0000      :
0001      :L    FW  100                 Load process value
0002      :L    KF  +300                Add-in offset
0004      :+F
0005      :L    KF  +2                  Extend value
0007      :XF
0008      :C    DB  108                 Open DB measured value
0009      :T    DW 13                   File process value
000A      :BE
```

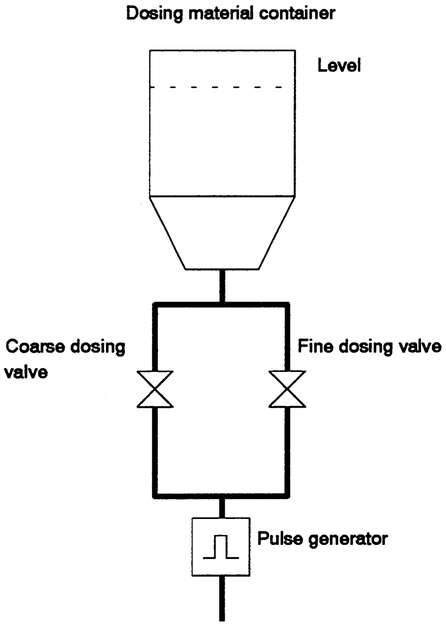
4.5 Dosing Apparatus (Object Type 9)

The object type 9 describes a dosing apparatus.

The designations of the commands, words and parameters for object type 9 correspond to the designations of the dosing module IP 261.

4.5.1 Description of Function

Mechanical construction of the dosing apparatus:



Material is taken from a storage tank (dosing tank) through the coarse dosing valve and the fine dosing valve. The quantity of the dosed material is monitored by a pulse-generating flow measuring device.

A certain preset material quantity (setpoint) should be taken by dosing.

The dosing process can be divided into three phases:

- Main flow phase
- Fine flow phase
- Dribbling acquisition phase

These phases are controlled by certain signals:

- Preliminary end value reached
- Main end value reached
- End of dosing

The following parameters and variables are important for the dosing apparatus:

Input variables

GAUF : "Coarse flow open" indication
GZU : "Coarse flow closed" indication
FAUF : "Fine flow open" indication
FZU : "Fine flow closed" indication
FRA : Enable the outputs
ZE : Count input

Output variables

CV : Positioning output for coarse flow
FV : Positioning output for fine flow
PVR : Preliminary end value reached
MVR : Main end value reached
DOSE : End of dosing
MCR : Dosing module ready
CFM : Group error signal
BERO24V : Shortcircuit-proof generator supply BERO24V

Parameters

VAW: Preliminary end value

When the preliminary end value is reached, the coarse flow valve is closed. The preliminary end value is programmed as difference value to the main end value.

HAW: Main end value

When the main end value is reached, the fine flow valve is closed. The main end value is the setpoint of the dosing apparatus.

NK: Dribbling correction value

After the dosing valves are closed, a certain quantity of material runs out from the pipe (dribbling).

The dribbling correction value corresponds to the dribbling and has the effect that the fine flow valve is already closed by the dribbling value before reaching the setpoint.

NFAK: Standardization factor NFAK

The standardization factor describes how many pulses of the measuring device correspond to a certain physical unit (e.g. pulses per kilogram)

EFAK: Influencing factor

The influencing factor takes a density correction into account.

NLZ: Dribbling time

The dribbling time indicates the period in which pulses may still arrive after reaching the main end value. It starts with closing the fine flow valve and ends with the dosing end signal DOSE.

IMPAZ: Pulse failure time

The pulse failure time indicates the period in which at least one count pulse is expected. When the pulse failure time is exceeded, the dosing process is shut down.

VANZ: Valve response time

The valve response time indicates the period in which the acknowledgement of the valve to a control command is expected. When the valve response time is exceeded, the dosing process is shut down.

4.5.2 O+M Interface of the Dosing Apparatus

The object data block for object type 9 is DB DOSAGE.

The following can be used for the data exchange between the object data block DB DOSAGE and the dosing apparatus:

- FB PER:DOS (FB 171) in connection with the dosing module IP 261,

  The mechanisms of operator control correspond to operator control of the IP 260 (see Chap. 4.3 for object type 6 and 7).

- An arbitrary user block which uses the prefabricated data format and the mechanisms of the DB DOSAGE.

4.6 Individual Control Elements ICM (Object Type 10 to 18)

Object type 10

Individual control element: Motor 2 loops

Actuation of 2 motors. The status and operator control information runs through an interface.

Object type 11

Individual control element: Reversing drive

Object type 12

Individual control element: Motor with 2 speeds, controlled acceleration

Object type 13

Individual control element: Motor with 2 speeds, automatic acceleration

Object type 14

Individual control element: Motor star-delta

Actuation of a motor with star-delta switch-over.

Object type 15

Individual control element: Valve 2 loops

Actuation of two valves. The status and operator control information run for both valves through an interface

Object type 16

Individual control element: Valve slide

Actuation of a valve slide.

Object type 17

Individual control element: Latched switching device

Actuation of a latched switching device

Object type 18

Individual control element: Valve slide with ESB

Actuation of a valve slide. Compared with object number 16 (valve slide), object number 18 has additional information on the readiness of the individual control element to be switched on.

O+M interface of the individual control elements ICM:

The PMC object types for individual control elements ICM contain the following blocks:

DB ICM Working data

- Statuses
- Name
- Status byte

FB ICM Tasks:

- Supplying the DB ICM with status information
- Passing on the operator controls
- Evaluation of the statuses
- Production of the status byte for the PMC status processing

4 bytes are available in each case for data from the ICM and 4 bytes for data to the ICM for the communication with the individual control elements.

According to ICM function, different information is evaluated or controlled from the communication data bytes.

In operator control, the control bit (D 8.0) is set in the DB ICM. The control bit is evaluated in the FB ICM by the following sequences (Example):

```
FB 132                          D:DRIVE1ST.S5D                  LEN=41

SEGMENT 1          0000
NAME :ICM
BEZ:DBIC E/A/D/B/T/Z:B

0008      :B    =DBIC
0009      :                            read data (programmed by the user)
000A      :
000B      :
000C      :L    KB  0
000D      :T    MB  250
000E      :L    DR  14
000F      :T    MB  249
0010      :O    M   249.1
0011      :O    M   249.2
0012      :O    M   249.3
0013      :=    M   250.6              fault
0014      :L    MB  250
0015      :T    DR  9                  status word
0016      :L    DR  8
0017      :T    MB  250
0018      :UN   M   250.0              operator control bit set ?
0019      :BEB                         no
001A      :
001B      :                            write data (programmed by the user)
001C      :
001D      :L    DR  8                  operator control bit reset
001E      :T    MB  250
001F      :U    M   250.0
```

```
0020    :R    M  250.0
0021    :L    MB 250
0022    :T    DR 8
0023    :BE
```

A set control bit has the consequence that the data bytes for data for the ICM are sent to the individual control element and then the control bit is reset.

Status information of the ICM 560:

A group error signal must be generated from the bits D 14.1, D 14.2 and D 14.3:

```
O   D 14.1
O   D 14.2
O   D 14.3
S   D 9.6
AN  D 14.1
AN  D 14.2
AN  D 14.3
R   D 9.6
```

4.7 Analog Value Function (Object Type 19)

Object type 9 (analog value function) contains the following blocks:

DB ANALOG

Working data:

- Process value
- Limit values
- Dimension
- Name
- Status byte

FB ANALOG

Monitoring the process value for two limit value pairs:

- Warning limit above/below
- Alarm or danger limit above/below

The limit value infringements are noted in the status byte which can be processed further by the PMC status processing.

PB ERFASS

Acquisition and standardization of the process variable

Function block FB ANALOG (Example):

```
FB 133                        D:DRIVE1ST.S5D                  LEN=49
                                                              PAGE 1
SEGMENT 1       0000
NAME :ANALOG                                 Analog value function
BEZ:DBAN  E/A/D/B/T/Z: B

0008        :B     =DBAN
0009        :***

SEGMENT 2       000A
000A        :                                Limiting/limit value infringement
000B        :
000C        :
000D        :L     DR  15                    Status byte
000E        :T     MB  249                   Intermediate Flag
000F        :L     DW 8                      Process value
0010        :L     DW 10                     BMin
0011        :>F                              above BMin
0012        :SPB   =M001                     Yes --> M001
0013        :T     DW 8                      Set process value to BMin
0014 M001   :L     DW 8                      Process value
0015        :L     DW 12                     PVLL
0016        :<F                              Not reached ?
0017        :=     M    249.0                AU
0018        :L     DW 8                      Process value
0019        :L     DW 14                     XUW
001A        :<F                              Not reached ?
001B        :=     M    249.2                WU
001C        :L     DW 8                      Process value
001D        :L     DW 13                     XOW
001E        :>F                              Exceeded ?
001F        :=     M    249.3                WO
0020        :L     DW 8                      Process value
0021        :L     DW 11                     XOG
0022        :>F                              Exceeded ?
0023        :=     M    249.1                AO
0024        :L     DW 8                      Process value
0025        :L     DW 9                      BMax
0026        :<F                              within the range
0027        :SPB   =M002                     further
0028        :T     DW 8                      Set BMax as process value
0029 M002   :L     MB  249                   Intermediate flag
002A        :T     DR  15                    File status byte
002B        :BE
```

4.8 Binary Function (Object Type 20)

The object type 20 describes a standardized file for bit sizes. Up to 5 values can be displayed and operator-controlled. The bit sizes must be read by the user. The values must be provided in each case with a name (value designation).

The function block FB BIN takes over the supply and disposal of the O+M interface (DB binary) (Example:

```
FB 134                          D:DRIVERST.S5D                  LEN=82
                                                                PAGE 1
SEGMENT 1          0000
NAME :BIN
BEZ:DBBI   E/A/D/B/T/Z:B
BEZ:EIN1   E/A/D/B/T/Z:E        BI/BY/W/D: BI
BEZ:EIN2   E/A/D/B/T/Z:E        BI/BY/W/D: BI
BEZ:EIN3   E/A/D/B/T/Z:E        BI/BY/W/D: BI
BEZ:EIN4   E/A/D/B/T/Z:E        BI/BY/W/D: BI
BEZ:EIN5   E/A/D/B/T/Z:E        BI/BY/W/D: BI
BEZ:AUS1   E/A/D/B/T/Z:A        BI/BY/W/D: BI
BEZ:AUS2   E/A/D/B/T/Z:A        BI/BY/W/D: BI
BEZ:AUS3   E/A/D/B/T/Z:A        BI/BY/W/D: BI
BEZ:AUS4   E/A/D/B/T/Z:A        BI/BY/W/D: BI
BEZ:AUS5   E/A/D/B/T/Z:A        BI/BY/W/D: BI

0026     :B     =DBBI
0027     :L     KB  0
0028     :T     MB  250
0029     :U     =EIN1                        Input variable 1
002A     :=     M   250.0
002B     :U     =EIN2                        Input variable 2
002C     :=     M   250.1
002D     :U     =EIN3                        Input variable 3
002E     :=     M   250.2
002F     :U     =EIN4                        Input variable 4
0030     :=     M   250.3
0031     :U     =EIN5                        Input variable 5
0032     :=     M   250.4
0033     :L     MB  250
0034     :T     DR  9                        Indicator
0035     :L     DR  10
0036     :T     MB  250
0037     :UN    M   250.0                    operator control bit set ?
0038     :BEB                                no
0039     :***
```

4.9 Control System S5-115U (Object Type 21 and 22)

Control systems with up to 8 individual controllers can be assembled for the PLC 115 U with the CPUs 942, 943 and 944 with the "Control system S5-115U" control system package.

The individual controllers are implemented as compact controller structures which can be programmed simply with relatively large flexibility. The controllers can be used optionally as quasi-continuous PID controllers (Conti controllers) or as step controllers.

The control loops can change in their functions and thus adapt to the control task by switching part functions in or out or branching through software switches.

Implementable control system types:

- Fixed value control
- Sequential control
- Ratio control
- Cascade control
- Mixing control

The controller test is programmed using COM REG 115U.

Please refer to the control system 115U manual for information on calling up the controller.

Functions of the controller

The PID algorithm integrated in the CPUs is used for calculating the manipulated variable.

Parameters

P : Proportional coefficient
I : Integral-action time
D : Derivative action time
MVUL : Upper limitation of the manipulated variable
MVLL: Lower limitation of the manipulated variable

Switching possibilities

- Manual/automatic change-over
- Input of the manual value Y Hand in manual mode

Actual value

The actual value is read and standardized by periphery, the read signal is monitored for wire breakage.

Equivalent actual value

Instead of the actual value, for instance, an equivalent actual value can be input for test purposes.

Polygon

The read actual value can be corrected (e.g. linearized) using a table.

Smoothing Noisy signals can be smoothed.

Limit signal element The actual value is monitored for 4 settable limits.

Dead band with hysteresis The actual value is compared with the setpoint. As long as the difference lies within certain limits, the set setpoint is output as actual value.

Setpoint The setpoint can be input internally or externally.

Setpoint adjuster The new setpoint is moved to incrementally using the setpoint adjuster.

Generating the PMC status byte:

The status word of the control system 115U must be converted into the PMC status word for further processing (Example):

```
FB 135                          D:DRIVE1ST.S5D                LEN=31
                                                              PAGE 1
SEGMENT 1          0000
NAME :STA115
BEZ:DBRE           E/A/D/B/T/Z: B

0008    :B    =DBRE
0009    :L    KB  0
000A    :T    MB  249
000B    :L    DR  48                Indicator word
000C    :T    MB  250
000D    :U    M   250.0             AO
000E    :=    M   249.1
000F    :U    M   250.1             WO
0010    :=    M   249.3
0011    :U    M   250.3             WU
0012    :=    M   249.2
0013    :U    M   250.4             AU
0014    :=    M   249.0
0015    :U    M   250.6             S
0016    :=    M   249.6
0017    :L    MB  249
0018    :T    DR  188
0019    :BE
```

4.10 Modular Control System (Object Type 23 and 24)

Modular control is a standard function block package with efficient modules for implementing control engineering tasks. Subdivision of the tasks into modules facilitates flexible use of the functions.

☞ The multiple use of a controller structure (standard controller) offers advantages:

- The controller structure must only be present once in the PLC which saves memory space.
- Visualization of the controller structure must only be implemented once in the operator station (multiple use of one standard display).
- Only one PMC object must be typified for the controller structure.
- Management of the controller in the communication and status processing is simplified.

4.10.1 System Frame for the Controller Modules

The blocks of the modular control are called up through a system frame.

Constituents of the system frame:

DB ODAT organizational data block

The DB ODAT contains the information as to which data block contains the internal controller data of a control system structure, which program blocks access the data and at which time the corresponding program blocks must be called up.

FB ORGANI organizational function block

The FB ORGANI ensures that the control system structures (program blocks) are called up at the sampling times. It is called up in the 100 ms grid.

FB ANLAUF Function block for starting up the programmable controller

The FB STARTUP ensures at startup that the internal data blocks of the controller structures have default settings. It is called up in the startup organization blocks of the programmable controller.

The blocks of the system frame are called up in the startup organization blocks and in the organization block 100 ms of the PLC.

OB 20
OB 21
OB 22

Startup blocks

The following sequence must be included in all three startup blocks:

```
     :JU  FB  63
NAME     :STARTUP
PLC :KF+3
TYPE     : 0
     :BE
```

OB 100 ms

Organization block 100 ms

Call sequence in OB 13

```
     :JU  FB  38
NAME     :SAVE
DB   :DB  40
     :JU  FB  69
NAME     :ORGANI
ODAT     :DB  255
     :JU  FB  39
NAME     :LOAD
DB   :DB  40
     :BE
```

The status byte for the modular control system is generated by the function block FB MRSTAT.

A status byte can be generated only if a limit value monitoring (GRENZSIG block) is programmed in the modular control system.

A data word must be reserved for the status word.

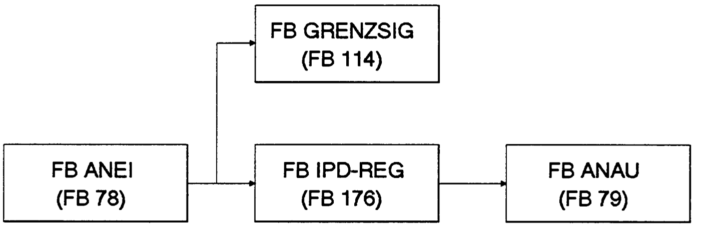
Structure of the FB MRSTAT (Example):

```
FB 136                           D:DRIVE1ST.S5D                 LEN=39
                                                                PAGE 1

SEGMENT 1          0000
NAME:MRSTAT
BEZ:DBRE  E/A/D/B/T/Z:B
BEZ:GRNZ  E/A/D/B/T/Z:E          BI/BY/W/D: BY
BEZ:STRG  E/A/D/B/T/Z:E          BI/BY/W/D: BY

000E      :B    =DBRE
000F      :L    KB  0
0010      :T    MB  249
0011      :L    =GRNZ
0012      :T    MB  250
0013      :U    M   250.0                   GA02 pending
0014      :=    M   249.1                   A0
0015      :U    M   250.1                   GA01 pending
0016      :=    M   249.3                   W0
0017      :U    M   250.3                   GAU1 pending
0018      :=    M   249.2                   WU
0019      :U    M   250.4                   GAU2 pending
001A      :=    M   249.0                   AU
001B      :L    =STRG                       Wire breakage
001C      :T    MB  250
001D      :U    M   250.7
001E      :=    M   249.6                   fault
001F      :L    MB  249
0020      :T    DR  87
0021      :BE
```

☞ To promote multiple use of the MRSTAT block, attention should be paid that the control and message byte (STEB) of the limit signal element GRENZSIG as well as the status byte are always filed at the same place in the data block DB INTER. Under this condition, the above command sequence can be programmed exactly the same in the PB ABTAST.

4.10.2 Structure Example: Continuous Controller

The basic structure K-REG represent a continuous controller with its most important basic functions. The part functions are performed by function blocks (modules):



FB ANEI Analog input block. Reading in the process value.

FB GRENZSIG Limit signal block. Monitoring the process value for two limit value pairs

FB IPD-REG PID controller with automatic/manual switch-over

FB ANAU Analog output module. Output of the process value

All blocks are processed at the sampling time. The blocks (modules) of the controller structure are called up by the program blocks PB ABTAST and PB 100 ms.

Structure of the PB 100 ms:

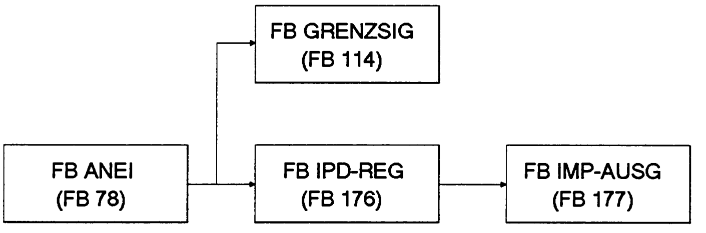
```
PB 100                          D:MODREGST.S5D                LEN=6
                                                              PAGE 1
SEGMENT 1          0000
0000       :BE                              no entry, because no function has
                                            to be called up in the 100 ms grid.
```

Structure of the PB ABTAST:

```
PB 101                     D:MODREGST.S5D                LEN=56
                                                         PAGE 1
SEGMENT 1          0000
0000       :JU   FB  78
0001 NAME :ANEI
0002 STEB :      DL  21          Control byte
0003 PBER :      DW  22          Peripheral area
0004 BG   :      DL  23          Module
0005 KN   :      DR  23          Identifier
0006 BT   :      DL  24          Module type
0007 NA   :      DD  25
0008 ER   :      DD  27          Equivalent value
0009 XA   :      DD  29          Output value
000A       :JU   FB  176
000B NAME :IPD-REG               IPD controller
000C STEW:       DW  31          Control word STEW
000D RSP  :      DW  32          Control word RSP
000E SOLL :      DD  33          Setpoint
000F IST  :      DD  29          Actual value
0010 XA   :      DD  35          Controller output
0011 OBXA :      DD  37          Upper manipulated variable limitation
0012 UBXA :      DD  39          Lower manipulated variable limitation
0013 ABTZ :      DD  41          End value (dead band)
0014 ANTZ :      DD  43          Start value (dead band)
0015 K0/P :      DD  45          Proportional coefficient
0016 K/TI :      DD  47          Integral component
0017 A(0) :      DD  49          Start value of the integrator
0018 K/TD :      DD  51          Differential component
0019 T1   :      DD  53          Time constant (D-T1)
001A TM   :      DD  55          Motor runtime
001B THLG :      DD  57          Acceleration time
001C HAND:       DD  59          Manual value
001D ZEIN :      DD  19          Disturbance input
001E I    :      DD  17          Output: I component
001F P    :      DD  17          Output: P component
0020 D    :      DD  17          Output: D component
0021       :JU   FB  79
0022 NAME :ANAU                  Analog output
0023 STEB :      DL  61          Control byte
0024 XE   :      DD  35          Input
0025 PBER :      DW  62          Peripheral area
0026 BG   :      DL  63          Module
0027 KN   :      DR  63          Identifier
0028 BT   :      DL  64          Module type
0029       :JU   FB  114
002A NAME :GRENZSIG              Limit signal generator
002B XE   :      DD  29          Input
002C STEB :      DL  65          Control byte
002D HYS  :      DD  66          Hysteresis
002E GWO2:       DD  68          Upper limit value
002F GWO1:       DD  70          Upper warning value
0030 GWU1 :      DD  72          Lower warning value
0031 GWU2:       DD  74          Lower limit value
0032       :JU   FB  140
0033 NAME :MRSTAT                Generating the status signal
0034       :BE
```

4.10.3 Structure Example: Step Controller

The basic structure S-REG represents a step controller with its most important basic functions. The part functions are performed by function blocks (modules):



FB ANEI	Analog input block. Reading the process value.
FB GRENZSIG	Limit signal block. Monitoring the process value for two limit value pairs
FB IPD-REG	PID controller with automatic/manual switch-over
FB IMP-AUSG	Pulse output block. Output of the process value for an integrating final controlling element

The blocks FB ANEI, FB GRENZSIG and FB IPD-REG are processed at the sampling time. The pulse output is processed in the 100 ms grid.

The blocks (modules) of the controller structure are called up by the program blocks PB ABTAST and PB 100 ms.

Structure of the PB 100 ms:

```
PB 200                          D:MODREGST.S5D                    LEN=13
                                                                  PAGE 1
SEGMENT 1          0000
0000        :JU  FB  177
0001 NAME :IMP-AUSG
0002 XE     :    DD  35              Input of the pulse output
0003 TMIN   :    DD  61              Minimum pulse duration
0004 STWO   :    DW  63              Control word
0005 IMPH   :    Q   0.0             Pulse output for "higher"
0006 IMPT   :    Q   0.0             Pulse output for "lower"
0007        :BE
```

Structure of the PB ABTAST:

```
PB 201                      D:MODREGST.S5D                  LEN=48
                                                            PAGE 1

SEGMENT 1       0000
0000        :JU  FB 78
0001 NAME :ANEI
0002 STEB :      DL 21          Control byte
0003 PBER :      DW 22          Peripheral area
0004 BG   :      DL 23          Module
0005 KN   :      DR 23          Identifier
0006 BT   :      DL 24          Module type
0007 NA   :      DD 25
0008 ER   :      DD 27          Equivalent value
0009 XA   :      DD 29          Output value
000A        :JU  FB 176
000B NAME :IPD-REG              IPD controller
000C STEW:       DW 31          Control word STEW
000D RSP  :      DW 32          Control word RSP
000E SOLL :      DD 33          Setpoint
000F IST  :      DD 29          Actual value
0010 XA   :      DD 35          Controller output
0011 OBXA :      DD 37          Upper manipulated variable limitation
0012 UBXA :      DD 39          Lower manipulated variable limitation
0013 ABTZ :      DD 41          End value (dead band)
0014 ANTZ :      DD 43          Start value (dead band)
0015 K0/P :      DD 45          Proportional coefficient
0016 K/TI :      DD 47          Integral component
0017 A(0) :      DD 49          Start value of the integrator
0018 K/TD :      DD 51          Differential component
0019 T1   :      DD 53          Time constant (D-T1)
001A TM   :      DD 55          Motor runtime
001B THLG :      DD 57          Acceleration time
001C HAND:       DD 59          Manual value
001D ZEIN :      DD 19          Disturbance input
001E I    :      DD 17          Output: I component
001F P    :      DD 17          Output: P component
0020 D    :      DD 17          Output: D component
0021        :JU  FB 114
0022 NAME :GRENZSIG             Limit signal indicator
0023 XE   :      DD 29          Input
0024 STEB :      DL 65          Control byte
0025 HYS  :      DD 66          Hysteresis
0026 GWO2:       DD 68          Upper limit value
0027 GWO1:       DD 70          Upper warning value
0028 GWU1:       DD 72          Lower warning value
0029 GWU2:       DD 74          Lower limit value
002A        :JU  FB 140
002B NAME :MRSTAT               Generating the status signal 002C :BE
```

4.10.4 Examples for Extending the Controller Structures

Adding smoothing in the actual value branch

The signal is smoothed by the function block FB GLAETTEN (FB 61).

Callup:

```
       :
       :JU  FB  61
NAME        :GLAETTEN
E1    :     DD  29
E2    :     DD  19
NE3   :     DD  19
A1    :     DD  17
A2    :     DD  17
A(0)  :     DD  96
T1    :     DD  98
ERU   :     DD  94
A     :     DD  94
STEB        : DR100
       :
```

The analog value (DD 29) of the analog input block is used as input signal of the smoothing block. The input signal of the controller and of the limit signal element is gained, instead of from DD 29 directly, from the output signal (DD 94) of the smoothing block.

The starting value for the internal working data of the controller (DW 16 in DB INTER) must be increased, in which case the correct length of the DB INTER must be observed. Internal working data are past and auxiliary variables.

The structure of the data to be visualized is not changed by inserting the smoothing block.

Interconnection to follower controllers:

In the interconnection to follower controller structures (e.g. controller cascades), a possibility of switching over between external setpoint (of the master controller) and internal setpoint should be created. Both values are filed in different memory cells.

The possibility of switching over can be implemented according to the program section below in PB ABTAST.

```
       :...
       :AN  D    87.15        (Bit for internal/external)
       :JC    =M001
       :Q   DB   Master controller •
       :L   DW   Output
       :Q   DB   Follower controller
       :T   DW   Setpoint
M001...
```

5 Reference Part of the Object Data Blocks

The data structures (object data blocks) of the individual PMC objects are described in the following chapter.

The object data blocks are located on the supplied disk in the file

DRIVERST.S5D.

A fixed assignment scheme applies for the assignment between data block number and object number:

No. of the object data block = Object type number + 100

5.1 R64 Controller Structures

Object type No.	1	2	3
Data block	DB 101	DB 102	DB 103

All object data blocks of the controller structure R64 have the same structure:

DW No.	Format	Meaning
0:	KF = +26470;	Organizational data
1:	KF = +12592;	
2:	KF = +00128;	
3:	KF = +00000;	
4:	KF = +00000;	
5:	KF = +00000;	
6:	KF = +00000;	
7:	KM = 00000000 00000000;	D 7.9: Operator bit
8:	KF = +00000;	Sampling time and minimum pulse duration
9:	KF = +01200;	
10:	KF = +00003;	
11:	KF = +00002;	
12:	KF = +00000;	
13:	KF = +00000;	
14:	KF = +00000;	
15:	KF = +00000;	
16:	KF = +00000;	
17:	KS ='M**3 ';	Physical dimension
20:	KF = +00000;	BMin
21:	KF = +10000;	BMax
22:	KF = +00002;	Decimal point identifier
23:	KM = 00000000 10000000;	Structure switch S01 to S16
24:	KM = 00000000 00000000;	Structure switch S17 to S21

DW No.	Format	Meaning
25:	KF = +00000;	
26:	KF = +00000;	Polygon
27:	KF = +00000;	
28:	KF = +00000;	
29:	KF = +00000;	
30:	KF = +00000;	
31:	KF = +00000;	
32:	KF = +00000;	
33:	KF = +00000;	
34:	KF = +00000;	
35:	KF = +00000;	
36:	KF = +00000;	
37:	KF = +00000;	
38:	KF = +00000;	
39:	KF = +00000;	Setpoint sequence
40:	KF = +00000;	
41:	KF = +00000;	
42:	KF = +00000;	
43:	KF = +00000;	
44:	KF = +00000;	
45:	KF = +00000;	
46:	KF = +00000;	
47:	KF = +00000;	
48:	KF = +00000;	
49:	KF = +00000;	
50:	KF = +00000;	
51:	KF = +00000;	
52:	KF = +00000;	Ramp-function generator
53:	KF = +00000;	
54:	KF = +00000;	
55:	KF = +00000;	
56:	KF = +00000;	Smoothing
57:	KF = +00000;	Smoothing
58:	KF = +00000;	Plausibility check
59:	KF = +00000;	
60:	KF = +00000;	Free limit monitor 1
61:	KF = +00000;	
62:	KF = +00000;	
63:	KF = +00000;	
64:	KF = +00000;	
65:	KF = +00000;	
66:	KF = +00000;	
67:	KF = +00000;	Free limit monitor 2
68:	KF = +00000;	
69:	KF = +00000;	
70:	KF = +00000;	
71:	KF = +00000;	
72:	KF = +00000;	
73:	KF = +00100;	P -- Conti --
74:	KF = +00100;	Comfort version : R
75:	KF = +00150;	TN
76:	KF = +00002;	Time format I
77:	KF = +00000;	D
78:	KF = +00002;	Time format D
79:	KF = +10000;	MVUL
80:	KF = +00000;	MVLL
81:	KF = +00000;	Upper positioning rate limitation
82:	KF = +00000;	Lower positioning rate limitation
83:	KF = +00000;	P -- Step

DW No.	Format	Meaning
84:	KF = +00000;	I
85:	KF = +00000;	Time format I
86:	KF = +00000;	D
87:	KF = +00000;	Time format D
88:	KF = +00000;	TM
89:	KF = +00000;	Time format TM
90:	KF = +00000;	Start value of the dead band
91:	KF = +00000;	End value of the dead band
92:	KF = +00000;	Pulse interval output
93:	KF = +00000;	Pulse interval output
94:	KF = +05000;	Startup actual value
95:	KF = +05093;	PG manual value
96:	KF = +00000;	Final controlling element adaptation
97:	KF = +00000;	Final controlling element adaptation
98:	KF = +07000;	SPUL
99:	KF = +03000;	SPLL
100:	KF = +08500;	PVH
101:	KF = +02000;	PVL
102:	KF = +03000;	PVHH
103:	KF = +01000;	PVLL
104:	KF = +00000;	reserved
105:	KF = +00000;	End value final controlling element indication
106:	KF = +00000;	free
107:	KF = +02561;	free
108:	KF = +00000;	free
109:	KF = +00000;	free
110:	KF = +00000;	free
111:	KF = +00000;	free
112:	KF = +00000;	free
113:	KF = +00000;	free
114:	KF = +00000;	free
115:	KF = +00000;	free
116:	KF = +00000;	
117:	KF = +00000;	Measuring point numbers for GWM and measuring sockets
118:	KF = +00000;	
119:	KF = +00000;	
120:	KF = +00000;	
121:	KF = +00000;	Addresses ADU1...ADU5
122:	KF = +00000;	
123:	KF = +00000;	
124:	KF = +00000;	
125:	KF = +00000;	
126:	KF = +00000;	reserved
127:	KF = +00000;	
128:	KF = +00000;	
129:	KF = +00000;	
130:	KF = +00000;	
131:	KF = +00000;	Address of the count input
132:	KF = +00000;	Address of the PAs of the input bits
133:	KF = +00000;	
134:	KF = +00000;	reserved
135:	KF = +00000;	
136:	KF = +00000;	
137:	KF = +00000;	
138:	KF = +00000;	
139:	KF = +00000;	
140:	KF = +00000;	
141:	KF = +00000;	
142:	KF = +00000;	
143:	KF = +00000;	

DW No.	Format	Meaning
144:	KF = +00000;	Address DAU 1
145:	KF = +00000;	Address DAU 2
146:	KF = +00000;	reserved
147:	KF = +00000;	
148:	KF = +00000;	
149:	KF = +00000;	
150:	KF = +00000;	
151:	KF = +00000;	
152:	KF = +00000;	
153:	KF = +00000;	
154:	KF = +00000;	Address DAU 3
155:	KF = +00000;	Address DAU 4
156:	KF = +00000;	Address of the PAs of the output bits
157:	KF = +00000;	reserved
158:	KF = +00000;	
159:	KF = +00000;	
160:	KF = +00000;	
161:	KF = +00000;	
162:	KF = +00000;	
163:	KF = +00000;	
164:	KF = +00000;	
165:	KF = +00000;	
166:	KF = +00000;	
167:	KF = +00000;	
168:	KF = +08000;	PA of ADU 1
169:	KF = +08344;	PA of ADU 2
170:	KF = +00000;	PA of ADU 3
171:	KF = +00000;	PA of ADU 4
172:	KF = +00000;	PA of ADU 5
173:	KF = +00000;	reserved
174:	KF = +00000;	
175:	KF = +00000;	
176:	KF = +00000;	
177:	KF = +00000;	
178:	KF = +00000;	
179:	KF = +00000;	PA of the count input
180:	KM = 00000000 00000000;	Control word
181:	KF = +00000;	reserved
182:	KF = +00000;	
183:	KF = +00000;	
184:	KF = +00000;	
185:	KF = +00000;	
186:	KF = +00000;	
187:	KF = +00000;	
188:	KF = +00000;	
189:	KF = +00000;	
190:	KF = +00000;	
191:	KF = +05099;	PLC setpoint
192:	KS ='LAGER VOLUMEN ';	Loop name
200:	KF = +00000;	reserved
201:	KF = +00000;	
202:	KF = +00000;	
203:	KF = +00000;	
204:	KF = +00000;	
205:	KF = +00000;	
206:	KF = +00000;	
207:	KF = +00000;	

DW No.	Format	Meaning
208:	KF = +00000;	PA of DAU 1
209:	KF = +00000;	PA of DAU 2
210:	KF = +00000;	
211:	KF = +00000;	reserved
212:	KF = +00000;	
213:	KF = +00000;	
214:	KF = +00000;	
215:	KF = +00000;	
216:	KF = +00000;	
217:	KF = +00000;	
218:	KF = +00000;	PA of DAU 3
219:	KF = +00000;	PA of DAU 4
220:	KM = 00000000 00000000;	PA of the output bits
221:	KF = +00000;	
222:	KF = +00000;	reserved
223:	KF = +00000;	
224:	KF = +00000;	
225:	KF = +00000;	
226:	KF = +00000;	
227:	KF = +00000;	
228:	KF = +00000;	
229:	KF = +00000;	
230:	KF = +00000;	
231:	KF = +00000;	
232:	KF = +05098;	Read setpoint -- measuring points
233:	KF = +05098;	Processed setpoint
234:	KF = +00006;	
235:	KF = +05093;	Manipulated variable
236:	KF = +00000;	Output manipulated variable
237:	KF = +05093;	
238:	KF = +00000;	
239:	KF = +05092;	Read actual value
240:	KF = +05092;	Processed actual value
241:	KF = +05093;	
242:	KF = +00000;	
243:	KF = +00000;	
244:	KF = +00000;	reserved
245:	KF = +00000;	
246:	KF = +00000;	free
247:	KF = +00000;	
248:	KF = +00000;	
249:	KF = +00000;	
250:	KF = +00000;	Final controlling element indication
251:	KF = +00000;	
252:	KF = +00000;	free
253:	KF = +00000;	
254:	KF = +00000;	
255:	KM = 00000000 00000010;	Status word
256:	KF = +00000;	
257:	KF = +30000;	Working data
258:	KF = +00000;	
259:	KF = +00000;	
260:	KF = +00000;	
.		
.		
512:		

A few data words contain data bits which control the controller as switch:

DW 7 Bit 9	Operator bit for parameters and limit values
DW 23 Bit 7	external/internal switch-over 0: external 1: internal
DW 180 Bit 11	manual/automatic switch-over 0: automatic 1: manual
DW 180 Bit 15	disabled/free switch-over (continuous controller 0: free 1: disabled
DW 180 Bit 9	disabled/free switch-over (step controller) 0: free 1: disabled

5.2 Standard Controller Interface

Object type No.	4	5
Data block	DB 104	DB 105

The data block DB SRS (DB 104 or DB 105) represent the standard controller interface:

DW No.	Format	Meaning
0:	KF = +00000;	Operator value number
1:	KF = +00000;	Operator value
2:	KH = 0000;	reserved
3:	KH = 0000;	reserved
4:	KH = 0000;	reserved
5:	KH = 0000;	reserved
6:	KH = 0000;	reserved
7:	KH = 0000;	reserved
8:	KH = 0000;	Response of the manipulated variable
9:	KM = 00000000 00000000;	Status word
10:	KF = +00000;	W internal
11:	KS ='Controller name Dim ';	Loop name
22:	KG = +0000000+00;	Elongation dimension-induced variable
24:	KF = +00000;	Actual value
25:	KG = +0000000+00;	Offset
27:	KG = +0000000+00;	Elongation
29:	KF = +00000;	0
30:	KF = +00000;	Setpoint
31:	KF = +00000;	Manipulated variable
32:	KM = 00000000 00000000;	Operating statuses
33:	KF = +00000;	PVHH
34:	KF = +00000;	PVLL
35:	KF = +00000;	MVUL
36:	KF = +00000;	MVLL
37:	KF = +00000;	BMin
38:	KF = +00000;	BMax
39:	KG = +0000000+00;	Elongation TN
41:	KG = +0000000+00;	Elongation TV
43:	KG = +0000000+00;	Elongation TMin
45:	KH = 0000;	reserved
46:	KF = +00000;	R
47:	KF = +00000;	I
48:	KF = +00000;	D
49:	KF = +00000;	P
50:	KF = +00000;	PVH
51:	KF = +00000;	PVL
52:	KF = +00000;	SPUL
53:	KF = +00000;	SPLL
54:	KF = +00000;	TM
55:	KF = +00000;	AN
56:	KF = +00000;	AB
57:	KY = 000,000;	Time format I
58:	KY = 000,000;	Time format D
59:	KY = 000,000;	Time format TM
60:		

Operator value numbers	Designation	
10	SP	Setpoint
11	PVHH	Upper danger limit
12	PVLL	Lower danger limit
13	PVH	Upper warning limit
14	PVL	Lower warning limit
15	SPUL	Setpoint upper limit
16	SPLL	Setpoint lower limit
17	AN	Start value of dead band
18	AB	End value of dead band
23	MV	Hand
26	MVUL	Upper manipulated variable limitation
27	MVLL	Lower manipulated variable limitation
28	R	Gain (=1)
29	P	Proportional coefficient
30	I	Integral-action time
33	D	Derivative action time
36	TM	Final controlling element runtime
39	Auto/manual switch-over	
41	External/internal switch-over	

Betriebszustände DL 32

1 Automatic, internal
2 Manual, internal
3 Automatic, external
4 Manual, external

5.3 Controller Module IP 260K

Object type No.	6	7
Data block	DB 106	DB 107

The data blocks DB 106 and DB 107 have the same structure:

DW No.	Format	Meaning
0:	KH = 0000;	occupied
1:	KS =' ';	Command FB 170
2:	KF = +00000;	Parameter number FB 170
3:	KH = 0000;	occupied
4:	KY = 000,000;	DB type, DB number (115,150)
5:	KH = 0000;	occupied
6:	KY = 000,000;	Addressing type(115), Address
7:	KY = 000,000;	Read deselection and errors
8:	KH = 0000;	occupied
9:	KH = 0000;	occupied
10:	KH = 0000;	occupied
11:	KH = 0000;	occupied
12:	KH = 0000;	occupied
13:	KH = 0000;	occupied
14:	KH = 0000;	occupied
15:	KH = 0000;	occupied
16:	KY = 000,000;	DR: DB number on IP 260
17:	KM = 00000000 00000000;	Module configuration
18:	KS ='DIM ';	Dimension
21:	KY = 000,000;	DR: Dimension identifier
22:	KF = +00000;	BMin
23:	KF = +00000;	BMax
24:	KF = +00000;	TA
25:	KY = 000,000;	DR: TA identifier
26:	KY = 000,000;	DR: Startup operating mode
27:	KF = +00000;	Value input for startup mode
28:	KY = 000,000;	DR: Default mode
29:	KF = +00000;	Value input for default mode
30:	KM = 00000000 00000000;	Structure of the controller
31:	KM = 00000000 00000000;	R, P component on/off Record 1
32:	KF = +00000;	P 1
33:	KF = +00000;	I 1
34:	KF = +00000;	D 1
35:	KY = 000,000;	Format I 1, Format D 1
36:	KM = 00000000 00000000;	R, P component on/off Record 2
37:	KF = +00000;	P 2
38:	KF = +00000;	I 2
39:	KF = +00000;	D 2
40:	KY = 000,000;	Format I 2, Format D 2
41:	KF = +00000;	GWM XdOG
42:	KF = +00000;	GWM XdOW
43:	KF = +00000;	GWM XdUW
44:	KF = +00000;	GWM XdUG
45:	KF = +00000;	MVUL
46:	KF = +00000;	MVLL
47:	KF = +00000;	TMin
48:	KF = +00000;	TM
49:	KY = 000,000;	Format TMin, Format TM

DW No.	Format	Meaning
50:	KF = +00000;	Response value
51:	KF = +00000;	Adaptation factor
52:	KH = 0000;	occupied
53:	KF = +00000;	TAN for dead band
54:	KF = +00000;	TAB for dead band
55:	KM = 00000000 00000000;	SP branch WS
56:	KF = +00000;	Evaluation factor setpoint
57:	KF = +00000;	Acceleration time SP branch TH
58:	KF = +00000;	Deceleration time SP branch TR
59:	KY = 000,000;	Format TH, Format TR
60:	KF = +00000;	Smoothing time SP branch TG
61:	KY = 000,000;	Format TG
62:	KF = +00000;	GWM SPUL
63:	KF = +00000;	GWM SPLL
64:	KM = 00000000 00000000;	Structure PV branch
65:	KF = +00000;	Evaluation factor
66:	KF = +00000;	Smoothing time actual value TG
67:	KY = 000,000;	Format TG
68:	KF = +00000;	Equivalent actual value for test
69:	KF = +00000;	PVHH
70:	KF = +00000;	PVH
71:	KF = +00000;	PVL
72:	KF = +00000;	PVLL
73:	KM = 00000000 00000000;	Structure auxiliary branch H1
74:	KF = +00000;	Evaluation factor
75:	KF = +00000;	Smoothing time TG
76:	KY = 000,000;	Time format TG
77:	KF = +00000;	TD
78:	KF = +00000;	Der
79:	KY = 000,000;	Time format TD, Der
80:	KM = 00000000 00000000;	Structure auxiliary branch 2
81:	KF = +00000;	Evaluation factor
82:	KF = +00000;	Smoothing time TG
83:	KY = 000,000;	Time format TG
84:	KF = +00000;	TD
85:	KF = +00000;	Der
86:	KY = 000,000;	Time format TD, Der
87:	KM = 00000000 00000000;	Structure MV branch
88:	KF = +00000;	TH
89:	KF = +00000;	TR
90:	KY = 000,000;	Time format TH, TR
91:	KH = 0000;	occupied
92:	KH = 0000;	occupied
93:	KH = 0000;	occupied
94:	KH = 0000;	occupied
95:	KH = 0000;	occupied
96:	KH = 0000;	occupied
97:	KF = +00000;	SP or MV hand input
98:	KF = +00000;	BP-SP1
99:	KF = +00000;	BP-SP2
100:	KF = +00000;	BP-PV1
101:	KF = +00000;	BP-PV2
102:	KF = +00000;	BP-PVd
103:	KF = +00000;	BP-MV
104:	KF = +00000;	BP-MVh
105:	KF = +00000;	BP-H11
106:	KF = +00000;	BP-H12
107:	KF = +00000;	BP-H21
108:	KF = +00000;	BP-H22
109:	KM = 00000000 00000000;	Status DE/DA

DW No.	Format	Meaning
110:	KF = +00000;	GWM status
111:	KF = +00000;	Operating error, AE status
112:	KM = 00000000 00000000;	Operating status indicator
113:	KH = 0000;	PLC interface error
114:	KS ='Typ Versio';	Identification
120:	KY = 000,000;	Loop number, controller number
121:	KY = 000,000;	BG-Dir, DB-Nr IP-RAM
122:	KY = 000,000;	BG-Dir, DB-Nr IP-EEPROM
123:	KF = +00000;	Setpoint input
124:	KF = +00000;	MV hand input
125:	KS ='Name of the object';	Object name
133:	KM = 00000000 00000000;	PMC status
134:	KM = 00000000 00000000;	Operator bit strip
135:		

Operator bits:

DW 133 Bit 0	Setpoint
DW 133 Bit 1	Manual value
DW 133 Bit 2	Parameters and limit values
DW 133 Bit 3	Manual/auto switch-over 0: Manual 1: Auto

Operating status indicator

DW 112 Bit 0	Manual/Auto 0: Manual 1: Auto

5.4 Analog Measured Values

Object type No.	8
Data block	DB 108

DW No.	Format	Meaning
0:	KS ='Name of the object';	Object name
8:	KM = 00000000 00000000;	Status word
9:	KS ='Field 1 ';	Name of the 1st measured value
13:	KF = +00000;	Value 1st measured value
14:	KG = +0000000+00;	Elongation 1st measured value
16:	KS ='Dimens';	Dimension 1st measured value
19:	KH = 0000;	free
20:	KS ='Field 2 ';	Name of the 2nd measured value
24:	KF = +00000;	Value 2nd measured value
25:	KG = +0000000+00;	Elongation 2nd measured value
27:	KS ='Dimens';	Dimension 2nd measured value
30:	KH = 0000;	free
31:	KS ='Field 3 ';	Name of the 3rd measured value
35:	KF = +00000;	Value 3rd measured value
36:	KG = +0000000+00;	Elongation 3rd measured value
38:	KS ='Dimens';	Dimension 3rd measured value
41:	KH = 0000;	free
42:	KS ='Field 4 ';	Name of the 4th measured value
46:	KF = +00000;	Value 4th measured value
47:	KG = +0000000+00;	Elongation 4th measured value
49:	KS ='Dimens';	Dimension 4th measured value
52:	KH = 0000;	free
53:	KS ='Field 5 ';	Name of the 5th measured value
57:	KF = +00000;	Value 5th measured value
58:	KG = +0000000+00;	Elongation 5th measured value
60:	KS ='Dimens';	Dimension 5th measured value
63:	KH = 0000;	free
64:		

5.5 Dosing Apparatus

Object type No.	9
Data block	DB 109

DW No.	Format	Meaning
0:	KH = 0000;	occupied
1:	KH = 0000;	Command (parameter BEF)
2:	KH = 0000;	Parameter No. (PANR)
3:	KH = 0000;	occupied
4:	KY = 000,000;	Block: type, number
5:	KH = 0000;	occupied
6:	KY = 000,000;	Address: P/Q, BG Adr.
7:	KY = 000,000;	occupied, read error selection
8:	KY = 000,000;	occupied
9:	KH = 0000;	occupied
10:	KH = 0000;	occupied
11:	KH = 0000;	occupied
12:	KH = 0000;	occupied
13:	KH = 0000;	occupied
14:	KH = 0000;	occupied
15:	KH = 0000;	occupied
16:	KG = +0000000+00;	Operating data: HAW
18:	KG = +0000000+00;	Operating data: VAW
20:	KH = 0000;	Operating data: NKW
21:	KY = 000,000;	Identifiers: NKW, HAW
22:	KH = 0000;	Operating data: NFAK
23:	KH = 0000;	Operating data: EFAK
24:	KS ='dim ';	Dimension
26:	KY = 000,000;	Times: pulse execution, valve response
27:	KY = 000,000;	Times: follow-on, dead time
28:	KF = +00000;	Identifiers for times
29:	KF = +00000;	Hysteresis
30:	KM = 00000000 00000000;	DZ configuration
31:	KH = 0000;	Error output
32:	KG = +0000000+00;	phys. meter reading (HIGH WORD)
34:	KH = 0000;	phys. meter reading (LOW WORD)
35:	KG = +0000000+00;	meter reading (pulses)
37:	KG = +0000000+00;	HAW actual
39:	KG = +0000000+00;	VAW actual
41:	KM = 00000000 00000000;	Statuses
42:	KH = 0000;	
43:	KH = 0000;	Module identification
44:	KH = 0000;	
45:	KH = 0000;	
46:	KH = 0000;	
47:	KH = 0000;	
48:	KH = 0000;	
49:	KS ='Name of the IP 261 ';	
57:	KM = 00000000 00000000;	
58:	KM = 00000000 00000000;	Status word
59:	KH = 0000;	
60:		

5.6 Individual Control Elements ICM

Object type No.	10	11	12	13	14
Data block	DB 110	DB 111	DB 112	DB 113	DB 114

Object type No.	15	16	17	18
Data block	DB 115	DB 116	DB 117	DB 118

All data blocks (DB ICM) of the individual control elements have the same structure. The meanings of the bits in the four data exchange words differ (DW 11, DW 12, DW 13 and DW 14).

Structure of a DB ICM:

DW No.	Format	Meaning
0:	KS ='ICM_560 xxxxxxxx';	Object name of the 1st loop
8:	KM = 00000000 00000000;	Operator bit = D 8.0
9:	KM = 00000000 00000000;	Status
10:	KH = 0000;	free
11:	KM = 00000000 00000000;	Data to the ICM
12:	KM = 00000000 00000000;	Data to the ICM
13:	KM = 00000000 00000000;	Data from the ICM
14:	KM = 00000000 00000000;	Data from the ICM
15:	KH = 0000;	free
16:	KH = 0000;	free
17:	KS ='ICM 560 xxxxxxxx';	Object name of the 2nd loop
25:		

5.6.1 Object Type 10 (DB 110)

Individual control element: Motor 2 loops

Information from the motor:

on/off motor 1	D	14. 7
on/off motor 2	D	14.15
ready 1	D	13. 0
ready 2	D	13. 8
test 1	D	13. 1
test 2	D	13. 9
fault motor 1	D	13. 4
fault motor 2	D	13.12

Information to the motor:

acknowledgement	D	12. 8
on motor 1	D	11. 7
off motor 1	D	11. 5
on motor 2	D	11.15
off motor 2	D	11.13
manual	D	12. 2

5.6.2 Object Type 11 (DB 111)

Individual control element: Reversing drive

Information from the drive:

left	D	14.7
right	D	14.15
test	D	13.1
ready	D	13.0
fault	D	13.4

Information to the drive:

acknowledgement	D	12. 8
left	D	11. 7
right	D	11.15
manual	D	12. 2

5.6.3 Object Type 12 (DB 112)

Individual control element: Motor with 2 speeds and controlled acceleration

Information from the motor:

n 1	D	14. 7
n 2	D	14.15
ready	D	13. 0
test	D	13. 1
fault	D	13. 4

Information to the motor:

acknowledgement	D	12. 8
n 1	D	11. 7
n 2	D	11.15
manual	D	12. 2
off	D	11. 5

5.6.4 Object Type 13 (DB 113)

Individual control element: Motor with 2 speeds and automatic acceleration

Information from the motor:

n 1	D	14. 7
n 2	D	14.15
ready	D	13. 0
test	D	13. 1
fault	D	13. 4

Information to the motor:

acknowledgement	D	12. 8
on	D	11. 7
off	D	11. 5
manual	D	12. 2

5.6.5 Object Type 14 (DB 114)

Individual control element: Motor star-delta

Information from the motor:

star	D	14. 7
delta	D	14.15
ready	D	13. 0
test	D	13. 1
fault	D	13. 4

Information to the motor:

acknowledgement	D	12. 8
on	D	11. 7
off	D	11. 5
manual	D	12. 2

5.6.6 Object Type 15 (DB 115)

Individual control element: Valve 2 loops

Information from the valve:

valve 1 open	D	14. 7
valve 2 open	D	14.15
test 1	D	13. 1
test 2	D	13. 9
fault valve 2	D	13. 4
fault valve 2	D	13.12

Information to the valve:

valve 1 open	D	11. 7
valve 1 closed	D	11. 5
acknowledgement	D	12. 8
valve 2 open	D	11.15
valve 2 closed	D	11.13
manual	D	12. 2

5.6.7 Object Type 16 (DB 116)

Individual control element: Valve slide

Information from the slide:

slide open	D	14. 7
slide closed	D	14.15
test	D	13. 1
stop	D	13.13
fault	D	13. 4

Information to the slide:

acknowledgement	D	12. 8
slide open	D	11. 7
slide closed	D	11. 5
manual	D	12. 2

5.6.8 Object Type 17 (DB 117)

Individual control element: Latched switching device

Information from the switching device:

on	D	14. 7
off	D	14.15
test	D	13. 1
fault	D	13. 4

Information to the switching device:

acknowledgement	D	12. 8
on	D	11. 7
off	D	11. 5
manual	D	12. 2

5.6.9 Object Type 18 (DB 118)

Individual control element: Valve slide with ESB

Information from the slide:

slide open	D	14. 7
slide closed	D	14.15
ready	D	13.15
test	D	13. 1
stop	D	13.13

Information to the slide:

acknowledgement	D	12. 8
slide open	D	11. 7
slide closed	D	11. 5
manual	D	12. 2

5.7 Analog Value Function

Object type No.	19
Data block	DB 119

DW No.	Format	Meaning
0:	KH = 0000;	free
1:	KH = 0000;	free
2:	KH = 0000;	free
3:	KS ='Litre ';	Dimension
6:	KG = +1000000+01;	Elongation
8:	KF = +00000;	Process value
9:	KF = +10000;	BMax
10:	KF = +00000;	BMin
11:	KF = +09500;	PVHH
12:	KF = +00500;	PVLL
13:	KF = +09000;	PVH
14:	KF = +01000;	PVL
15:	KM = 00000000 00000000;	Status word
16:	KS ='Analog DB 212 ';	Object name
24:	KH = 0000;	free
25:	KH = 0000;	free
26:	KH = 0000;	free
27:	KH = 0000;	free
28:	KH = 0000;	free
29:	KH = 0000;	free
30:		

The data double word elongation (DD 6) states a factor with which the process variable is multiplied for its display.

5.8 Binary Function

Object type No.	20
Data block	DB 120

DW No.	Format	Meaning
0:	KS ='Name of the object';	Object name
8:	KM = 00000000 00000000;	Status word
9:	KM = 00000000 00000000;	DL: Operate/DR: Indication
10:	KM = 00000000 00000000;	D 10.0: Operator bit
11:	KS ='Field 1 ';	Name of the 1st value
15:	KH = 0000;	free
16:	KS ='Field 2 ';	Name of the 2nd value
20:	KH = 0000;	free
21:	KS ='Field 3 ';	Name of the 3rd value
25:	KH = 0000;	free
26:	KS ='Field 4 ';	Name of the 4th value
30:	KH = 0000;	free
31:	KS ='Field 5 ';	Name of the 5th value
35:	KH = 0000;	free
36:		

DW 9

States

D 9.0	Staus value 1
D 9.1	Status value 2
D 9.2	Status value 3
D 9.3	Status value 4
D 9.4	Status value 5

Operating

D 9.7	Operating value 1
D 9.8	Operating value 2
D 9.9	Operating value 3
D 9.10	Operating value 4
D 9.11	Operating value 5

The operating is fetched by the user from DL 9 with the operating bit set, and the operating bit is reset. The additionally processed value is written in DR 9 as response message.

5.9 Control System S5-115U

Object type No.	21	22
Data block	DB 121	DB 122

The data blocks DB 121 and DB 122 have the same structure:

DW No.	Format	Meaning
0:	KF = +00000;	
1:	KM = 00000001 00000000;	Function identifiers
2:	KM = 00001111 00010000;	Function identifiers
3:	KM = 00000000 00000001;	Operator bits
4:	KH = 0000;	
5:	KH = 0001;	
6:	KF = +01000;	Proportional coefficient P
7:	KF = +01000;	Gain R
8:	KF = +00020;	Integral-action time I
9:	KF = +00030;	Derivative action time D
10:	KF = +01000;	MVUL
11:	KF = -00001;	MVLL
12:	KF = +00000;	Area start
13:	KF = +01000;	Area end
14:	KF = +00100;	Setpoint input
15:	KF = +00500;	MV Hand
16:	KH = 0000;	
17:	KH = 0000;	
18:	KH = 0000;	
19:	KH = 00CC;	
20:	KH = 0000;	
21:	KH = 0303;	
22:	KF = +01000;	PVHH
23:	KF = +00900;	PVH
24:	KF = +00200;	PVL
25:	KF = +00100;	PVLL
26:	KH = 0001;	
27:	KH = 0014;	
28:	KH = 000A;	
29:	KH = 000A;	
30:	KH = 0005;	
31:	KH = 000B;	
32:	KH = 0000;	
33:	KH = 0000;	
34:	KH = 0000;	
35:	KH = 0000;	
36:	KH = 0001;	
37:	KH = 0000;	
38:	KH = 0000;	
39:	KH = 0067;	
40:	KH = 0000;	
41:	KH = 0000;	
42:	KH = 0000;	
43:	KH = 0000;	
44:	KH = 0000;	
45:	KH = 0000;	

DW No.	Format	Meaning
46:	KM = 00000000 00000000;	Control word
47:	KH = 0000;	
48:	KF = +00000;	Indicator word
49:	KH = 0000;	
50:	KF = +00000;	Actual value PV
51:	KH = 0000;	
52:	KF = +00000;	Setpoint SP
53:	KH = 0000;	
54:	KF = +00000;	Manipulated variable MV
55:	KH = 0000;	
56:	KH = 0000;	
57:	KH = 0000;	
58:	KH = 0000;	
59:	KH = 0000;	
60:	KH = 0000;	
61:	KH = 0000;	
62:	KH = 0000;	
63:	KH = 0000;	
64:	KH = 0000;	
65:	KH = 0000;	
66:	KH = 0000;	
67:	KH = 0000;	
68:	KH = 0000;	
69:	KH = 0000;	
70:	KH = 0000;	
71:	KH = 0000;	
72:	KH = 0000;	
73:	KH = 0000;	
74:	KH = 0000;	
75:	KH = 0000;	
76:	KH = 0000;	
77:	KH = 0000;	
78:	KH = 0000;	
79:	KH = 0000;	
80:	KH = 0000;	
81:	KH = 0000;	
82:	KH = 0000;	
83:	KH = 0000;	
84:	KH = 0000;	
85:	KH = 0000;	
86:	KH = 0000;	
87:	KH = 0000;	
88:	KH = 0000;	
89:	KH = 0000;	
90:	KH = 0000;	
91:	KH = 0000;	
92:	KH = 0000;	
93:	KH = 0000;	
94:	KH = 0000;	
95:	KH = 0000;	
96:	KH = 0000;	
97:	KH = 0000;	
98:	KH = 0000;	
99:	KH = 0000;	

DW No.	Format	Meaning
100:	KH = 0000;	
101:	KH = 0000;	
102:	KH = 0000;	
103:	KH = 0000;	
104:	KH = 0000;	
105:	KH = 0000;	
106:	KH = 0000;	
107:	KH = 0000;	
108:	KH = 0000;	
109:	KH = 0000;	
110:	KH = 0000;	
111:	KH = 0000;	
112:	KH = 0000;	
113:	KH = 0000;	
114:	KH = 0000;	
115:	KH = 0000;	
116:	KH = 0000;	
117:	KH = 0000;	
118:	KH = 0000;	
119:	KH = 0000;	
120:	KH = 0000;	
121:	KH = 0000;	
122:	KH = 0000;	
123:	KH = 0000;	
124:	KH = 0000;	
125:	KH = 0000;	
126:	KH = 0000;	
127:	KH = 0000;	
128:	KH = 0000;	
129:	KH = 0000;	
130:	KH = 0000;	
131:	KH = 0000;	
132:	KH = 0000;	
133:	KH = 0000;	
134:	KH = 0000;	
135:	KH = 0000;	
136:	KH = 0000;	
137:	KH = 0000;	
138:	KH = 0000;	
139:	KH = 0000;	
140:	KH = 0000;	
141:	KH = 0000;	
142:	KH = 0000;	
143:	KH = 0000;	
144:	KH = 0000;	
145:	KH = 00A6;	
146:	KH = 0000;	
147:	KH = 0000;	
148:	KF = +00000;	
149:	KS =' Litre';	Dimension
152:	KH = 0000;	
153:	KH = 0000;	
154:	KH = 0000;	
155:	KH = 0000;	
156:	KH = 0000;	
157:	KH = 0000;	
158:	KH = 0000;	
159:	KH = 0000;	

DW No.	Format	Meaning
160:	KH = 0000;	
161:	KH = 0000;	
162:	KH = 0000;	
163:	KH = 0000;	
164:	KH = 0000;	
165:	KH = 0000;	
166:	KH = 0000;	
167:	KH = 0000;	
168:	KH = 0000;	
169:	KH = 0000;	
170:	KH = 0000;	
171:	KH = 0000;	
172:	KH = 0000;	
173:	KH = 0000;	
174:	KH = 0000;	
175:	KH = 0000;	
176:	KH = 0000;	
177:	KH = 0000;	
178:	KH = 0000;	
179:	KH = 0000;	
180:	KS ='Name of the object';	Name of the object
188:	KM = 00000000 00000000;	Status word
189:		

Operating Bits DW 3

D 3.3	Controller parameter MVUL, MVLL
D 3.4	Setpoint
D 3.5	Manual value
D 3.6	Limit values

Control Word DW 46

D 46.0	Off/on
D 46.1	Manual/automatic
D 46.2	Internal/external

Display Word DW 48

D 48.0	PV > PVHH
D 48.1	PV > PVH
D 48.2	PVL < PV < PVH
D 48.3	PV < PVL
D 48.4	PV < PVLL
D 48.5	Wire break
D 48.10	Off/on
D 48.11	Manual/automatic
D 48.12	Internal/external

5.10 Modular Control system

Object type No.	23	24
Data block	DB 123	DB 124

The controller data block DB INTER (DB 123 or DB 124) contains the working data of a controller structure. The contents of the data block depend in part upon the controller structure.

5.10.1 Controller Structure: Continuous Controller (KREG)

Structure of the controller data block DB INTER for the controller structure of continuous controllers:

D No.	Format/Type	FB affiliation	Name/Contents
DW 0... ...DW 15			organizational data (System data)
DW 16	KF = 96;		Start address Past values
DD 17	KG (output) KG (output) KG (output)	FB IPD-REG FB IPD-REG FB IPD-REG	I P D
DD 19	KG (input)	FB IPD-REG	ZEIN
DL 21 DR 21	KM = 0000 0001 KM;	FB ANEI	STEB not occupied
DW 22	KS = 'NP';	FB ANEI	PBER
DL 23 DR 23	KY = 128; KY = 0;	FB ANEI FB ANEI	BG KN
DL 24 DR 24	KY = 0; KY	FB ANEI	BT not occupied
DD 25	KG = 0;	FB ANEI	NA
DD 27	KG = 0;	FB ANEI	ER
DD 29	KG (output direct) KG (input direct) KG (input direct)	FB ANEI FB IPD-REG FB GRENZSIG	XA IST XE
DW 31	KM = 0000 0000 0000 0000;	FB IPD-REG	STEW
DW 32	KM = 0000 0000 0001 0010;	FB IPD-REG	RSP
DD 33	KG = 4000;	FB IPD-REG	SOLL
DD 35	KG (output direct) KG (input direct)	FB IPD-REG FB ANAU	XA XE
DD 37	KG = 10000;	FB IPD-REG	OBXA
DD 39	KG = -10000;	FB IPD-REG	UBXA
DD 41	KG = 50;	FB IPD-REG	ABTZ
DD 43	KG = 100;	FB IPD-REG	ANTZ

D No.	Format/Type	FB affiliation	Name/Contents
DD 45	KG = 0;	FB IPD-REG	KO/P
DD 47	KG = 20;	FB IPD-REG	K/TI
DD 49	KG = 0;	FB IPD-REG	A(O)
DD 51	KG = 5;	FB IPD-REG	K/TD
DD 53	KG = 2;	FB IPD-REG	T1
DD 55	KG = 10;	FB IPD-REG	TM
DD 57	KG = 20;	FB IPD-REG	THLG
DD 59	KG = 0;	FB IPD-REG	HAND
DL 61 DR 61	KM = 0000 0010; KM	FB ANAU	STEB not occupied
DW 62	KS = 'NP';	FB ANAU	PBER
DL 63 DR 63	KY = 128; KY = 0;	FB ANAU FB ANAU	BG KN
DL 64 DR 64	KY = 0; KY	FB ANAU	BT not occupied
DL 65 DR 65	KY = 0000 00000; KY	FB GRENZSIG	STEB not occupied
DD 66	KG = 10;	FB GRENZSIG	HYS
DD 68	KG = 9000;	FB GRENZSIG	GWO2
DD 70	KG = 7000;	FB GRENZSIG	GWO1
DD 72	KG = -7000;	FB GRENZSIG	GWU1
DD 74	KG = -9000;	FB GRENZSIG	GWU2
DW 76... ...DW 83	KS		NAME
DW 84... ...DW 86	KS		DIM
DL 87 DR 87	KM = 1000 0000; KM = 0000 0000;	 FB STATUS	I/E STAT
DD 88	KG = 10000;		SPUL
DD 90	KG = 0;		SPLL
DD 92	KG = 10000;		BMAX
DD 94	KG = 0;		BMIN
DW 96... ...DW 121			Past and auxiliary variables (system data)

Control words of the continuous controller structure (KREG):

DW 31	Control word (STEW) for the function block FB IPD-REG Bit 2 = 1: Additive form
DW 32	Controller operating statuses (RSP) for the function block FB IPD-REG Bit 0 = 1: Controller on Bit 7 = 1: Operator bit (RBED) is active (operator control) Bit 9 = 1: Manual/automatic switch-over is on automatic mode
DL 65	Control and indicator byte (STEB) for the function block FB GRENZSIG. Bit 7 = 1: Operator bit (SBED) is active (operator control)
DL 87	internal/external (I/E) Bit 7 = 1: internal/external switch-over is on external mode

5.10.2 Controller Structure: Step Controller (SREG)

Structure of the controller data block DB INTER for the step controller structure:

D No.	Format/Type	FB affiliation	Name/Contents
DW 0... ...DW 15			organizational data (system data)
DW 16	KF = 96;		Start address Past values
DD 17	KG (output) KG (output) KG (output)	FB IPD-REG FB IPD-REG FB IPD-REG	I P D
DD 19	KG (input)	FB IPD-REG	ZEIN
DL 21 DR 21	KM = 0000 0001 KM;	FB ANEI	STEB not occupied
DW 22	KS = 'NP';	FB ANEI	PBER
DL 23 DR 23	KY = 128; KY = 0;	FB ANEI FB ANEI	BG KN
DL 24 DR 24	KY = 0; KY	FB ANEI	BT not occupied
DD 25	KG = 0;	FB ANEI	NA
DD 27	KG = 0;	FB ANEI	ER
DD 29	KG (output direct) KG (input direct) KG (input direct)	FB ANEI FB IPD-REG FB GRENZSIG	XA IST XE
DW 31	KM = 0000 0000 0000 0000;	FB IPD-REG	STEW
DW 32	KM = 0000 0000 0001 0010;	FB IPD-REG	RSP
DD 33	KG = 4000;	FB IPD-REG	SOLL
DD 35	KG (output direct) KG (input direct)	FB IPD-REG FB IMP-AUSG	XA XE
DD 37	KG = 10000;	FB IPD-REG	OBXA
DD 39	KG = -10000;	FB IPD-REG	UBXA
DD 41	KG = 50;	FB IPD-REG	ABTZ
DD 43	KG = 100;	FB IPD-REG	ANTZ
DD 45	KG = 0;	FB IPD-REG	KO/P
DD 47	KG = 20;	FB IPD-REG	K/TI
DD 49	KG = 0;	FB IPD-REG	A(O)
DD 51	KG = 5;	FB IPD-REG	K/TD
DD 53	KG = 2;	FB IPD-REG	T1
DD 55	KG = 10;	FB IPD-REG	TM
DD 57	KG = 20;	FB IPD-REG	THLG
DD 59	KG = 0;	FB IPD-REG	HAND
DD 61	KG = 0,1;	FB IMP-AUSG	TMIN

D No.	Format/Type	FB affiliation	Name/Contents
DW 63	KM = 0000 0010 0000 0000;	FB IMP-AUSG	STWO
DL 64 DR 64	KY = 0000 0000; KY	FB GRENZSIG	STEB not occupied
DD 65	KG = 10;	FB GRENZSIG	HYS
DD 67	KG = 9000;	FB GRENZSIG	GWO2
DD 69	KG = 7000;	FB GRENZSIG	GWO1
DD 71	KG = -7000;	FB GRENZSIG	GWU1
DD 73	KG = -9000;	FB GRENZSIG	GWU2
DW 75... ...DW 82	KS		NAME
DW 83... ...DW 85	KS		DIM
DW 86	KH		not occupied
DL 87 DR 87	KM = 1000 0000; KM = 0000 0000;	 FB STATUS	I/E STAT
DD 88	KG = 10000;		SPUL
DD 90	KG = 0;		SPLL
DD 92	KG = 10000;		BMAX
DD 94	KG = 0;		BMIN
DW 96... ...DW 121			Past and auxiliary variables (system data)

Control words of the continuous controller structure (KREG):

DW 31 — Control word (STEW) for the function block FB IPD-REG

Bit 1 = 1: Speed algorithm
Bit 2 = 1: Additive form

DW 32 — Controller operating statuses (RSP) for the function block FB IPD-REG

Bit 0 =: Controller on
Bit 7 = 1: Operator bit (RBED) is active (operator control)
Bit 9 = 1: Manual/automatic switch-over is on automatic mode

DL 64 — Control and indicator byte (STEB) for the function block FB GRENZSIG.

Bit 7 = 1: Operator bit (SBED) is active (operator control)

DL 87 — internal/external (I/E)

Bit 7 = 1: internal/external switch-over is on external mode

6 Reference Part for Standard Displays

This chapter describes the finished existing standard displays for the predefined PMC object types.

The following types of integration are available for the standard displays.

- Integration in a group display
- Integration in a circle display
- Integration as graphic box

6.1 Standard Displays for Controllers

Standard display blocks exist for controller objects for displaying the controller itself and, as extension possibility, standard display blocks for visualizing the limit values of a controller.

For R64 controller structures, a standard display for visualizing the measuring points of the R64 controller (object type 3) exists in addition.

Display example for displaying a controller:

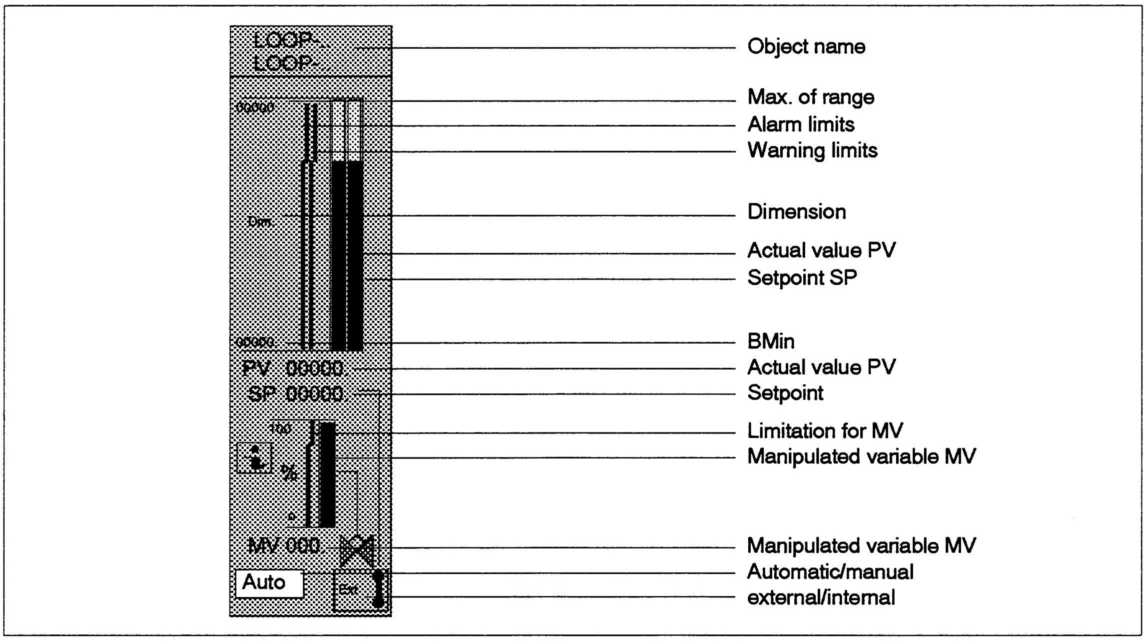


Fig. 6.1: Continuous controller in COROS LS-B

Example for limit value display of a controller:

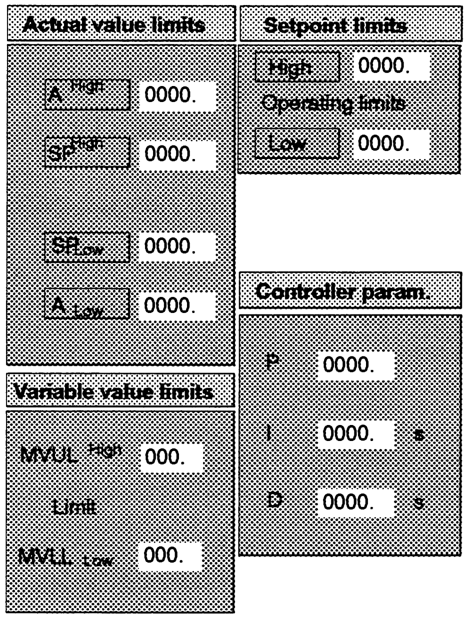


Fig. 6.2: Limit values for a continuous controller

The standard display blocks are stored in separate files. Depending upon whether the limit value display should be incorporated as element of a loop display or as process box, another file must be used in each case.

Overview of the files of the standard display blocks:

Object type	Controller display file	Limit value display file
1	RegR64.K.SBB	GRegR64K.SBB
2	RegR64S.SBB	GRegR64S.SBB
4	SRS_K.SBB	GSRS_K.SBB
5	SRS_S.SBB	GSRS_S.SBB
6	IP260K.SBB	GIP260K.SBB
7	IP260S.SBB	GIP260S.SBB
21	Reg115K.SBB	GReg115K.SBB
22	Reg115S.SBB	GReg115S.SBB
23	ModRegK.SBB	GModRegK.SBB
24	ModRegS.SBB	GModRegS.SBB

Standard display for measuring points R64 (object type 3):

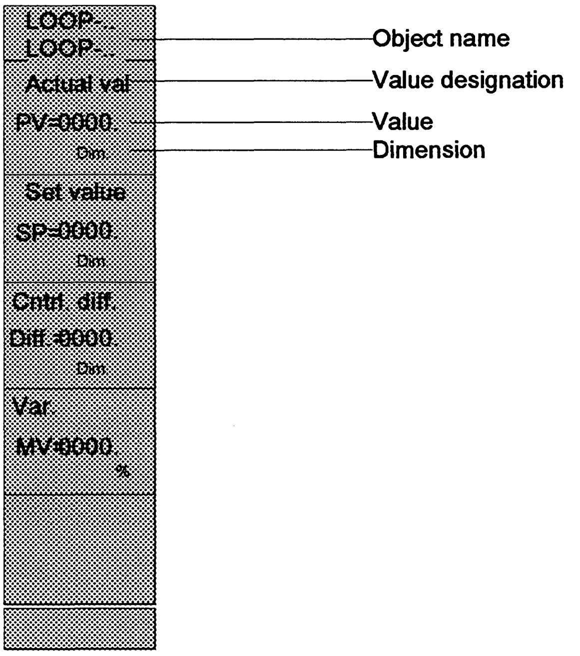


Fig. 6.3: Standard display block

File of the standard display block for object type 3 (measuring point R64):

MPR 64.SBB

6.2 Standard Display for Analog Measured Values

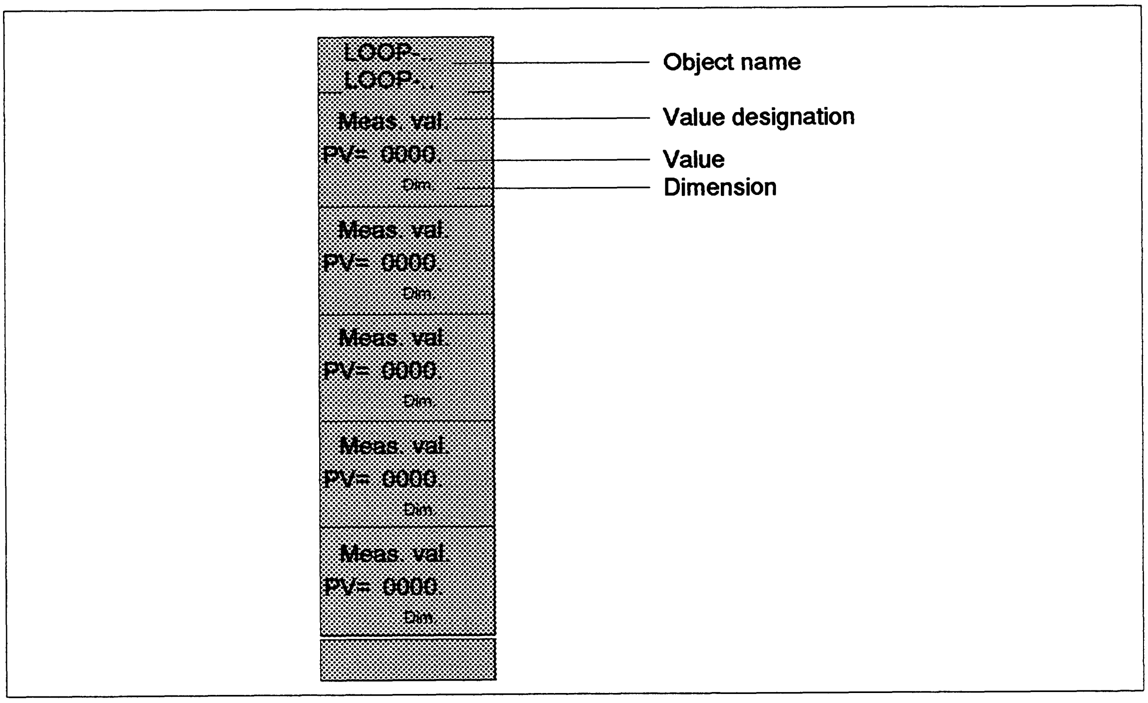


Fig. 6.4: Standard display block

File of the standard display block for object type 8 (analog measured values):

MW.SBB

6.3 Standard Displays for Dosing Apparatus

For the standard object of dosing apparatus (object type 9) there is a standard display block for displaying the dosing apparatus itself, and a standard display block for displaying additional values of the dosing apparatus (factors, end values, dribbling correction factor).

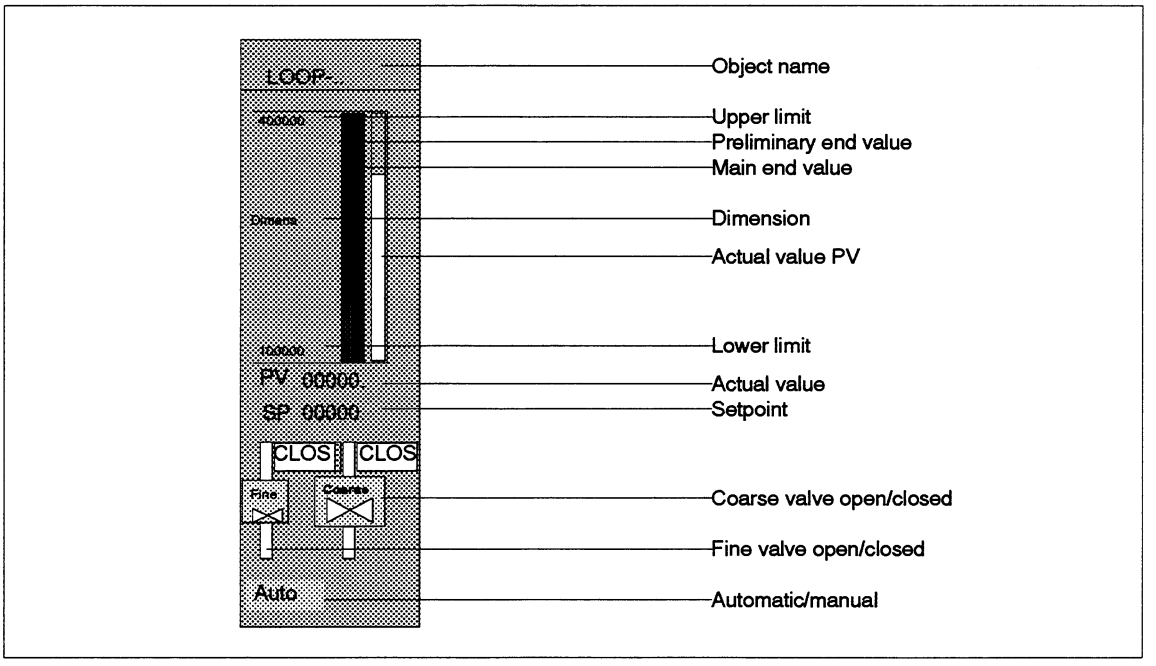


Fig. 6.5: Standard dosing apparatus display

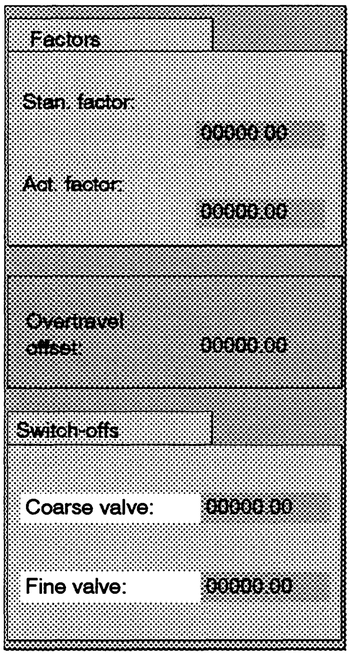


Fig. 6.6: Standard additional values display

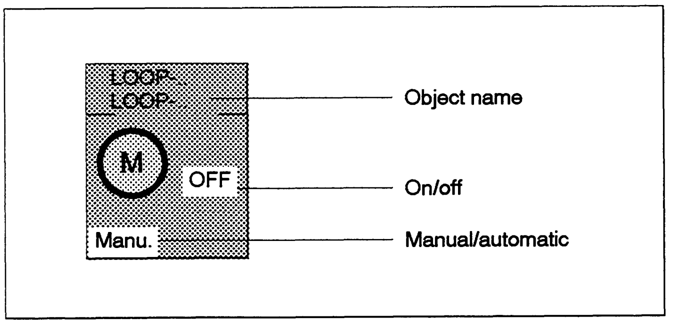
The standard display blocks are stored in separate files.

Standard Display Block	File
Doser	DOS.SBB
Additional values	DOSPARA.SBB

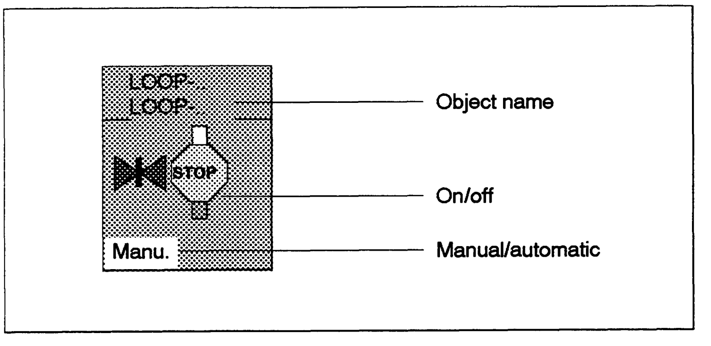
6.4 Standard Displays for Individual Control Elements

Display examples for displaying individual control elements:

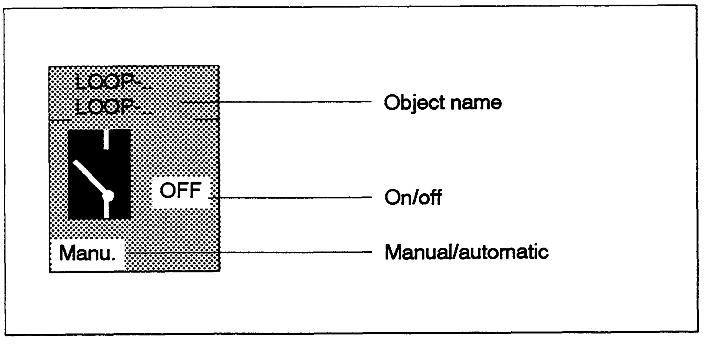
Motor



Valve



Switch



Overview of the files of the standard display blocks

Object type	Object	File of the display block
10	Motor (2 loops)	Mot_1.SBB (1st loop) Mot_2.SBB (2nd loop)
11	Reversing drive	Mot_W.SBB
12	Motor with 2 speeds, controlled acceleration	Mot_2ns.SBB
13	Motor with 2 speeds, automatic acceleration	Mot_2na.SBB
14	Motor delta/star	Mot_dx.SBB
15	Valve (2 loops)	V_1.SBB (1st loop) V_2.SBB (2nd loop)
16	Valve slide	Schieb.SBB
17	Latched switch gear unit	Schalt.SBB
18	Valve slide with signalling of the switch-on readiness	SchiebE.SBB

6.5 Standard Displays for the Analog Value Output

For the analog value function (object type 19), displaying limit values is possible in addition to the standard display block of the analog value output.

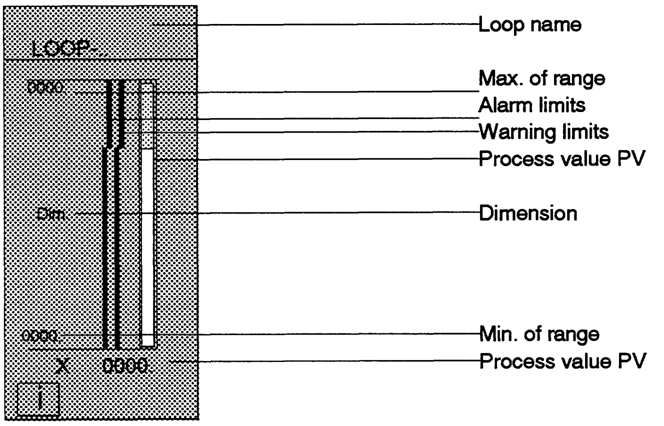


Fig. 6.7. Display example for analog value display

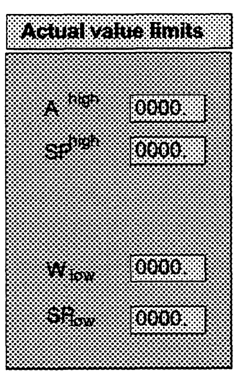


Fig. 6.8: Limit values of an analog value

The standard display blocks are stored in separate files:

Standard display block	File
Analog value display	Analog.SBB
Limit value display	GAnalog.SBB

6.6 Standard Display for Binary Values

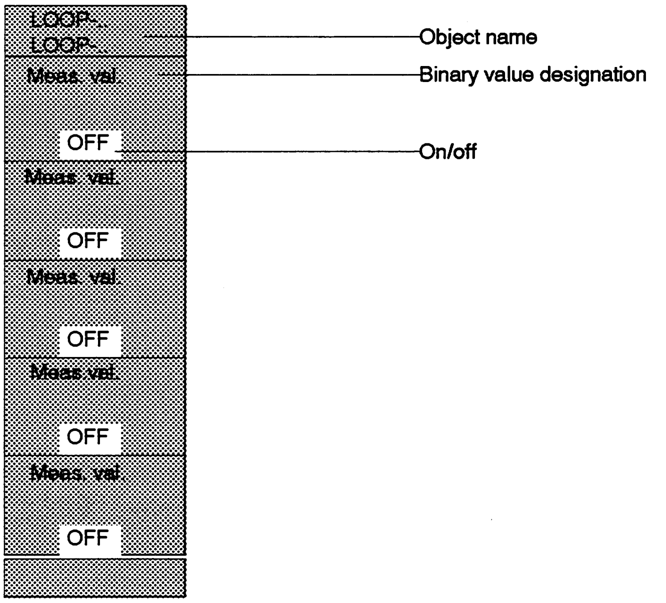


Fig. 6.9: Standard display block

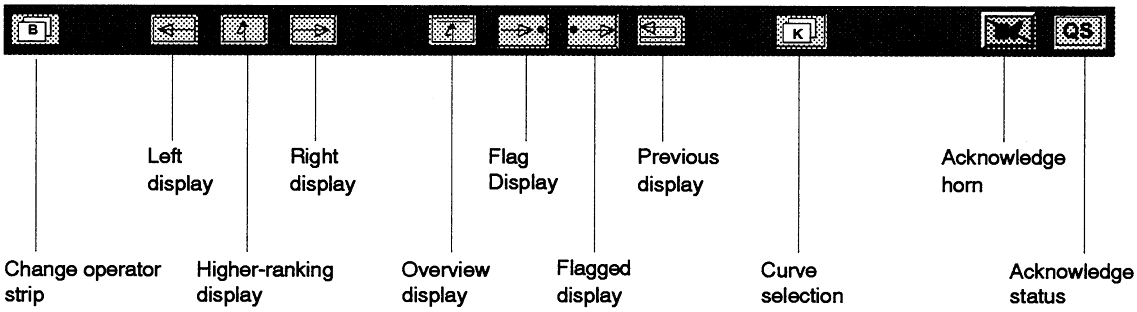
File of the standard display block for object type 20 (binary values):

BINAER.SBB

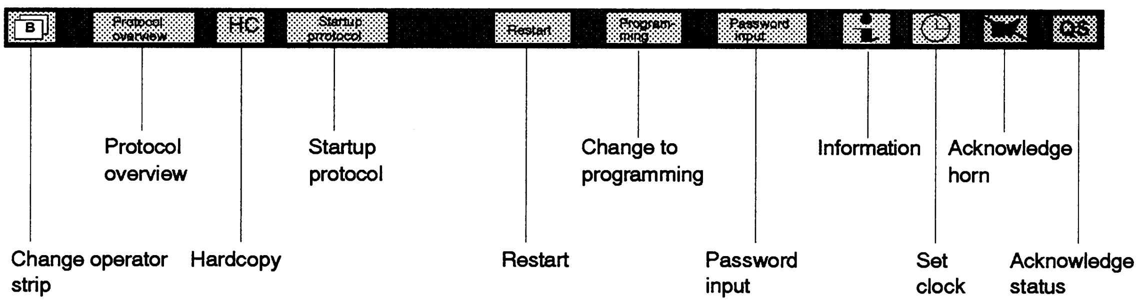
6.7 Operator Strips

Predefined operator strips exist for operator control of the standard displays, as well as of the loop, group and overview displays.

Operator strip for display switch-over:

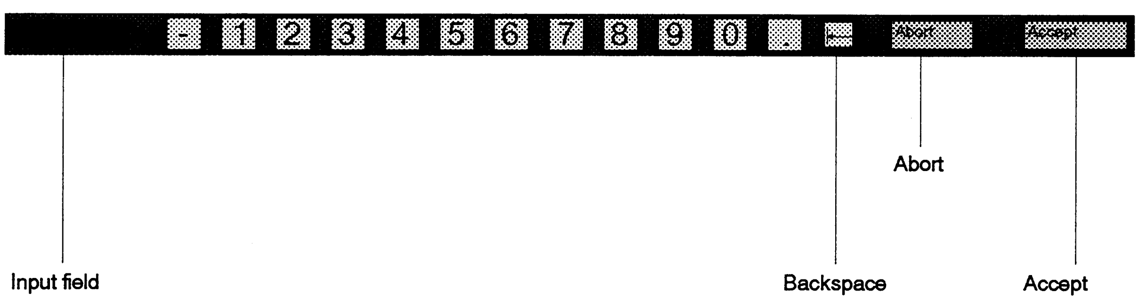


Operator strip for selecting basic functions:



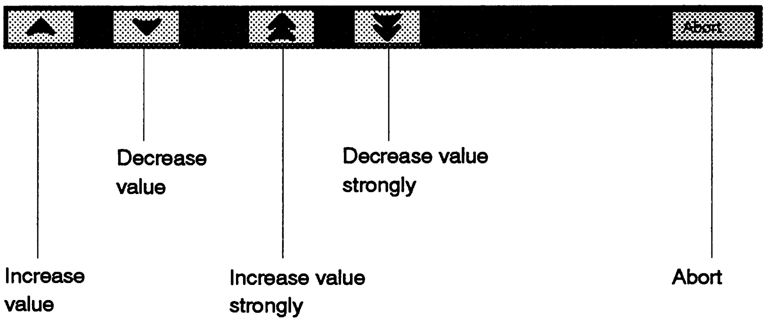
Numerical operator strip:

The numerical operator strip serves for entering numerical values.

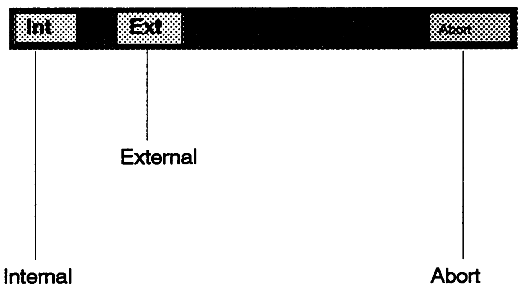


Control strip for adjusting a value:

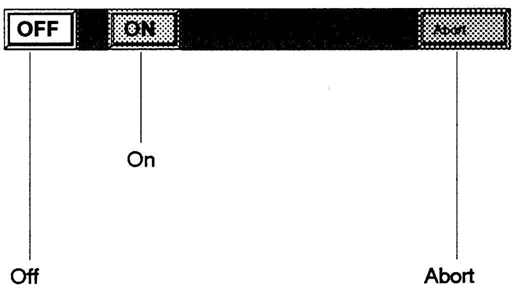
The value is changed by operating up/down key fields.



Control strip for internal/external switch-over:

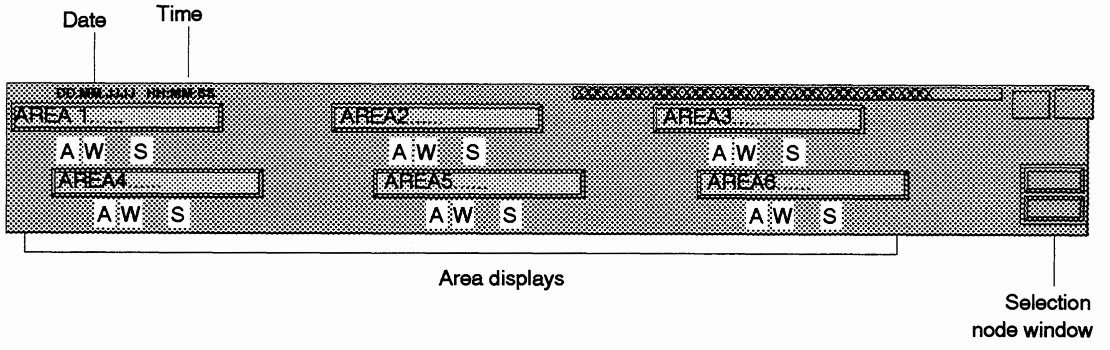


Control strip for switching on/off:



6.8 Standard Display for Area Overview

In the standard display for the area overview, 6 areas are displayed with short information on the status.



6.9 Information on Setting the COROS LS-B On-Line

If the standard display blocks specified in Chapter 6 are used, the following files have to be specified additionally, when the COROS LS-B is set on-line:

Type 1,2 4,5	Controller R64	Standard controller interface
	INCDEC, PTA NUM-TAS.PTA HA.PTA INTEXT.PTA	GREN-BER.GB0 PROZWAR5.GB0
Type 6,7	IP260	
	INCDEC.PTA NUM-TAS.PTA HA.PTA INTEXT.PTA	GREN-BER.GB0 PROZWAR4.GB0 PROZWARN.GB0
Type 9	Dosing apparatus	
	DOSSTOP.PTA HA.PTA DOSAZHA.PTA NUM-TAS.PTA	GREN-BER.GB0 PROZWARN.GB0 PROZWARZ.GB0 PROZWAR3.GB0
Type 10	Motor (2 Kreise)	
	EINAUS.PTA HA.PTA	PROZWARN.GB0 BER-MOT.GB0
Type 11	Wendeantrieb	
	 HA.PTA REU.PTA	PROZWARN.GBO BER-MOT.GB0 RELI.GB0
Type 12	Motor 2 Drehzahlen	(controlled start-up)
	N1N2.PTA HA.PTA	PROZWARN.GB0 BER-MOT.GB0 N1.GB0
Type 13	Motor 2 Drehzahlen	(automatic start-up)
	EINAUS.PTA HA.PTA	PROZWARN.GB0 BER-MOT.GB0
Type 14	Motor Stern-Dreieck	
	EINAUS.PTA HA.PTA	PROZWARN.GB0 BER-MOT.GB0
Type 15	Ventil (2 Kreise)	
	AUFZU.PTA HA.PTA	PROZWARN.GB0
Type 16	Ventilschieber	
	AUFZU.PTA HA.PTA	PROZWARN.GB0

Type 17	Verklinktes Schaltgerät	
	EINAUS.PTA HA.PTA	PROZWARN.GB0
Type 18	Ventilschieber mit ESB	
	AUFZU.PTA HA.PTA	PROZWARN.GB0 BER-SCHI.GB0
Type 19	analog value function	
	NUM-TAS.PTA	DEZKENN.GB0 GREN-BER.GB0
Type 20	binary function	
	EINAUS.PTA	
Type 21,22	control 115U	
	INCDEC.PTA NUM-TAS.PTA HA.PTA INTEXT.PTA	GREN-BER.GB0 PROZWAR1.GB0 PROZWARN.GB0
Type 23,24	modular control system	
	INCDEC.PTA NUM-TAS.PTA HA.PTA INTEXT.PTA	GREN-BER.GB0 PROZWARN.GB0

7 Technical Specifications

This chapter contains tables and calculation bases for determining the necessary storage space requirement, as well as the required runtimes when using the PMC status processing system.

7.1 Storage Space Requirement

The storage space requirement can be divided into required storage space for:

function blocks
+ program blocks (approx. 60 data words)
+ data blocks

With the preconditions for the application of status elaboration which are PMC System Functions, Operating and Monitoring Functions and Message Functions. For detailed information about the contents and storage space requirement of the blocks for Communications system, Operating and Monitoring Functions and Message Functions please refer to the respective manual (Section: Technican Specifications).

Storage space requirements of the function block (All information in data words)

PMC/LS-B V 2.0: Status

FB-Nr.	FB-Name	CPU 941-943	CPU 944	CPU 945	CPU 928	CPU 946/47	CPU 948
Communication, O+M	total	9619	9619	11727	7470	19038	11838
FB 209 FB 222 FB 223	S-ANLAUF STATQUIT STATMELD	82 80 699	82 80 699	158 117 1357	72 113 565	156 110 1383	156 110 1383
Status	total	861	861	1632	750	1649	1649
Communckation, Messages and Status	total	10490	10490	13359	8220	20687	13487

The function block FB STATUS (created by PMCPRO) needs in addition to its total storage requirement 4 data words per monitored PMC object of additional storage space (for type 1, 2 and 3 (R 64): 6 DW, while accessing to > DW 255: 8 DW are required).

Storage space requirement of the additionally required data blocks for status elaboration (All information in data words):

Dat ablock	Number of data words	Remark
DB OBJ-STAT DB STAT-ANZ	6 DW + 1 DW for every PMC object 6 DW + 1 DW for every PMC object	Acc. to number of objects Acc. to number of objects

7.2 Runtimes

The runtimes of function blocks for PMC systemcommunication depend on the utilities in elaboration and on the jobs the PMC system communication of COROS LS-B or PMC_581 have to accomplish: The higher the demand for communication jobs to be accomplished by the CPU, the longer CPU runtimes of PMC system communication.
The table below shows standard values which occur during normal service and extreme values which occur during high-duty service.

System communication and different number of status objects

Standard values:

System communication and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
50 Objects	57	22	2	71	23	20	5
100 Objects	80	33	3	91	34	24	6
200 Objects	126	44	6	132	57	32	8
400 Objects	only 200 Objects	only 200 Objects	9	only 200 Objects	only 200Objects	48	11
750 Objects	only 200 Objects	only 200 Objects	11	only 200 Objects	only 200Objects	74	17

Max. values:

System communication and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
50 Objects	80	80	10	180	50	40	10
100 Objects	100	80	10	200	60	50	10
200 Objects	160	100	10	240	80	70	20
400 Objects	only 200 Objects	only 200 Objects	20	only 200 Objects	only 200 Objects	70	20
750 Objects	only 200 Objects	only 200 Objects	20	only 200 Objects	only 200 Objects	100	30

System communication, 1008 messages and different number of status objects

Standard values:

System communication 1008 messages and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
50 Objects	74	26	2	80	28	21	5

100 Objects	93	33	4	102	38	26	6
200 Objects	131	40	6	140	55	32	8

Max. values:

System communication 1008 messages and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
50 Objects	110	80	10	190	60	40	10
100 Objects	130	80	10	200	80	40	20
200 Objects	170	90	10	250	90	50	20

System communication, 200 Objects and different number of messages

Standard values:

System communication 200 Objects and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
1008 messages	131	40	6	140	55	32	8
2000 messages	137	41	7	143	57	33	8
5008 messages	143	44	7	145	58	36	9
10000 messages	exceeds storage capacity	45	8	148	59	36	9

Max. values:

Systemkommunikatio n 200 Objekte und	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
1008 messages	170	90	10	250	90	50	20
2000 messages	180	100	10	250	90	50	20
5008 messages	190	100	10	260	90	50	30
10000 messages	exceeds storage capacity	110	10	260	90	50	30

System communication, 5008 messages and different number of status objects

Standard values:

System communication 5008 messages and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
200 Objects	143	44	7	145	58	36	9
400 Objects	only 200 objects possible	nur 200 objects possible	9	only 2oo objects possible	only 200 objects possible	50	18

Max. values:

System communication 5008 messages and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
200 Objects	190	100	10	260	90	70	20
400 Objects	only 200 objects possible	only 200 objects possible	20	only 200 objects possible	only 200 objects possible	100	30

Max. capacity: System communication, 10000 messages and 750 objects

Standard values:

System communication 10000 messages and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
750 Objects	only 200 objects possible	only 200 objects possible	12	only 200 objects possible	only 200 objects possible	77	18

Max. values:

System communication 10000 messages and	CPU 943B	CPU 944B	CPU 945	CPU 928A	CPU 928B	CPU 946/947	CPU 948
750 Objects	only 200 objects possible	only 200 objects possible	20	only 200 objects possible	only 200 objects possible	100	30

Appendix

Overview of PMC data blocks

All data blocks of the PMC status processing are displayed collectively below. Please refer to Chapter 5 for detailed information on the individual data words.

DB OBJ-STAT

DW 0	KM	Change flag
DW 1	KM	Central status suppression
DW 2		free
DW 3		free
DW 4		free
DW 5		free
DW 6	KM	Status of object 1
DW 7	KM	Status of object 2
		⋮
DW n+5	KM	Status of object n

DB STAT-ANZ

DL 0	KY	Telegram type identifier 37H
DR 0	KY	Telegram body length (max. DW No.)
DW 1	KM	Central status suppression and offset
DL 2	KY	1/100 seconds
DR 2	KY	Seconds
DL3	KY	Minutes
DR 3	KY	Hours
DL 4	KY	Day
DR 4	KY	Month
DL 5	KY	Year
DR 5	KY	0
DW 6	KM	Status display of object 1
DW 7	KM	Status display of object 2
		⋮
DW n+5	KM	Status display of object n

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