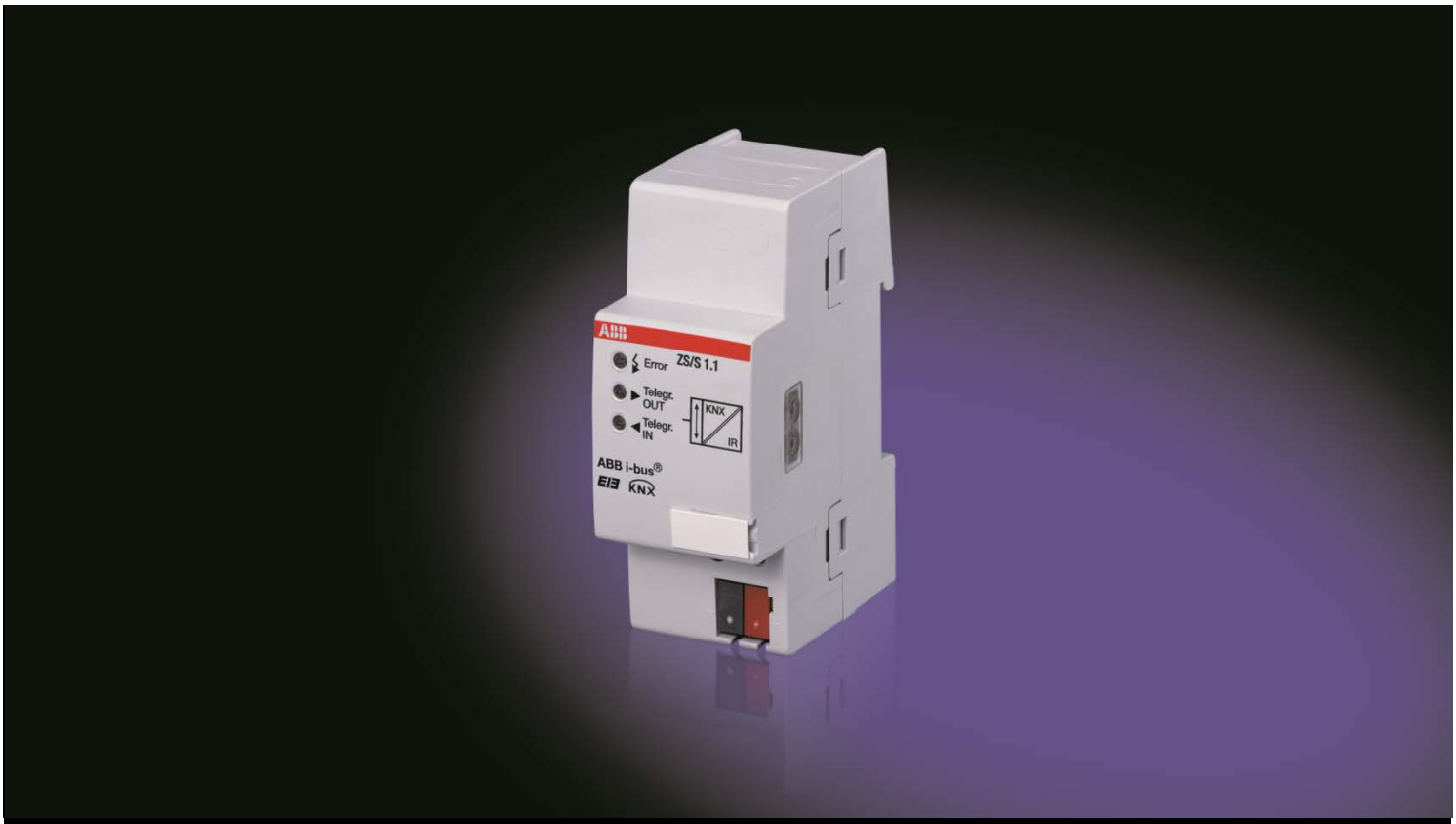

ABB i-bus® KNX
Meter Interface Module ZS/S 1.1
Product Manual

Power and productivity
for a better world™

Content

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1 General

Energy measurement

The recording of energy variables and values as well as their processing is continually gaining in significance. This is not just due to the rising energy costs but also due to the frequently demanded evaluation and reading possibilities via a decentralized reading station. When combined with the features of the ABB i-bus®, the operator or user in the field of intelligent building technology can implement comfortable and economical solutions for modern energy management. The demands placed on recording and evaluation as well as on billing and charging in commercial and functional buildings, and also in industrial systems and residential properties have increased significantly over recent years. ABB offers a wide range of meters and interfaces specially designed for these applications.

What is Automatic Meter Reading (AMR)?

Automatic Meter Reading (AMR) is the process of remote reading of data from meters. AMR allows the suppliers of electrical energy, as well as water, gas and district heating to improve the handling of their contracts and services. The ongoing costs involved in manual reading of the meter are eliminated and the consumption data become transparent.

What is energy management?

Energy management is the overall concept which ranges from planning of requirement to selection, installation and operation of energy generation systems. The objective is to provide complete coverage of the energy needs of the consumer and to use the most minimum amount of energy at the given comfort or production levels (industrial and commercial). Energy management can be applied in every building where energy is required: Industrial buildings, office buildings, sports halls, housing, apartments, etc.

Reasons for energy management:

- Guaranteeing the provision of an interruption free supply of energy or power
- Retention of the voltage or current quality
- Economic efficiency, e.g. favorable power or heat prices, conservation of energy
- Environmental aspects, e.g. conservation of energy, energy recovery
- Independence of fossil based primary energy carriers

What is load management?

The primary objective of load management is an economical and resource efficient use of energy provided by electrical utility companies in industry, commercial applications and domestic households for environmental cost and/or safety reasons. Load management also incorporates measures for the avoidance of circuit overloads. Cost savings can be achieved by the avoidance of load peaks or reduction of consumption during tariff times when higher power prices are charged.

1.1 Using the product manual

This manual provides detailed technical information concerning the Meter Interface Module, its installation and commissioning.

This manual is divided into the following chapters:

Chapter 1	General
Chapter 2	Device technology
Chapter 3	Commissioning
Chapter 4	Planning and application
Chapter A	Appendix

1.1.1 Structure of the product manual

In chapter 3, the parameters for the Meter Interface Module in conjunction with the A series, B series, DELTAplus, DELTAsingle, ODIN and ODINsingle meter types are described. Following the parameter descriptions, you will find the descriptions of the available communication objects.

1.1.2 Notes

Notes and safety instructions are represented as follows in this manual:

Note
Tips for usage and operation

Examples
Application examples, installation examples, programming examples

Important
These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury.

Caution
These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury.

 **Danger**
These safety instructions are used if there is a danger to life and limb with inappropriate use.

 **Danger**
These safety instructions are used if there is an extreme danger to life with inappropriate use.

1.2 Product and functional overview

The Meter Interface Module ZS/S 1.1 from ABB STOTZ-KONTAKT converts telegrams from ABB energy meters for the DIN rail mounting into KNX telegrams. The device features an infrared interface, which can be used to read the data from ABB energy meter types A series, B series, DELTA and ODIN. These read values can be processed in a number of ways, e.g. in visualization systems, energy management systems or for billing purposes. Different values and variables can be processed by the Meter Interface Module depending on the meter type used.

The following functions are available with the application program *Meter data logging*:

2CMC 484 004 F0001

Functions of ZS/S 1.1 with A series, B series and DELTAplus meters*

- Active and reactive energy consumed (total, tariffs 1/2/3/4)
- Active and reactive energy exported (total, tariffs 1/2/3/4)
- Instantaneous voltages and currents
- Instantaneous powers and power factors (active, reactive and apparent power)
- Instantaneous phase angle (voltage, current, power)
- Instantaneous frequency
- Quadrant
- Send and reset power failures (counter)
- Send and switch tariff
- Read voltage and current transformer ratio
- Status byte

2CDC 071 151 F0007

Functions of ZS/S 1.1 with DELTAsingle meter*

- Active energy
- Active energy tariffs 1/2/3/4
- Send and reset power failures (counter)
- Read tariff
- Status byte

* The scope of functions depends on the version of the corresponding meter type

2CDC 071 152 F0007

Functions of ZS/S 1.1 with ODIN meter*

- Active energy
- Transformation ratio (current)
- Status byte

2CDC 101 175 F0008

Functions of ZS/S 1.1 with ODINsingle meter*

- Active energy
- Resettable energy register
- Send and reset power failures (counter)
- Status byte

* The scope of functions depends on the version of the corresponding meter type

2 Device technology

2CDC 071 153 F0007

Meter Interface Module ZS/S

The Meter Interface Module ZS/S enables remote reading of meter data and meter values from ABB energy meters from the A series, B series, DELTA and ODIN.

The information that is read can be used, for example, for cost-center accounting, energy optimization, visualization or monitoring of installations. Furthermore, meter functions such as tariff switching, for example, can be controlled via KNX, depending on the meter type used.

The Meter Interface Module is a modular installation device (MDRC) in Pro*M* design. It is designed for installation in a distribution board on 35 mm mounting rails. The connection to the ABB i-bus® KNX is established via the bus connection terminal.

2.1 Technical data

Power supply	Bus voltage	21 …31 V DC via KNX
	Current consumption KNX	Maximum 12 mA
	Power loss	Maximum 250 mW
Operating and display elements	LED red and programming button	For assignment of the physical address and checking the bus connection
	Error LED (red)	On: No IR communication Flashing: Connected meter does not comply with parameterization
	2 LEDs input/output telegram (yellow)	Flashing: Telegram traffic IN/OUT
Connections	KNX	Via bus connection terminal 0.8 mm Ø, solid
Infrared interface	Compliant to IEC 61107	
Degree of protection	IP 20	EN 60 529
Protection class	II	EN 61 140
Isolation category	Overvoltage category	III to EN 60 664-1
	Pollution degree	2 to EN 60 664-1
KNX safety extra low voltage	SELV 24 V DC	
Temperature ranges	Operation	-5 °C…+45 °C
	Storage	-25…+55 °C
	Transport	-25…+70 °C
Ambient conditions	Maximum air humidity	95 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro*M*
	Dimensions	90 x 36 x 64.5 mm (H x W x D)
	Mounting width in space units	2 x 18 mm modules
	Mounting depth	68 mm

Installation	On 35 mm mounting rail	EN 60 715
Mounting Position	On mounting rail adjacent to energy meter	Observe the installation instructions!
Weight	Approx. 0.1 kg	
Housing, color	Plastic housing, gray	
Approvals	KNX	
CE mark	In accordance with EMC and low-voltage guidelines	

Application program	Max. number of communication objects	Maximum number of group addresses	Maximum number of associations
Meter data logging/···*	77	254	254

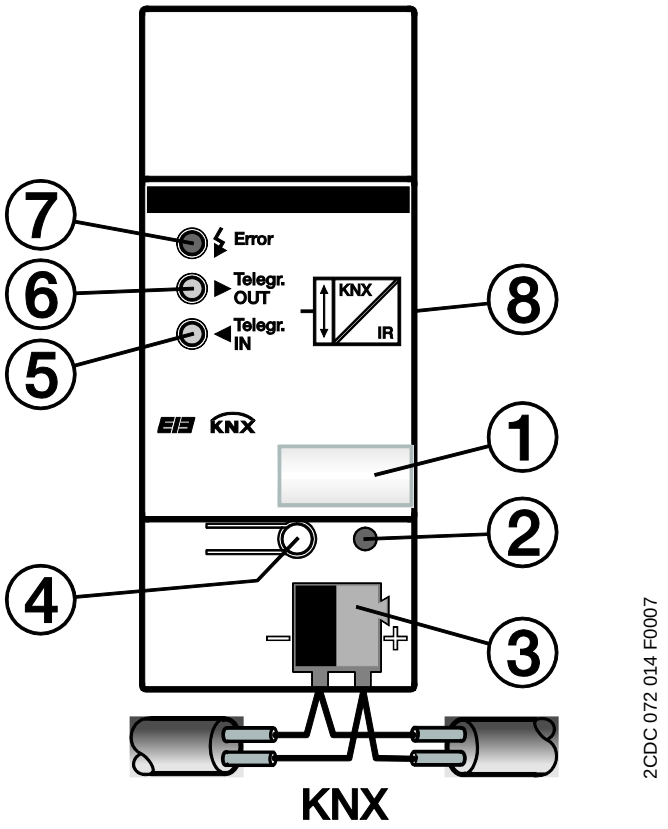
* … = Current version number of the application program. Please refer the software information on our homepage for this purpose.

Note

The programming requires Software Tool ETS2 V1.2a or higher. If ETS3 is used, a ".VD3" type file or higher must be imported. The application program is available in the ETS2/ETS3 at *ABB/Energy Management*.

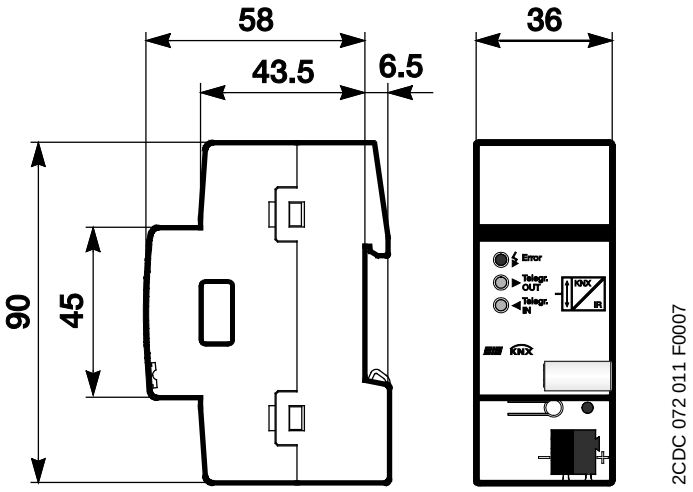
The device does not support the password function of a project or the KNX device in ETS. If you inhibit access to all devices of the project with *BCU code*, it has no effect on this device. Data can still be read and programmed.

2.2 Wiring diagrams



1	Label carrier	5	Input telegram LED (yellow)
2	Programming LED	6	Output telegram LED (yellow)
3	Bus connection terminal	7	Error LED (red)
4	Programming button	8	Infrared interface (sidewise)

2.3 Dimension drawing



2.4 Mounting and installation

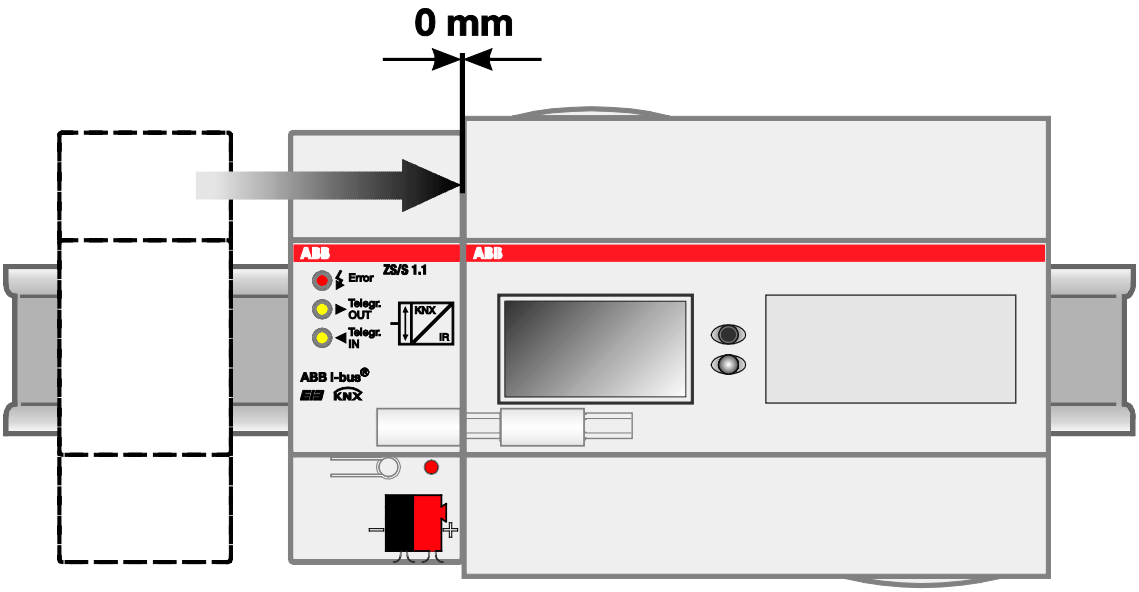
The Meter Interface Module ZS/S 1.1 is a modular installation device for quick installation in the distribution board on 35 mm mounting rails to EN 60 715.

The connection to the bus is implemented using the supplied bus connection terminal. The device is ready for operation after connection to the bus voltage.

Accessibility of the devices for the purpose of operation, testing, visual inspection, maintenance and repair must be provided compliant to VDE 0100-520.

The device is solely intended for installation in a closed distribution board. This is intended to minimize the occurrence of malfunctions caused by dirt, humidity and external light sources. The communication between the interface and the counters may be subjected to interference with direct incidence of light.

For operation, the Meter Interface Module must be snapped onto the mounting rail arranged flush to the energy meter, to ensure that communication via the infrared interface is assured. No air gap may exist between both devices. An air gap can interfere with the communication and makes the IR interface susceptible to malfunctions. If there is a malfunction of the IR communication, the LED *Error* will light red when bus voltage is available. In order to avoid the development of an air gap, ensure that the device is not subjected to vibrations after commissioning.



ZS/S Energy meter

It is important to ensure that the Meter Interface Module and energy meter remain dust-free, dry and clean. In order to guarantee a secure interface function, we recommend checking the devices at regular intervals – taking account of the level of dirt in their environment – and to clean them.

The specifications and notes in the manuals for the connected energy meter must be observed for mounting, installation and commissioning.

Commissioning requirements

In order to commission the device, a PC with ETS (from ETS2 V1.2a or higher) as well as an interface to the ABB i-bus®, e.g. via a KNX interface, is required.

The device is ready for operation after connection to the bus voltage. No additional auxiliary voltage is required.

Mounting and commissioning may only be carried out by electrical specialists. The appropriate standards, directives, regulations and specifications should be observed when planning and setting up electrical installations.

- Protect the device from moisture, dirt and damage during transport, storage and operation.
- Only operate the device within the specified technical data!
- The device should only be operated in an enclosed housing (distribution board)!

Supplied state

The device is supplied with the physical address 15.15.255. The application program is pre-installed. It is therefore only necessary to load group addresses and parameters during commissioning.

However, the complete application program can be reloaded if required. Downloads may take longer after a change of application program, an interrupted download or after unloading a device.

Download response

Depending on the PC which is used, the progress bar for the download may take up to one and a half minutes to appear, due to the complexity of the device.

Assignment of the physical address

The assignment and programming of the physical address is carried out in ETS.

The device features a programming button for assignment of the physical device address. The red programming LED lights up after the button has been pushed. It switches off as soon as the ETS has assigned the physical address or the programming button is pressed again.

Cleaning

If devices become dirty, they can be cleaned using a dry cloth. Should a dry cloth not remove the dirt, they can be cleaned using a slightly moistened cloth and soap solution. Corrosive agents or solutions should never be used.

Maintenance

The device is maintenance-free. No repairs should be carried out by unauthorized personnel if damage occurs, e.g. during transport and/or storage. The warranty expires if the device is opened.

3 Start-up

3.1 Application program

Programming is carried out with ETS from version ETS2 V1.2a onwards.

The Meter Interface Module ZS/S is delivered with a pre-installed application program. Hence, only group addresses and parameters must be loaded during commissioning. If necessary, the entire user program can be loaded. The device must be discharged beforehand.

Note
After the device is programmed, it may take up to ten seconds before the Meter Interface Module has synchronized with the energy meter. The interface is only ready for operation after this time. Because of the cyclic data exchange between the energy meter and the Meter Interface Module ZS/S 1.1, the average reaction time of the interface is approx. 6 seconds. This means that the requests or changes of meter readings or values are not sent immediately on the bus; they are sent after approx. 6 seconds.

In order to guarantee simple programming, the application program is structured dynamically, i.e. in the basic setting only very few important communication objects and parameters are visible. The full functionality of the application program becomes visible via the activation of the respective parameters.

3.1.1 Conversion

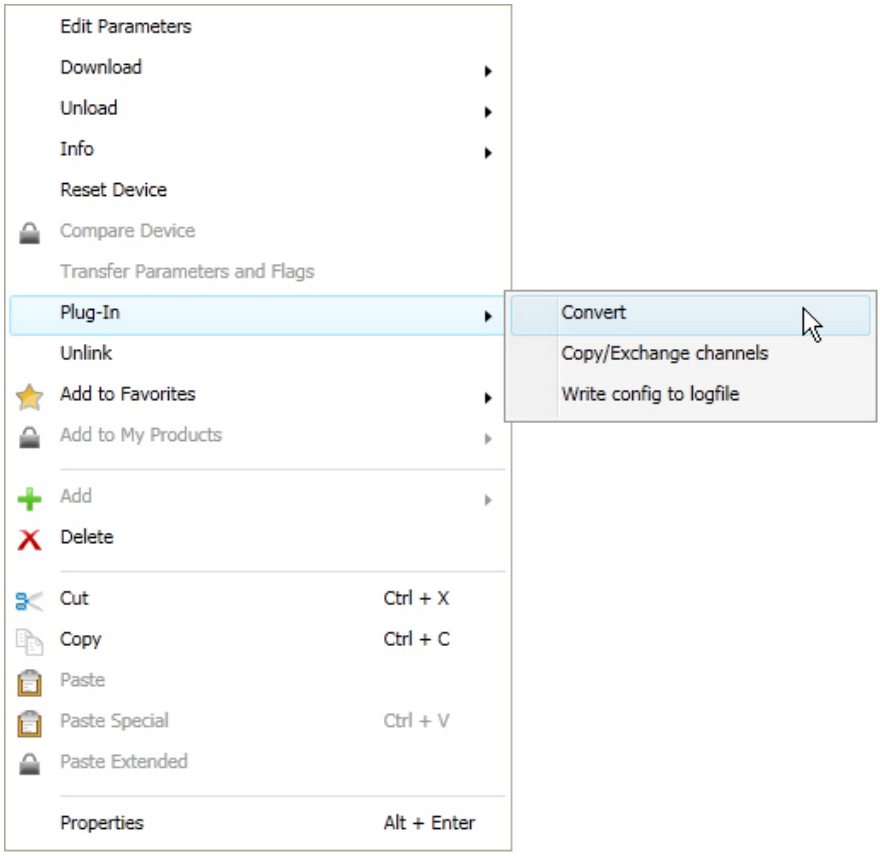
For ABB i-bus® KNX devices, it is possible to adopt the parameter settings and group addresses from earlier versions of the application program from ETS3.

Furthermore, conversion can be used to transfer the existing parameterization of a device to a different device.

Note
When the term "channels" is used in ETS, it means inputs and/or outputs. To make the language of ETS generally valid for as many ABB i-bus® devices as possible, the word channels is used in this document.

3.1.1.1 Procedure

- Insert the desired device into your project.
- Import the current application program into the ETS.
- Perform your parameterizations and program the device.
- Once you have programmed the device, you can transfer the settings to a second device.
- To do this, right-click on the product and select *Convert* from the *Plug-In* > context menu.



- Then make the desired settings in the dialog *Convert*.
- Finally, you must replace the physical address and delete the old device.

3.2 Parameters

The parameterization of the Meter Interface Module is implemented using the Engineering Tool Software ETS from version ETS2 V1.2 or higher. The application program is available in the ETS2/ETS3 at *ABB/Energy management*.

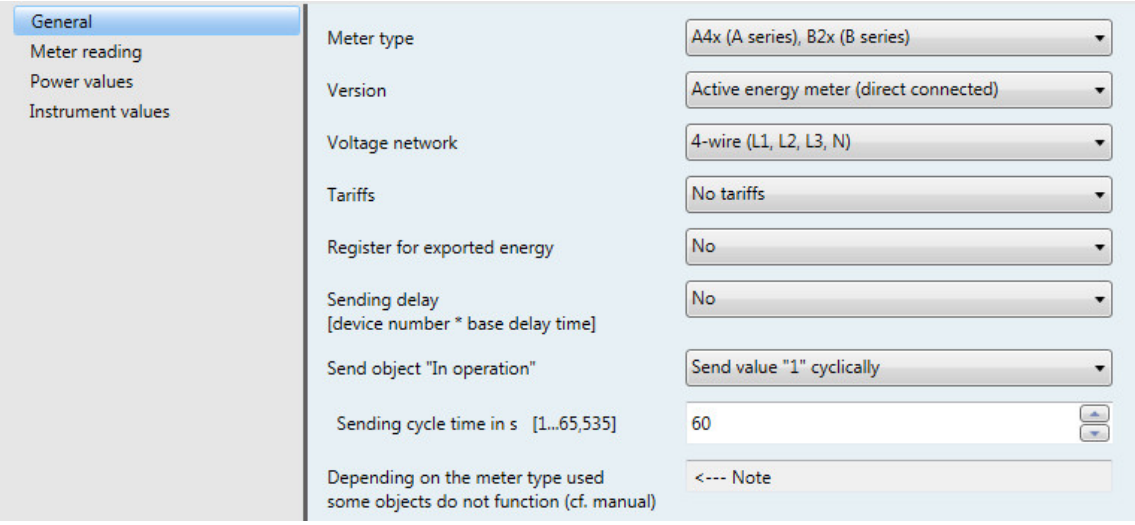
The following chapter describes the parameters of the ZS/S 1.1 using the parameter windows. Parameter windows are structured dynamically so that further parameters may be enabled depending on the parameterization and function of the outputs.

The default values of the parameters are underlined, e.g.:

Options: Yes
No

3.2.1 Parameter window *General*

Higher-level parameter settings for the connected meter can be made in the parameter window *General*.



Meter type

Options: A4x (A series), B2x (B series)
DELTAplus
DELTAsingle
ODIN
ODINsingle

The energy meter connected to the interface is selected using this parameter. Depending on the selected meter type, communication objects, parameters or parameter pages are enabled for the respective meter type.

The following table shows the general parameters (without dependent parameters) and parameter options depending on the selected meter type.

Parameters	Parameter options				
Meter type	A series B series	DELTAplus	DELTAsingle	ODIN	ODINsingle
Version	Active energy meter (direct connected) Active energy meter (transformer rated) Combination meter (direct connected) Combination meter (transformer rated)		Active energy meter (direct connected)	Active energy meter (direct connected) Active energy meter (transformer rated)	Active energy meter (direct connected)
Voltage network	4-wire (L1, L2, L3, N) 3-wire (L1, L2, L3) 2-wire (L, N)		2-wire (L, N)	4-wire (L1, L2, L3, N)	2-wire (L, N)
Tariffs	No tariffs 4 tariffs	No tariffs 2 tariffs 4 tariffs	No tariffs 2 tariffs 4 tariffs	No tariffs	No tariffs
Register for exported energy	No Yes	-	-	-	-
Intermediate meter	-	-	-	-	No Yes
Sending delay	No Yes				
Send object "In operation"	No Yes				

Version

Options: Active energy meter (direct connected)
Active energy meter (transformer rated)
Combination meter (direct connected)
Combination meter (transformer rated)

Using this parameter, you can set or display whether the energy meter connected to the interface is an active energy meter or a combination meter. Active energy meters only measure the active power or energy. Combination meters also measure the reactive and apparent power or energy.

Note
If a meter of the A4x or B2x type with the functionality *Bronze*, *Silver*, *Gold* or *Platinum* is to be read, the option *Combination meter* must be selected under the parameter *Configuration*.

- *Active energy meter/Combination meter* (direct connected): Currents up to 65 A (types B21 and B23) or 80 A (types A41 and A43) are measured directly by the meter.
- *Active energy meter/Combination meter* (transformer rated): The communication objects *Transformer ratio current*, *Transformer ratio voltage* and *Total transformer ratio* are enabled.

  The following parameters also appear:

  Power and instrument values

  Options: Send as secondary values
  Send as primary values

  This parameter is used to set how the power or instrument values are to be sent. This parameter appears only if a transformer rated active energy meter or combination meter of the type A series, B series and DELTAplus is selected.

  - *Send as secondary values*: The set transformer ratio on the meter is not considered. The sent power values (active, reactive and apparent power) must be multiplied by the transformer ratio (CT x VT) in order to determine the actual value (primary value). The sent currents or voltages must be multiplied by the corresponding current transformer ratio (VT) in order to determine the actual value (primary value).

For further information see: Energy metering, p. 72

  - *Send as primary values*: The set transformer ratio on the meter is considered. The actual or primary values, active, reactive and apparent power, current and voltage are sent.

Meter reading values

Options: Send as secondary values (4-byte object type)
Send as primary values (8-byte object type)

This parameter is used to set how the energy values or meter reading values are to be sent. This parameter appears only if a transformer rated active energy meter or combination meter of the type *A series, B series*, *DELTAplus or ODIN* is selected.

- *Send as secondary values:* The set transformer ratio on the meter is not considered. The sent energy values (active or reactive power) must be multiplied by the transformer ratio (CT x VT) in order to determine the actual value (primary value).

For further information see: Energy metering, p. 72

- *Send as primary values:* The set transformer ratio on the meter is considered. The actual or primary energy values; meter reading, active energy and meter reading, reactive energy are sent.

Note
Using this option, the energy consumption value is sent via an 8-byte communication object. It is necessary to ensure that the receiving device or software is capable of processing 8-byte values.

Voltage network

Options: 4-wire (L1, L2, L3, N)
3-wire (L1, L2, L3)
2-wire (L, N)

Using this parameter, you set the type of voltage network that the energy meter connected to the interface is configured. Depending on the voltage network connected, the communication objects for 2, 3 or 4-wire networks are displayed.

- 4-wire (L1, L2, L3, N): 3-phase DELTAplus meters with neutral conductor (3 x 57-288 V or 100-500 V).
- 3-wire (L1, L2, L3): 3-phase DELTAplus meters without neutral conductor (3 x 100-500 V).
- 2-wire (L, N): 1-phase DELTAplus meter (1 x 57-288 V) and meter type A41 or A42.

Note
If a meter of the DELTAsingle or ODINsingle type is selected, the 2-wire voltage network (L, N) is preset and cannot be parameterized.

Register for exported energy

Options: No
Yes

This parameter is displayed only if a meter of the A4x or B2x type is selected, and it enables the objects for the meter readings of the exported active or reactive energy*.

Note
Registers for exported energy are available only for meters of the A4x and B2x type with the functionality *Bronze*, *Silver*, *Gold* and *Platinum*.

- *Yes*: The communication objects for exported active or reactive energy* appear.

  Active energy exported (total**)

  Active energy exported Trf. 1-4

  Reactive energy exported (total**)

  Reactive energy exported Trf. 1-4

* The communication objects for the reactive energy are displayed only if a combination meter is selected.

** The communication objects *Active energy exported Total/Tariff* and *Reactive energy exported Total/Tariff* only appear with the selection of a tariff meter.

Tariffs

Options: No tariffs
2 tariffs*
4 tariffs

Using this parameter, you can select if the interface connected to the energy meter features tariff functions.

- *2/4 tariffs*: The communication objects for sending of the tariff meter readings and for sending/switching the tariffs are displayed.

* Available only if a meter of the type DELTAplus or DELTAsingle is selected.

Note
Tariffs are available only for meters of the A4x or B2x type with the functionality *Silver*, *Gold* and *Platinum*. Tariff switching via KNX only functions with DELTAplus meters, which have no separate inputs for tariff switching. No tariffs can be parameterized if a meter of the type ODIN or ODINsingle is selected.

Intermediate meter

Options: No
Yes

ODINsingle type (OD1365) energy meters feature a resettable intermediate meter similar to a trip meter in a car. The resettable intermediate meter can be used for energy consumption metering of an accounting period and then can be reset to 0 kWh via KNX. Furthermore, the number of resets is counted and sent.

- *Yes:* The communication objects *Meter reading*, *Intermediate meter*, *Reset intermediate meter* and *Send resets* assigned to the intermediate meter are displayed.

Note
The function or the parameter for the resettable energy register is displayed only if a meter of the type ODINsingle is selected.

Sending delay
(Device number * Base delay time)

Options: No
Yes

The sending delay is used to minimize the telegram traffic on the bus by ensuring that multiple meters in a KNX system send their readings to the bus at different times.

- *No:* The telegrams are sent without a delay, i.e. telegrams are sent immediately after a value is requested, e.g. with the communication object *Request meter reading* via the bus.
- *Yes:* The parameters *Device number* and *Base delay time* for setting the sending delay time are displayed. After every request of a value (meter reading, power value, instrument value), the information is sent via the bus after the set sending delay time has elapsed. The sending delay time is started after every ETS reset, after bus voltage recovery and after tariff switching.

  What is the sending delay time?

  The sending delay time results from the product of the set values:

  Sending delay time = Device number x base delay time.

  In this way, groups of energy meters (up to 255 per group) can be established with the same base delay time. Every one of the up to 255 meters per group is assigned with a number with the parameter *Device number*. With a simultaneous meter reading request via the communication object *Request meter reading*, the meters of the device series send their readings via the bus.

  If the options *Sending delay* and *Send cyclically* are activated simultaneously, delayed sending of the telegrams will only occur once directly after an ETS reset, after bus voltage recovery or tariff switching. This means that after each of these events the parameterized sending delay runs before the cyclic sending delay has commenced. With each subsequent send operation, only the cyclic rhythm is observed as the interfaces now send with a time offset.

Device number
[1...255]
Options: 1-…255

For assignment of the device number of the energy meter.

Base delay time in s
[1…65,535]
Options: 1…65,535

For setting the base delay time of the sending delay.

Send object "In operation"
Options: No
Send value 1 cyclically
Send value 0 cyclically

The communication object *In operation* indicates that the device on the bus is working properly. This cyclic telegram can be monitored by an external device.

Note
After bus voltage recovery, the communication object sends its value after the set sending delay has timed out.

- *Send value 0/1 cyclically*: The communication object In operation and the parameter Cycle time in s appear:

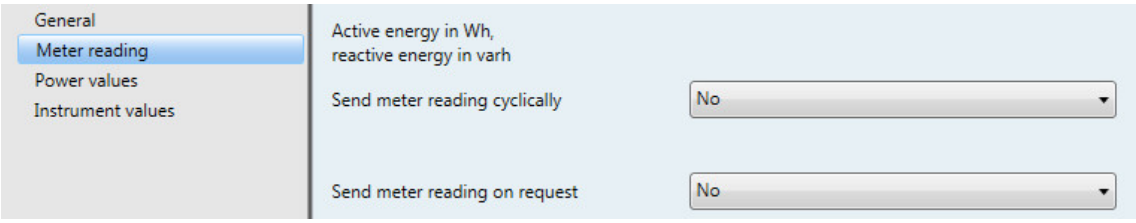
  Cycle time in s
  [1…65,535]
  Options: 1…60…65,535

  Here, a time interval is set that the communication object *In operation* uses to send a telegram cyclically.

Note
Depending on the meter type used, some objects do not function. Individual communication objects can be shown in the ETS but are not supported or sent by the connected meter. Example: Objects nos. 6 and 7 are visible in the ETS. A connected meter of type A44 111-100 (*Steel* functionality) does not support these objects. They are inactive when this meter is used. The table in Chapter 3.3 provides an overview of the available and active communication objects of the application program, according to the connected meter.

3.2.2 Parameter window *Meter reading*

In this parameter window, the sending behavior of the *meter readings* is defined.



The meter readings are always sent as 4 byte values with directly connected meters.

On transformer rated meters, meter reading or energy values can be sent as secondary values (4 byte) or primary values (8 byte).

Depending on the selected meter type and the set parameters, the following communication objects are available for the meter readings:

	A series B series	DELTAplus	DELTAsingle	ODIN	ODINsingle
Active energy	▪	▪	▪	▪	▪
Total active energy	▪	▪	▪	-	-
Active energy tariff 1-4	▪	▪	▪	-	-
Reactive energy	▪	▪	-	-	-
Total reactive energy	▪	▪	-	-	-
Reactive energy tariff 1-4	▪	▪	-	-	-
Active energy exported	▪	-	-	-	-
Total active energy exported	▪	-	-	-	-
Active energy exported trf. 1-4	▪	-	-	-	-
Reactive energy exported	▪	-	-	-	-
Total reactive energy exported	▪	-	-	-	-
Reactive energy exported trf. 1-4	▪	-	-	-	-
Intermediate meter	-	-	-	-	▪

Note
Communication objects for the reactive energy meter reading are displayed only if a combination meter is selected in Parameter window *General,* page 16, parameter *Configuration*. Communication objects for reactive energy are only supported by meters with the *Bronze*, *Silver*, *Gold* or *Platinum* functionality. Communication objects for the meter reading of the exported active and reactive energy are displayed only after selection of an active energy meter or combination meter of the type A4x or B2s in the Parameter window *General,* page 16, parameter Register for exported energy. Communication objects for exported energy are only supported by meters with the *Bronze*, *Silver*, *Gold* or *Platinum* functionality. Communication objects for the meter reading of the (exported) active and reactive energy of tariffs 1-4 only appear when a meter with tariff function is selected (2 or 4 tariffs) in the Parameter window *General,* page 16, parameter *Tariffs*. Communication objects for tariffs are only supported by meters with the *Silver*, *Gold* or *Platinum* functionality.

Reading of the momentary meter readings can be implemented via reading of the communication object values via *Value_Read*, e.g. with the assistance of the Engineering Tool Software ETS. The option of cyclically sending the meter readings or sending on request continues to apply. The meter readings are sent via a 4-byte communication object with a resolution of 1 Wh/varh. Thus meter readings up to a max. of 2,147,483,647 Wh/varh (2.147 GWh/Gvarh) can be sent. If values received from the connected meter are greater than the max. value, the max. value of 2,147,483,647 Wh/varh is always sent.

Send meter reading cyclically

Options: No
Yes

The meter readings are sent cyclically via the bus with this setting.

- *Yes:* The parameter Cycle time in s is displayed. Using this parameter, the send interval at which the meter reading/the meter readings is/are to be sent is set. Multiple meters that send with the same cycle time can send at staggered times using the sending delay time (if it is parameterized) in order to avoid possible communication problems. Cyclical sending is interrupted as soon as communication to the energy meters cannot be established. The meter readings of the active and reactive energy are sent (only when a combination meter is selected). Only the tariff that is currently active and the sum of the tariffs are sent with tariff meters.

Cycle time in s
[1…172,800]
Options: 1…900...172,800

The parameter is displayed if the option *Send cyclically* has been selected. Here, the time is set for cyclically sending the meter readings.

Note
If Sending delay and Send cyclically are activated simultaneously, timed offsetting of the meter reading telegrams will only occur once directly after an ETS reset, after bus voltage recovery or tariff switching, i.e. after each of these events the meter waits for the parameterized sending delay time before beginning with the cyclic sending process. With each subsequent send operation only the cyclic rhythm is observed as the meters now send with a time offset.

Send meter reading on request
Options: No
Yes

With this setting, the meter readings are sent on request via a separate communication object.

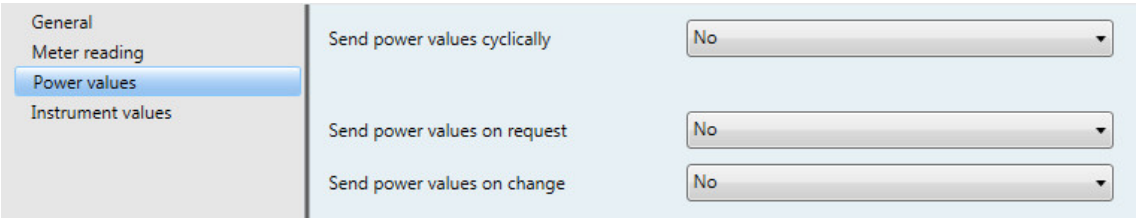
- *Yes:* The communication object *Request meter reading* is displayed. This communication object enables active reading of the momentary meter readings. After receiving a meter reading request telegram with the value 1, the meter reading is sent after a sending delay (if parameterized) via the bus.

  The sending delay time prevents simultaneous sending of telegrams, if multiple meters react to the same meter reading request telegram.

3.2.3 Parameter window *Power values*

In this parameter window, the sending behavior of the *power values* is defined.

Note
The parameter window *Power values* appears only if a meter from the A series, B series or DELTAplus is selected.



Depending on the selected version (active energy meter or combination meter) and parameterization, the following communication objects are available for the power values:

	A series B series		**DELTAplus**	
	Active energy meter ***Steel***	**Combination meter** ***Bronze to platinum***	**Active energy meter**	**Combination meter**
Active power (total)	▪	▪	▪	▪
Active power L1, L2, L3	▪	▪	▪	▪
Reactive power (total)	-	▪	-	▪
Reactive power L1, L2, L3	-	▪	-	▪
Apparent power (total)	-	▪	-	▪
Apparent power L1, L2, L3	-	▪	-	▪
Phase angle power (total)	-	▪	-	▪
Phase angle power L1, L2, L3	-	▪*	-	▪
Power factor total	▪	▪	▪	▪
Power factor L1, L2, L3	-	▪**	-	▪

* Only available for A series meters with *Platinum* functionality

** Not available for A series and B series meters with *Steel* functionality

Note

The parameters or communication objects for reactive and apparent power as well as phase angle are only displayed if, in the Parameter window *General*, page 16, a combination meter (direct connected or transformer rated) has been selected under parameter *Configuration*.

If an energy meter is parameterized for 3- or 4-wire voltage networks, the following communication objects are displayed*:*

Active power total

Active power L1, L2, L3

Reactive and apparent power total *

*Reactive and apparent power L1, L2, L3**

*Phase angle power total**

*Phase angle L1, L2, L3**

Power factor total

Power factor L1, L2, L3

* These communication objects are only displayed with the selection of the combination meter in the Parameter window *General*, page 16, parameter *Configuration*.

Reading of the actual power values can be implemented via reading of the communication object values via *Value_Read*, e.g. with the assistance of the Engineering Tool Software ETS. The option of *Send power values cyclically; Send power values on request* or *Send power values on change* continues to apply.

Send power values cyclically

Options: No
Yes

- *Yes:* The parameter *Cycle time in s* is displayed.

  Cycle time in s
  [1…172,800]

  Options: 1…900...172,800

  Here the time is set for cyclically sending all power values via the bus. The send interval is defined with the parameter *Cycle time in s*. Multiple meters that send with the same cycle time can send at staggered times using the sending delay time *(if it is parameterized)* in order to avoid possible communication problems.

Note
If the sending delay and cyclic sending of the power values are activated, the send delay time only runs once directly after an ETS reset, after bus voltage recovery or tariff switching. After the sending delay time has timed out, the cyclic send process commences. With each additional send operation, only the cycle time is observed as the interface now sends with a time offset. Cyclical sending is interrupted as soon as communication to the energy meters cannot be established.

  Conversion of the cycle time in seconds

  900 s = 15 minutes
  3,600 s = 1 hour
  86,400 s = 1 day
  172,800 s = 2 days

Send power values on request

Options: No
Yes

- *Yes:* The communication object Request power values is displayed. This communication object enables active reading of the momentary power values. After receiving a telegram with a request with the value 1, all the momentary values *(Active power, Reactive power*, Apparent power*, Phase angle** and *Power factor)* are sent after a sending delay time (if parameterized) via the bus. The send delay time prevents simultaneous sending of telegrams, if multiple meters respond to the same request for power values.

* Only with the selection of the combination meter in the Parameter window *General*, page 16, parameter Configuration

Send power values on change
Options: No
Yes

- *Yes:* The parameter values for entering the change values are displayed. If no change of the value occurs, the momentary power values are sent after the set cycle time (*if parameterized*) has timed out. After bus voltage recovery, programming and ETS reset, the power values whose change value is greater than or equal to ± 1 (*0 = do not send*) are sent after the sending delay time (*if parameterized*) has elapsed.

Send active power in W at +/- [0…65,535]
Options: 0…65,535 (0 = do not send)

The change value to be entered here applies for the communication objects *Active power (Total; Active power L1, L2, L3)**. If the preset change value is exceeded or undershot, the corresponding momentary active power value is sent on the bus.

The change value in meters with a transformer ratio always relates to the set parameter option (*Send as primary values* or *Send as secondary values*) of the parameter *Power and instrument values* in the Parameter window *General,* page 16.

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the Parameter window *General,* page 16, parameter *Network Type*.

Send reactive power in var at +/- [0…65,535]
Options: 0…65,535 (0 = do not send)

This parameter is only displayed as soon as a combination meter has been selected in the Parameter window *General,* page 16, parameter *Configuration*.

The change value to be entered here applies for the communication objects *Reactive power (total; Reactive power L1, L2, L3)**. If the preset change value is exceeded or undershot, the corresponding momentary reactive power value is sent on the bus.

The change value in meters with a transformer ratio always relates to the set parameter option (*Send as primary values* or *Send as secondary values*) of the parameter *Power and instrument values* in the Parameter window *General,* page 16.

* These communication objects are only displayed with the selection of a 3-wire network or 4-wire network in the Parameter window *General*, page 16, parameter *Network Type*.

Send apparent power in VA at +/- [0…65,535]

Options: 0…65,535 (0 = do not send)

This parameter is only displayed as soon as a combination meter has been selected in the Parameter window *General*, page 16, parameter *Configuration*.

The change value to be entered here applies for the communication objects *Apparent power (Total; Apparent power L1, L2, L3)**. If the preset change value is exceeded or undershot, the corresponding momentary apparent power value is sent on the bus.

The change value in meters with a transformer ratio always relates to the set parameter option (*Send as primary values* or *Send as secondary values*) of the parameter *Power and instrument values* in the Parameter window *General*, *page* .

* These communication objects are only displayed with the selection of a 3-wire network or 4-wire network in the Parameter window *General*, page 16, parameter *Network Type*.

Send phase angle power in degrees at +/- [0…90]

Options: 0…65,535 (0 = do not send)

This parameter is only displayed as soon as a combination meter has been selected in the Parameter window *General*, page 16, parameter *Configuration*.

The change value to be entered here applies for the communication objects *Phase angle power (Total; Phase angle power L1, L2, L3)**.

If the preset change value is exceeded or undershot, the corresponding momentary phase angle power value is sent on the bus.

* These communication objects are only displayed with the selection of a 3-wire network or 4-wire network in the Parameter window *General*, page 16, parameter *Network Type*.

Send power factor at +/- 0.01 * value [0…100]

Options: 0 …100

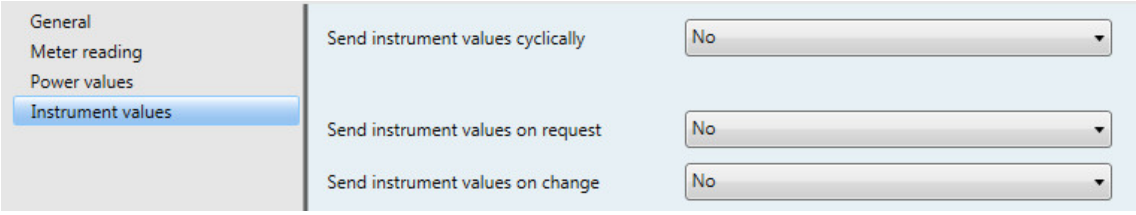
The change value to be entered here applies for the communication objects *Power factor (Total*; *Power factor L1, L2, L3)**. If the preset change value is exceeded or undershot, the corresponding momentary power factor value is sent on the bus.

* These communication objects are only displayed with the selection of a 3-wire network or 4-wire network in the Parameter window *General*, page 16, parameter *Network Type*.

3.2.4 Parameter window *Instrument values*

In this parameter window, the sending behavior of the *instrument values* is defined.

Note
The parameter window *Instrument values* appears only if a meter from the A series or DELTAplus is selected.



Depending on the selected configuration (*Active energy meter* or *Combination meter*) and parameterized voltage network, the following communication objects are available for the instrument values:

	A series B series		**DELTAplus**	
	Active energy meter	**Combination meter**	**Active energy meter**	**Combination meter**
Current (L1, L2, L3)	▪	▪	▪	▪
Current N*	-	▪	-	-
Voltage (L1-N, L2-N, L3-N)	▪	▪	▪	▪
Voltage L1-L2, L2-L3, L1-L3**	▪	▪	▪	▪
Frequency	▪	▪	▪	▪
Phase angle Current (L1, L2, L3)***	-	▪	-	▪
Phase angle Voltage (L1, L2, L3)****	-	▪	-	▪
Quadrant (total)***	-	▪	-	▪
Quadrant L1, L2, L3***	-	▪	-	▪

* The communication object *Current N* is displayed only if a combination meter of the A4x type is selected and is only supported by meters with the *Platinum* functionality.

** The communication objects *Voltage L1-L3* are displayed only if a meter of the A4x or B2x type for 3-wire or 4-wire networks is selected.

*** These communication objects are displayed only if a combination meter is selected.

Reading of the actual instrument values can be implemented via reading of the communication object values via *Value_Read*, e.g. with the assistance of the Engineering Tool Software ETS. The option of cyclically sending the instrument values, sending the instrument values on request or when a change occurs continues to apply.

Send instrument values cyclically

Options: No
Yes

- *Yes:* The parameter *Cycle time in s* is displayed.

Cycle time in s
[1…172,800]

Options: 1...900...172,800

Here, the time is set for cyclically sending all instrument values via the bus. The send interval is defined with the parameter *Cycle time in s*. Multiple meters that send with the same cycle time can send at staggered times using the sending delay time (if it is parameterized) in order to avoid possible communication problems.

Note
If the sending delay and cyclic sending of the instrument values are activated, the sending delay time only runs once directly after an ETS reset, after bus voltage recovery or tariff switching. After the sending delay time has timed out, the cyclic send process commences. With each additional send operation, only the cycle time is observed as the interface now sends with a time offset. Cyclical sending is interrupted as soon as communication to the energy meters cannot be established.

Conversion of the cycle time in seconds

900 s = 15 minutes
3,600 s = 1 hour
86,400 s = 1 day
172,800 s = 2 days

Send instrument values on request

Options: No
Yes

- *Yes:* The communication object *Request instrument values* is displayed. This communication object enables active reading of the momentary instrument values. After receiving a telegram with a request with the value 1, all the momentary values *(Current, Voltage, Frequency, Phase angle Current/Voltage, Quadrant)* are sent after a sending delay time (if parameterized) via the bus. The sending delay time prevents simultaneous sending of telegrams, if several meters respond to the same request for instrument values.

Send instrument values on change
Options: No
Yes

- *Yes:* The parameter values for entering the change values are displayed. If no change of the value occurs, the momentary instrument values are sent after the set cycle time (if parameterized) has timed out. After bus voltage recovery, programming and ETS reset, the instrument values whose change value is greater than or equal to ± 1 (0 = do not send) are sent after the sending delay time (if parameterized) has elapsed.

  **Send current in mA at +/-
  100 mA value [0…65,535]**
  Options: 0…65,535 (0 = do not send)

  The change value to be entered here relates to the communication objects *Current (Current L1, L2, L3, N)*. If the preset change value is exceeded or undershot with one of these communication objects, the momentary current value is sent. If the value 0 is entered, the current value is not sent.

  The change value is calculated on the basis of 100 mA and the value or factor to be entered, e.g.:

  change value = Basis x factor
  = 100 mA x 10
  = 1000 mA
  = 1 A

  The change value in meters with a transformer ratio always relates to the set parameter option (*Send as primary values* or *Send as secondary values*) of the parameter *Power and instrument values* in the Parameter window *General*, page 16.

**Send voltage in mV at +/-
10 mV value [0…65,535]**

Options: 0…65,535 (0 = do not send)

The change value to be entered here relates to the communication objects *Voltage (Voltage L1-N, L2-N, L3-N, L1-L2, L2-L3, L1-L3).* If the preset change value is exceeded or undershot with one of these communication objects, the momentary voltage values are sent on the bus. If the value 0 is entered, the voltage value is not sent.

The change value is calculated on the basis of 10 mV and the value or factor to be entered, e.g.:

change value = Basis x factor
= 10 mV x 1000
= 10000 mV
= 10 V

The change value in meters with a transformer ratio always relates to the set parameter option (*Send as primary values* or *Send as secondary values*) of the parameter *Power and instrument values* in the Parameter window *General*, page 16.

Note
When using transformers it is important to observe that practical values which are dependent on the transformer are used.

**Send frequency in Hz at +/-
0.1 Hz* value [0…100]**

Options: 0…100 (0 = do not send)

If the preset change value is exceeded or undershot, the corresponding actual frequency is sent on the bus. If the value 0 is entered, the voltage value is not sent, e.g.:

change value = Basis x factor
= 0.1 Hz x 10
= 1 Hz

Send phase angle current in degrees at +/- [0...90]

Options: 0…90 (0 = do not send)

These parameters are only displayed with the selection of the combination meter in the Parameter window *General,* page 16, parameter *Configuration*.

The change value to be entered here relates to the communication objects *Phase angle Current (Phase angle Current L1, L2, L3)* or *Phase angle Voltage (Phase angle Voltage L1, L2, L3)*. If the preset change value is exceeded or undershot with one of these communication objects, the momentary phase angle current or voltage values are sent on the bus.

Send Quadrant on change

Options: No
Yes

This parameter is only displayed with the selection of the combination meter in the Parameter window *General,* page 16, parameter *Configuration*.

- *Yes:* The communication objects *Quadrant (Quadrant total; Quadrant L1, L2, L3)* are displayed. If the communication object value changes with the communication object *Quadrant (Total* and/or *Quadrant L1, L2, L3),* the momentary quadrant is sent on the bus.

3.3 Communication objects

3.3.1 Overview of the communication objects

The following table provides an overview of the available and active communication objects of the application program, according to the connected meter.
Individual communication objects can be shown in the ETS but are not supported or sent by the connected meter.
Example: Objects nos. 6 and 7 are visible in the ETS. A connection meter of type A44 111-100 (*Steel* functionality) does not support these objects. They are inactive when this meter is used.

		Steel			Bronze			Silver			Gold			Platinum		
A series	Direct connection up to 80 A	A43		A41	A43		A41	A43		A41	A43		A41	A43		A41
	Transformer connection CTVT 6 A	A44		A42	A44		A42	A44		A42	A44		A42	A44		A42
B series	Direct connection up to 65 A	B23		B21	B23		B21	B23		B21	-		-	-		-
	Transformer connection CT 6 A	B24		-	B24		-	B24		-	-		-	-		-
	Number of Phases	3		1	3		1	3		1	3		1	3		1
	Network type / wire*	4	3	2	4	3	2	4	3	2	4	3	2	4	3	2

* programmable in 3-phase meters

Obj. No.	Object function															
0	Request status values	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1	In operation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2	Status byte	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3	Error report	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4	Meter type	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5	False meter type	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6	Send power failures				•	•	•	•	•	•	•	•	•	•	•	•
7	Reset power failures				•	•	•	•	•	•	•	•	•	•	•	•
8	Source of tariff switching							•	•	•	•	•	•	•	•	•
9	Not assigned															
10	Request meter reading	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
11	Total active energy	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
12	Active energy tariff 1							•	•	•	•	•	•	•	•	•
13	Active energy tariff 2							•	•	•	•	•	•	•	•	•
14	Active energy tariff 3							•	•	•	•	•	•	•	•	•
15	Active energy tariff 4							•	•	•	•	•	•	•	•	•
16	Total reactive energy				•	•	•	•	•	•	•	•	•	•	•	•
17	Reactive energy tariff 1							•	•	•	•	•	•	•	•	•
18	Reactive energy tariff 2							•	•	•	•	•	•	•	•	•
19	Reactive energy tariff 3							•	•	•	•	•	•	•	•	•
20	Reactive energy tariff 4							•	•	•	•	•	•	•	•	•

Obj. No.	Object function															
21	Active energy exported (total*)				•	•	•	•	•	•	•	•	•	•	•	•
22	Active energy exported trf. 1							•	•	•	•	•	•	•	•	•
23	Active energy exported trf. 2							•	•	•	•	•	•	•	•	•
24	Active energy exported trf. 3							•	•	•	•	•	•	•	•	•
25	Active energy exported trf. 4							•	•	•	•	•	•	•	•	•
26	Reactive energy exported (total*)				•	•	•	•	•	•	•	•	•	•	•	•
27	Reactive energy exported trf. 1							•	•	•	•	•	•	•	•	•
28	Reactive energy exported trf. 2							•	•	•	•	•	•	•	•	•
29	Reactive energy exported trf. 3							•	•	•	•	•	•	•	•	•
30	Reactive energy exported trf. 4							•	•	•	•	•	•	•	•	•
31	Send tariff							•	•	•	•	•	•	•	•	•
32	Tariff switching							•	•	•	•	•	•	•	•	•
33	Request power values	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
34	Active power total	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
35	Active power L1	•	•		•	•		•	•		•	•		•	•	
36	Active power L2	•			•			•			•			•		
37	Active power L3	•	•		•	•		•	•		•	•		•	•	
38	Reactive power total				•	•	•	•	•	•	•	•	•	•	•	•
39	Reactive power L1				•	•		•	•		•	•		•	•	
40	Reactive power L2				•			•			•			•		

Obj. No.	Object function															
41	Reactive power L3				•	•		•	•		•	•		•	•	
42	Apparent power total				•	•	•	•	•	•	•	•	•	•	•	•
43	Apparent power L1				•	•		•	•		•	•		•	•	
44	Apparent power L2				•			•			•			•		
45	Apparent power L3				•	•		•	•		•	•		•	•	
46	Phase angle power total				•	•	•	•	•	•	•	•	•	•	•	•
47	Phase angle power L1													•	•	
48	Phase angle power L2													•		
49	Phase angle power L3													•	•	
50	Power factor total	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
51	Power factor L1				•	•		•	•		•	•		•	•	
52	Power factor L2				•			•			•			•		
53	Power factor L3				•	•		•	•		•	•		•	•	
54	Request instrument values	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
55	Current L1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
56	Current L2	•			•			•			•			•		
57	Current L3	•	•		•	•		•	•		•	•		•	•	
58	Current N													•	•	•
59	Voltage L1-N	•		•	•		•	•		•	•		•	•		•
60	Voltage L2-N	•			•			•			•			•		

Obj. No.	Object function															
61	Voltage L3-N	•			•			•			•			•		
62	Voltage L1-L2	•	•		•	•		•	•		•	•		•	•	
63	Voltage L2-L3	•	•		•	•		•	•		•	•		•	•	
64	Voltage L1-L3	•			•			•			•			•		
65	Frequency	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
66	Phase angle current L1													•	•	•
67	Phase angle current L2													•		
68	Phase angle current L3													•	•	
69	Phase angle voltage L1													•	•	•
70	Phase angle voltage L2													•		
71	Phase angle voltage L3													•	•	
72	Quadrant total				•	•	•	•	•	•	•	•	•	•	•	•
73	Quadrant L1				•	•		•	•		•	•		•	•	
74	Quadrant L2				•			•			•			•		
75	Quadrant L3				•	•		•	•		•	•		•	•	
76	Transformer ratio voltage**	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
77	Transformer ratio current	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
78	Total transformer ratio**	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

** Only available for A series meters

3.3.2 Communication objects *General*

No.	Function	Object name	Data type	Flags
0	**Request status values**	**General**	**EIS 1, 1-bit** **DPT 1.017**	**C, W, T**
If a telegram with the value 1 is received on this communication object, all status objects are sent on the bus. Thus the momentary state of the Meter Interface Module and energy meters can be checked. The following communication objects are sent on request: No. 2 Status byte No. 3 Error signal No. 4 Meter type No. 5 False meter type No. 6 Send power failures (does not apply to meters from the A series and B series with the functionality *Steel*)				
1	**In operation**	**General**	**EIS 1, 1-bit** **DPT 1.001**	**C, R, T**
This communication object is activated by the parameter *Send object "In operation"*. The Meter Interface Module cyclically sends a telegram with the value 1 or 0 on this communication object. This telegram can be used by other devices for function monitoring. If, for example, the telegram with the value 1 is sent to an actuator with the function Staircase lighting, the failure of the Meter Interface Module can be signaled by the absence of the telegram.				
2	**Status byte**	**General**	**Non EIS, 8-bit**	**C, R, T**
With this communication object, different types of status information of the meter can be sent on the bus. Each individual bit of the telegram corresponds to a defined state or error of the meter. If an error or state is detected, the corresponding bit is set to 1 and the status byte is sent after approx. six seconds. In addition, the communication object *Error signal* is sent in order to indicate that an error has occurred. If the errors have been corrected and the status byte once again has the value 0, the communication object *Error signal* also sends a telegram with the value 0. Thus the correction of the error can be indicated. In order to obtain the actual value of the status byte, the communication object value can be read via *Value_Read*, e.g. with the assistance of the Engineering Tool Software ETS. The communication object is also sent after bus voltage recovery, programming and ETS reset. The Status byte code table page 69, enables quick decoding of the telegram code for the corresponding error type. Telegram code (1-byte): 76543210 7: End value of meter reading, active energy reached (only with 4-byte value) 6: End value of meter reading, reactive energy reached (only with 4-byte value) 5: Internal or hardware error in meter 4: IR communication error with meter 3: Current I1, I2 and/or I3 outside of the specification limit* 2: Power is negative (total power or one of three phases) 1: No voltage or undervoltage / overvoltage on phase 1, 2 or 3 0: Installation fault: L and N interchanged Time + date not set* * only with meter type DELTAsingle in operation Telegram value: 0 = Not activated 1 = Activated				

No.	Function	Object name	Data type	Flags
3	**Error report**	**General**	**EIS 1, 1-bit** **DPT 1.005**	**C, R, T**
An error signal in the form of a common error signal is sent on the bus on this communication object. An error message can have many causes and can be decoded with the assistance of the status byte or by reading out the meter DELTAplus error codes, page 70. The communication object is sent as soon as a bit of the communication object *Status byte* is set to 1. If the errors have been corrected and the status byte has the value 0, the communication object *Error report* also sends a telegram with the value 0. Thus the correction of the error can be indicated. The communication object is also sent after bus voltage recovery, programming and ETS reset. Telegram value: 0 = No error 1 = Error				
4	**Meter type**	**General**	**Non EIS, 8-bit**	**C, R, T**
With this communication object, it is possible to read the meter type connected to the Meter Interface Module: Telegram value: 0 = DELTAplus 1 = DELTAsingle 2 = ODIN 3 = ODINsingle 4 = A series, B series Other = Reserved 254 = Unknown meter 255 = No meter connected In order to obtain the actual value/connected meter, the communication object value can be read via *Value_Read*, e.g. with the assistance of the Engineering Tool Software ETS. Furthermore, the communication object is also sent with a change, after bus voltage recovery, programming and ETS reset.				
5	**False meter type**	**General**	**EIS 1, 1-bit** **DPT 1.005**	**C, R, T**
The Meter Interface Module cyclically scans the connected meters. If the meter parameterized in the ETS does not correspond with the connected meter, this communication object is sent. Telegram value: 0 = Parameterization OK 1= False meter type parameterized				

No.	Function	Object name	Data type	Flags
6	**Send power failures**	**General**	**EIS 14, 1-byte DPT 5.010**	**C, R, T**

The interface sends the momentary number of power failures on this communication object. A power failure is detected as soon as the voltage on all phases drops below 57.7 V -20 %. The number of power failures is sent with a change and on bus voltage recovery.

Note
With counters from the A series and B series with the functionality *Steel*, no power failures can be sent. The object is inactive.

7	**Reset power failures**	**General**	**EIS 1, 1-bit DPT 1.017**	**C, W, T**

If a telegram is received on this communication object, the meter count of power failures is deleted. This can take up to ten seconds. If the erasing process fails, communication object No. 6 is sent again. If the deletion procedure is successful, object No. 6 is also sent.

Telegram value: 0 = No function
1 = Reset power fail counter

Note
With counters from the A series and B series with the functionality *Steel*, no power failures can be deleted.

8	**Source of tariff switching**	**General**	**EIS 1, 1-bit DPT 1.001**	**C, W**

This function is available only for energy meters of the types DELTAplus and A4x/B2x, which do not feature separate inputs for tariff switching and which have an internal clock for tariff switching.

With this communication object, the source that is used to switch the tariff in the meter is selected. This communication object is displayed only as soon as a meter with tariffs has been selected in the Parameter window *General*, page 16, parameter *Tariffs*.

Telegram value: 0 = Tariff switching via internal clock in the meter
1 = Tariff switching via KNX

3.3.3 Communication objects *Meter Reading*

No.	Function	Object name	Data type	Flags
10	**Request meter reading**	**Meter reading**	**EIS 1, 1 bit DPT 1.017**	**C, W, T**
The momentary meter readings are requested via the telegram with the value 1 on this communication object. The request applies for the communication objects No. 11-30. The momentary meter readings – depending on the meters used – are sent to the bus after the sending delay time (if parameterized). Telegram value: 0 = No function 1 = Request meter reading				
11 **12** **13** **14** **15**	**Total active energy*** **Active energy tariff 1** **Active energy tariff 2** **Active energy tariff 3** **Active energy tariff 4**	**Meter reading** **Meter reading** **Meter reading** **Meter reading** **Meter reading**	**EIS 11, 4 byte** **DPT 13.010** **or** **Non EIS, 8 byte** **DPT 29.010**	**C, R, T**
The momentary meter readings for active energy are sent on these communication objects. If a meter with 2** or 4 tariffs is selected in the Parameter window *General*, page 16, communication objects No. 11-13 or 11 -15 are displayed. If a tariff meter has been parameterized, communication object No. 11 sends the meter reading of the sum of all tariffs of the consumed active energy, whereas communication objects No. 12-15 send the consumed active energy of the respective tariffs. Only the tariff that is currently active and the total of the tariffs are sent. The communication object is also sent after bus voltage recovery, programming and ETS reset. With the 4 byte communication object, meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh can be sent. If values received from the connected meter are greater than the max. value, the end value of 2,147,483,647 Wh and the status bit No. 7 (end value of meter reading, active energy reached) are always sent. If a transformer rated meter is used, the meter reading values of the active energy are sent as the primary values. For this purpose, an 8-byte communication object is displayed. It is necessary to ensure that the receiving device or software is capable of processing 8-byte values. * The communication object *Total active energy* is only displayed if a tariff meter has been selected and indicates the sum of the meter readings of tariff 1 + 2 or tariff 1 + 2 + 3 + 4. ** 2 tariffs available only for meters of the configuration DELTAplus.				

No.	Function	Object name	Data type	Flags
16 **17** **18** **19** **20**	**Total reactive energy*** **Reactive energy tariff 1** **Reactive energy tariff 2** **Reactive energy tariff 3** **Reactive energy tariff 4**	**Meter reading** **Meter reading** **Meter reading** **Meter reading** **Meter reading**	**EIS 11, 4 byte** **DPT 13.012 or** **Non EIS, 8 byte** **DPT 29.012**	**C, R, T**

The momentary meter readings for reactive energy are sent on these communication objects. These communication objects are displayed only if a combination meter of the A4x/B2x type or DELTAplus has been selected in the Parameter window *General*, page 16.

If a meter with 2** or 4 tariffs is selected in the Parameter window *General*, page 16, communication objects No. 16-18 or 16 -20 are displayed. If a tariff meter has been parameterized, communication object No. 16 sends the meter reading of the sum of all tariffs of the consumed reactive energy, whereas communication objects No. 17-20 send reactive energy of the respective tariffs.

Only the tariff that is currently active and the total of the tariffs are sent. The communication object is also sent after bus voltage recovery, programming and ETS reset.

With the 4 byte communication object meter readings up to a max. of 2,147,483,647 varh (2.147 Gvarh) and a resolution of 1 varh can be sent. If values received from the connected meter are greater than the max. value, the end value of 2,147,483,647 varh and the status bit No. 6 (end value of meter reading, reactive energy reached) is always sent.

If a transformer rated meter is used, the meter reading values of the reactive energy are sent as the primary values. For this purpose, an 8-byte communication object is displayed. It is necessary to ensure that the receiving device or software is capable of processing 8-byte values.

* The communication object *Total reactive energy* is only displayed if a tariff meter has been selected and indicates the sum of the meter readings of tariff 1 + 2 or tariff 1 + 2 + 3 + 4.

** 2 tariffs available only for meters of the configuration DELTAplus.

21 **22** **23** **24** **25**	**Active energy exported (total*)** **Active energy exported trf. 1** **Active energy exported trf. 2** **Active energy exported trf. 3** **Active energy exported trf. 4**	**Meter reading** **Meter reading** **Meter reading** **Meter reading** **Meter reading**	**EIS 11, 4 byte** **DPT 13.010** **or** **Non EIS, 8 byte** **DPT 29.010**	**C, R, T**

These communication objects are available only for meters of the A4x/B2x type and send the momentary meter readings of the active energy exported.

Communication object No. 21 is enabled if, in the Parameter window *General*, page 16, under parameter *Register for exported energy*, the option *Yes* was selected. If the option *4 tariffs* is additionally selected under the parameter *Tariffs*, communication options 22-25 are enabled. If a tariff meter has been parameterized, communication object No. 21 sends the meter reading of the sum of all tariffs of the exported active energy, whereas communication objects No. 22-25 send the exported active energy of the respective tariffs.

Only the tariff that is currently active and the total of the tariffs are sent. The communication object is also sent after bus voltage recovery, programming and ETS reset.

With the 4 byte communication object, meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh can be sent. If values received from the connected meter are greater than the max. value, the end value of 2,147,483,647 Wh and the status bit No. 7 (end value of meter reading, active energy reached) are always sent.

If a transformer rated meter is used, the meter reading values of the active energy are sent as the primary values. For this purpose, an 8-byte communication object is displayed. It is necessary to ensure that the receiving device or software is capable of processing 8-byte values.

* The communication object *Total active energy exported* is only displayed if a tariff meter has been selected and indicates the sum of the meter readings of tariffs 1 + 2 + 3 + 4.

No.	Function	Object name	Data type	Flags
26 **27** **28** **29** **30**	**Reactive energy exported (total*)** **Reactive energy exported trf. 1** **Reactive energy exported trf. 2** **Reactive energy exported trf. 3** **Reactive energy exported trf. 4**	**Meter reading** **Meter reading** **Meter reading** **Meter reading** **Meter reading**	**EIS 11, 4-byte** **DPT 13.012** **or** **Non EIS, 8 byte** **DPT 29.012**	**C, R, T**

These communication objects are available only if a combination meter of the A4x/B2x type is selected, and they send the momentary meter readings of the reactive energy exported.

Communication object No. 27 is enabled if, in the Parameter window *General*, page 16, under parameter *Register for exported energy*, the option *Yes* was selected. If the option *4 tariffs* is additionally selected under the parameter *Tariffs*, communication options 27-30 are enabled. If a tariff meter has been parameterized, communication object No. 26 sends the meter reading of the sum of all tariffs of the exported reactive energy, whereas communication objects No. 27-30 send the exported reactive energy of the respective tariffs.

Only the tariff that is currently active and the total of the tariffs are sent. The communication object is also sent after bus voltage recovery, programming and ETS reset.

With the 4 byte communication object, meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh can be sent. If values received from the connected meter are greater than the max. value, the end value of 2,147,483,647 Wh and the status bit No. 7 (end value of meter reading, reactive energy reached) is always sent.

If a transformer rated meter is used, the meter reading values of the reactive energy are sent as the primary values. For this purpose, an 8-byte communication object is displayed. It is necessary to ensure that the receiving device or software is capable of processing 8-byte values.

* The communication object *Total reactive energy exported* is only displayed if a tariff meter has been selected and indicates the sum of the meter readings of tariffs 1 + 2 + 3 + 4.

31	**Send tariff**	**Tariff**	**Non EIS, 8-bit**	**C, R, T**

On these communication objects, the tariff momentarily in use is sent, provided that a tariff meter with 2** or 4 tariffs has been selected in the Parameter window *General*, page 16. If the tariff is changed on the meter or via KNX, a new tariff is sent. The communication object is also sent after bus voltage recovery, programming and ETS reset.

Telegram value:
0 = No tariff available
1 = Tariff 1
2 = Tariff 2
3 = Tariff 3
4 = Tariff 4
Other values = no function

** 2 tariffs available only for meters of the configuration DELTAplus.

32	**Tariff switching**	**Tariff**	**Non EIS, 8-bit**	**C, W, T**

This communication object is only displayed as soon as a tariff meter has been selected in the Parameter window *General*, page 16.

This communication object allows switching between 4 different tariffs. Switching to the required tariff is performed if a valid communication object value is received. If an invalid communication object value is received, the momentarily active tariff is sent. After the sending delay (if parameterized) the momentary data of the old tariff and the new tariff and sum of all tariffs up to the time of the tariff switch are sent on the bus. If the tariff could not be switched, the momentarily active tariff is sent again.

Tariff switching via KNX only functions with DELTAplus or A4x/B2x type energy meters which have no separate tariff inputs for tariff switching.

Telegram value:
0 = No function
1 = Switch to tariff 1
2 = Switch to tariff 2
3 = Switch to tariff 3
4 = Switch to tariff 4
Other values = No function

3.3.4 Communication objects *Power values*

The communication objects for the power values are available only for the meter types A4x and DELTAplus [depending on the configuration (active energy meter or combination meter) and voltage network].

No.	Function	Object name	Data type	Flags
33	**Request power values**	**Power values**	**EIS 1, 1-bit** **DPT 1.017**	**C, W, T**
The momentary power values are requested via the telegram with the value 1 on this communication object. The request applies for communication objects No. 34-53 (if they are functional). The momentarily applicable values are sent on the bus after the sending delay time (if parameterized). Telegram value: 0 = No function 1 = Request power values				
34 **35** **36** **37**	**Active power total** **Active power L1** **Active power L2** **Active power L3**	**Power value**	**EIS 9, 4 byte** **DPT 14.056**	**C, R, T**
The momentary active power values of phases L1…L3 as well as the total active power are sent on these communication objects. The communication objects for the active powers L1…L3 are displayed according to the parameterized voltage network (2-, 3- or 4-wire voltage network). The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Power values*, page 25.				
38 **39** **40** **41**	**Reactive power total** **Reactive power L1** **Reactive power L2** **Reactive power L3**	**Power value**	**EIS 9, 4 byte** **DPT 14.056**	**C, R, T**
The momentary reactive power values of phases L1…L3, as well as the total reactive power are sent on these communication objects. They are only displayed when a combination meter has been selected and/or are dependent on the parameterized voltage network (2-, 3- or 4-wire voltage network). The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Power values*, page 25.				
42 **43** **44** **45**	**Apparent power total** **Apparent power L1** **Apparent power L2** **Apparent power L3**	**Power value**	**EIS 9, 4 byte** **DPT 14.056**	**C, R, T**
The momentary apparent power values of phases L1…L3, as well as the total apparent power are sent on these communication objects. They are only displayed when a combination meter has been selected and/or are dependent on the parameterized voltage network (2-, 3- or 4-wire voltage network). The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Power values*, page 25.				

No.	Function	Object name	Data type	Flags
46 **47** **48** **49**	**Phase angle power total** **Phase angle ower L1** **Phase angle power L2** **Phase angle power L3**	**Power value**	**EIS 9, 4-byte** **DPT 14.055**	**C, R, T**
The phase angles of the power values L1…L3 as well as the total phase angle in degrees [°] are sent on these communication objects. They are only displayed when a combination meter has been selected and/or are dependent on the parameterized voltage network (2-, 3- or 4-wire voltage network). The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Power values*, page 25.				
50 **51** **52** **53**	**Power factor total** **Power factor L1** **Power factor L2** **Power factor L3**	**Power value**	**EIS 9, 4-byte** **DPT 14.057**	**C, R, T**
The momentary power factors (cos phi) L1…L3, as well as the total power factor are sent on these communication objects. They are only displayed when a combination meter has been selected and/or are dependent on the parameterized voltage network (2-, 3- or 4-wire voltage network). The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Power values*, page 25.				

3.3.5 Communication objects *Instrument values*

The communication objects for the instrument values are available only for the meter types A4x and DELTAplus [depending on the configuration (active energy meter or combination meter) and voltage network].

No.	Function	Object name	Data type	Flags
54	**Request instrument values**	**Instrument value**	**EIS 1, 1-bit** **DPT 1.017**	**C, W, T**
The momentary instrument values are requested via the telegram with the value 1 on this communication object (current, voltage, frequency, phase angle current and voltage, quadrant). The request applies for communication objects No. 55-74 (if they are functional). The momentarily applicable values are sent on the bus after the sending delay time (if parameterized). Telegram value: 0 = No function 1 = Request instrument values				
55 **56** **57** **58**	**Current (L1)** **Current L2** **Current L3** **Current N**	**Instrument value**	**EIS 9, 4-byte** **DPT 14.019**	**C, R, T**
The currents of phases L1…L3 are sent on these communication objects. The communication objects of currents L1…L3 are displayed with the selection of a 3- or 4-wire voltage network. Communication object No. 58 is only supported for combination meters of the A4x type with the *Platinum* functionality. The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Instrument values*, page 30.				
59 **60** **61** **62** **63** **64**	**Voltage (L1-N)** **Voltage L2-N** **Voltage L3-N** **Voltage L1-L2** **Voltage L2-L3** **Voltage L1-L3**	**Instrument value**	**EIS 9, 4-byte** **DPT 14.027**	**C, R, T**
On these communication objects the voltages of the individual phases relative to zero and to one another are sent. According to the meter type A4x, B2x or DELTAplus used and the parameterized voltage network (2-, 3-, or 4-wire network), the communication objects for the voltages are displayed. The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Instrument values*, page 30.				
65	**Frequency**	**Instrument value**	**EIS 9, 4-byte** **DPT 14.033**	**C, R, T**
The momentary frequency of the voltage network is sent on this communication object. The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Instrument values* page 30.				

No.	Function	Object name	Data type	Flags
66 **67** **68**	**Phase angle current (L1)** **Phase angle current L2** **Phase angle current L3**	**Instrument value**	**EIS 9, 4-byte** **DPT 14.055**	**C, R, T**
The phase angles of currents L1…L3 are sent on these communication objects. They are only displayed when a combination meter has been selected and/or are dependent on the parameterized voltage network (2-, 3- or 4-wire voltage network). Communication objects No. 66-68 are only supported for combination meters of the A4x type with the *Platinum* functionality. The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Instrument values*, page 30.				
69 **70** **71**	**Phase angle voltage (L1)** **Phase angle voltage L2** **Phase angle voltage L3**	**Instrument value**	**EIS 9, 4-byte** **DPT 14.055**	**C, R, T**
The phase angles of voltages L1…L3 are sent on these communication objects. They are only displayed when a combination meter has been selected and/or are dependent on the parameterized voltage network (2-, 3- or 4-wire voltage network). Communication objects Nos. 69-71 are only supported for combination meters of the A4x type with the *Platinum* functionality. The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Instrument values*, page 30.				
72 **73** **74** **75**	**Quadrant (total)** **Quadrant L1** **Quadrant L2** **Quadrant L3**	**Instrument value**	**Non EIS,** **8-byte**	**C, R, T**
The quadrant in which the meter measures is sent in these communication objects. These communication objects are only displayed when a combination meter has been selected and/or are dependent on the parameterized voltage network (2-, 3- or 4-wire voltage network). The send behavior (cyclically, on request, send on change) of these communication objects can be set in Parameter window *Instrument values*, page 30. Telegram value: 0 = No quadrant available 1 = Quadrant 1 2 = Quadrant 2 3 = Quadrant 3 4 = Quadrant 4 Other values = No function				

3.3.6 Communication objects *Transformer ratios*

No.	Function	Object name	Data type	Flags
76 **76**	**Transformer ratio voltage** **Transformer ratio voltage***	**Current transformers** **Current transformers**	**EIS 10, 2-byte DPT 7.001** **EIS 11, 4-byte DPT 12.001**	**C, R, T**
77	**Transformer ratio current**	**Current transformers**	**EIS 10, 2-byte DPT 7.001**	**C, R, T**
78	**Total transformer ratio***	**Current transformers**	**EIS 11, 4-byte DPT 12.001**	**C, R, T**

On these communication objects the interface sends the set voltage or current transformer ratios on the meter. These communication objects are only displayed if a transformer rated energy meter has been selected beforehand in the Parameter window *General*, page 16. The transformer ratios are sent after bus voltage recovery, after an ETS reset, after programming and with a change. The *Total transformer ratio* is calculated from the product of the *current* and *voltage transformer ratios*:

GT = CT* VT

GT = Total transformer ratio

CT = Transformer ratio current

VT = Transformer ratio voltage

* The communication object *Transformer ratio voltage* (4 byte) and *Total transformer ratio* is available only for transformer rated meters of the A4x type.

3.3.7 Communication objects *Intermediate meter*

The communication objects for a resettable energy register are available only for the meter of the type ODINsingle (OD1365). The communication objects are displayed as soon as the parameter *Intermediate meter* has been confirmed with *Yes*.

No.	Function	Object name	Data type	Flags
12	**Meter reading**	**Intermediate meter**	**EIS 10, 2-byte DPT 7.001**	**C, R, T**

Note

This communication object is only available with the meter configuration ODINsingle type OD1365.

This communication object displays the intermediate meter reading (similar to a trip meter in a car) of the active energy. The value of the communication object is also sent after bus voltage recovery, programming and an ETS reset. With the 4-byte communication object, meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh can be sent. If values received from the connected meter are greater than the max. value, the end value of 2,147,483,647 Wh and the status bit No. 7 (end value of meter reading, active energy reached) are always sent.

79	**Reset intermediate meter**	**Intermediate meter**	**EIS 10, 2-byte DPT 7.001**	**C, R, T**

Note

This communication object is only available with the meter configuration ODINsingle type OD1365.

If a telegram with the value 1 is received on this communication object, the intermediate meter value (communication object No. 12) is reset to 0 kWh. This can take up to ten seconds. If the reset operation fails, communication objects No. 11, 12 and 80 are sent again. If the deletion procedure is successful, object No. 12 is also sent.

Telegram value: 0 = No function
1 = Reset intermediate meter value

80	**Number of resets**	**Intermediate meter**	**EIS 11, 4-byte DPT 12.001**	**C, R, T**

Note

This communication object is only available with the meter configuration ODINsingle type OD1365.

The number of intermediate meter resets can be sent with this communication object via the Meter Interface Module. The number of resets is sent if the intermediate meter is reset via the bus or on the meter itself using the Reset button and on bus voltage recovery.

4 Planning and application

The ABB EQ energy meters (A series and B series) are designed as intermediate meters and offer a wide range of functions for countless applications. The meters are available in various variants: Meters for single or three-phase measurement as well as meters for direct connection or transformer rated.

For simple selection of the right meter, various "metal colors" corresponding to the properties and functions are assigned to the EQ energy meters.

The B series meters are available with the functions Steel, Bronze and Silver.

The A series meters are available with the functions Steel, Bronze, Silver, Gold and Platinum.

Refer to the selection aid in Chapter 4.1 for the functions of the appropriate metal color.

Note
Time-dependent functions (value/event memories, min./max. values, load profiles, harmonics measurement), pulse inputs/outputs and resettable energy registers cannot be read or controlled via Meter Interface Module ZS/S 1.1.

4.1 Selection guide

	Single-phase energy meter			Three-phase energy meter			
Type	**B21**	**A41**	**A42**	**B23**	**B24**	**A43**	**A44**
Connection type	Direct	Direct	Current transformers	Direct	Current transformers	Direct	Current transformers
Maximum current I_{max}	65 A	80 A	6 A	65 A	6 A	80 A	6 A
Connections/measuring elements (configurable *)							
2-wire connection/1 measuring element	■■■	■■■■■	■■■■■				
3-wire connection/2 measuring elements*				■■■	■■■	■■■■■	■■■■■
4-wire connection/3 measuring elements*				■■■	■■■	■■■■■	■■■■■
Accuracy classes							
B (Class 1)	■■■	■■■■■	■■■■■	■■■	■■■	■■■■■	■■
C (Class 0.5 S)			■		■		■■■
Energy values/meter readings							
Active energy	■■■	■■■■■	■■■■■	■■■	■■■	■■■■■	■■■■■
Reactive energy	■■	■■■■■	■■■■■	■■	■■	■■■■■	■■■■■
Apparent energy	■■	■■■■■	■■■■■	■■	■■	■■■■■	■■■■■
4-quadrant measurement	■■	■■■■■	■■■■■	■■	■■	■■■■■	■■■■■
Resettable intermediate meter	■	■■■	■■■	■	■	■■■	■■■
Tariff registers, 1-4	■	■■■	■■■	■	■	■■■	■■■
Diagnostics and alarms							
Measured values (e.g. W, V, A, Hz, Pf)	■■■			■■■	■■■	■■■■■	■■■■■
Alarm function	■■■			■■■	■■■	■■■■■	■■■■■
Harmonics analysis		■	■			■	■
Time dependent functions							
Value memory (day, week, month)		■■	■■			■■	■■
Requirement values (min./max.)		■■	■■			■■	■■
Load profiles (8 channels)		■	■			■	■
Inputs/Outputs							
Pulse output	■■	■■	■■	■■	■■	■■	■■
2 inputs/2 outputs	■	■■	■■	■	■	■■	■■
4 freely-configurable inputs and outputs		■	■			■	■
Tariff control							
via inputs	■			■	■		
via communication	■			■	■		
via internal clock		■■	■■			■■	■■
Conformity							
MID (Module B + D)	■■■	■■■■■	■■■■■	■■■	■■■	■■■■■	■■■■■
IEC	■■■	■■■■■	■■■■■	■■■	■■■	■■■■■	■■■■■
Communication/Interfaces							
Infrared	■■■	■■■■■	■■■■■	■■■	■■■	■■■■■	■■■■■
M-Bus	optional	optional	optional	optional	optional	optional	optional
RS-485 (Modbus or EQ-Bus, configurable)	optional	optional	optional	optional	optional	optional	optional

■ Steel ■ Bronze ■ Silver ■ Gold ■ Platinum

4.2 Energy meters A series

4.2.1 Type key

Example	**A**	**4**	**3**		**1**	**1**	**2**	**-**	**1**	**0**	**0**
A series (7 space units and 4 space units)	A										
Hardware/electronics - advanced		4									
Single phase direct meter to 80 A			1								
Single phase transformer connected			2								
Three phase direct meter to 80 A			3								
Three phase transformer connected			4								
Functionality - Steel					1						
Functionality - Bronze					2						
Functionality - Silver					3						
Functionality - Gold					4						
Functionality - Platinum					5						
Accuracy class 1						1					
Accuracy class 2						2					
Accuracy class 0.5						5					
Integrated interface - none							0				
Integrated interface - infrared (IR)							1				
Integrated interface - RS-485							2				
Integrated interface - M-bus							3				
IEC approved + MID approved and verified									1		
Standard version										0	
Standard version											0

4.2.2 A41 measurement transformer meters, single phase (1 + N)

Direct connection up to 80 A. With measured values and alarm function.
Communication: Infrared interface.
Optional interfaces: M-Bus, RS-485 (Modbus or EQ-Bus settable).
Width: 4 DIN modules. Verified and approved according to MID and IEC.

Voltage V	Accuracy class	Inputs/outputs	Communication	Type	Order code
Steel ■					
Active energy measurement					
57.7...288 V AC	B (Cl.1)	Pulse output	-	A41 111 - 100	2CMA170554R1000
			RS-485	A41 112 - 100	2CMA170500R1000
			M-Bus	A41 113 - 100	2CMA100240R1000
Bronze ■					
4-quadrant measurement					
57.7...288 V AC	B (Cl.1) reactive energy Cl. 2	Pulse output	RS-485	A41 212 - 100	2CMA170501R1000
Silver ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs and communication.					
57.7...288 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	-	A41 311 - 100	2CMA170502R1000
			RS-485	A41 312 - 100	2CMA170503R1000
			M-Bus	A41 313 - 100	2CMA170504R1000
Gold ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.).					
57.7...288 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	RS-485	A41 412 - 100	2CMA170505R1000
			M-Bus	A41 413 - 100	2CMA170506R1000
Platinum ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.). Advanced load profiles and harmonics measurement.					
57.7...288 V AC	B (Cl.1) reactive energy Cl. 2	4 configurable inputs and outputs	RS-485	A41 512 - 100	2CMA100237R1000
			M-Bus	A41 513 - 100	2CMA170508R1000

4.2.3 A42 measurement transformer meters, single phase (1 + N)

Transformer rated CTVT 1(6) A. With measured values and alarm function.
Communication: Infrared interface.
Optional interfaces: M-Bus, RS-485 (Modbus or EQ-Bus settable).
Width: 4 DIN modules. Verified and approved according to MID and IEC.

Voltage V	Accuracy class	Inputs/outputs	Communication	Type	Order code
Steel ■					
Active energy measurement					
57.7...288 V AC	B (Cl.1)	Pulse output	-	A42 111 - 100	2CMA170555R1000
			RS-485	A42 112 - 100	2CMA170510R1000
			M-Bus	A42 113 - 100	2CMA100242R1000
Bronze ■					
4-quadrant measurement					
57.7...288 V AC	B (Cl.1) reactive energy Cl. 2	Pulse output	RS-485	A42 212 - 100	2CMA170511R1000
Silver ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs and communication.					
57.7...288 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	RS-485	A42 312 - 100	2CMA170512R1000
Gold ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.).					
57.7...288 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	RS-485	A42 412 - 100	2CMA170513R1000
			M-Bus	A42 413 - 100	2CMA170514R1000
Platinum ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.). Advanced load profiles and harmonics measurement.					
57.7...288 V AC	C (Cl.0.5 S) reactive energy Cl. 2	4 configurable inputs and outputs	RS-485	A42 552 - 100	2CMA100238R1000
			M-Bus	A42 553 - 100	2CMA170516R1000

4.2.4 A43 Three-phase current meters (3 + N)

Direct connection up to 80 A. With measured values and alarm function.
For 3 and 4-wire connection. Communication: Infrared interface.
Optional interfaces: M-Bus, RS-485 (Modbus or EQ-Bus settable).
Width: 7 DIN modules. Verified and approved according to MID and IEC.

Voltage V	Accuracy class	Inputs/outputs	Communication	Type	Order code
Steel ■					
Active energy measurement					
3 x 57.7/100... 288/500 V AC	B (Cl.1)	Pulse output	-	A42 111 - 100	2CMA170520R1000
			RS-485	A43 112 - 100	2CMA170244R1000
			M-Bus	A43 113 - 100	2CMA100245R1000
	A (cl. 2)		-	A43 121 - 100	2CMA100521R1000
Bronze ■					
4-quadrant measurement					
3 x 57.7/100... 288/500 V AC	B (Cl.1) reactive energy Cl. 2	Pulse output	-	A43 211 - 100	2CMA170012R1000
			RS-485	A43 212 - 100	2CMA170522R1000
			M-Bus	A43 213- 100	2CMA170523R1000
Silver ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs and communication.					
3 x 57.7/100... 288/500 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	-	A43 311 - 100	2CMA170524R1000
			RS-485	A43 312 - 100	2CMA170525R1000
			M-Bus	A43 313 - 100	2CMA170526R1000
Gold ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.).					
3 x 57.7/100... 288/500 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	RS-485	A43 412 - 100	2CMA170528R1000
			M-Bus	A43 413 - 100	2CMA170529R1000
Platinum ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.). Advanced load profiles and harmonics measurement.					
3 x 57.7/100... 288/500 V AC	B (Cl.1) reactive energy Cl. 2	4 configurable inputs and outputs	-	A43 511 - 100	2CMA170143R1000
			RS-485	A43 512 - 100	2CMA170531R1000
			M-Bus	A43 513 - 100	2CMA170532R1000

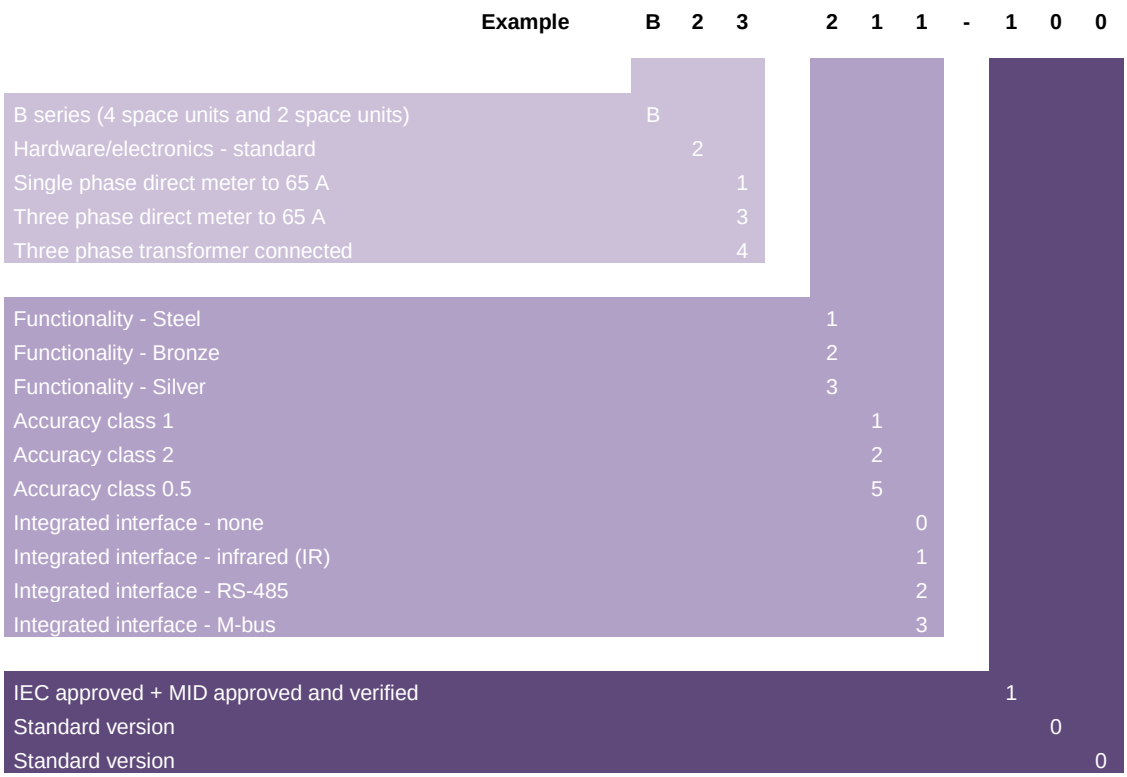
4.2.5 A44 Measurement transformer meters, three phase (3 + N)

Transformer rated CTVT 1(6) A. With measured values and alarm function.
For 3 and 4-wire connection. Communication: Infrared interface.
Optional interfaces: M-Bus, RS-485 (Modbus or EQ-Bus settable).
Width: 7 DIN modules. Verified and approved according to MID and IEC.

Voltage V	Accuracy class	Inputs/outputs	Communication	Type	Order code
Steel ■					
Active energy measurement					
3 x 57.7/100... 288/500 V AC	B (Cl.1)	Pulse output	-	A44 111 - 100	2CMA170533R1000
			RS-485	A44 112 - 100	2CMA170248R1000
			M-Bus	A44 113 - 100	2CMA100249R1000
Bronze ■					
4-quadrant measurement					
3 x 57.7/100... 288/500 V AC	B (Cl.1) reactive energy Cl. 2	Pulse output	-	A44 211 - 100	2CMA170013R1000
			RS-485	A44 212 - 100	2CMA170534R1000
			M-Bus	A44 213- 100	2CMA170535R1000
Silver ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs and communication.					
3 x 57.7/100... 288/500 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	-	A44 311 - 100	2CMA170536R1000
	C (Cl.0.5 S) reactive energy Cl. 2		RS-485	A44 352 - 100	2CMA170537R1000
			M-Bus	A44 353 - 100	2CMA170538R1000
Gold ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.).					
3 x 57.7/100... 288/500 V AC	C (Cl.0.5 S) reactive energy Cl. 2	2 outputs, 2 inputs	RS-485	A44 452 - 100	2CMA170540R1000
			M-Bus	A44 453 - 100	2CMA170541R1000
Platinum ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs, communication or integrated clock. Value memory. Requirement values (min./max.). Advanced load profiles and harmonics measurement.					
3 x 57.7/100... 288/500 V AC	C (Cl.0.5 S) reactive energy Cl. 2	4 configurable inputs and outputs	RS-485	A44 552 - 100	2CMA170545R1000
			M-Bus	A44 553 - 100	2CMA170546R1000

4.3 Energy meters B series

4.3.1 Type key



4.3.2 B21 measurement transformer meters, single phase (1 + N)

Direct connection up to 65 A. With measured values and alarm function.
Communication: Infrared interface.
Optional interfaces: M-Bus, RS-485 (Modbus or EQ-Bus settable).
Width: 2 DIN modules. Verified and approved according to MID and IEC.

Voltage V	Accuracy class	Inputs/outputs	Communication	Type	Order code
Steel ■					
Active energy measurement					
1 x 230 V AC	B (Cl.1)	Pulse output	-	B21 111 - 100	2CMA170149R1000
			RS-485	B21 112 - 100	2CMA170150R1000
			M-Bus	B21 113 - 100	2CMA100151R1000
Bronze ■					
4-quadrant measurement					
1 x 230 V AC	B (Cl.1) reactive energy Cl. 2	Pulse output	RS-485	B21 212 - 100	2CMA170152R1000
Silver ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs and communication.					
1 x 230 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	-	B21 311 - 100	2CMA170154R1000
			RS-485	B21 312 - 100	2CMA170155R1000
			M-Bus	B21 313 - 100	2CMA170156R1000

4.3.3 B23 Three-phase current meters (3 + N)

Direct connection up to 65 A. With measured values and alarm function.
For 3 and 4-wire connection. Communication: Infrared interface.
Optional interfaces: M-Bus, RS-485 (Modbus or EQ-Bus settable).
Width: 2 DIN modules. Verified and approved according to MID and IEC.

Voltage V	Accuracy class	Inputs/outputs	Communication	Type	Order code
Steel ■					
Active energy measurement					
3 x 230/400 V AC	B (Cl.1)	Pulse output	-	B23 111 - 100	2CMA170163R1000
			RS-485	B23 112 - 100	2CMA170164R1000
			M-Bus	B23 113 - 100	2CMA100165R1000
Bronze ■					
4-quadrant measurement					
3 x 230/400 V AC	B (Cl.1) reactive energy Cl. 2	Pulse output	RS-485	B23 212 - 100	2CMA170166R1000
Silver ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs and communication.					
3 x 230/400 V AC	B (Cl.1) reactive energy Cl. 2	2 outputs, 2 inputs	-	B23 311 - 100	2CMA170168R1000
			RS-485	B23 312 - 100	2CMA170169R1000
			M-Bus	B23 313 - 100	2CMA170170R1000

4.3.4 B24 Measurement transformer meters, three phase (3 + N)

Transformer rated CT 1(6) A. With measured values and alarm function.
For 3 and 4-wire connection. Communication: Infrared interface.
Optional interfaces: M-Bus, RS-485 (Modbus or EQ-Bus settable).
Width: 2 DIN modules. Verified and approved according to MID and IEC.

Voltage V	Accuracy class	Inputs/outputs	Communication	Type	Order code
Steel ■					
Active energy measurement					
3 x 230/400 V AC	B (Cl.1)	Pulse output	-	B24 111 - 100	2CMA170177R1000
			RS-485	B24 112 - 100	2CMA170178R1000
			M-Bus	B24 113 - 100	2CMA100179R1000
Bronze ■					
4-quadrant measurement					
3 x 230/400 V AC	B (Cl.1) reactive energy Cl. 2	Pulse output	RS-485	B24 212 - 100	2CMA170180R1000
Silver ■					
4-quadrant measurement, intermediate meter, tariffs 1-4, tariff control via inputs and communication.					
3 x 230/400 V AC	C (Cl.0.5 S) reactive energy Cl. 2	2 outputs, 2 inputs	-	B24 351 - 100	2CMA170182R1000
			RS-485	B24 352 - 100	2CMA170183R1000
			M-Bus	B24 353 - 100	2CMA170184R1000

4.4 Energy meter overview DELTAplus

ABB offers a comprehensive range of energy meters of the DELTAplus type. In the same way, meters of the DZ+(EIB) type can be read. In the following an overview of the available device configurations suitable for connection to the Meter Interface Module is provided:

4.4.1 DELTAplus type key

Sequence of the type designation	1	2	3	4	5	6-8
Type designation example	**D**	**D**	**B**	**1**	**3**	**056**
Basis						
Standard	D					
Measurement method						
Active energy meter with transformer rated		A				
Active energy meter with direct connection		B				
Active and reactive power with transformer rated		C				
Active and reactive power with direct connection		D				
Communication						
Pulse output, IR interface			B			
Accuracy						
Class 1				1		
Class 2				2		
Voltage						
1 x 57 - 288 V (2-wire AC grid L, N)					1	
3 x 100-500 V (3-wire three-phase L1, L2, L3)					2	
3 x 57-288 / 100-500 V (4-wire three-phase L1, L2, L3, N)					3	
Optional functions						
No options						000
4 tariffs (control only via 230 V input)						002
4 tariffs, switching via IR communication (ZS/S)						004
4 tariffs, switching via IR communication (ZS/S) or by internal clock. With time-dependent functions *						006

* S0 meter pulses and time-dependent functions cannot be processed via the Meter Interface Module.

The following energy meters of the DELTAplus type (MID[1] certification) can be read via the Meter Interface Module ZS/S:

4.4.2 DELTAplus measurement transformer meters

Measurement transformer meters for 1 A and 5 A current transformers

Type	Voltage [V]	Current [A]	Class	Order No.
Active energy meter				
DAB11000	1 x 57…288	1 (6)	1	2CMA 180 819 R1000
DAB12000	3 x 100…500	1 (6)	1	2CMA 180 807 R1000
DAB13000	3 x 57/100 to 3 x 288/500	1 (6)	1	2CMA 180 806 R1000
Combination meter (active and reactive power)				
DCB12000	3 x 100…500	1 (6)	1	2CMA 180 809 R1000
DCB13000	3 x 57/100 to 3 x 288/500	1 (6)	1	2CMA 180 808 R1000
Tariff meters				
DAB13002 2	3 x 57/100 to 3 x 288/500	1 (6)	1	2CMA 180 871 R1000
DAB13004 3	3 x 57/100 to 3 x 288/500	1 (6)	1	2CMA 139 460 R1000
DAB13006 4	3 x 57/100 to 3 x 288/500	1 (6)	1	2CMA 139 392 R1000

4.4.3 DELTAplus directly connected meter

Type	Voltage [V]	Current [A]	Class	Order No.
Active energy meter				
DBB21000	1 x 57…288	5(80)	2	2CMA 180 804 R1000
DBB12000	3 x 100…500	5(80)	1	2CMA 180 803 R1000
DBB22000	3 x 100…500	5(80)	2	2CMA 180 802 R1000
DBB13000	3 x 57/100 to 3 x 288/500	5(80)	1	2CMA 180 801 R1000
DBB23000	3 x 57/100 to 3 x 288/500	5(80)	2	2CMA 180 800 R1000
Combination meter (active and reactive power)				
DDB23000	3 x 57/100 to 3 x 288/500	5(80)	2	2CMA 180 810 R1000
Tariff meters				
DBB23002 [2]	3 x 57/100 to 3 x 288/500	5(80)	2	2CMA 180 813 R1000
DBB23004 [3]	3 x 57/100 to 3 x 288/500	5(80)	2	2CMA 139 461 R1000
DBB23006 [4]	3 x 57/100 to 3 x 288/500	5(80)	2	2CMA 139 394 R1000

[1] The S0 pulse outputs of certified meters are checked to ensure that they function during calibration. However, they are not calibrated. On combination meters, only the active power section is calibrated. The validity period for the official calibration is eight years.

[2] Control of the tariffs only via 230 V input

[3] Control of the tariffs via IR communication (ZS/S 1.1)

[4] Control of the tariffs via IR communication (ZS/S 1.1) or by internal clock

4.4.4 DELTAsingle directly connected meter

The following energy meters of the DELTAsingle type (MID[1] certification) for 2-wire AC current (1 phase + N, 230 V ~) can be read via the Meter Interface Module ZS/S:

Type	Integrated clock	Tariffs [2]	Pulse output	Order No.
FBB11200	-	1	Yes	2CMA 180 892 R1000
FBB11205	Yes	2	Yes	2CMA 180 894 R1000
FBB11206	Yes	4	Yes	2CMA 180 896 R1000
FBU11200	-	1	-	2CMA 180 891 R1000
FBU11205	Yes	2	-	2CMA 180 893 R1000
FBU11206	Yes	4	-	2CMA 180 895 R1000

1 The S0 pulse outputs of certified meters are checked to ensure that they function during calibration. However, they are not calibrated. On combination meters, only the active power section is calibrated. The validity period for the official calibration is eight years.

2 Tariffs can only be controlled via the meter and not via the Meter Interface Module.

4.4.5 ODIN

The following energy meters of the ODIN type can be read via the Meter Interface Module ZS/S:

Direct meters for four-wire three-phase (3 phases + N, 3 x 230/400 V~)

Type	Voltage [V]	Current [A]	Class	Order No.
OD4165	3 x 230/400	65	2	2CMA 131 024 R1000

Transformer rated meters for /5 A transformers for four-wire three-phase (3 phases + N, 3 x 230/400 V~)

Type	Voltage [V]	Current [A]	Class	Order No.
OD4110	3 x 230/400	5	2	2CMA 131 024 R1000

4.4.6 ODINsingle

The following energy meters of the ODINsingle type can be read via the Meter Interface Module ZS/S:

Direct meter (1-phase + N, 230 V ~)

Type	Voltage [V]	Current [A]	Class	Order No.
OD1065	230	65	1	2CMA 131 040 R1000

Direct meter , (1-phase + N, 230 V ~) with resettable intermediate meter and pulse output

Type	Voltage [V]	Current [A]	Class	Order No.
OD1365	230	65	1	2CMA 131 041 R1000

4.5 Behavior after bus voltage recovery, download and ETS reset

	Bus voltage recovery* (BW)	Behavior after programming	ETS Reset *Reset device*
Sending delay	Active, if parameterized	Active, if parameterized	Active, if parameterized
Meter reading [1] Active / reactive energy (tariffs 1-4, total)	Momentary meter reading (or meter reading tariff X and meter reading total) is sent	Momentary meter reading (or meter reading tariff X and meter reading total) is sent	Momentary meter reading (or meter reading tariff X and meter reading total) is sent
Power values [2] P_{Active} $P_{Reactive}$, $P_{Apparent}$, Phase angle, power factor	Are sent as soon as the change value under parameter *Send power values on change* is ≥ ±1	Are sent as soon as the change value under parameter *Send power values on change* is ≥ ±1	Are sent as soon as the change value under parameter *Send power values on change* is ≥ 1
Instrument values [2] Current, voltage, frequency, phase angle (I, U)	Are sent as soon as the change value under parameter *Send instrument values on change* ≥ 1	Are sent as soon as the change value under parameter *Send instrument values on change* ≥ 1	Are sent as soon as the change value under parameter *Send instrument values on change* ≥ 1
Current tariff [3]	Is sent	Is sent	Is sent
Transformer ratio [4] Current, voltage, total	Is sent	Is sent	Is sent
Power failures [3]	Are sent	Are sent	Are sent
Status byte	Is sent	Is sent	Is sent
Error report	Is sent	Is sent	Is sent
Meter type	Is sent	Is sent	Is sent

1 The meter reading of the reactive energy or meter reading total/tariffs 1-4 to be sent is dependent on the parameterized energy meter (meter type, configuration, tariffs).

2 Power and instrument values are sent depending on the parameterized configuration of the meter of type A4x or DELTAplus.

3 Tariffs and power failures are not sent by energy meters of the ODIN type.

4 Transformer ratios can only be sent with meters of the type A4x or DELTAplus and ODIN.

Note

* We recommend the use of an Uninterruptible Power Supply such as the SU/S 30.640.1, to avoid brief failures of the bus voltage.

4.6 LED display

The status of the device and the IR communication are indicated via the LED on the front of the device.

After bus voltage recovery, programming and/or ETS reset all three LEDs light up for approx. 1 second.

Possible states of the display LEDs are compiled in the following table:

LED	Status	Description
LED (red) Error	Flashes	Parameterized meter does not correspond with connected meter
	ON	IR communication disrupted
LED (yellow) Telegr.OUT	Flashes	Telegram traffic from the interface to the meter
LED (yellow) Telegr.IN	Flashes	Telegram traffic from the meter to the interface

A Appendix

A.1 Status byte code table

Diagnostic value	Hexadecimal	End value meter reading active energy	End value meter reading reactive energy [1]	Internal or hardware error	IR communication error	I1, I2 and/or I3 out of specification [2]	Negative power L1, L2, and/or L3	Under/over voltage L1, L2, and/or L3	Installation fault
0	00								
1	01								■
2	02							■	
3	03							■	■
4	04						■		
5	05						■		■
6	06						■	■	
7	07						■	■	■
8	08					■			
9	09					■			■
10	0 A					■		■	
11	0B					■		■	■
12	0C					■	■		
13	0D					■	■		■
14	0E					■	■	■	
15	0F					■	■	■	■
16	10				■				
17	11				■				■
18	12				■			■	
19	13				■			■	■
20	14				■		■		
21	15				■		■		■
22	16				■		■	■	
23	17				■		■	■	■
24	18				■	■			
25	19				■	■			■
26	1 A				■	■		■	
27	1B				■	■		■	■
28	1C				■	■	■		
29	1D				■	■	■		■
30	1E				■	■	■	■	
31	1F				■	■	■	■	■
32	20			■					
33	21			■					■
34	22			■				■	
35	23			■				■	■
36	24			■			■		
37	25			■			■		■
38	26			■			■	■	
39	27			■			■	■	■
40	28			■		■			
41	29			■		■			■
42	2 A			■		■		■	
43	2B			■		■		■	■
44	2C			■		■	■		
45	2D			■		■	■		■
46	2E			■		■	■	■	
47	2F			■		■	■	■	■
48	30			■	■				
49	31			■	■				■
50	32			■	■			■	
51	33			■	■			■	■
52	34			■	■		■		
53	35			■	■		■		■
54	36			■	■		■	■	
55	37			■	■		■	■	■
56	38			■	■	■			
57	39			■	■	■			■
58	3 A			■	■	■		■	
59	3B			■	■	■		■	■
60	3C			■	■	■	■		
61	3D			■	■	■	■		■
62	3E			■	■	■	■	■	
63	3F			■	■	■	■	■	■
64	40		■						
65	41		■						■
66	42		■					■	
67	43		■					■	■
68	44		■				■		
69	45		■				■		■
70	46		■				■	■	
71	47		■				■	■	■
72	48		■			■			
73	49		■			■			■
74	4 A		■			■		■	
75	4B		■			■		■	■
76	4C		■			■	■		
77	4D		■			■	■		■
78	4E		■			■	■	■	
79	4F		■			■	■	■	■
80	50		■		■				
81	51		■		■				■
82	52		■		■			■	
83	53		■		■			■	■
84	54		■		■		■		
85	55		■		■		■		■
86	56			■		■		■	
87	57			■		■		■	■
88	58			■		■	■		
89	59			■		■	■		■
90	5 A			■		■	■	■	
91	5B			■		■	■	■	■
92	5C			■		■	■	■	
93	5D			■		■	■	■	■
94	5E			■		■	■	■	
95	5F			■		■	■	■	■
96	60			■	■				
97	61			■	■				■
98	62			■	■			■	
99	63			■	■			■	■
100	64			■	■				
101	65			■	■				■
102	66			■	■			■	
103	67			■	■			■	■
104	68			■	■		■		
105	69			■	■		■		■
106	6 A			■	■		■		
107	6B			■	■		■		■
108	6C			■	■		■	■	
109	6D			■	■		■	■	
110	6E			■	■		■	■	
111	6F			■	■		■	■	■
112	70			■	■	■			
113	71			■	■	■			■
114	72			■	■	■		■	
115	73			■	■	■		■	■
116	74			■	■	■	■		
117	75			■	■	■	■		■
118	76			■	■	■	■	■	
119	77			■	■	■	■	■	■
120	78			■	■	■	■		
121	79			■	■	■	■		■
122	7 A			■	■	■	■		
123	7B			■	■	■	■	■	■
124	7C			■	■	■	■	■	
125	7D			■	■	■	■	■	■
126	7E			■	■	■	■	■	
127	7F			■	■	■	■	■	■
128	80	■							
129	81	■							■
130	82	■						■	
131	83	■						■	■
132	84	■					■		
133	85	■					■		■
134	86	■					■	■	
135	87	■					■	■	■
136	88	■				■			
137	89	■				■			■
138	8 A	■				■		■	
139	8B	■				■		■	■
140	8C	■				■	■		
141	8D	■				■	■		■
142	8E	■				■	■	■	
143	8F	■				■	■	■	■
144	90	■			■				
145	91	■			■				■
146	92	■			■			■	
147	93	■			■			■	■
148	94	■			■		■		
149	95	■			■		■		■
150	96	■			■		■	■	
151	97	■			■		■	■	■
152	98	■			■	■			
153	99	■			■	■			■
154	9 A	■			■	■		■	
155	9B	■			■	■		■	■
156	9C	■			■	■	■		
157	9D	■			■	■	■		■
158	9E	■			■	■	■	■	
159	9F	■			■	■	■	■	■
160	A0	■		■					
161	A1	■		■					■
162	A2	■		■				■	
163	A3	■		■				■	■
164	A4	■		■			■		
165	A5	■		■			■		■
166	A6	■		■			■	■	
167	A7	■		■			■	■	■
168	A8	■		■		■			
169	A9	■		■		■			■
170	AA	■		■		■		■	
171	AB	■		■		■		■	■
172	AC	■		■		■	■		
173	AD	■		■		■	■		■
174	AE	■		■		■	■	■	
175	AF	■		■		■	■	■	■
176	B0	■		■	■				
177	B1	■		■	■				■
178	B2	■		■	■			■	
179	B3	■		■	■			■	■
180	B4	■		■	■		■		
181	B5	■		■	■		■		■
182	B6	■		■	■		■	■	
183	B7	■		■	■		■	■	■
184	B8	■		■	■	■			
185	B9	■		■	■	■			■
186	BA	■		■	■	■		■	
187	BB	■		■	■	■		■	■
188	BC	■		■	■	■	■		
189	BD	■		■	■	■	■		■
190	BE	■		■	■	■	■	■	
191	BF	■		■	■	■	■	■	■
192	C0	■	■						
193	C1	■	■						■
194	C2	■	■					■	
195	C3	■	■					■	■
196	C4	■	■				■		
197	C5	■	■				■		■
198	C6	■	■				■	■	
199	C7	■	■				■	■	■
200	C8	■	■			■			
201	C9	■	■			■			■
202	CA	■	■			■		■	
203	CB	■	■			■		■	■
204	CC	■	■			■	■		
205	CD	■	■			■	■		■
206	CE	■	■			■	■	■	
207	CF	■	■			■	■	■	■
208	D0	■	■		■				
209	D1	■	■		■				■
210	D2	■	■		■			■	
211	D3	■	■		■			■	■
212	D4	■	■		■		■		
213	D5	■	■		■		■		■
214	D6	■	■		■		■	■	
215	D7	■	■		■		■	■	■
216	D8	■	■		■	■			
217	D9	■	■		■	■			■
218	DA	■	■		■	■		■	
219	DB	■	■		■	■		■	■
220	DC	■	■		■	■	■		
221	DD	■	■		■	■	■		■
222	DE	■	■		■	■	■	■	
223	DF	■	■		■	■	■	■	■
224	E0	■	■	■					
225	E1	■	■	■					■
226	E2	■	■	■				■	
227	E3	■	■	■				■	■
228	E4	■	■	■			■		
229	E5	■	■	■			■		■
230	E6	■	■	■			■	■	
231	E7	■	■	■			■	■	■
232	E8	■	■	■		■			
233	E9	■	■	■		■			■
234	EA	■	■	■		■		■	
235	EB	■	■	■		■		■	■
236	EC	■	■	■		■	■		
237	ED	■	■	■		■	■		■
238	EE	■	■	■		■	■	■	
239	EF	■	■	■		■	■	■	■
240	F0	■	■	■	■				
241	F1	■	■	■	■				■
242	F2	■	■	■	■			■	
243	F3	■	■	■	■			■	■
244	F4	■	■	■	■		■		
245	F5	■	■	■	■		■		■
246	F6	■	■	■	■		■	■	
247	F7	■	■	■	■		■	■	■
248	F8	■	■	■	■	■			
249	F9	■	■	■	■	■			■
250	FA	■	■	■	■	■		■	
251	FB	■	■	■	■	■		■	■
252	FC	■	■	■	■	■	■		
253	FD	■	■	■	■	■	■		■
254	FE	■	■	■	■	■	■	■	
255	FF	■	■	■	■	■	■	■	■

Empty = value 0
■ = Value 1, applicable

[1] only with meter type DELTAplus (combination meter) in
[2] only with meter type DELTAsingle in function

A.2 DELTAplus error codes

Energy meters of the DELTAplus type can indicate installation and connection faults on the display of the meter in the form of 3-digit error codes. The following table describes the individual error codes and the possible causes:

Error code	Description/cause
100	No voltage or voltage too low in phase 1
101	No voltage or voltage too low in phase 2
102	No voltage or voltage too low in phase 3
123	Power in phase 1 is negative **Note** – Reverse polarity of current connection – Direction of current flow through the current transformer is incorrect – Incorrectly connected phase voltages – Current transformer connected to incorrect current input
124	Power in phase 2 is negative **Note** – Reverse polarity of current connection – Direction of current flow through the current transformer is incorrect – Incorrectly connected phase voltages – Current transformer connected to incorrect current input
125	Power in phase 3 is negative **Note** – Reverse polarity of current connection – Direction of current flow through the current transformer is incorrect – Incorrectly connected phase voltages – Current transformer connected to incorrect current input
126	Total effective power is negative **Note** – reverse polarity of one or more current connections – direction of current flow through one or more current transformers is wrong – Incorrectly connected phase voltages – Current transformer connected to incorrect current input
128	Phase voltage connected to neutral conductor N on meter (terminal 11) **Note** Incorrect connection of phase voltage and neutral conductor

A.3 DELTAsingle error codes

Energy meters of the DELTAsingle type can indicate installation and connection faults on the display of the meter in the form of 3-digit error codes. The following table describes the individual error codes and the possible causes:

Error code	Description/cause
100	Checksum error tariff 1, active energy
101	Checksum error tariff 2, active energy
102	Checksum error tariff 3, active energy
103	Checksum error tariff 4, active energy
104	Checksum error total active energy
105	Checksum error monthly values, active energy
106	Checksum error
107	Checksum error
200	Checksum error tariff 1, reactive energy
201	Checksum error tariff 2, reactive energy
202	Checksum error tariff 3, reactive energy
203	Checksum error tariff 4, reactive energy
204	Checksum error total, reactive energy
205	Checksum error monthly values, reactive energy
300	Voltage U1, U2 or U3 too high (above meter specification range)
301	Voltage U1, U2 or U3 too low (under meter specification range)
302	Current I1, I2 or I3 too high (above meter specification range)
303	Frequency out of meter specification
304	U1 missing
305	U2 missing
306	U3 missing
307	Phase connected to neutral conductor
400	Negative power phase 1
401	Negative power phase 2
402	Negative power phase 3
403	Total negative power
404	External data signal on input out of specification
500	Pulse overlay
501	Date not set
502	Time not set
503	Tariffs incorrectly set
600	Single phase meter
601	Two phase meter
602	Three phase meter
603	Active energy
604	Reactive energy
700	EEPROM failure
701	Extended EEPROM failure
702	Vref is not VDD/2
703	Temperature sensor error
704	Clock error (RTC)
800 - 807	Internal error (for ABB use only)

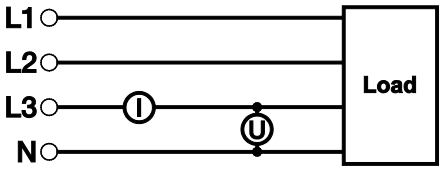
A.4 Energy metering

A.4.1 Measurement fundamentals

Different measurement methods are employed on energy meters depending on the type selected. The following equations are vector equations.

Measurement process with one measuring element

This method only produces the correct result when the phase loading is symmetrical (balanced).

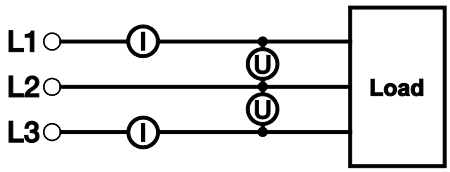


$P = 3 \cdot I_{L3} \cdot U_{L3}$

This method is not suitable for exact measurements in three-phase networks, as a 100 % symmetrical load is generally very seldom.

Measurement process with 2 measuring elements

This method is used in three-phase networks without a neutral conductor (three conductor network) with the same or any load.



$P = U_{L1} \cdot I_{L1} + U_{L2} \cdot I_{L2} + U_{L3} \cdot I_{L3}$

$\Sigma I = I_{L1} + I_{L2} + I_{L3} = 0$

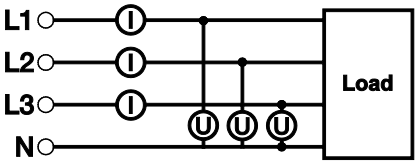
$P = U_{L1} \cdot I_{L1} - U_{L2} (I_{L1} + I_{L3}) + U_{L3} \cdot I_{L3}$

$P = I_{L1}(U_{L1 - L2}) + I_{L3}(U_{L3 - L2})$

This measurement process (with 2 measuring elements) is not suitable for very accurate measurements in networks with inductive or capacitive loads with a low cos φ. In these cases, a measurement process with three measuring elements should be selected.

Measurement process with 3 measuring elements

This method is used in three-phase networks with neutral conductor (four-conductor networks). However, it can be used in networks without neutral conductor, provided that an artificial star point is provided.

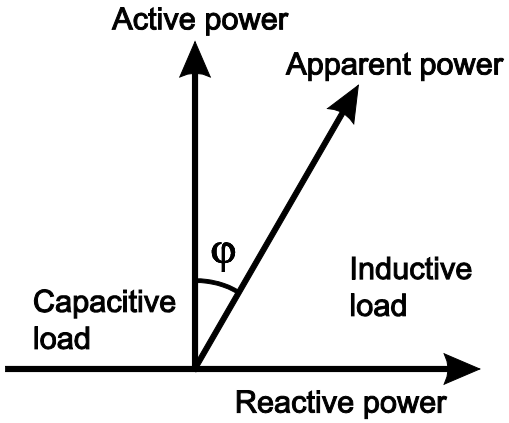


$P = U_{L1} \cdot I_{L1} + U_{L2} \cdot I_{L2} + U_{L3} \cdot I_{L3}$

This measurement method is very accurate even with asymmetrical loads and a low cos φ.

Active and reactive power

Capacitive or inductive loads result in a phase angle shift between the phase current and the phase voltage.



Active power = U*I*cos φ
Reactive power = U*I*sin φ
Apparent power = U*I

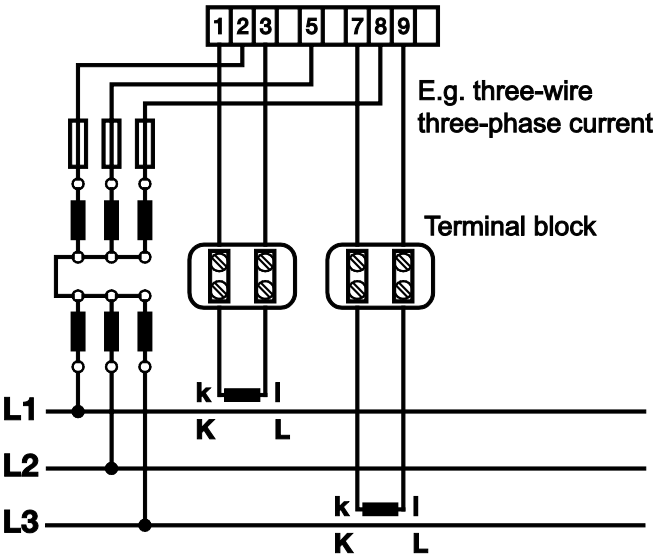
The maximum permissible phase shift is often subject to a contractual agreement with the electrical utility company.

In order to ensure that the defined values are not exceeded, power factor compensation equipment is installed and the compensation is monitored with reactive power meters or combination meters.

A.4.2 Measurements with current and/or voltage transformers

Current and/or voltage transformers must be used in order to measure currents and voltages out of range of the rated measurement range of the meter.

It is important that the secondary currents and voltages of the measurement transformer are within the permissible approved measurement range of the meter transformer. In order to ensure the required accuracy, the selected transformers should have a higher accuracy class than the meter which is used. Please note that the current transformers must be connected using the correct polarity (K1 → L1, k1 → l1).



Note
Secondary measurement cables from the transformer must be laid separately from the main current cables. The terminal block shown above is not compulsory for installation purposes but simplifies any service measures required.

Power consumption of the secondary measurement cables

If a current transformer is connected in series with an energy meter, the power consumption of the secondary measurement cables must be considered during design of the current transformer in order to obtain the correct measurement values. The current transformer rating (S_{sec}) must be selected to take the power requirement of the connected meters and the secondary power loss of the measurement cables into account.

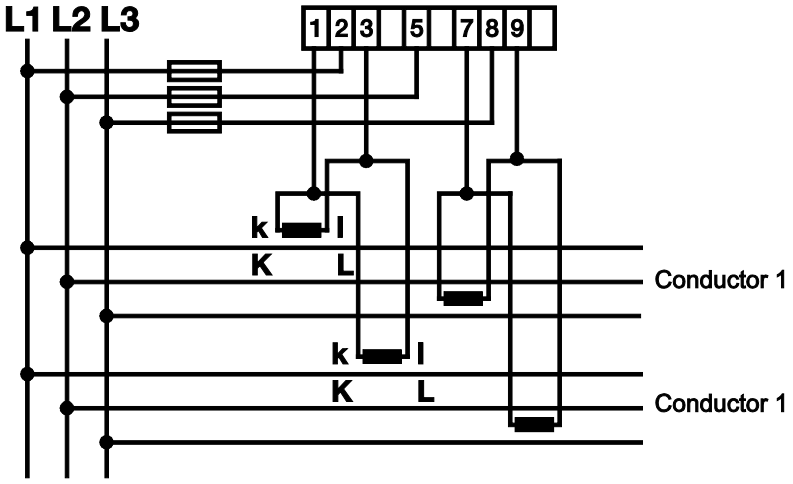
The following applies: $S_{sec} \geq S_{cable} + S_{meter}$ S = apparent power (VA)

The table of reference values below presents the cable power loss (S_{cable}) as a function of the cable length and cross-section.

Secondary current A	Cross section mm^2	Cable power loss (VA)						
		Cable length (input/output cable)						
		1 m	2 m	5 m	10 m	20 m	50 m	100 m
1 A	1.0	0.04	0.07	0.18	0.36	0.71	1.78	3.57
1 A	2.5	0.01	0.03	0.07	0.14	0.29	0.72	1.43
1 A	4.0	–	–	–	0.09	0.18	0.45	0.89
5 A	2.5	0.36	0.71	1.78	3.57	7.10	17.8	–
5 A	4.0	0.22	0.45	1.12	2.24	4.50	11.2	22.4
5 A	6.0	0.15	0.30	0.74	1.49	3.00	7.40	14.9

Energy summation

If the energy of several loads is to be measured using a single energy meter, the individual cables of assigned current transformers must be connected in parallel. All the current transformers used must have identical transformer ratios, and the sum of the currents may not exceed 6 A. In the example shown (3-wire network) the meter measures the sum of the energy consumption of cable 1 and cable 2. The type of load (asymmetrical or symmetrical) is irrelevant in this case.



The same application is possible in a 4-wire network. Current transformers are then required in L1, L2 and L3. Please note that the current transformers must be connected using the correct polarity (K1 → L1, k1 → l1).

A.4.3 Energy calculation

On directly connected energy meters, the energy on the LCD display is the same as the consumed energy. If current and/or voltage transformers are used, the displayed consumption value must be multiplied by the transformer ratio (CT x VT) in order to obtain the actual energy consumption.

The LED beside the registering mechanism and the LCD display symbols [A] and [R] flash at a frequency (Z_k) of:

- Direct meters: 1000 pulses/kWh (kvarh)
- Meters with transformer rating: 5000 pulses/kWh (kvarh)

In order to derive the LED/LCD flashing frequency with the given power, the equations in the following example can be used:

Three-wire three-phase current system with current and voltage transformers

Current transformer type:	250/5 A
Voltage transformer type:	600/100 V
Secondary current (I):	3 A
Secondary voltage (U):	100 V
Power factor (cos φ):	0.9
Meter constants (LED, LCD) (Zk):	5000 pulses/kWh

Voltage transformer ratio (VT):

$$VT = \frac{\text{Primary voltage } (U_P)}{\text{Secondary voltage } (U_S)} = \frac{600\ V}{100\ V} = 6$$

Current transformer ratio (CT):

$$CT = \frac{\text{Primary current } (I_P)}{\text{Secondary current } (I_S)} = \frac{250\ A}{5\ A} = 50$$

Secondary power (P_s):

$$P_S = \frac{\sqrt{3} \bullet U \bullet I \bullet \cos\varphi}{1000} = \frac{\sqrt{3} \bullet 100\ V \bullet 3\ A \bullet 0{,}9}{1000} = \mathbf{0{,}47\ kW}$$

Primary power (P_p):

$$P_p = P_S \bullet CT \bullet VT = 0{,}47\ kWh \bullet 50 \bullet 6 = \mathbf{141\ kW}$$

LED/LCD flash frequency (B_f):

$$B_f = \frac{P_S \bullet Z_k}{3600} = \frac{0{,}47\ kW \bullet 5000\ Imp/kWh}{3600} = \mathbf{0{,}65\ Hz}$$

LED/LCD flash period (B_p):

$$B_p = \frac{1}{B_f} = \frac{1}{0{,}65\ Hz} = \mathbf{1{,}53\ s}$$

When correctly connected, the LED and the LCD display symbol [A] should flash approx. every 1.5 s in the example shown.

A.5 Ordering details

Short description	Designation	Order No.	bbn 40 16779 EAN	Price group	Unit weight 1 pc. [kg]	Packaging unit (pc)
ZS/S 1.1	Meter Interface Module, MDRC	2CDG 110 083 R0011	66207 9	26	0.1	1

Notes

Notes

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