Product Manual

# ABB i-bus® KNX
# Meter Interface Module, MDRC
# ZS/S 1.1

Intelligent Installations Systems

This manual describes the function of the Meter Interface Module ZS/S 1.1
with its application program “Meter data logging/2.0”.
Subject to changes and errors excepted.

**Exclusion of liability:**
Despite checking that the contents of this document match the hardware and software, deviations cannot be completely excluded. We therefore cannot accept any liability for this. Any necessary corrections will be inserted in new versions of the manual.
Please inform us of any suggested improvements.
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## Contents

# 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 required evaluation and reading possibilities via a decentral 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 econoimic solutions for modern energy management. The demands placed on recording and evaluation as well as on billing and charging in commercial buildings, and also in industrial systems and residential properties has 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 enegry at the given comfort or production levels (residential and commercial).
Energy management can be applied in every building where energy is required: Industrial buildings, office buildings, sports halls, residential buildings and appartments, 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 (favourable power or heat prices, conservation of energy)
- Environmental aspects (conservation of energy, energy recovery, independence of fossil based primary energy carriers)

**What is load management?**

The primary objective of load management is an economic 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 Product and functional overview ZS/S 1.1

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 is used to read the data from ABB energy meter types DELTAplus, DELTAsingle, ODIN and ODINsingle. These data and values can be processed in a number of ways, e.g. in visualisation systems, energy management systems or for billing purposes. Different values and variables from the Meter Interface Module can be sent on the bus in dependence on the meter type used.

The following functions are available with the application program “Meter data logging/2.0“:

**Functions of ZS/S 1.1 with DELTAplus meter ***

- Active and reactive energy (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

**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

**Functions of ZS/S 1.1 with ODIN meter ***

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

**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

Fig. 1: Meter Interface Module ZS/S 1.1

The Meter Interface Module ZS/S enables remote reading of meter data and values from ABB energy meter types DELTAplus, DELTAsingle, ODIN and ODINsingle. The information which is read can be used for example for cost-centre accounting, energy optimisation, visualisation or monitoring of installations.

Furthermore, meter functions such as tariff switching can be controlled via KNX, depending on the meter type used.

The Meter Interface Module is a modular DIN rail device for installation in distribution boards. The connection to the ABB i-bus® KNX is established via the bus connection terminal.

### 2.1 Technical data

| | | |
|---|---|---|
| **Power supply** | Bus voltage | 21 …30 V DC via KNX |
| | Power consumption KNX | < 12 mA |
| | Leakage loss | Max. 250 mW |
| **Operating and display elements** | LED red and programming button | For assignment of the physical address and checking the bus connection |
| | LED fault (red) | On: No IR communication<br>Flashing: Connected meter does not comply with parameterisation |
| | 2 LEDs input/output telegram (yellow) | Flashing: Telegram traffic IN/OUT |
| **Connections** | KNX | Bus connection terminal (black/red) |
| **Infrared interface** | Compliant to IEC 61107 | |
| **Enclosure** | IP 20, EN 60 529 | |
| **Ambient temperature range** | Operation | - 5 °C ... + 45 °C |
| | Storage | - 25 °C ... + 55 °C |
| | Transport | - 25 °C ... + 70 °C |
| **Design** | Modular installation device, pro*M* | |
| **Housing, colour** | Plastic housing, grey | |
| **Installation** | On 35 mm mounting rail | Complaint to DIN EN 60 715 |
| **Dimensions** | 90 x 36 x 64.5 mm (H x W x D) | |
| **Mounting depth / width** | 68 mm / 2 modules at 18 mm | |
| **Weight** | approx. 0.1 kg | |
| **Mounting position** | On mounting rail adjacent to energy meter. Observe the installation instructions! | |
| **Approvals** | EIB / KNX | |
| **CE mark** | In accordance with EMC and low-voltage guidelines | |

Table 1: Technical data

| Application program | Number of communication objects | Max. number of group addresses | Max. number of associations |
|---|---|---|---|
| Meter data logging/2.0 | 68 | 254 | 254 |

Table 2: Application program

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

Note: The device does not support the closing function of a project or the KNX devices in the ETS. If you inhibit access to all devices of the project with a "BA password" (ETS2) or "BCU code" (ETS3), it has no effect on this device. Data can still be read and programmed.

## 2.2 Circuit diagram

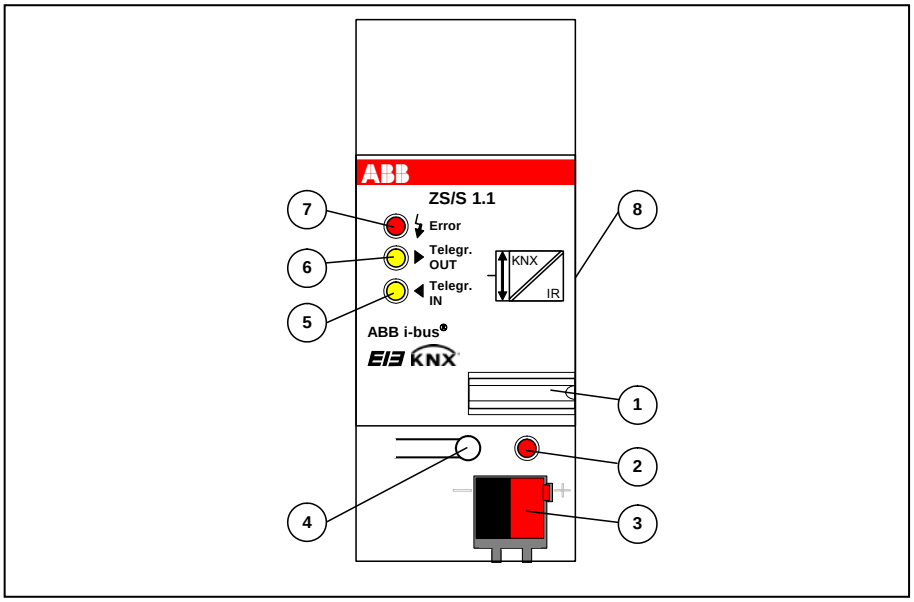



Fig. 2: Circuit diagram and displaying elements ZS/S 1.1

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

## 2.3 Dimension drawing

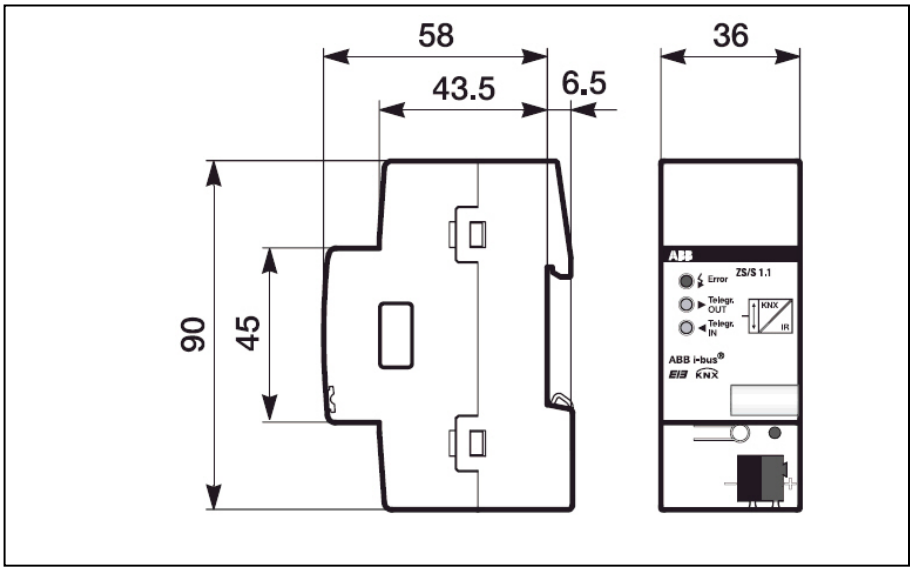



Fig. 3: Dimension drawing ZS/S 1.1

## 2.4 Assembly and installation

The device is solely intended for installation in a closed distribution board. This is intended to minimise 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 (see Fig. 4). 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” (when bus voltage is present) will flash red. In order to avoid the development of an air gap, ensure that the device is not subjected to vibrations after commissioning.
It is important to ensure that the Meter Interface Module and energy meters remains dust-free, dry and clean. In order to guarantee 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 corresponding meter must be observed for mounting, installation and commissioning of the DELTAplus, DELTAsingle, ODIN and ODINsingle meters.

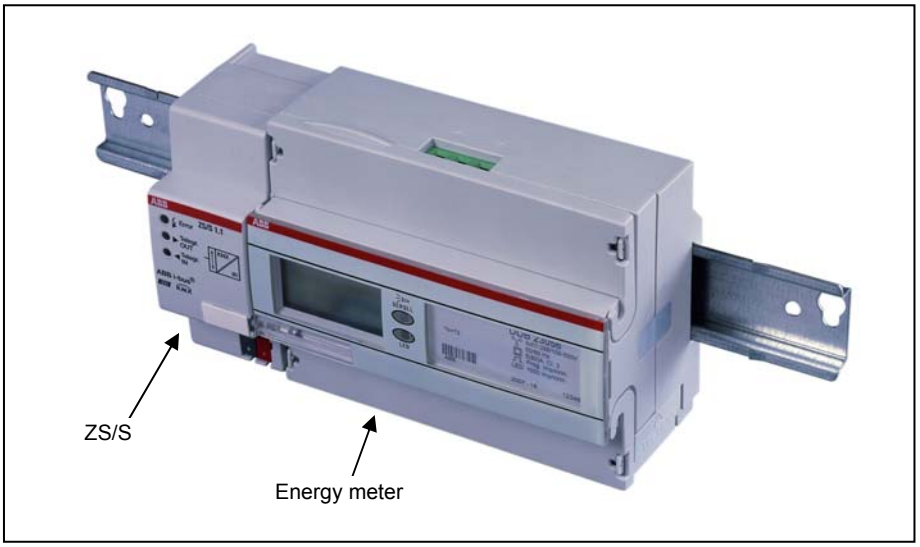



Fig. 4: Installation

### 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 damp cloth with a soap solution. Corrosive materials or solvents should never be used.

Accessibility to the device for the purpose operation, testing, visual inspection, maintenance and repair must be provided (conform to DIN VDE 0100-520).

# 3 Commissioning

## 3.1 Application program

The 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 10 seconds before the Meter Interface Module has synchronized with the energy meters. The interface is ready for operation after this time.

Note: Because of the cyclic data exchange between the energy meter and the Meter Interface Module ZS/S 1.1, the average event reaction time of the interface is about 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.

## 3.2 Parameter window DELTAplus

In the following sections the individual parameter windows with their respective parameters when using a DELTAplus energy meter are described. Underlined parameter values are the factory default values.

### 3.2.1 Parameter window “General”

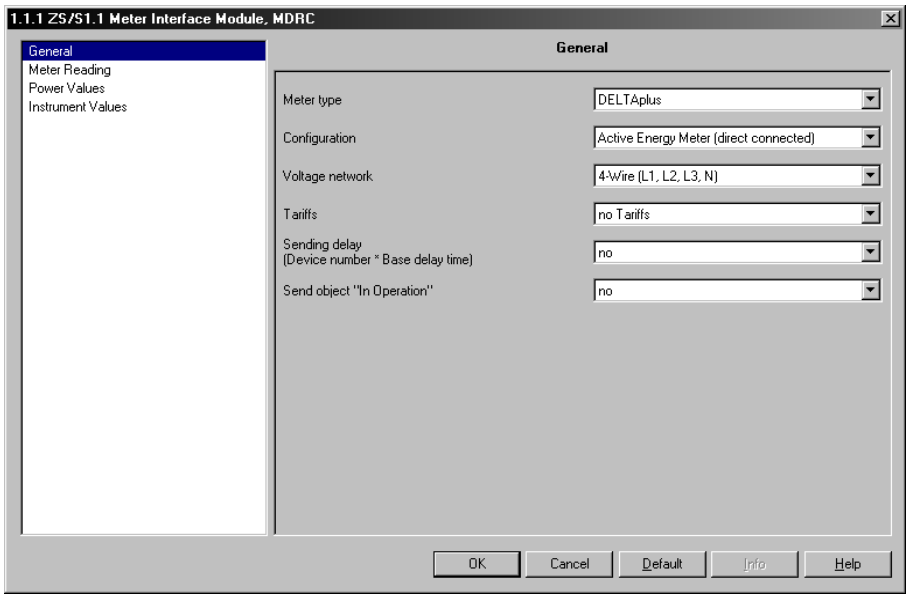



Fig. 5: Parameter window “General”

**Meter type**

Options:
- DELTAplus
- DELTAsingle
- ODIN
- ODINsingle

The energy meter connected to the interface is selected using these parameters. The communication objects and parameter pages for the respective meter type are displayed or activated to suit the meter type selected. If the option “DELTAplus” is selected the following listed parameters and parameter pages are shown. The descriptions and parameters windows for the meter types DELTAsingle, ODIN and ODINsingle are described in chapters 3.4, 3.6 and 3.8 respectively.

**Configuration**

Options:
- Active Energy Meter (direct connected)
- Active Energy Meter (transformer rated)
- Combination Meter (direct connected)
- Combination Meter (transformer rated)

Using these parameters you can select if the energy meter connected to the meter 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. The corresponding communication objects or parameter pages are displayed to suit the meter type selected.

Furthermore it is possible to differentiate between the directly connected meters (for currents up to 80 A) and meters which are transformer rated. If a meter with transformer connection is selected, the communication objects *Transformer Ratio Current*, *Transformer Ratio Voltage* and *Total Transformer Ratio* are displayed.

**Send power- and instrument values as**

Options: - secondary values
- primary values

This parameter appears as soon as a transformer rated meter is selected for the *Configuration* parameter.

*secondary values:* The adjusted 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 (CT) or voltage transformer ratio (VT) in order to determine the actual value (primary value).
Refer to Appendix 5.4.3 here.

*primary values:* The adjusted transformer ratio on the meter is considered. The actual or primary values (active, reactive and apparent power, current and voltage) are sent.

**Send meter reading values as**

Options: - secondary values (4-Byte object type)
- primary values (8-Byte object type)

This parameters appears as soon as a transformer rated meter is selected for the *Configuration* parameter.

*secondary values:* The adjusted 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).
Refer to Appendix 5.4.3 here.

*primary values:* The adjusted 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 the option *primary values* 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:
- 2-Wire (L, N)
- 3-Wire (L1, L2, L3)
- 4-Wire (L1, L2, L3, N)

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

*2-Wire (L, N):* 1-phase DELTAplus meter (1 x 57-288 V)

3-Wire (L1, L2, L3): 3-phase DELTAplus meter without neutral conductor (3 x 100-500 V).

*4-Wire (L1, L2, L3, N):* 3-phase DELTAplus meters with neutral conductor (3 x 57-288 V / 100-500 V).

**Tariffs**

Options:
- no Tariffs
- 2 Tariffs
- 4 Tariffs

Using these parameters you can select if the energy meter connected to the meter interface features tariff functions.

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

Note: Tariff switching via KNX only functions with DELTAplus meters which have **no** separate inputs for tariff switching.

**Sending delay**
**(Device number * Base delay time)**

Options:
- no
- yes

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

*no:* The telegrams are sent without a delay, i.e. telegrams are sent immediately after a value is requested (e.g. via the communication object *Request Meter Reading*) via the ABB i-bus.

*yes:* The parameters *Device number* and *Base delay time* for setting the sending delay are displayed. After every request of a value (meter reading, power values, instrument value) the information is sent via the ABB i-bus after the adjusted sending delay has elapsed. The sending delay is started after every reset, after bus voltage recovery and after tariff switching.
The sending delay 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 *Device number* parameter. With a simultaneous meter reading request via the communication object *Request Meter Reading* the meters of the device series send their readings via the ABB i-bus.

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

**Device number**
**[1...255]**

Options: 1…255

For assigning 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 "0" cyclically
- send value "1" cyclically

With the *in operation* object correct function of the device can be assured by monitoring the cyclic sending of the object value by another bus device.

*send value "0" / “1” cyclically:* The object *In operation* and the parameter *Cycle time in s* will be displayed.

**Cycle time in s**
**[1…65.535]**

Options: 1…60…65.535

With this parameter the time interval is set with which the object *In operation* cyclically sends a telegram with the value “0” or “1”.

### 3.2.2 Parameter window “Meter Reading”

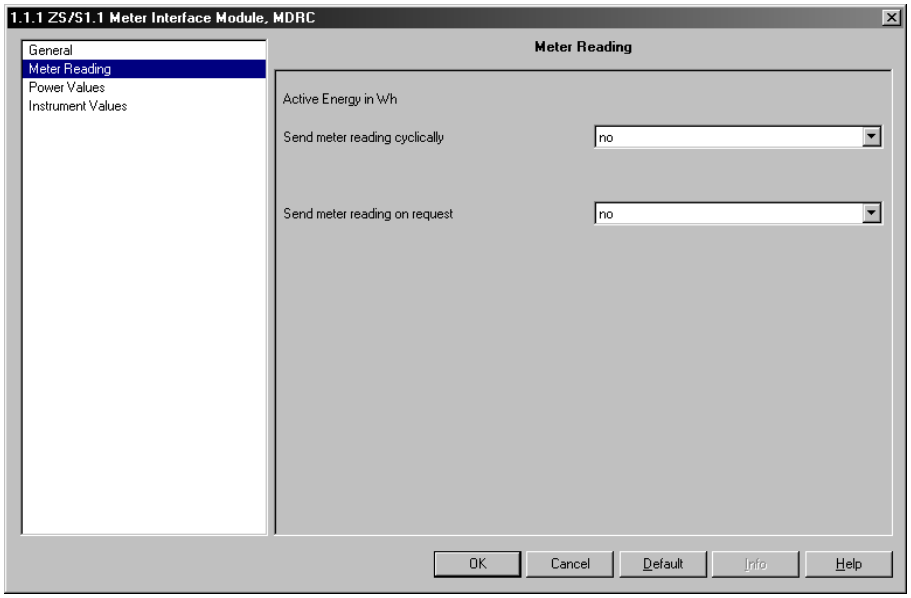



Fig. 6: Parameter window “Meter Reading”

In this parameter window the sending behaviour of the meter readings is defined. The meter readings are always send as **secondary values** with directly connected meters. On transformer rated meters the meter readings or energy consumption values can also be sent as primary values via an 8-Byte communication object:

- Meter Reading, Tot.Act.Energy*
- Meter Reading, Active Energy Tariff 1/ 2/ 3/ 4
- Meter Reading, Tot.React.Energy*
- Meter Reading, Reactive Energy Tariff 1/ 2/ 3/ 4

Note: Additional objects for the meter readings of the reactive energy can be displayed with the selection of the combination meter in the parameter window *General -> Configuration*.

Objects for the meter reading (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 -> Tariffs*.

Reading of the actual meter readings can be implemented by reading out the object values via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS. Further the meter reading values can be sent cyclically or on request.

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 the meter values are received from the connected meter which are greater than the max. value, the max. value of 2,147,483,647 Wh/varh is always sent.

* The objects *Meter Reading, Tot.Act.Energy, Meter Reading,Tot.React.Energy* only appear with the selection of a tariff meter. They indicate the sum of the meter readings of tariff 1+2 or tariff 1+2+3+4.

**Send meter reading cyclically**

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

Options: - no
- yes

*yes:* The parameter *Cycle time in s* is displayed. Using this parameter the send interval at which the meter reading/meter readings are to be sent is/are set. Multiple meters which send with the same cycle time can send at staggered times using the send delay time (if it is parameterised) in order to avoid possible communication problems.

Cyclical sending is interrupted as soon as communication to the energy meters can not be established.

The meter readings of the active and reactive energy are sent (only when a combination meter is selected). Only the tariff which 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 a reset, after bus voltage recovery or tariff switching, i.e. after each of these events the parameterised sending delay waits before the cyclic sending delay commences. With each subsequent send only the cyclic rhythm is observed as the meters now send with a time offset.

**Send meter reading on request**

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

Options: - no
- yes

*yes:* The communication object *Request Meter Reading* is displayed.
This object enables active reading of the momentary meter readings. After receiving a meter request telegram with the value “1” the meter reading is sent after a send delay (if parameterised) via the ABB i-bus. The send 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”

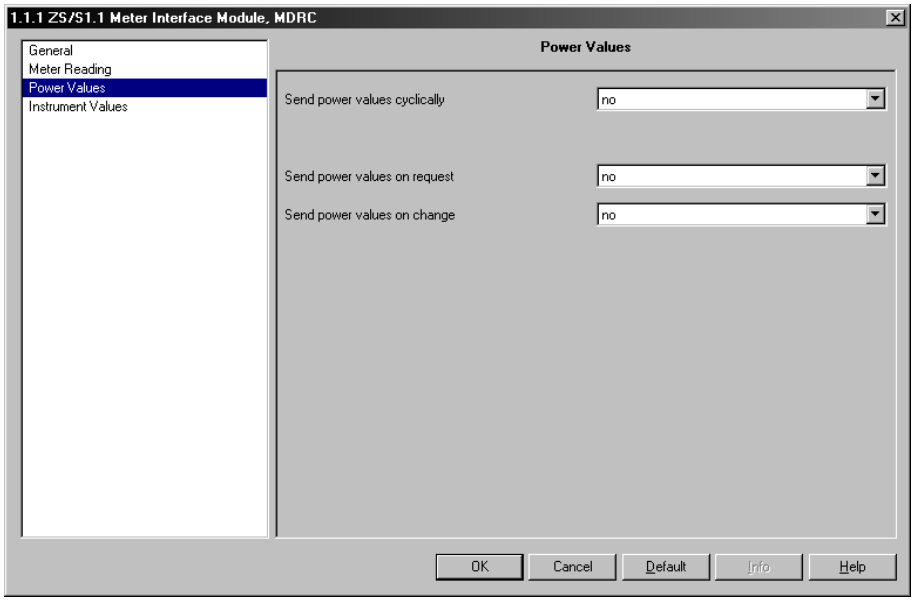



Fig. 7: Parameter window “Power Values”

In this parameter window the sending behaviour of the power values is defined.

- Total Active Power Total [W]
- Active Power L1 L2 L3 [W]
- Total Reactive Power [var]
- Reactive Power L1, L2, L3 [var]
- Total Apparent Power [VA]
- Apparent Power L1, L2, L3 [VA]
- Total Phase Angle Power [°]
- Phase Angle Power L1, L2, L3 [°]
- Total Power Factor [cos phi]
- Power Factor L1, L2, L3 [cos phi]

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*, a combination meter (direct connected or transformer rated) has been selected under parameter *Configuration*.

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

*Total Active Power Total*
*Active Power L1 L2 L3*
*Total Reactive and Apparent power **
*Reactive and Apparent power L1, L2, L3 **
*Total Phase Angle Power **
*Phase angle L1, L2, L3 **
*Total Power Factor*
*Power Factor L1, L2, L3*

* These objects are only displayed with the selection of the combination meter in the parameter window *General -> Configuration.*

Reading of the actual power values can be implemented by reading out the object values via “Value_Read”, e.g. with the assistance of the EIB / KNX Tool software ETS. Further the power values can be sent cyclically, on request or when a change occurs.

**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 ABB i-bus. The send interval is defined with the parameter *Cycle time in s*. Multiple meters which send with the same cycle time can send at staggered times using the sending delay (if it is parameterised) in order to avoid possible communication problems.

Note: If the sending delay and cyclic sending of the power values are activated, the sending delay time only runs once directly after a 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 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 can not be established.

Conversion of the cycle time to seconds:

| | | |
|---|---|---|
| 900 s | = | 15 minutes |
| 3600 s | = | 1 hour |
| 86400 s | = | 1 day |
| 172800 s | = | 2 days |

**Send power values on request**

Options: - no
- yes

*yes:* The communication object *Request Power Values* is displayed.
This 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 the sending delay (if parameterised) via the ABB i-bus. The sending delay 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 -> 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 adjusted cycle time (if parameterised) has timed out. After bus voltage recovery, programming and ETS bus 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 parameterised) 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 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 adjusted parameter option (*primary values* or *secondary values)* of the parameter *Send power- and instrument values as* in the parameter window *General*.

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

**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 -> Configuration*.

The change value to be entered here applies for the 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 adjusted parameter option (*primary values* or *secondary values)* of the parameter *Send power- and instrument values as* in the parameter window *General*.

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

**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 -> Configuration*.

The change value to be entered here applies for the 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 adjusted parameter option (*primary values* or *secondary values)* of the parameter *Send power- and instrument values as* in the parameter window *General*.

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

**Send Phase Angle Power in degree at +/- [0...90]**

Options: 0 …90 (0 = do not send)

This parameter is only displayed as soon as a combination meter has been selected in the parameter window *General -> Configuration*.

The change value to be entered here applies for the objects *Phase Angel Power (Total*, *Phase Angle Power L1 L2 L3)**. If the preset change value is exceeded or undershot, the corresponding momentary phase angle value is sent on the bus.

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

**Send Power Factor at +/- 0,01 * Value [0…100]**

Options: 0 …100

The change value to be entered here applies for the 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 objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

### 3.2.4 Parameter window “Instrument Values”

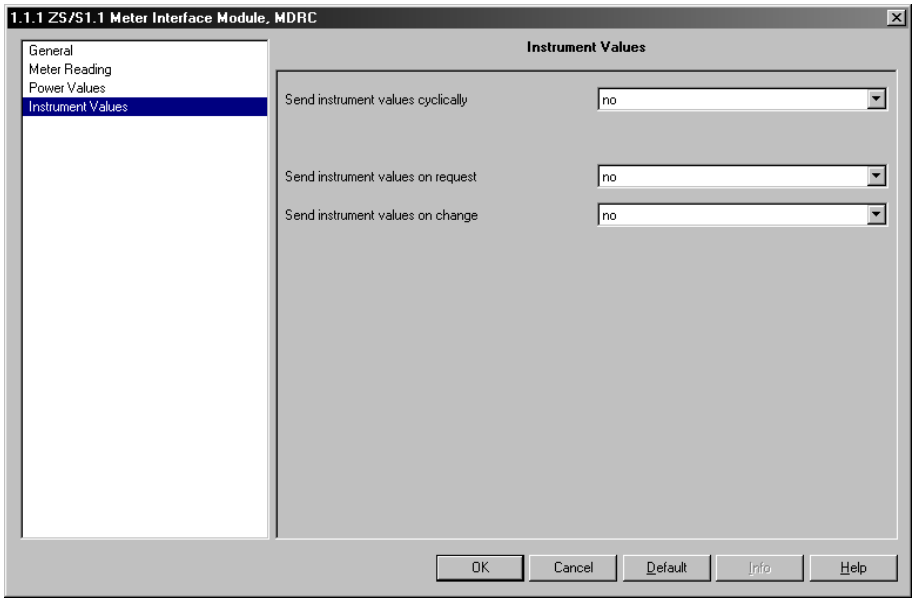



Fig. 8: Parameter window “Instrument Values”

In this parameter window the sending behaviour of the instrument values is defined. When choosing a meter for a 2-wire voltage network in the parameter window *General -> Voltage Network*, the following objects will be displayed:

- *Current*
- *Voltage*
- *Frequency*
- *Phase angle current*
- *Phase angle voltage*
- *Quadrant*

If a 3-wire or 4-wire voltage network is parameterised the following objects are displayed:

- *Current L1*
- *Current L2*
- *Current L3*
- *Voltage L1-N* (only on meters for 4-wire networks)
- *Voltage L2-N* (only on meters for 4-wire networks)
- *Voltage L3-N* (only on meters for 4-wire networks)
- *Voltage L1-L2* (only on meters for 3-wire networks)
- *Voltage L2-L3* (only on meters for 3-wire networks)
- *Frequency*
- *Phase Angle Current L1, L2, L3**
- *Phase Angle Voltage L1, L2, L3**
- *Total Quadrant **
- *Quadrant L1, L2, L3 **

* These objects are only displayed with the selection of the combination meter in the parameter window *General -> Configuration.*

Reading of the actual instrument values can be implemented by reading out the object values via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS. Further the instrument values can be sent cyclically, on request or when a change occurs.

**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 ABB i-bus. The send interval is defined with the parameter *Cycle time in s*. Multiple meters which send with the same cycle time can send at staggered times using the sending delay (if it is parameterised) 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 a 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 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 can not be established.

Conversion of the cycle time to seconds:

900 s = 15 minutes
3600 s = 1 hour
86400 s = 1 day
172800 s = 2 days

**Send instrument values on request**

Options: - no
- yes

*yes:* The communication object *Request Instrument Values* is displayed. This 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 (if parameterised) via the ABB i-bus.
The sending delay time prevents simultaneous sending of telegrams, if multiple meters respond to the same request for instrument values.

* Only with the selection of the combination meter in the parameter window *General -> Configuration.*

**Send instrument values on change**

*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 adjusted cycle time (if parameterised) has timed out. After bus voltage recovery, programming and ETS bus 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 parameterised) 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 objects *Current (Current L1 L2 L3)**. If the preset change value is exceeded or undershot with one of these 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 enterted, e.g.:

Change value = Base x Factor
= 100 mA x 10
= 1000 mA
= 1 A

The change value in meters with a transformer ratio always relates to the adjustetd parameter option (*primary values* or *secondary values)* of the parameter *Send power- and instrument values as* in the parameter window *General*.

>* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

**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 Voltage objects *(Voltage L1-N, L2-N, L3-N, L1-L2, L2-L3)**. If the preset change value is exceeded or undershot with one of these 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 enterted, e.g.:

Change value = Base x Factor
= 10 mV x 1000
= 10000 mV
= 10 V

The change value in meters with a transformer ratio always relates to the adjusted parameter option (*primary values* or *secondary values)* of the parameter *Send power- and instrument values as* in the parameter window *General*.

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

Note: When using transformers it is important to observe that pratical 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.

Change value = Base x Factor
= 0.1 Hz x 10
= 1 Hz

**Send Phase Angle Current in degrees
at +/- [0…90]**
**Send Phase Angle Voltage in degrees
at +/- [0…90]**

Options: 0…90 (0 = do not send)

These objects are only displayed with the selection of the combination meter in the parameter window *General -> Configuration.*

The change value to be entered here relates to the 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 objects, the momentary phase angle current or voltage values are sent on the bus.

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

**Send Quadrant on change**

Options: - no
- yes

These parameters are only displayed with the selection of the combination meter in the parameter window *General -> Configuration.*

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

* These objects are only displayed with the selection of a 3-wire network or 4-wire network in the parameter window *General -> Voltage Network.*

## 3.3 Communication objects DELTAplus

### 3.3.1 Communications objects General

These objects are always available or are valid for each DELTAplus meter independently of the version and voltage network.

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 0 | Input Telegram | Request Status Values | 1 bit | C | - | W | T |
| 1 | Output Telelgram | In Operation | 1 bit | C | R | - | T |
| 2 | Output Telelgram | Status Byte | 1 Byte | C | R | - | T |
| 3 | Output Telelgram | Error Signal | 1 bit | C | R | - | T |
| 4 | Output Telelgram | Meter Type | 1 Byte | C | R | - | T |
| 5 | Output Telelgram | False Meter Type | 1 bit | C | R | - | T |
| 6 | Output Telelgram | Send Power Fail Counter | 1 Byte | C | R | - | T |
| 7 | Input Telegram | Reset Power Fail Counter | 1 bit | C | - | W | T |
| 8 | Input Telegram | Source Of Tariff Switching | 1 bit | C | - | W | - |
| 10 | Input Telegram | Request Meter Reading | 1 bit | C | - | W | T |
| 11 | Output Telelgram | Meter Reading, Tot.Act.Energy | 4 Byte | C | R | - | T |
| 24 | Output Telelgram | Active Power | 4 Byte | C | R | - | T |
| 40 | Output Telelgram | Power Factor | 4 Byte | C | R | - | T |
| 45 | Output Telelgram | Current | 4 Byte | C | R | - | T |
| 48 | Output Telelgram | Voltage | 4 Byte | C | R | - | T |
| 53 | Output Telelgram | Frequency | 4 Byte | C | R | - | T |

Fig. 9: General communication objects

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **0** | **Input Telegram** | **Request status values** | **1 Bit EIS 1 DPT 1.017** | **C, R, T** |

If a telegram with the value “1” is received on this 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 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 Fail Counter

| | | | | |
|---|---|---|---|---|
| **1** | **Output telegram** | **In operation** | **1 Bit EIS 1 DPT 1.001** | **C, R, T** |

The Meter Interface Module cyclically sends telegrams with the value “1” or “0” on this object. This telegram can be used by other devices to monitor functions. If for example, the telegram with the value “1” is sent to an actuator with a staircase lighting function, the failure of the Meter Interface Module can be signalled by the absence of the telegram. This object is activated by the parameter “Send object "in operation".

| | | | | |
|---|---|---|---|---|
| **2** | **Output Telegram** | **Status Byte** | **8 Bit Non EIS** | **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. 6 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 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 object value can be read out via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS.

The object is also sent after bus voltage recovery, programming and ETS bus reset.

The status byte code table in chapter 5.1 enables quick decoding of the telegram code for the corresponding error type.

Telegram code: 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 *

Telegram value: „0": Not activated
„1“: Activated

* only with meter type DELTAsingle in operation

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **3** | **Output Telegram** | **Error Signal** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

On this communication object an error message in the form of a common error signal is sent on the bus. An error message can have many causes and can be decoded with the assistance of the status byte or by reading out the error code (see chapter 5.2) of the meter. The object is sent as soon as a bit of the object “Status byte“ is set to “1”. If the errors have been corrected and the status byte has the value “0”, the object “Error Signal” also sends a telegram with the value “0”. Thus the correction of the error can be indicated.
The object is also sent after bus voltage recovery, programming and ETS bus reset.

Telegram value: „0": No error
„1“: Error

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **4** | **Output Telegram** | **Meter Type** | **8 Bit Non EIS** | **C, R, T** |

Via this object it is possible to read out the meter type connected to the Meter Interface Module:

Telegram value: „0": DELTAplus
„1“: DELTAsingle
„2“: ODIN
„3“: ODINsingle

“other”: reserved

„254“: Unknown meter
„255“: No meter connected

In order to obtain the actual value/connected meter, the object value can be read out via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS. Furthermore, the object is also sent with a change, after bus voltage recovery, programming and ETS bus reset.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **5** | **Output Telegram** | **False Meter Type** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

The Meter Interface Module cyclically scans the connected meters. If the meter parameterised in the ETS does not correspond with the connected meter, this object is sent.

Telegram value: „0": Parameterisation OK
„1“: False Meter Type parameterised

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **6** | **Output Telegram** | **Send Power Fail Counter** | **1 Byte EIS 14 DPT 5.010** | **C, R, T** |

The interface sends the momentary number of mains 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.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **7** | **Input Telegram** | **Reset Power Fail Counter** | **1 Bit EIS1 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 10 seconds. If the erasing procedure fails object No. 6 is sent again. If the erasing procedure is successful, object No. 6 is also sent.<br>Telegram value: „0": No function<br>„1“: Reset power fail counter | | | | |
| **8** | **Input Telegram** | **Source Of Tariff Switching** | **1 Bit EIS1 DPT 1.001** | **C, W** |
| With this object the source which is used to switch the tariff in the meter is selected.<br>This object is only displayed as long as a meter with 2 or 4 tariffs has been selected in the parameter window General -> Tariffs. This function only applies to energy meters of the type DELTAplus, which do not feature separate inputs for tariff switching and which have an internal clock for tariff switching. The device overview in chapter 4.1.1 indicates the available types and functions of DELTAplus meters.<br>Telegram value: „0": Tariff switching via internal clock in the meter<br>„1“: Tariff switching via KNX | | | | |

### 3.3.2 Communication objects Meter Reading

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 10 | Input Telegram | Request Meter Reading | 1 bit | C | - | W | T |
| 11 | Output Telelgram | Meter Reading, Tot.Act.Energy | 4 Byte | C | R | - | T |
| 12 | Output Telelgram | Meter Reading, ActiveEnergy T1 | 4 Byte | C | R | - | T |
| 13 | Output Telelgram | Meter Reading, ActiveEnergy T2 | 4 Byte | C | R | - | T |
| 14 | Output Telelgram | Meter Reading, ActiveEnergy T3 | 4 Byte | C | R | - | T |
| 15 | Output Telelgram | Meter Reading, ActiveEnergy T4 | 4 Byte | C | R | - | T |
| 16 | Output Telelgram | Meter Reading,Tot.React.Energy | 4 Byte | C | R | - | T |
| 17 | Output Telelgram | Meter Reading, React.Energy T1 | 4 Byte | C | R | - | T |
| 18 | Output Telelgram | Meter Reading, React.Energy T2 | 4 Byte | C | R | - | T |
| 19 | Output Telelgram | Meter Reading, React.Energy T3 | 4 Byte | C | R | - | T |
| 20 | Output Telelgram | Meter Reading, React.Energy T4 | 4 Byte | C | R | - | T |
| 21 | Output Telelgram | Send Tariff | 1 Byte | C | R | - | T |
| 22 | Input Telegram | Tariff Switching | 1 Byte | C | - | W | T |

Fig. 10: Communication objects meter readings / tariffs

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **10** | **Input Telegram** | **Request Meter Reading** | **1 Bit EIS 1 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 objects No. 11 - 20.
The momentary meter readings - depending on the meters used - are sent on the bus after the sending delay time (if parameterised).

Telegram value: „0": No function
„1“: Request Meter Reading

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **11** | **Output telegram** | **Meter reading, Tot.Act.Energy *** | **4 Byte EIS 11 DPT 13.010 or 8 Byte Non EIS DPT 29.010** | **C, , T** |
| **12** | **Output telegram** | **Meter reading, Active Energy T1** | | |
| **13** | **Output telegram** | **Meter reading, Active Energy T2** | | |
| **14** | **Output telegram** | **Meter reading, Active Energy T3** | | |
| **15** | **Output telegram** | **Meter reading, Active Energy T4** | | |

On these communication objects the momentary meter readings for active energy are sent. If a tariff meter with 2 tariffs is selected in the parameter window “General”, communication objects No. 11-13 are displayed. If a tariff meter with 4 tariffs is selected communication objects No. 14+15 are also displayed.
If a tariff meter has been parameterised object No. 11 sends the meter reading of the sum of all tariffs of the consumed active energy, whereas objects No. 12-15 sends the consumed active energy of the respective tariffs.
Only the tariff momentarily active and the sum of the tariffs are sent (object No. 11). The object is also sent after bus voltage recovery, programming and ETS bus reset.

With the 4-byte objects meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh are sent. If the meter values are received from the connected meter which 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) is always sent.

If a transformer rated meter is used, the energy consumption values of the active energy can optionally be sent as 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 object *Meter Reading, Tot.Act.Energy* is only displayed if a tariff meter has been selected and indicates the sum of the meter readings of tariff T1+T2 or T1+T2+T3+T4.

| | | | | |
|---|---|---|---|---|
| **16** | **Output telegram** | **Meter reading, Tot.React.Energy *** | **4 Byte EIS 11 DPT 13.012 or 8 Byte Non EIS DPT 29.012** | **C, R, T** |
| **17** | **Output telegram** | **Meter reading, Reactive Energy T1** | | |
| **18** | **Output telegram** | **Meter reading, Reactive Energy T2** | | |
| **19** | **Output telegram** | **Meter reading, Reactive Energy T3** | | |
| **20** | **Output telegram** | **Meter reading, Reactive Energy T4** | | |

On these communication objects the momentary meter readings for reactive energy are sent. These objects are only displayed as soon as a combination meter has been selected in the parameter window “General”.
If a tariff meter with 2 tariffs is selected in the parameter window “General”, communication objects No. 16-18 are displayed. If a tariff meter with 4 tariffs is selected communication objects No. 19+20 are also displayed.
If a tariff meter has been parameterised object No. 16 sends the meter reading of the sum of all tariffs of the consumed reactive energy, whereas objects No. 17-20 send reactive energy of the respective tariffs.
Only the tariff momentarily active and the sum of the tariffs are sent (object No. 16). The object is also sent after bus voltage recovery, programming and ETS bus reset.

With the 4-byte objects meter readings up to a max. of 2,147,483,647 varh (2.147 Gvarh) and a resolution of 1 varh are sent. If meter values are received from the connected meter which are greater than the max. value, the end value of 2,147,483,647varh 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 energy consumption values of the reactive energy can be sent as 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 object *Meter Reading, Tot.React.Energy* is only displayed if a tariff meter has been selected and indicates the sum of the meter readings of tariff T1+T2 or T1+T2+T3+T4.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **21** | **Output telegram** | **Send Tariff** | **8 Bit Non EIS** | **C, R, T** |

On these communication objects the tariff momentarily in use is sent, provided that a tariff meter with 1, 2 or 4 tariffs has been selected in the parameter window “General”. If the tariff is changed on the meter or via KNX, a new tariff is sent. The object is also sent after bus voltage recovery, programming and ETS bus reset.

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

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **22** | **Input telegram** | **Tariff Switching** | **8 Bit Non EIS** | **C, W, T** |

This communication object allows switching between 4 different tariffs. Switching to the required tariff is performed if a valid object value is received. If an invalid object value is received the momentarily active tariff is sent. After the sending delay time (if parameterised) 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. These communication objects are only displayed as soon as a tariff meter has been selected in the parameter window “General”.
Tariff switching via KNX only functions with DELTAplus type 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

### 3.3.3 Communication objects Power Values

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 23 | Input Telegram | Request Power Values | 1 bit | C | - | W | T |
| 24 | Output Telelgram | Total Active Power Total | 4 Byte | C | R | - | T |
| 25 | Output Telelgram | Active Power L1 | 4 Byte | C | R | - | T |
| 26 | Output Telelgram | Active Power L2 | 4 Byte | C | R | - | T |
| 27 | Output Telelgram | Active Power L3 | 4 Byte | C | R | - | T |
| 28 | Output Telelgram | Total Reactive Power | 4 Byte | C | R | - | T |
| 29 | Output Telelgram | Reactive Power L1 | 4 Byte | C | R | - | T |
| 30 | Output Telelgram | Reactive Power L2 | 4 Byte | C | R | - | T |
| 31 | Output Telelgram | Reactive Power L3 | 4 Byte | C | R | - | T |
| 32 | Output Telelgram | Total Apparent Power | 4 Byte | C | R | - | T |
| 33 | Output Telelgram | Apparent Power L1 | 4 Byte | C | R | - | T |
| 34 | Output Telelgram | Apparent Power L2 | 4 Byte | C | R | - | T |
| 35 | Output Telelgram | Apparent Power L3 | 4 Byte | C | R | - | T |
| 36 | Output Telelgram | Total Phase Angle Power | 4 Byte | C | R | - | T |
| 37 | Output Telelgram | Phase Angle Power L1 | 4 Byte | C | R | - | T |
| 38 | Output Telelgram | Phase Angle Power L2 | 4 Byte | C | R | - | T |
| 39 | Output Telelgram | Phase Angle Power L3 | 4 Byte | C | R | - | T |
| 40 | Output Telelgram | Total Power Factor | 4 Byte | C | R | - | T |
| 41 | Output Telelgram | Power Factor L1 | 4 Byte | C | R | - | T |
| 42 | Output Telelgram | Power Factor L2 | 4 Byte | C | R | - | T |
| 43 | Output Telelgram | Power Factor L3 | 4 Byte | C | R | - | T |

Fig. 11: Communication objects Power Values

<table>
<tr><th>No.</th><th>Object name</th><th>Function</th><th>Data type</th><th>Flags</th></tr>
<tr><td>23</td><td>Input telegram</td><td>Request Power Values</td><td>1 Bit<br>EIS 1<br>DPT<br>1.017</td><td>C, W, T</td></tr>
<tr><td colspan="5">The momentary power values are requested via the telegram with the value “1” on this communication object. The request applies for objects No. 24-43<br>(if they are functional). The momentarily applicable values are sent on the bus after the sending delay time (if parameterised).<br><br>Telegram value: „0“: no function<br>„1“: Request Power Values</td></tr>
<tr><td>24<br>25<br>26<br>27</td><td>Output telegram<br>Output telegram<br>Output telegram<br>Output telegram</td><td>Total Active Power Total<br>Active power L1<br>Active power L2<br>Active power L3</td><td>4 Byte<br>EIS 9<br>DPT<br>14.056</td><td>C, R, T</td></tr>
<tr><td colspan="5">On these communication objects the momentary active power values of phases L1 - L3, as well as the total active power are sent. The communication objects for the active powers L1-L3 are displayed dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Power Values”.</td></tr>
</table>

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **28**<br>**29**<br>**30**<br>**31** | **Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram** | **Total Reactive Power**<br>**Reactive power L1**<br>**Reactive power L2**<br>**Reactive power L3** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.056** | **C, R, T** |
| On these communication objects the momentary reactive power values of phases L1 - L3, as well as the total reactive power are sent. They are only displayed when a combination meter has been selected and/or are dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Power Values”. | | | | |
| **32**<br>**33**<br>**34**<br>**35** | **Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram** | **Total Apparent Power**<br>**Apparent power L1**<br>**Apparent power L2**<br>**Apparent power L3** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.056** | **C, R, T** |
| On these communication objects the momentary apparent power values of phases L1 - L3, as well as the total apparent power are sent. They are only displayed when a combination meter has been selected and/or are dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Power Values”. | | | | |
| **36**<br>**37**<br>**38**<br>**39** | **Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram** | **Total phase angle power**<br>**Phase angle power L1**<br>**Phase angle power L2**<br>**Phase angle power L3** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.055** | **C, R, T** |
| On these communication objects the phase angle of the power values L1 - L3, as well as the total phase angle in degrees [°] are sent. They are only displayed when a combination meter has been selected and/or are dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Power Values”. | | | | |
| **40**<br>**41**<br>**42**<br>**43** | **Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram** | **Total Power Factor**<br>**Power factor L1**<br>**Power factor L2**<br>**Power factor L3** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.057** | **C, R, T** |
| On these communication objects the momentary power factors (cos phi) L1 - L3, as well as the total power factor are sent. The communication objects L1-L3 are displayed dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Power Values”. | | | | |

### 3.3.4 Communication objects Instrument Values

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 44 | Input Telegram | Request Instrument Values | 1 bit | C | - | W | T |
| 45 | Output Telelgram | Current L1 | 4 Byte | C | R | - | T |
| 46 | Output Telelgram | Current L2 | 4 Byte | C | R | - | T |
| 47 | Output Telelgram | Current L3 | 4 Byte | C | R | - | T |
| 48 | Output Telelgram | Voltage L1-N | 4 Byte | C | R | - | T |
| 49 | Output Telelgram | Voltage L2-N | 4 Byte | C | R | - | T |
| 50 | Output Telelgram | Voltage L3-N | 4 Byte | C | R | - | T |
| 51 | Output Telelgram | Voltage L1-L2 | 4 Byte | C | R | - | T |
| 52 | Output Telelgram | Voltage L2-L3 | 4 Byte | C | R | - | T |
| 53 | Output Telelgram | Frequency | 4 Byte | C | R | - | T |
| 54 | Output Telelgram | Phase Angle Current L1 | 4 Byte | C | R | - | T |
| 55 | Output Telelgram | Phase Angle Current L2 | 4 Byte | C | R | - | T |
| 56 | Output Telelgram | Phase Angle Current L3 | 4 Byte | C | R | - | T |
| 57 | Output Telelgram | Phase Angle Voltage L1 | 4 Byte | C | R | - | T |
| 58 | Output Telelgram | Phase Angle Voltage L2 | 4 Byte | C | R | - | T |
| 59 | Output Telelgram | Phase Angle Voltage L3 | 4 Byte | C | R | - | T |
| 60 | Output Telelgram | Total Quadrant | 1 Byte | C | R | - | T |
| 61 | Output Telelgram | Quadrant L1 | 1 Byte | C | R | - | T |
| 62 | Output Telelgram | Quadrant L2 | 1 Byte | C | R | - | T |
| 63 | Output Telelgram | Quadrant L3 | 1 Byte | C | R | - | T |

Fig. 12: Communication objects Instrument Values

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **44** | **Input telegram** | **Request Instrument Values** | **1 Bit<br>EIS 1<br>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 the objects No. 45 -63.<br>The momentary values are sent on the bus after the send delay time (if parameterised).<br>Telegram value: „0": No function<br>„1“: Request Instrument Values | | | | |
| **45<br>46<br>47** | **Output telegram<br>Output telegram<br>Output telegram** | **Current (L1)<br>Current L2<br>Current L3** | **4 Byte<br>EIS 9<br>DPT 14.019** | **C, R, T** |
| On these communication objects the currents of phases L1 – L3 are sent.<br>The communication objects of currents L1 - L3 are displayed with the selection of a 3 or 4-wire voltage network. The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Instrument Values”. | | | | |

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **48**<br>**49**<br>**50**<br>**51**<br>**52** | **Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram** | **Voltage (L1-N)**<br>**Voltage L2-N**<br>**Voltage L3-N**<br>**Voltage L1-L2**<br>**Voltage L2-L3** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.027** | **C, R, T** |
| On these communication objects the voltages of the individual phases relative to neutral and to one another are sent. The communication objects for the voltages are displayed dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). Objects No. 51 + 52 are only displayed when meters for 3-wire networks are selected. The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Instrument Values”. | | | | |
| **53** | **Output telegram** | **Frequency** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.033** | **C, R, T** |
| On this communication object the momentary frequency of the voltage network is sent. The send behaviour (cyclically, on request, send on change) of this object can be set in the parameter window “Instrument Values”. | | | | |
| **54**<br>**55**<br>**56** | **Output telegram**<br>**Output telegram**<br>**Output telegram** | **Phase angle current (L1)**<br>**Phase angle current L2**<br>**Phase angle current L3** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.055** | **C, R, T** |
| On these communication objects the phase angle of currents L1 – L3 are sent. They are only displayed when a combination meter has been selected and/or are dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Instrument Values”. | | | | |
| **57**<br>**58**<br>**59** | **Output telegram**<br>**Output telegram**<br>**Output telegram** | **Phase angle voltage (L1)**<br>**Phase angle voltage L2**<br>**Phase angle voltage L3** | **4 Byte**<br>**EIS 9**<br>**DPT**<br>**14.055** | **C, R, T** |
| On these communication objects the phase angle of voltages L1 – L3 are sent. They are only displayed when a combination meter has been selected and/or are dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Instrument Values”. | | | | |
| **60**<br>**61**<br>**62**<br>**63** | **Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram** | **Total Quadrant**<br>**Quadrant L1**<br>**Quadrant L2**<br>**Quadrant L3** | **8 Bit**<br>**Non EIS** | **C, R, T** |
| The quadrant in which the meter measures is sent in these communication objects.<br>These objects are only displayed when a combination meter has been selected and/or are dependent on the parameterised voltage network (2, 3, or 4-wire voltage network). The send behaviour (cyclically, on request, send on change) of these objects can be set in the parameter window “Instrument Values”.<br>Telegram value: „0": No quadrant available<br>„1“: Quadrant 1<br>„2“: Quadrant 2<br>„3“: Quadrant 3<br>„4“: Quadrant 4<br>“Other values”: No function | | | | |

### 3.3.5 Communication objects Transformer Ratios

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 64 | Output Telelgram | Transformer Ratio Voltage | 2 Byte | C | R | - | T |
| 65 | Output Telelgram | Transformer Ratio Current | 2 Byte | C | R | - | T |
| 66 | Output Telelgram | Total Transformer Ratio | 4 Byte | C | R | - | T |

Fig. 13: Communication objects Transformer Ratios

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **64**<br>**65** | **Output telegram**<br>**Output telegram** | **Transformer Ratio Voltage**<br>**Transformer Ratio Current** | **2 Byte**<br>**EIS 10**<br>**DPT 7.001** | **C, R, T** |
| **66** | **Output telegram** | **Total Transformer Ratio** | **4 Byte**<br>**EIS 11**<br>**DPT 12.001** | **C, R, T** |

On these communication objects the Meter Interface Module sends the adjusted voltage or current transformer ratios (1-9999) on the meter. These objects are only displayed if a transformer rated energy meter has been selected in the parameter window “General” beforehand. The transformer ratios are sent after bus voltage recovery, after a reset, after programming and with a change. The total transformer ratio calculates the current and voltage from the product of the transformer ratio:

GT = CT * VT

GT = Total Transformer Ratio
CT = Transformer Ratio Current
VT = Transformer Ratio Voltage

## 3.4 Parameter window DELTAsingle

In the following sections the individual parameter windows with their respective parameters and communication objects are described for the DELTAsingle energy meters. For this purpose the option “DELTAsingle” must be selected in the “General” parameter window under the parameter “Meter Type”. Underlined parameter values are the factory default settings.

### 3.4.1 Parameter window “General”

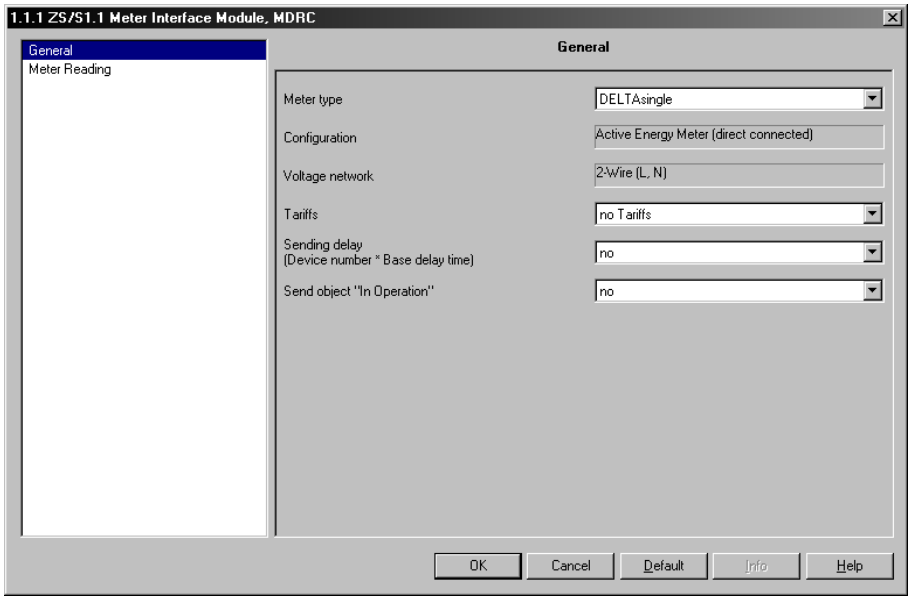



Fig. 14: Parameter window “General”

**Meter type**

Options:
- DELTAplus
- DELTAsingle
- ODIN
- ODINsingle

The energy meter connected to the interface is set using these parameters. The communication objects and parameter pages for the respective meter type are displayed to suit the selected meter type. If the option “DELTAsingle” is selected the following parameters and parameter pages are displayed.
The parameters windows for the meter types DELTAplus, ODIN and ODINsingle are described in chapters 3.2, 3.6 and 3.8 respectively.

**Configuration**

- Active Energy Meter (direct connected)

**Voltage network**

- 2-Wire (L, N)

**Tariffs**

Options:
- no Tariffs
- 2 Tariffs
- 4 Tariffs

Using these parameters you can select if the energy meter connected to the meter interface features tariff functions.

*2 Tariffs / 4 Tariffs*: The communication objects for sending the tariff meter readings are displayed.

Note: Tariff with DELTAsingle meters can not be switched via KNX.

**Sending delay**
**(Device number * Base delay time)**

Options:
- no
- yes

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

*no:* The telegrams are sent without a delay, i.e. telegrams are sent immediately after a value is requested (e.g. via the communication object *Request Meter Reading*) via the ABB i-bus.

*yes:* The parameters *Device number* and *Base delay time* for setting the sending delay are displayed. After every request of a value the information is sent via the ABB i-bus after the adjusted sending delay has elapsed. The sending delay is started after every reset, after bus voltage recovery and after tariff switching. The sending delay 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 *Device number* parameter. With a simultaneous meter reading request via the communication object *Request Meter Reading* the meters of the device series send their readings via the ABB i-bus.

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

**Device number**
**[1...255]**

Options: 1…255

For assigning 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 "0" cyclically
- send value "1" cyclically

With the *in operation* object correct function of the device can be assured by monitoring the cyclic sending of the object value by another bus device.

*send value "0" / “1” cyclically:* The object *In operation* and the parameter *Cycle time in s* will be displayed.

**Cycle time in s**
**[1…65.535]**

Options: 1…60…65.535

With this parameter the time interval is set with which the object *In operation* cyclically sends a telegram with the value “0” or “1”.

### 3.4.2 Parameter window “Meter Reading”

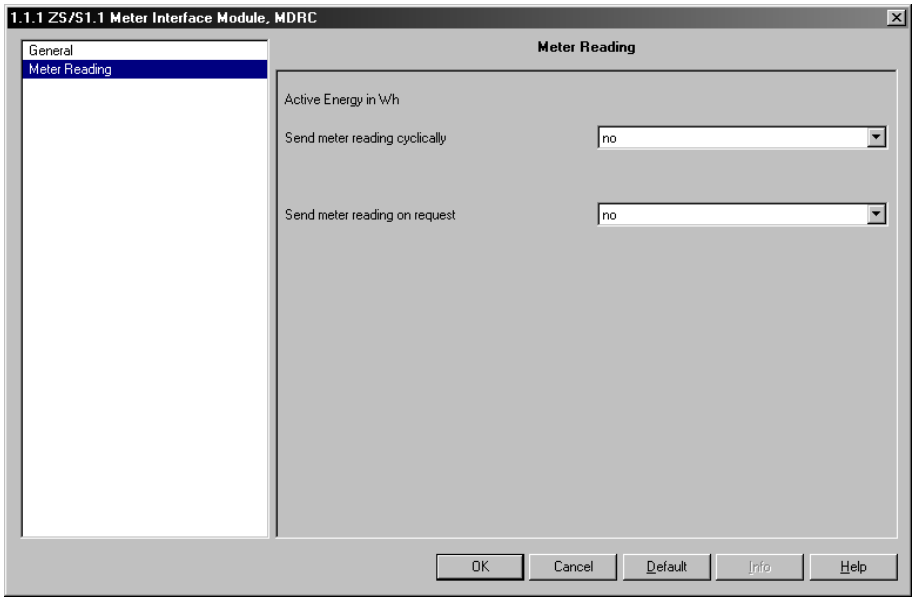



Fig. 15: Parameter window “Meter Reading”

**Send meter reading cyclically**

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

Options: - no
- yes

*yes:* The parameter *Cycle time in s* is displayed. Using this parameter the send interval at which the meter reading/meter readings are to be sent is/are set. Multiple meters which send with the same cycle time can send at staggered times using the sending delay time (if it is parameterised) in order to avoid possible communication problems.

Cyclic sending is interrupted as soon as communication to the energy meters can not be established.

**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 a reset, after bus voltage recovery or tariff switching, i.e. after each of these events the parameterised sending delay time waits before the cyclic sending delay commences. With each subsequent send only the cyclic rhythm is observed as the meters now send with a time offset.

**Send meter reading on request**

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

Options:
- no
- yes

*yes:* The communication object *Request Meter Reading* is displayed. This object enables active reading of the momentary meter readings. After receiving a meter request telegram with the value “1” the meter reading is sent after a sending delay (if parameterised) via the ABB i-bus. The sending delay time prevents simultaneous sending of telegrams, if multiple meters react to the same meter reading request telegram.

## 3.5 Communication objects DELTAsingle

### 3.5.1 Communications objects General

Independently of the meter configuration of type DELTAsingle these communication objects are always available.

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 0 | Input Telegram | Request Status Values | 1 bit | C | - | W | T |
| 1 | Output Telelgram | In Operation | 1 bit | C | R | - | T |
| 2 | Output Telelgram | Status Byte | 1 Byte | C | R | - | T |
| 3 | Output Telelgram | Error Signal | 1 bit | C | R | - | T |
| 4 | Output Telelgram | Meter Type | 1 Byte | C | R | - | T |
| 5 | Output Telelgram | False Meter Type | 1 bit | C | R | - | T |
| 6 | Output Telelgram | Send Power Fail Counter | 1 Byte | C | R | - | T |
| 7 | Input Telegram | Reset Power Fail Counter | 1 bit | C | - | W | T |

Fig. 16: Allgemeine KommunikationsobjekteGeneral communication objects

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **0** | **Input Telegram** | **Request Status Values** | **1 Bit EIS 1 DPT 1.017** | **C, R, T** |
| If a telegram with the value “1” is received on this 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 objects are sent on request:<br>No. 2 Status Byte<br>No. 3 Error Signal<br>No. 4 Meter Type<br>No. 5 False Meter Type<br>No. 6 Send Power Fail Counter | | | | |
| **1** | **Output telegram** | **In Operation** | **1 Bit EIS 1 DPT 1.001** | **C, R, T** |
| The Meter Interface Module cyclically sends telegrams with the value “1” or “0” on this object. This telegram can be used by other devices to monitor functions. If for example, the telegram with the value “1” is sent to an actuator with a staircase lighting function, the failure of the Meter Interface Module can be signalled by the absence of the telegram. This object is activated by the parameter “Send object ‘in operation’ ". | | | | |

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **2** | **Output telegram** | **Status Byte** | **8 Bit Non EIS** | **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. 6 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 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 object value can be read out via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS.

The object is also sent after bus voltage recovery, programming and ETS bus reset.

The status byte code table in chapter 5.1 enables quick decoding of the telegram code for the corresponding error type.

Telegram code: 76543210
- 7: End value of Meter Reading, Active Energy reached
- 6: End value of Meter Reading, Reactive Energy reached (only with DELTAplus)
- 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 *

Telegram value:
- „0": Not activated
- „1“: Activated

* only with meter type DELTAsingle in operation

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **3** | **Output telegram** | **Error Signal** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

On this communication object an error message in the form of a common error signal is sent on the bus. An error message can have many causes and can be decoded with the assistance of the status byte or by reading out the error code (see chapter 5.3) of the meter. The object is sent as soon as a bit of the object “Status byte“ is set to “1”. If the errors have been corrected and the status byte has the value “0”, the object “Error Signal” also sends a telegram with the value “0”. Thus the correction of the error can be indicated. The object is also sent after bus voltage recovery, programming and ETS bus reset.

Telegram value:
- „0": No error
- „1“: Error

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **4** | **Output telegram** | **Meter Type** | **8 Bit Non EIS** | **C, R, T** |

Via this object it is possible to read out the meter type connected to the Meter Interface Module:

Telegram value:
„0": DELTAplus
„1": DELTAsingle
„2": ODIN
„3": ODINsingle

"other": Reserved

„254": Unknown meter
„255": No meter connected

In order to obtain the actual value/connected meter, the object value can be read out via "Value_Read", e.g. with the assistance of the KNX Tool software ETS. The object is also sent after bus voltage recovery, programming and ETS bus reset.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **5** | **Output telegram** | **False Meter Type** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

The Meter Interface Module cyclically scans the connected meters. If the meter parameterised in the ETS does not correspond with the connected meter, this object is sent. The object will continue to be sent with a change.

Telegram value:
„0": Parameterisation OK
„1": False Meter Type parameterised

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **6** | **Output telegram** | **Send Power Fail Counter** | **1 Byte EIS 14 DPT 5.010** | **C, R, T** |

The interface sends the momentary number of mains power failures on this comunication 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 also sent with a change, after bus voltage recovery, programming and ETS bus reset.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **7** | **Input telegram** | **Reset Power Fail Counter** | **1 Bit EIS 1 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 10 seconds. If the deletion proces fails object No. 6 is sent again. If the erasing procedure is successful, object No. 6 is also sent.

Telegram value:
„0": No function
„1": Reset power fail counter

### 3.5.2 Communication objects Meter Reading/Tariff

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 10 | Input Telegram | Request Meter Reading | 1 bit | C | - | W | T |
| 11 | Output Telelgram | Meter Reading, Tot.Act.Energy | 4 Byte | C | R | - | T |
| 12 | Output Telelgram | Meter Reading, ActiveEnergy T1 | 4 Byte | C | R | - | T |
| 13 | Output Telelgram | Meter Reading, ActiveEnergy T2 | 4 Byte | C | R | - | T |
| 14 | Output Telelgram | Meter Reading, ActiveEnergy T3 | 4 Byte | C | R | - | T |
| 15 | Output Telelgram | Meter Reading, ActiveEnergy T4 | 4 Byte | C | R | - | T |
| 21 | Output Telelgram | Send Tariff | 1 Byte | C | R | - | T |

Fig. 17: Communication objects Meter Reading/Tariff

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **10** | **Input telegram** | **Request Meter Reading** | **1 Bit EIS 1 DPT 1.017** | **C, W, T** |
| Via this communication object the read request for the momentary meter reading or the meter readings on the meter is sent. The read request applies for the objects No. 11 -15. The momentary meter readings – depending on the meters used - are sent on the bus after the send delay time (if parameterised).<br>Telegram value: „0": no function<br>„1": Request Meter Reading | | | | |
| **11**<br>**12**<br>**13**<br>**14**<br>**15** | **Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram**<br>**Output telegram** | **Meter reading, Tot.Act.Energy ***<br>**Meter reading, Active Energy T1**<br>**Meter reading, Active Energy T2**<br>**Meter reading, Active Energy T3**<br>**Meter reading, Active Energy T4** | **4 Byte EIS 11 DPT 13.010** | **C, R, W, T** |
| On these communication objects the momentary meter readings for active energy (primary values) are sent.<br>If a tariff meter with 2 tariffs is selected in the parameter window "General", communication objects No. 11-13 are displayed. If a tariff meter with 4 tariffs is selected communication objects No. 14-15 are also displayed.<br>If a tariff meter has been parameterised object No. 11 sends the meter reading of the sum of all tariffs of the consumed active energy, whereas objects No. 12-15 send the consumed active energy of the respective tariffs.<br>Only the tariff momentarily active and the sum of the tariffs are sent (object No. 11).<br>The object is also sent after bus voltage recovery, programming and ETS bus reset.<br>With the 4-byte objects meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh are sent. If the meter values are received from the connected meter which 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) is always sent.<br>* The object *Meter Reading, Tot.Act.Energy* is only displayed if a tariff meter has been selected and indicates the sum of the meter readings of tariff T1+T2 or T1+T2+T3+T4. | | | | |

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **21** | **Output telegram** | **Send Tariff** | **8 Bit Non EIS** | **C, R, W, 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”.
The object is also sent after bus voltage recovery, programming and ETS bus reset.

Telegram value:
„0“: No tariff available
„1“: Tariff 1
„2“: Tariff 2
„3“: Tariff 3
„4“: Tariff 4
Other values: No function

## 3.6 Parameter window ODIN

In the following sections the individual parameter windows with their respective parameters and communication objects are described.
For this purpose the meter type “ODIN” must be selected in the “General” parameter window. Underlined parameter values are the factory default settings.

### 3.6.1 Parameter window “General”

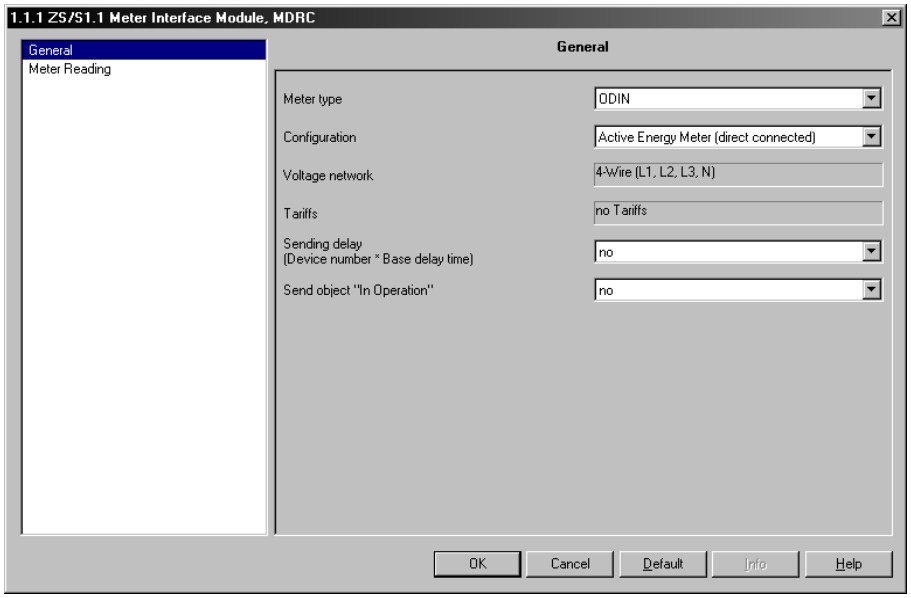



Fig. 18: Parameter window “General”

**Meter type**

Options:
- DELTAplus
- DELTAsingle
- ODIN
- ODINsingle

The energy meter connected to the interface is selected using these parameters. The communication objects and parameter pages for the respective meter type are displayed to suit the selected meter type. If the option “ODIN” is selected the following parameters and parameter pages are displayed.
The parameters windows for the meter types DELTAplus, DELTAsingle and ODINsingle are described in chapters 3.2, 3.4 and 3.6 respectively.

**Configuration**

Options:
- Active Energy Meter (direct connected)
- Active Energy Meter (transformer rated)

Using these parameters you can select if the energy meter connected to the Meter Interface Module is configured as an active energy meter for direct current measurement (up to 65 A), or a transformer rated active energy meter. If the option with transformer rating is selected, the communication object *Transformer Ratio Current* and *Transformer Ratio Voltage* are displayed.

**Send meter reading values as**

Options: - secondary values (4-Byte object type)
- primary values (8-Byte object type)

This parameter appears as soon as a transformer rated meter is selected for the *Configuration* parameter.

*secondary values:* The adjusted 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).
Refer to Appendix 5.4 here.

*primary values:* The adjusted transformer ratio on the meter is considered. The actual or primary energy values (Meter Reading, Active 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**

- 4-Wire (L1, L2, L3, N)

**Tariffs**

- No tariffs

**Sending delay**
**(Device number * Base delay time)**

Options: - no
- yes

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

*no:* The telegrams are sent without a delay, i.e. telegrams are sent immediately after a value is requested (e.g. via the communication object *Request Meter Reading*) via the ABB i-bus (if parameterised).

*yes:* After every request of a value the information is sent via the ABB i-bus after the adjusted sending delay has elapsed. The parameters *Device number* and *Base delay time* for setting the send delay time are displayed. The send 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 *Device number* parameter. With a simultaneous meter reading request via the communication object *Request Meter Reading* the meters of the device series send their readings via the ABB i-bus.

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

**Device number**
**[1...255]**

Options: 1…255

For assigning 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 "0" cyclically
- send value "1" cyclically

With the *in operation* object correct function of the device can be assured by monitoring the cyclic sending of the object value by another bus device.

*send value "0" / “1” cyclically:* The object *In operation* and the parameter *Cycle time in s* will be displayed.

**Cycle time in s**
**[1…65.535]**

Options: 1…60…65.535

With this parameter the time interval is set with which the object *In operation* cyclically sends a telegram with the value “0” or “1”.

### 3.6.2 Parameter window “Meter Reading”

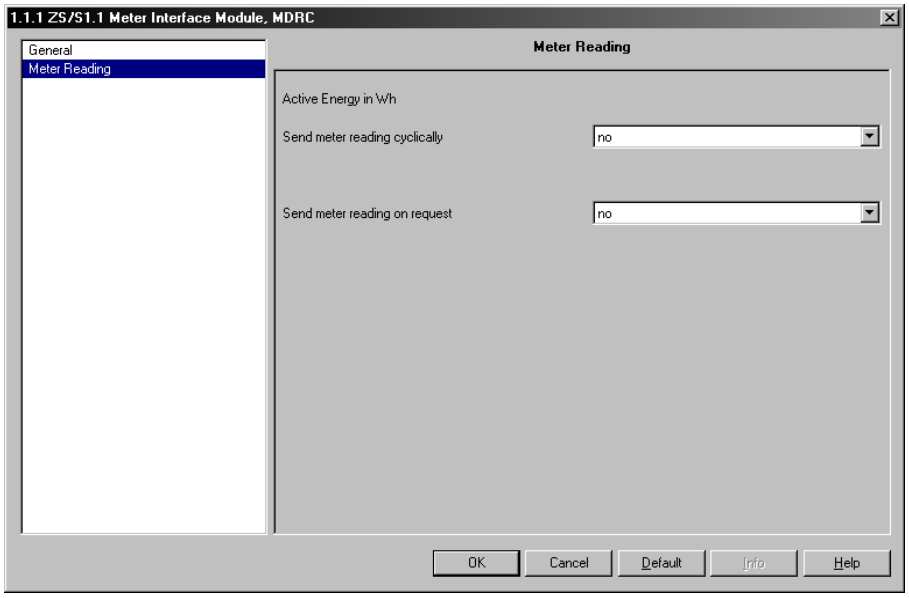



Fig. 19: Parameter window “Meter Reading”

In this parameter window the sending behaviour of the meter reading is defined. The meter reading is always sent as a **secondary value** with directly connected meters. On transformer rated meters the meter readings or energy consumption values can also be sent as primary values via an 8-Byte communication object.

Reading of the actual meter readings can be implemented by reading the object values via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS. The option of cyclically sending the meter readings or sending requests continues to apply.

The meter readings are sent via a 4-Byte communication object with a resolution of 1 Wh. Thus meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) can be sent. If the meter values are received from the connected meter which are greater than the maximum value, the maximum value of 2,147,483,647 Wh is always sent.

#### Send meter reading cyclically

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

Options:
- no
- yes

*yes:* The parameter *Cycle time in s* is displayed. Using this parameter the send interval at which the meter reading/meter readings are to be sent is/are set. Multiple meters which send with the same cycle time can send at staggered times using the sending delay time (if it is parameterised) in order to avoid possible communication problems.

Cyclical sending is interrupted as soon as communication to the energy meters can not be established.

**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 a reset, after bus voltage recovery or tariff switching, i.e. after each of these events the parameterised sending delay time waits before the cyclic sending delay commences. With each subsequent send only the cyclic rhythm is observed as the meters now send with a time offset.

**Send meter reading on request**

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

Options:
- no
- yes

*yes:* The communication object *Request Meter Reading* is displayed.
This object enables active reading of the momentary meter readings.
After receiving a meter request telegram with the value “1” the meter reading is sent after a send delay (if parameterised) via the ABB i-bus. The send delay time prevents simultaneous sending of telegrams, if multiple meters react to the same meter reading request telegram.

### 3.7 Communication objects ODIN

| Number | Name | Object Function | Length | C | R | W | T | U |
|---|---|---|---|---|---|---|---|---|
| 0 | Input Telegram | Request Status Values | 1 bit | C | - | W | T | - |
| 1 | Output Telelgram | In Operation | 1 bit | C | R | - | T | - |
| 2 | Output Telelgram | Status Byte | 1 Byte | C | R | - | T | - |
| 3 | Output Telelgram | Error Signal | 1 bit | C | R | - | T | - |
| 4 | Output Telelgram | Meter Type | 1 Byte | C | R | - | T | - |
| 5 | Output Telelgram | False Meter Type | 1 bit | C | R | - | T | - |
| 10 | Input Telegram | Request Meter Reading | 1 bit | C | - | W | T | - |
| 11 | Output Telelgram | Meter Reading, Active Energy | 4 Byte | C | R | - | T | - |
| 65 | Output Telelgram | Transformer Ratio Current | 2 Byte | C | R | - | T | - |

Fig. 20: Communication objects ODIN

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **0** | **Input Telegram** | **Request Status Values** | **1 Bit EIS 1 DPT 1.017** | **C, R, T** |
| If a telegram with the value “1” is received on this 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 objects are sent on request:<br>No. 2 Status Byte<br>No. 3 Error Message<br>No. 4 Meter Type<br>No. 5 False Meter Type<br>No. 6 Send Power Fail Counter | | | | |
| **1** | **Output telegram** | **In Operation** | **1 Bit EIS 1 DPT 1.001** | **C, R, T** |
| The Meter Interface Module cyclically sends telegrams with the value “1” or “0” on this object. This telegram can be used by other devices to monitor functions. If for example, the telegram with the value “1” is sent to an actuator with a staircase lighting function, the failure of the Meter Interface Module can be signaled by the absence of the telegram. This object is activated by the parameter“Send object "in operation". | | | | |

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **2** | **Output telegram** | **Status Byte** | **8 Bit Non EIS** | **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. 6 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 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 object value can be read out via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS.

The object is also sent after bus voltage recovery, programming and ETS bus reset.

The status byte code table in chapter 5.1 enables quick decoding of the telegram code for the corresponding error type.

Telegram code: 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 DELTAplus)
- 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

Telegram value: „0": Not activated
„1“: Activated

* only with meter type DELTAsingle in operation

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **3** | **Output telegram** | **Error Signal** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

On this communication object an error message in the form of a common error signal is sent on the bus. An error message can have many causes and can be decoded with the assistance of the status byte. The object is sent as soon as a bit of the object “Status byte“ is set to “1”. If the errors have been corrected and the status byte has the value “0”, the object “Error Signal” also sends a telegram with the value “0”. Thus the correction of the error can be indicated. The object is also sent after bus voltage recovery, programming and ETS bus reset.

Telegram value: „0": No error
„1“: Error

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **4** | **Output telegram** | **Meter Type** | **8 Bit Non EIS** | **C, R, T** |

Via this object it is possible to read out the meter type connected to the Meter Interface Module:

Telegram value:
„0": DELTAplus
„1“: DELTAsingle
„2“: ODIN
„3“: ODINsingle

„254“: Unknown meter
„255“: No meter connected

In order to obtain the actual value/connected meter, the object value can be read out via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS. The object is also sent after bus voltage recovery, programming and ETS bus reset.

| | | | | |
|---|---|---|---|---|
| **5** | **Output telegram** | **False Meter Type** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

The Meter Interface Module cyclically scans the connected meters. If the meter parameterised in the ETS does not correspond with the connected meter, this object is sent.

Telegram value:
„0": Parameterisation OK
„1“: False Meter Type parameterised

| | | | | |
|---|---|---|---|---|
| **10** | **Input telegram** | **Request Meter Reading** | **1 Bit EIS 1 DPT 1.017** | **C, W, T** |

The momentary meter reading is requested via the telegram with the value “1” on this communication object. The request applies for the object No. 11. The momentary values are sent on the bus after the sending delay time (if parameterised).

Telegram value:
„0": Nno function
„1“: Request Meter Reading

| | | | | |
|---|---|---|---|---|
| **11** | **Output telegram** | **Meter Reading, Active Energy*** | **4 Byte EIS 11 DPT 13.010 or 8 Byte Non EIS DPT 29.010** | **C, R, T** |

On these communication objects the momentary meter reading for active energy is sent. The object is also sent after bus voltage recovery, programming and ETS bus reset.

With the 4-byte objects meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh are sent. If the meter values received from the connected meter which 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) is always sent.

If a transformer rated meter is used, the energy consumption values of the active energy can be sent as 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.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **65** | **Output telegram** | **Transformer Ratio Current** | **2 Byte EIS 10 DPT 7.001** | **C, R, W** |
| The interface sends the adjusted meter transformer ratio on this communication object. This object is only displayed if a transformer rated energy meter has been selected in the parameter window “General” beforehand. The transformer ratio is sent after bus voltage recovery, after a reset after programming and with a change. | | | | |

## 3.8 Parmeter window ODINsingle

In the following sections the individual parameter windows with their respective parameters and communication objects are described.
For this purpose the meter type “ODIN” must be selected in the “General” parameter window. Underlined parameter values are the factory default settings.

### 3.8.1 Parmeter window „General“

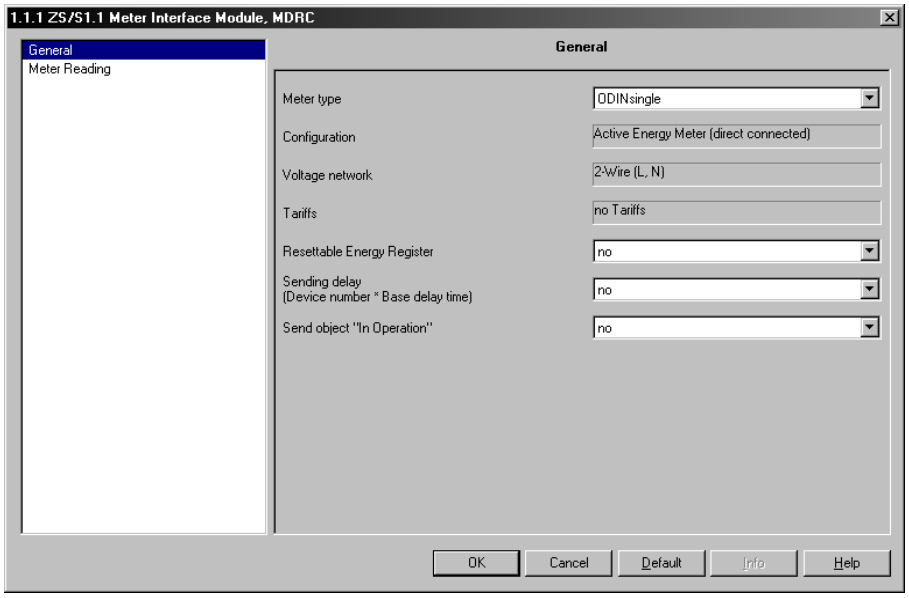



Fig. 21: Parameter window „General“

**Meter type**

Options:
- DELTAplus
- DELTAsingle
- ODIN
- ODINsingle

The energy meter connected to the interface is selected using these parameters. The communication objects and parameter pages for the respective meter type are displayed to suit the selected meter type. If the option “ODIN” is selected the following parameters and parameter pages are displayed.
The parameters windows for the meter types DELTAplus, DELTAsingle and ODINsingle are described in chapters 3.2, 3.4 and 3.6 respectively.

**Configuration**

- Active Energy Meter (direct connected)

**Voltage network**

- 2-Wire (L, N)

**Tariffs**

- no Tariffs

**Resettable Energy Register**

Options: - no
- yes

ODINsingle type OD1365 includes a resettable energy register. With this energy register, e.g. a power consumption value of an accounting period can be read out and set to 0 kWh via KNX. Further the number of resets will be counted and sent.

*yes:* The following communication objects belonging to this energy register will be displayed.

- *Meter reading, Resettable* (No.12)
- *Reset Resettable Energy* (No. 67)
- *Number of Resets* (No. 68)

**Sending delay**
**(Device number * Base delay time)**

Options: - no
- yes

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

*no:* The telegrams are sent without a delay, i.e. telegrams are sent immediately after a value is requested (e.g. via the communication object *Request Meter Reading*) via the ABB i-bus.

*yes:* The parameters *Device number* and *Base delay time* for setting the sending delay are displayed. After every request of a value the information is sent via the ABB i-bus after the adjusted sending delay has elapsed. The sending delay is started after every reset, after bus voltage recovery and after tariff switching. The sending delay 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 *Device number* parameter. With a simultaneous meter reading request via the communication object *Request Meter Reading* the meters of the device series send their readings via the ABB i-bus.

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

**Device number**
**[1...255]**

Options: 1…255

For assigning 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 "0" cyclically
- send value "1" cyclically

With the *in operation* object correct function of the device can be assured by monitoring the cyclic sending of the object value by another bus device.

*send value "0" / “1” cyclically:* The object *In operation* and the parameter *Cycle time in s* will be displayed.

**Cycle time in s**
**[1…65.535]**

Options: 1…60…65.535

With this parameter the time interval is set with which the object *In operation* cyclically sends a telegram with the value “0” or “1”.

### 3.8.2 Parameter window „Meter Reading“

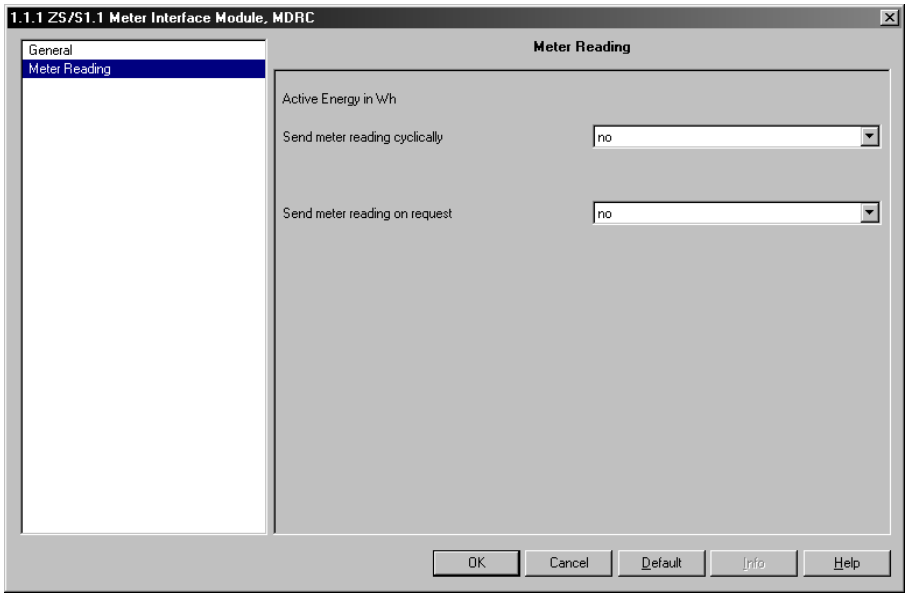



Fig.22: Parameter window „Meter Reading“

In this parameter window the sending behaviour of the meter reading is defined. The meter reading is always sent as a **secondary value** with directly connected meters. On transformer rated meters the meter readings or energy consumption values can also be sent as primary values via an 8-Byte communication object.

Reading of the actual meter readings can be implemented by reading the object values via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS. The option of cyclically sending the meter readings or sending requests continues to apply.

The meter readings are sent via a 4-Byte communication object with a resolution of 1 Wh. Thus meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) can be sent. If the meter values are received from the connected meter which are greater than the maximum value, the maximum value of 2,147,483,647 Wh is always sent.

#### Send meter reading cyclically

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

Options: - no
- yes

*yes:* The parameter *Cycle time in s* is displayed. Using this parameter the send interval at which the meter reading/meter readings are to be sent is/are set. Multiple meters which send with the same cycle time can send at staggered times using the sending delay time (if it is parameterised) in order to avoid possible communication problems.

Cyclical sending is interrupted as soon as communication to the energy meters can not be established.

**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 a reset, after bus voltage recovery or tariff switching, i.e. after each of these events the parameterised sending delay time waits before the cyclic sending delay commences. With each subsequent send only the cyclic rhythm is observed as the meters now send with a time offset.

**Send meter reading on request**

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

Options:
- no
- yes

*yes:* The communication object *Request Meter Reading* is displayed. This object enables active reading of the momentary meter readings. After receiving a meter request telegram with the value “1” the meter reading is sent after a send delay (if parameterised) via the ABB i-bus. The send delay time prevents simultaneous sending of telegrams, if multiple meters react to the same meter reading request telegram.

### 3.9 Communication Objects ODINsingle

| Number | Name | Object Function | Length | C | R | W | T |
|---|---|---|---|---|---|---|---|
| 0 | Input Telegram | Request Status Values | 1 bit | C | - | W | T |
| 1 | Output Telelgram | In Operation | 1 bit | C | R | - | T |
| 2 | Output Telelgram | Status Byte | 1 Byte | C | R | - | T |
| 3 | Output Telelgram | Error Signal | 1 bit | C | R | - | T |
| 4 | Output Telelgram | Meter Type | 1 Byte | C | R | - | T |
| 5 | Output Telelgram | False Meter Type | 1 bit | C | R | - | T |
| 6 | Output Telelgram | Send Power Fail Counter | 1 Byte | C | R | - | T |
| 7 | Input Telegram | Reset Power Fail Counter | 1 bit | C | - | W | T |
| 10 | Input Telegram | Request Meter Reading | 1 bit | C | - | W | T |
| 11 | Output Telelgram | Meter Reading, Active Energy | 4 Byte | C | R | - | T |
| 12 | Output Telelgram | Meter Reading, Resettable | 4 Byte | C | R | - | T |
| 67 | Input Telegram | Reset Resettable Energy | 1 bit | C | - | W | T |
| 68 | Output Telelgram | Number of Resets | 4 Byte | C | R | - | T |

Fig. 23: Communication objects ODINsingle

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **0** | **Input Telegram** | **Request Status Values** | **1 Bit EIS 1 DPT 1.017** | **C, R, T** |
| If a telegram with the value “1” is received on this 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 objects are sent on request:<br>No. 2 Status Byte<br>No. 3 Error Signal<br>No. 4 Meter Type<br>No. 5 False Meter Type<br>No. 6 Send Power Fail Counter | | | | |
| **1** | **Output telegram** | **In Operation** | **1 Bit EIS 1 DPT 1.001** | **C, R, T** |
| The Meter Interface Module cyclically sends telegrams with the value “1” or “0” on this object. This telegram can be used by other devices to monitor functions. If for example, the telegram with the value “1” is sent to an actuator with a staircase lighting function, the failure of the Meter Interface Module can be signalled by the absence of the telegram. This object is activated by the parameter “Send object ‘in operation’ ". | | | | |

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **2** | **Output telegram** | **Status Byte** | **8 Bit Non EIS** | **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. 6 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 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 object value can be read out via “Value_Read”, e.g. with the assistance of the KNX Tool software ETS.

The object is also sent after bus voltage recovery, programming and ETS bus reset.

The status byte code table in chapter 5.1 enables quick decoding of the telegram code for the corresponding error type.

Telegram code: 76543210

- 7: End value of Meter Reading, Active Energy reached
- 6: End value of Meter Reading, Reactive Energy reached (only with DELTAplus)
- 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 *

Telegram value:
- „0": Not activated
- „1“: Activated

* only with meter type DELTAsingle in operation

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **3** | **Output telegram** | **Error Signal** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

On this communication object an error message in the form of a common error signal is sent on the bus. An error message can have many causes and can be decoded with the assistance of the status byte or by reading out the error code (see chapter 5.3) of the meter. The object is sent as soon as a bit of the object “Status byte“ is set to “1”. If the errors have been corrected and the status byte has the value “0”, the object “Error Signal” also sends a telegram with the value “0”. Thus the correction of the error can be indicated. The object is also sent after bus voltage recovery, programming and ETS bus reset.

Telegram value:
- „0": No error
- „1“: Error

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **4** | **Output telegram** | **Meter Type** | **8 Bit Non EIS** | **C, R, T** |

Via this object it is possible to read out the meter type connected to the Meter Interface Module:

Telegram value:
„0": DELTAplus
„1": DELTAsingle
„2": ODIN
„3": ODINsingle
"other": Reserved
„254": Unknown meter
„255": No meter connected

In order to obtain the actual value/connected meter, the object value can be read out via "Value_Read", e.g. with the assistance of the KNX Tool software ETS. The object is also sent after bus voltage recovery, programming and ETS bus reset.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **5** | **Output telegram** | **False Meter Type** | **1 Bit EIS 1 DPT 1.005** | **C, R, T** |

The Meter Interface Module cyclically scans the connected meters. If the meter parameterised in the ETS does not correspond with the connected meter, this object is sent. The object will continue to be sent with a change.

Telegram value:
„0": Parameterisation OK
„1": False Meter Type parameterised

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **6** | **Output telegram** | **Send Power Fail Counter** | **1 Byte EIS 14 DPT 5.010** | **C, R, T** |

The interface sends the momentary number of mains power failures on this comunication 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 also sent with a change, after bus voltage recovery, programming and ETS bus reset.

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **7** | **Input telegram** | **Reset Power Fail Counter** | **1 Bit EIS 1 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 10 seconds. If the deletion proces fails object No. 6 is sent again. If the erasing procedure is successful, object No. 6 is also sent.

Telegram value:
„0": No function
„1": Reset power fail counter

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **10** | **Input telegram** | **Request Meter Reading** | **1 Bit EIS 1 DPT 1.017** | **C, W, T** |

Via this communication object the read request for the momentary meter reading or the meter readings on the meter is sent. The read request applies for the objects No. 11 -15. The momentary meter readings – depending on the meters used - are sent on the bus after the send delay time (if parameterised).

Telegram value:
„0": no function
„1": Request Meter Reading

| No. | Object name | Function | Data type | Flags |
|---|---|---|---|---|
| **11** | **Output telegram** | **Meter reading, Active Energy** | **4 Byte EIS 11 DPT 13.010** | **C, R, T** |
| On this communication object the momentary meter reading for active energy is sent. The object is also sent after bus voltage recovery, programming and ETS bus reset.<br>With the 4-byte objects meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh are sent. If the meter values received from the connected meter which 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) is always sent. | | | | |
| **12** | **Output telegram** | **Meter reading, Resettable** | **4 Byte EIS 11 DPT 13.010** | **C, R, T** |
| On this communication object the momentary meter reading for active energy is sent. The object is also sent after bus voltage recovery, programming and ETS bus reset.<br>Note: This object can only be used with ODINsingle Type OD1365.<br>With the 4-byte objects meter readings up to a max. of 2,147,483,647 Wh (2.147 GWh) and a resolution of 1 Wh are sent. If the meter values received from the connected meter which 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) is always sent. | | | | |
| **67** | **Iput telegram** | **Reset Resettable Energy** | **1 Bit EIS 1 DPT 1.017** | **C, W, T** |
| If a telegram with the value „1“ will be received on this object,the resettable energy register (object. No. 12) will be set to 0 kWh. This can take up to 10 seconds. If the reset process failed objects No. 1, 12 and 68 will be sent again. Obcet No. 12 will also be sent if the reset process was effective.<br>Note: This object can only be used with ODINsingle Type OD1365.<br>Telegram value: „0": no function<br>„1“: Reset resettable meter reading | | | | |
| **68** | **Output telegram** | **Send Number of Resets** | **1 Byte EIS 14 DPT 5.010** | **C, R, T** |
| With this object the number of resets of the resettable nergy register can be sent via the Meter Interface Module. The number of resets will by sent if the resettable energy register was reseted via bus communcation or via the reset push button on the meter and after bus voltage recovery.<br>Note: This object can only be used with ODINsingle Type OD1365. | | | | |

# 4 Planning and application

## 4.1 Overview Energy meters

A detailed overview and ordering details of all available energy meters can be found under www.abb.se > Products & services > Modular DIN Rail Products > Electricity Meters.

### 4.1.1 DELTAplus

ABB offers a comprehensive range of energy meters of the DELTAplus type. In the following an overview of the available device configurations suitable for connection to the Meter Interface Module is provided:

| 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 (transformer rated) | | A | | | | |
| Active energy meter with direct connection | | B | | | | |
| Combination meter (transformer rated) | | C | | | | |
| Combination meter with direct connection | | D | | | | |
| **Communication** | | | | | | |
| Pulse output, IR-communication | | | B | | | |
| **Accuracy** | | | | | | |
| Class 1 | | | | 1 | | |
| Class 2 | | | | 2 | | |
| **Voltage** | | | | | | |
| 1 x 57 - 288 V (2-wire; L, N) | | | | | 1 | |
| 3 x 100 -500 V (3-wire; L1, L2, L3) | | | | | 2 | |
| 3 x 57-288 / 100-500 V (4-wire; L1, L2, L3, N) | | | | | 3 | |
| **Optional functions** | | | | | | |
| No options | | | | | | x00 |
| 2 tariffs switching only via 1 input (230 V) | | | | | | xx1 |
| 4 tariff switching only via 2 inputs (230 V) | | | | | | xx2 |
| 2 tariffs switching via IR communication (ZS/S) | | | | | | xx3 |
| 4 tariffs switching via IR communication (ZS/S) | | | | | | xx4 |
| 2 tariffs switching via internal clock or IR communication (ZS/S), time dependent functions* | | | | | | xx5 |
| 4 tariffs switching via internal clock or IR communication (ZS/S}, time dependent functions* | | | | | | xx6 |
| Time dependent functions* | | | | | | xx7 |
| 2 tariffs switching via 1 input, time dependent functions* | | | | | | xx8 |
| 4 tariff switching via 2 inputs, time dependent functions* | | | | | | xx9 |
| 2 inputs (40 V)* | | | | | | x2x |
| 2 inputs (230 V)* | | | | | | x4x |
| 1 input / 1 output (230 V)* | | | | | | x5x |
| 1 input / 1 output (40 V)* | | | | | | x6x |
| 2 pulse outputs in combination meters, 1 in all others (230 V)* | | | | | | x7x |

* S0 meter pulses and time dependent functions can not be processed via the Meter Interface Modue.

### Common directly connected energy meters, 5(80)A

Verified and approved according MID, IEC approval

| Voltage [V] | Energy | Class | Tariffs | Type | Order No. |
|---|---|---|---|---|---|
| 3x57-288/ 100-500 | Active energy | 2 | - | DBB23000 | 2CMA 180 800 R1000 |
| | Active energy | 2 | 2 | DBB23001 | 2CMA 180 811 R1000 |
| | Active energy | 2 | 4 | DBB23002 | 2CMA 180 813 R1000 |
| | Active energy | 1 | - | DBB13000 | 2CMA 180 801 R1000 |
| | Active energy | 1 | 2 | DBB13001 | 2CMA 180 812 R1000 |
| | Active energy | 1 | 4 | DBB23004 * | Beginning 2008 |
| | Active energy | 2 | 4 | DBB23006 * | 2CMA 139 394 R1000 |
| | Active & reactive energy | 1 | - | DDB13000 | 2CMA 180 810 R1000 |
| | Active energy | 2 | - | DBB23007 | 2CMA 139 261 R1000 |
| 3x100-500 | Active energy | 2 | - | DBB22000 | 2CMA 180 802 R1000 |
| | Active energy | 2 | 2 | DBB22001 | 2CMA 180 814 R1000 |
| | Active energy | 2 | 4 | DBB22002 | 2CMA 180 815 R1000 |
| 1x57-288 | Active energy | 2 | - | DBB21000 | 2CMA 180 804 R1000 |
| | Active energy | 2 | 2 | DBB21001 | 2CMA 180 816 R1000 |
| | Active energy | 1 | 2 | DBB21002 | 2CMA 180 817 R1000 |
| | Active energy | 1 | 2 | DBB11001 | 2CMA 180 818 R1000 |

* tariff switching possible via ZS/S

### Common energy meters (transformer rated /1A and /5A)

Verified and approved according MID, IEC approval

| Voltage [V] | Energy | Class | Tariffs | Type | Order No. |
|---|---|---|---|---|---|
| 3x57-288/ 100-500 | Active energy | 1 | - | DAB13000 | 2CMA 180 806 R1000 |
| | Active & reactive energy | 1 | - | DCB13000 | 2CMA 180 808 R1000 |
| | Active energy | 1 | 2 | DAB13001 | 2CMA 180 870 R1000 |
| | Active & reactive energy | 1 | 2 | DCB13001 | 2CMA 180 872 R1000 |
| | Active energy | 1 | 4 | DAB13002 | 2CMA 180 871 R1000 |
| | Active & reactive energy | 1 | 4 | DCB13002 | 2CMA 180 873 R1000 |
| | Active energy | 1 | 4 | DAB13004 * | 2CMA 139 460 R1000 |
| | Active energy | 1 | 4 | DAB13006 * | 2CMA 139 392 R1000 |
| | Active energy | 1 | - | DAB13007 | 2CMA 139 305 R1000 |
| 3x100-500 | Active energy | 1 | - | DAB12000 | 2CMA 180 807 R1000 |
| | Active & reactive energy | 1 | - | DCB12000 | 2CMA 180 809 R1000 |
| 1x57-288 | Active energy | 1 | - | DAB11000 | 2CMA 180 819 R1000 |
| | Active & reactive energy | 1 | - | DCB11000 | 2CMA 137 601 R1000 |

* tariff switching possible via ZS/S

### 4.1.2 DELTAsingle

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

| Voltage [V] | Energy | Class | Tariffs | Type | Order No. |
|---|---|---|---|---|---|
| 230 | Active energy | 1 | - | FBU11200 | 2CMA 180 891 R1000 |
| | Active energy | 1 | - | FBB11200* | 2CMA 180 892 R1000 |
| | Active energy | 1 | 2 | FBU11205 | 2CMA 180 893 R1000 |
| | Active energy | 1 | 2 | FBB11205* | 2CMA 180 894 R1000 |
| | Active energy | 1 | 4 | FBU11206 | 2CMA 180 895 R1000 |
| | Active energy | 1 | 4 | FBB11206* | 2CMA 180 896 R1000 |

Verified and approved according MID, IEC approval

* DELTAsingle with pulse output

### 4.1.3 ODIN

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

**ODIN directly connected up to 65 A, 3-phase**

| Voltage [V] | Energy | Class | Tariffs | Type | Order No. |
|---|---|---|---|---|---|
| 230/400 | Active energy | 2 | - | OD4165 | 2CMA 131 024 R1000 |

**ODIN transformer rated, 3-phase**

| Voltage [V] | Energy | Class | Tariffs | Type | Order No. |
|---|---|---|---|---|---|
| 230/400 | Active energy | 2 | - | OD4110 | 2CMA 131 025 R1000 |

### 4.1.4 ODINsingle

The following energy meters type ODINsingle can be read out and used with the Meter Interface Module ZS/S:

**DIrectly connected (1 phase + N, 230 V ~)**

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

**DIrectly connected (1 phase + N, 230 V ~) with resettable energy register**

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

## 4.2 Behaviour after bus voltage recovery, download and bus reset

| | Behaviour after | | |
|---|---|---|---|
| | **Bus voltage recovery (BW)** | **Programming** | **ETS bus reset "Reset device"** |
| **Sending Delay** | Active, if parameterised | Active, if parameterised | Active, if parameterised |
| **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 | Is sent as soon as the change value under parameter "Send power values on change " ≥ ±1 | Is sent as soon as the change value under parameter "Send power values on change " ≥ ±1 | Is sent as soon as the change value under parameter "Send power values on change " ≥ ±1 |
| **Instrument Values** [2] Current, voltage, frequency, phase angle (I, U) | Is sent as soon as the change value under parameter "Send instrument values on change " ≥ 1 | Is sent as soon as the change value under parameter "Send instrument values on change " ≥ 1 | Is 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 Signal** | 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 parameterised energy meter (meter type, configuration, tariffs).

[2] Power and instrument values are sent depending on the parameterised configuration of the DELTAplus meter of type.

[3] Tariffs and power failures are not sent by energy meter types ODIN.

[4] Transformer ratios can only be sent with type DELTAplus and ODIN meters.

Note:

* In order to avoid short failures of the bus voltage, we recommend the use of an uninterruptable power supply (e.g. SU/S 30.640.1).

### 4.3 LED display

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

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

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

| LED | Status | Description |
|---|---|---|
| LED (red) Error | Flashes | Parameterised 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 |

Table 3: LED states

# 5 Appendix

## 5.1 Status byte code table

| Diagnostic value | Hexadecimal | End value meter reading active energy | End value meter reading reactive energy | 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 | 0A | | | | | ■ | | ■ | |
| 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 | 1A | | | | ■ | ■ | | ■ | |
| 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 | 2A | | | ■ | | ■ | | ■ | |
| 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 | 3A | | | ■ | ■ | ■ | | ■ | |
| 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 | 4A | ■ | | | | ■ | | ■ | |
| 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 | 5A | | | | ■ | | ■ | ■ | |
| 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 | 6A | | | | ■ | ■ | ■ | ■ | |
| 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 | 7A | | | | ■ | ■ | ■ | ■ | |
| 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 | 8A | ■ | | | | | ■ | ■ | |
| 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 | 9A | ■ | | | | ■ | ■ | ■ | |
| 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 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

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

Table 4: Status byte code table

### 5.2 DELTAplus error codes

Energy meters of type DELTAplus can indicate installation and connection faults on the display of the meter in the form of 3-digit number 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<br><br>Note: - reverse polarity of current connection<br>- direction of current flow through the current transformer is incorrect<br>- phase voltages incorrectly connected<br>- current transformer connected to incorrect current input |
| 124 | Power in phase 2 is negative<br><br>Note: - reverse polarity of current connection<br>- direction of current flow through the current transformer is incorrect<br>- phase voltages incorrectly connected<br>- current transformer connected to incorrect current input |
| 125 | Power in phase 3 is negative<br><br>Note: - reverse polarity of current connection<br>- direction of current flow through the current transformer is incorrect<br>- phase voltages incorrectly connected<br>- current transformer connected to incorrect current input |
| 126 | Total effective power is negative<br><br>Note: - reverse polarity of one or more current connections<br>- direction of current flow through one or more current transformers is incorrect<br>- phase voltages incorrectly connected<br>- current transformer connected to incorrect current input |
| 128 | Phase voltage connected to neutral conductor “N” on meter (terminal 11)<br><br>Note: Incorrect connection of phase voltage and neutral conductor |

Table 5: DELTAplus error codes

### 5.3 DELTAsingle error codes

Energy meters of type DELTAsingle can indicate installation and connection faults on the display of the meter in the form of 3-digit number 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 | Tariff incorrectly set |
| 600 | Single phase meter |
| 601 | Two phase mater |
| 602 | Three phase mater |
| 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) |

Table 6: DELTAsingle error codes

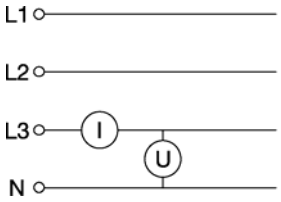
## 5.4 Energy measurement

### 5.4.1 Measurement fundamentals

Different measurement methods are used with meters depending on the type involved. 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).

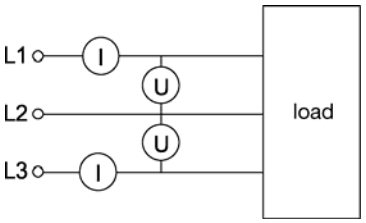



$P = 3 \cdot I_{L3} \cdot U_{L3}$

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

**Measurement process with 2 measuring elements**

These methods are used in three-phase networks without a neutral conductor (three conductor network) with the same or any load.




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

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

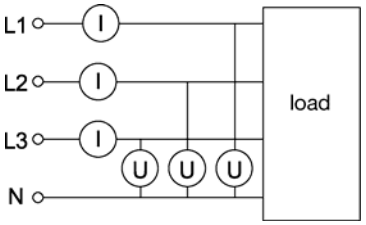
$P = U_{L1} \cdot I_{L1} - U_{L2} (I_{L1} + I_{L3}) + U_{L3} \cdot I_{L3}$

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

These measurement processes (with 2 measuring elements) are 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**

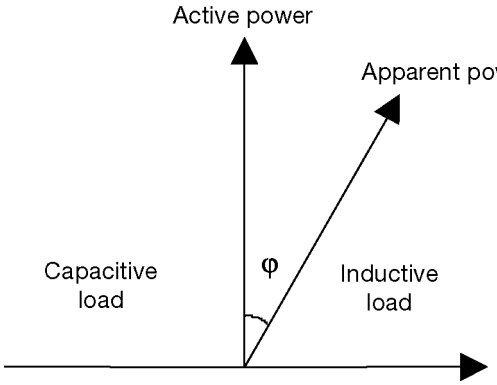
These methods are used in three-phase networks with neutral conductor (four-conductor networks). However, it can be used in networks without neutral conductor, provided that an artificial star point is provided.




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

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

**Active & reactive power:** Capacitive or inductive loads result in a phase angle shift between the phase current and the phase voltage.

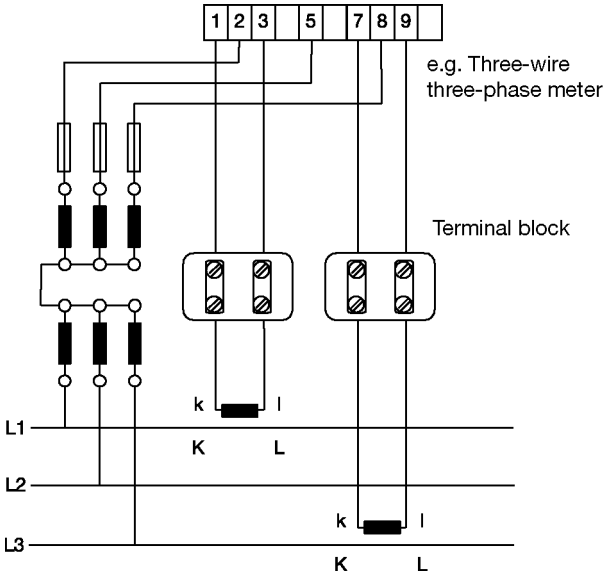



Active power = U x I x cos φ
Reactive power = U x I x sin φ
Apparent power = U x I

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.

### 5.4.2 Measurements with current and/or voltage transformers

Um in Installationen mit Strömen und Spannungen außerhalb des Nennmessbereiches der EIB Delta-Meter den Energieverbrauch zu messen, müssen Strom- und/oder Spannungswandler eingesetzt werden.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. Wichtig ist, dass die sekundären Ströme und Spannungen der Messwandler innerhalb der zugelassenen Messbereiche der Wandlerzähler liegen.It is important that the secondary currents and voltages of the measurement transformer are within the permissible approved measurement range of the meter transformer.
Um die gewünschte Gesamtgenauigkeit zu garantieren, sollten die ausgewählten Wandler eine höhere Genauigkeitsklasse als der eingesetzte Zähler haben.In order to ensure the required accuracy the selected transformer should have a higher accuracy class than the meter which is used. Es ist zu beachten, dass die Stromwandler mit der korrekten Polarität (K1 → L1, k1 → l1) angeschlossen werden.Please note
that the current transformer 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.

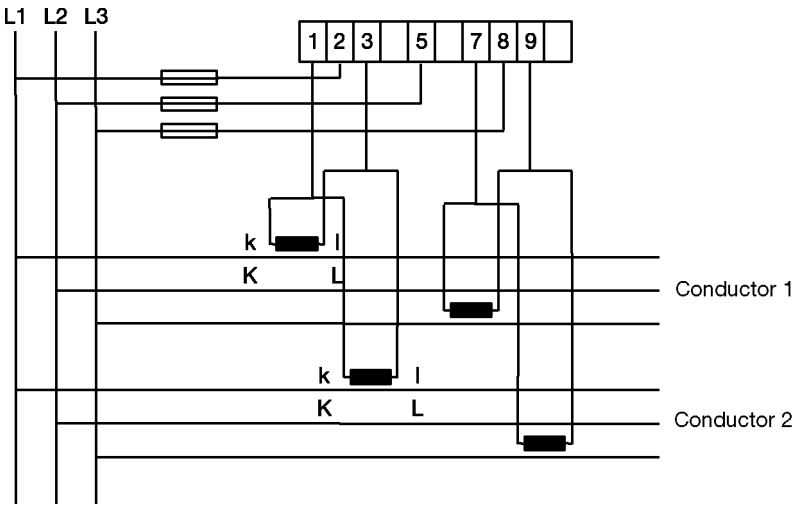
**Power consumption of the secondary measurement cables:** If a current transformer of an meter is connected in series, the power consumption of the secondary measurement cables must be considered during design of the current transformer in order to obtain the correct measurement values.
The 'current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

The following applies: $S_{sec}$ M $S_{cable}$ + $S_{meter}$ S = apparant 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 transformer must be connected using the correct polarity (K1 → L1, k1 → l1).

### 5.4.3 Energy calculation

The energy consumption can be read off both from the LCD display of the meter as well as with the assistance of the KNX communication interface, and recorded and processed at a remote point.

On directly connected 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:

Directly connected meter 1000 pulses/kWh(kvarh)
Transformer rated meter 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: | 250/5A |
| Voltage transtormer 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):**

$$VT = \frac{\text{Primary voltage } (U_p)}{\text{Secondary voltage } (U_s)} = \frac{600\ V}{100\ V} = \mathbf{6}$$

**Current transformer ratio (CT):**

$$CT = \frac{\text{Primary current } (I_p)}{\text{Secondary current } (I_s)} = \frac{250\ A}{5\ A} = \mathbf{50}$$

**Secondary power ($P_s$):**

$$P_S = \frac{\sqrt{3} \bullet U \bullet I \bullet \cos\varphi}{1000} = \frac{\sqrt{3} \bullet 100\ V \bullet 3\ A \bullet 0{,}9}{1000} = 0.47\ kW$$

**Primary power ($P_p$):**

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

**LED/LCD flash frequency ($B_f$):**

$$Bf = \frac{Ps \bullet Zk}{3600} = \frac{0{,}47\ kW \bullet 5000\ Imp/kWh}{3600} = 0.65\ Hz$$

**LED/LCD flash period ($B_p$):**

$$Bp = \frac{1}{Bf} = \frac{1}{0{,}65\ Hz} = \mathbf{1{,}53\ s}$$

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

### 5.5 Ordering Information

| **Short description** | Designation | Order No. | **bbn 40 16779 EAN** | Price group | Unit weight 1 pc. [kg] | Packaging [pc] |
|---|---|---|---|---|---|---|
| **ZS/S 1.1** | Meter Interface Module, MDRC | 2CDG 110 083 R0011 | 66207 9 | 26 | 0,1 | 1 |

Publication No. 2CDC 512 066 D0201b
Replaces 2CDC 512 066 D0201



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