

# ABB i-bus® EIB EIB Delta-Meter Electricity Meters

Intelligent Installation Systems



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Technical specifications are subject to change without prior notice.

## 1 General information

### 1.1 General description



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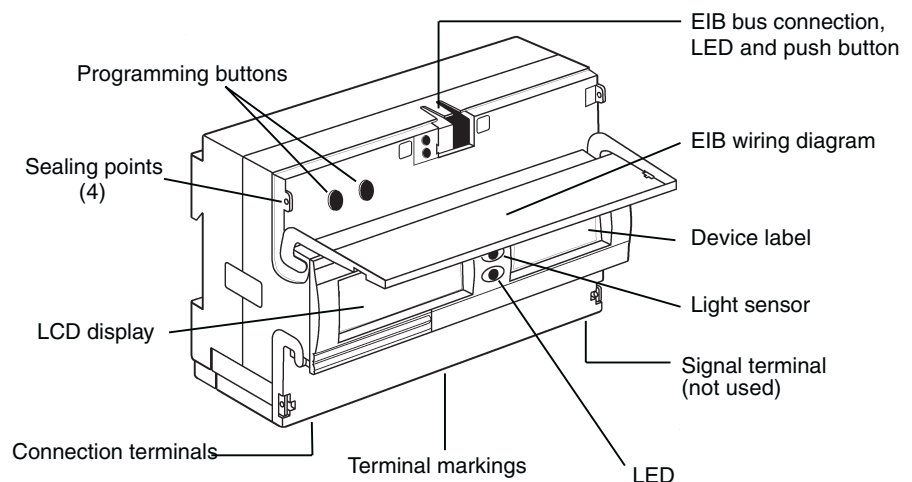
The EIB Delta-Meters are a new generation of certified, electronic, electricity meters with an integrated ABB i-bus® EIB communication interface.

The new EIB Delta-Meters are compact, reliable, immune to interference impulses and suitable for use in single-phase and polyphase voltage networks. As the meters have no mechanical moving parts, they can easily be mounted in any position onto DIN rails according to EN 50022. The EIB communication interface allows remote reading of the meter data via the ABB i-bus® EIB for billing, energy optimisation, visualisation or installation monitoring purposes.

They can be universally employed for submetering applications in industrial installations, commercial buildings, offices, leisure complexes and private households.

#### Special features:

- Precise measurement of energy consumption (kWh, kvarh with combination meter)
- For 2-, 3- and 4-wire voltage networks with any load
- Integrated EIB interface for remote reading of meter data
- Network monitoring function: recording and display of up to 24 electrical measured variables
- Automatic wiring check with an installation self-test
- Easy to read LCD display, LED indicator for energy consumption
- Direct connection up to 65 A (measuring range of 0.05 A to 65 A)
- Transformer connection (/1A or /5 A) with transformer rated meter
- Accuracy classes 1 or 2
- Tariff meter with 4 tariffs
- Fulfils standards IEC 1036/1268
- Resistant to shocks and vibration, can be mounted in any position
- System pro *M* design: can be snapped onto 35 mm DIN rail, sealable





**1.2 Technical Data**

<b>Accuracy class:</b>	Active energy meter:	Class 1 or 2 according to IEC 1036
	Reactive energy meter:	Class 2 according to IEC 1268
<b>Operating voltage:</b>	Nominal voltage:	See selection table
	Permitted deviation:	– 20% ... +15%
<b>Nominal current <math>I_b</math> (limit current <math>I_{max}</math>):</b>	Transformer rated meter: (/1 A or /5 A transformer)	1(6) A for class 1, 2(6) A for class 2
	Direct connected meter:	5(65) A for class 1 and 2
<b>Starting current:</b>	Transformer rated meter: (/1 A or /5 A transformer)	< 2 mA for class 1, < 4 mA for class 2
	Direct connected meter:	< 25 mA
<b>Power consumption:</b>	Voltage circuit:	
	– Two-wire meter	< 2 VA, 1.5 W
	– Three- and four-wire meter	< 2 VA, 1.5 W per phase
	Current circuit:	
– Transformer rated meter	< 0.01 VA at $I_b = 2$ A	
– Direct connected meter	< 0.01 VA at $I_b = 5$ A	
<b>Frequency:</b>	Nominal frequency:	50 Hz
	Frequency range:	45 Hz ... 65 Hz
<b>Electromagnetic compatibility (EMC):</b>	Surge voltage:	6 kV, 1.2/50 $\mu$ s (IEC 255-4)
	Burst:	4 kV, 5/50 ns (IEC 801-4)
	Electromagnetic fields:	
	– Interference immunity	10 V/m, 150 kHz-1 GHz (IEC 1000-4-3)
	– Emitted radiation	according to CISPR clause 6/7 (150 kHz – 300 MHz)
Electrostatic discharge:	15 kV (IEC 801-2)	
<b>Overload capability:</b>	All meters:	Unlimited $1.2 \times I_{max}$
	Direct connected meter:	1 hour $1.5 \times I_{max}$ 2 sec $15 \times I_{max}$
	– Short circuit	10 kA peak
	Transformer rated meter:	0.5 sec $20 \times I_{max}$
<b>Circuit protection:</b>	Transformer rated meter:	max. 6 A gl
	Direct connected meter:	max. 65 A gl (63 A)

<b>Environmental conditions:</b>	Ambient temperature:	– 5° C ... + 45° C
	Storage temperature:	– 40° C ... + 70° C
	Relative humidity:	< 75% annual average, 95% max. 30 days/year
<b>Mechanical data:</b>	Housing material:	
	– Front window and housing	Polycarbonate
	– Terminal area	Glass-fibre-reinforced polycarbonate
	Dimensions (H x W x D):	96 x 122.5 x 64.8 mm
	Protection class:	II
	Resistance to heat and fire:	Equivalent to IEC 695-2-1
	Protection against penetration of dust and water:	Equivalent to IEC 529
	Test voltage:	Output/housing ↔ earth 2 kV, 50 Hz/min
	Type of protection acc. to DIN VDE 0100:	
	– with long terminal cover	IP51
	– with short terminal cover	IP20
Cable cross-section:		
	– Transformer rated meter	max. 10 mm <sup>2</sup>
– Direct connected meter	max. 25 mm <sup>2</sup>	
Weight:	0.6 kg	
<b>Display:</b>	LCD display:	7-digit, height of figures: 7 mm
	LED indicator:	
	– Transformer rated meter	Red LED, 1000 Imp/kWh (kvarh)
– Direct connected meter	Red LED, 5000 Imp/kWh (kvarh)	
<b>EIB connection:</b>	Communication protocol:	ABB i-bus® EIB (European Installation Bus)
	Number of bus devices:	max. 64 per line (total of over 14,000 possible)
	Transmission medium:	Twisted twin-core cable, YCYM or J-Y(St)Y 2x2x0.8 mm
	Cable lengths:	
	– Total length of a line	≤ 1000 m
	– Between two devices	≤ 700 m
	– Between power supply and device	≤ 350 m
	EMC:	Between meter and EIB terminals
– Surge voltage	6 kV, 1.2/50 μs (IEC 255-4)	
– Burst	4 kV, 5/50 ns (IEC 801-4)	
Operating and display elements:		
– ABB i-bus®, EIB terminal	Bus connection terminal, supplied	
– Red LED and push button	For entering the physical address	
<b>Standards/norms:</b>	Active energy meter, class 1 and 2:	IEC 1036
	Reactive energy meter, class 2:	IEC 1268
	ABB i-bus®, EIB:	EIBA hand book, release 3.0
	PTB approval number:	20.15 98.80

### 1.3 Important note

EIB Delta-Meters are intended solely for the measurement of electrical energy. The installation and commissioning may only be carried out by authorised electrical specialists. The appropriate norms, guidelines, regulations and specifications should be observed when planning and setting up electrical installations.

**Advisory:**

- EIB Delta-Meters should be protected from damp, dirt and damage during transport, storage and operation.
- EIB Delta-Meters should not be operated outside the specified technical data.
- Sufficient cooling for the EIB Delta-Meter must be allowed for.

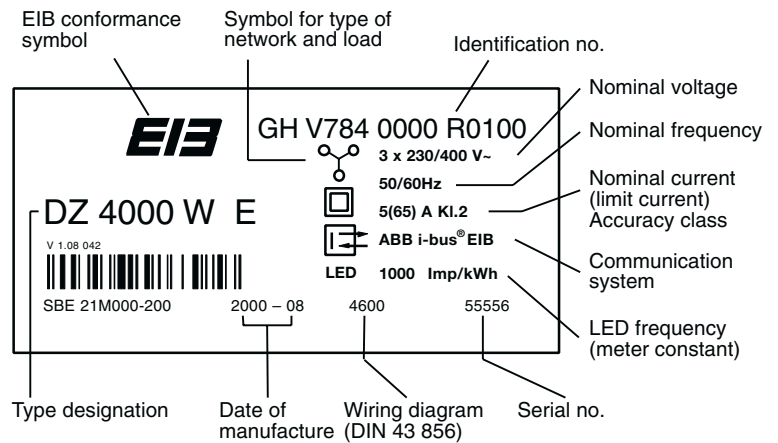
**Cleaning:** If devices become dirty, they can be cleaned using a slightly damp cloth and soap solution should a dry cloth not remove the dirt. Corrosive materials or solutions should never be used. EIB Delta-Meters should always be disconnected from the supply prior to cleaning.

**Maintenance:** EIB Delta-Meters are maintenance-free. No repairs should be carried out if damage occurs (e.g. during transport or storage).

**The warranty expires if the EIB Delta-Meter is opened.**

### 1.4 Labelling of the EIB Delta-Meter (Example)

#### Standard meters



**1.5 Installation**

The EIB Delta-Meters are suitable for installation in distribution boards or small enclosures, for wall mounting or panel mounting. They can be snapped onto 35 mm mounting rails, according to DIN EN 50 022.

**Connection:** The electrical connection is carried out via screw terminals. The terminal markings and insulation strip lengths are embossed in the terminal area of the meter. (Wiring diagrams can be found in section 5.3). The connecting screws should be tightened using the following torque:

Main terminal:

- Direct connected meter (M5 screw) 2.0 Nm
- Transformer rated meter (M4 screw) 1.2 Nm

When connecting aluminium conductors, the contact surfaces of the conductors should be cleaned, brushed and greased. The connecting terminals should be re-tightened after approx. 6 to 8 weeks.

Maintenance procedures can be simplified by using external terminal blocks when connecting a transformer.

**Fuse protection:** The voltage circuit should be protected by a series-connected, miniature circuit-breaker, in order to prevent the meter from being damaged in the event of a short circuit or overload.

- Direct connected meter max. 65 A (63 A)
- Transformer rated meter max. 6 A

**Seal:** To protect the EIB Delta-Meter from being tampered with after installation and programming, it is possible to seal the device at four points.



**2 Measurement of energy**

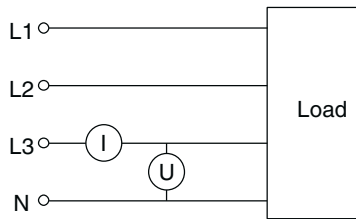
**2.1 Basic measurement techniques**

Various measurement methods are used in the EIB Delta-Meters depending on the type of meter. The following equations are vector equations.



**Measurement method with one measuring element**

This method only produces the correct result if the phase load is symmetrical.



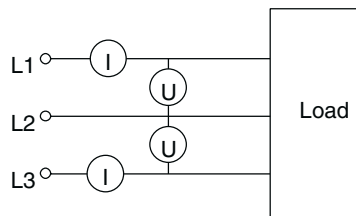
$$P = 3 \cdot I_{L3} \cdot U_{L3}$$

This method is not suitable for carrying out accurate measurements in polyphase voltage networks as 100% symmetrical loading seldom occurs.



**Measurement method with two measuring elements**

This method is used in polyphase voltage networks without a neutral conductor (three-wire network) with symmetrical or asymmetrical loading.



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

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

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

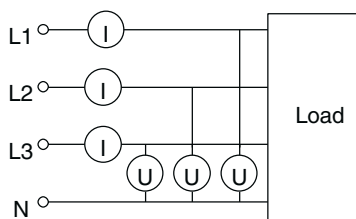
$$P = I_{L1}(U_{L1} - U_{L2}) + I_{L3}(U_{L3} - U_{L2})$$

This method (with 2 measuring elements) is not suitable for carrying out accurate measurements in networks with inductive or capacitive loads with a low  $\cos \varphi$ . In this case, the method that uses 3 measuring elements should be selected.



**Measurement method with three measuring elements**

This method is used in polyphase voltage networks with a neutral conductor (four-wire network). It can however also be used in networks without a neutral conductor, provided that an artificial neutral point is created.

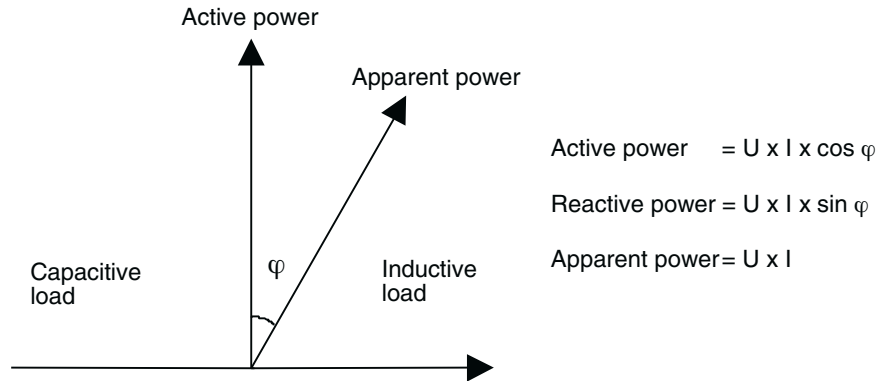


$$P = U_{L1} \cdot I_{L1} + U_{L2} \cdot I_{L2} + U_{L3} \cdot I_{L3}$$

This method is very accurate, even in the case of asymmetrical loads and low  $\cos \varphi$ .



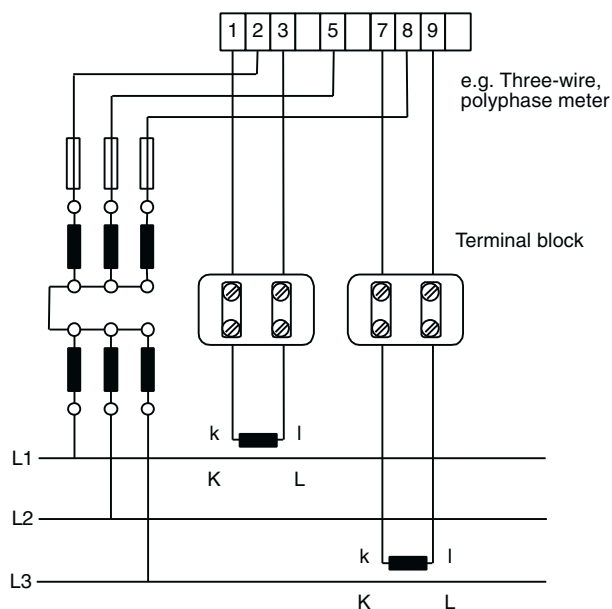
**Active and reactive power:** Capacitive or inductive loads cause a phase angle shift between the phase current and phase voltage.



The maximum permitted phase angle shift is often contractually defined by the power supply companies. So that the specified values are not exceeded, power factor correction systems are often installed and the consumption is monitored using reactive energy meters or combination meters.

**2.2 Measurements with current and voltage transformers**

So that energy consumption can be measured in installations with current and voltage levels beyond the nominal measuring range of the EIB Delta-Meter, it is necessary to use current and/or voltage transformers. It is important that the secondary current and voltage of the measurement transformers, lie within the permitted measuring ranges of the transformer rated meter. In order to guarantee the required level of accuracy, the selected transformers should have a higher accuracy class than the meter. The current transformers must be connected with the correct polarity ( $K1 \Rightarrow L1, k1 \Rightarrow I1$ ).



**Note:** The secondary measuring circuits of the transformers must be laid separately to the main power cables to eliminate induced current errors. The terminal block indicated above is not absolutely necessary for the installation but simplifies servicing procedures.

## EIB Delta-Meter Electricity Meters

**Power consumption of the secondary measuring circuits:** If current transformers are to be connected to an EIB Delta-Meter, it is necessary to consider the power consumption of the entire secondary measuring circuits when selecting the current transformers, so that accurate measured values are achieved. The nominal power of the current transformer ( $S_{sec}$ ) must be selected according to the power loss of the connected meter and the power loss of the secondary measuring circuits.

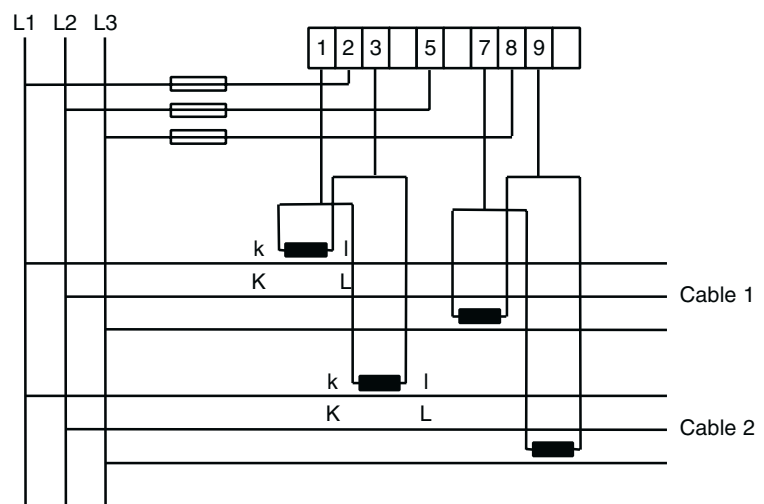
The following applies:

$$S_{sec} \geq S_{cable} + S_{meter} \quad S = \text{Apparent power (VA)}$$

The table of recommended values below represents the power consumption of the cable ( $S_{cable}$ ) as a function of the cable length and cross section.

Secondary current A	Cross section mm <sup>2</sup>	Power consumption of cable						
		Cable lengths (outgoing and return 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 electricity meter connected to more than one current transformer per phase, the individual lines that are assigned to the current transformer must be operated in parallel. All current transformers used must have the same transformer ratio. The total of all the currents may not exceed 6 A. In the example shown (three-wire network), the meter measures the total energy consumption of cable 1 and cable 2. The type of load (asymmetrical or symmetrical) is not significant in this case.



The same application is possible in a four-wire network. Current transformers must then be operated in L1, L2, L3. The current transformers must be connected with the correct polarity (K1 ⇒ L1, k1 ⇒ I1).

### 2.3 Calculation of energy

The energy consumption can be read out from the LCD display of the EIB Delta-Meter and can also be recorded and processed remotely using the EIB communication interface.

In the case of direct connected EIB Delta-Meters, the energy in the LCD display is identical to the energy that has been consumed. If current and/or voltage transformers have been used, the displayed consumption value must be multiplied by the transformer ratio (CT x VT) in order to determine the actual, primary energy consumption.

**All transformer rated meters display secondary measured values.**

The light-emitting diodes next to the meter readout and the LCD display symbols [A] and [R], flash at a rate [ $Z_k$ ] of:

Direct connected meter	1000 Imp/kWh (kvarh)
Transformer rated meter	5000 Imp/kWh (kvarh)

The equations in the following example can be used in order to calculate the LED/LCD flash rate at the given power.

Three-wire polyphase network with current and voltage transformers:

Type of current transformer:	250/5 A/A
Type of voltage transformer:	600/100 V/V
Secondary current (I):	3 A
Secondary voltage (U):	100 V
Power factor (cos $\varphi$ ):	0.9
Meter constant (LED, LCD) ( $Z_k$ ):	5000 Imp/kWh

**Transformer ratio of voltage transformer (VT):**

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

**Transformer ratio of current transformer (CT):**

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

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

$$P_s = \frac{\sqrt{3} \cdot U \cdot I \cdot \cos \varphi}{1000} = \frac{\sqrt{3} \cdot 100 \text{ V} \cdot 3 \text{ A} \cdot 0.9}{1000} = 0.47 \text{ kW}$$

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

$$P_p = P_s \cdot CT \cdot VT = 0.47 \text{ kW} \cdot 50 \cdot 6 = 141 \text{ kW}$$

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

$$B_f = \frac{P_s \cdot Z_k}{3600} = \frac{0.47 \text{ kW} \cdot 5000 \text{ Imp/kWh}}{3600} = 0.65 \text{ Hz}$$

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

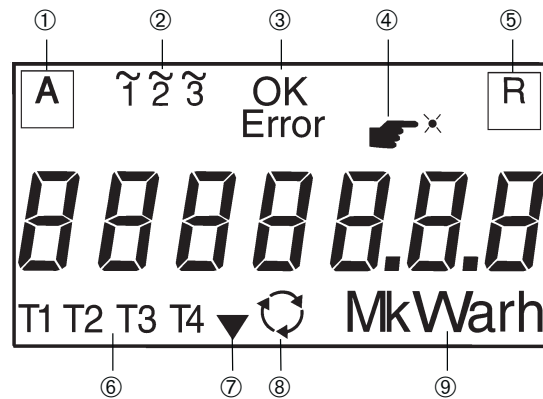
$$B_p = \frac{1}{B_f} = \frac{1}{0.65 \text{ Hz}} = 1.53 \text{ s}$$

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

### 3 Features and functions

#### 3.1 LCD display

In addition to the energy consumption values, the multifunctional LCD display shows the user the parameters outlined below.



- ① **Active power indicator:** The symbol flashes dependent on the instantaneous active power consumption.  
 Direct connected meter: 1000 Imp/kWh  
 Transformer rated meter: 5000 Imp/kWh
- ② **Voltage indicators:** The symbols L1, L2 and L3 are constantly lit if the corresponding phase voltage has been connected.  
**Note:** In the case of three-wire, polyphase meters, only voltage indicators L1 and L3 normally light up.
- ③ **Status indicator:** The text indicates whether the device is 'OK' or there is an 'Error', i.e., device or installation errors present.
- ④ **Operational indicator:** The 'Hand' symbol lights up if a push button action is expected.
- ⑤ **Reactive power indicator:** The symbol flashes dependent on the instantaneous reactive power consumption.  
 Direct connected meter: 1000 Imp/kvarh  
 Transformer rated meter: 5000 Imp/kvarh
- ⑥ **Tariff indicators:** The symbols T1, T2, T3 and T4 indicate the active tariff and the tariff that is currently on the LCD display.  
 No symbol is lit = The sum of all tariffs is displayed.  
 Only TX flashes = Tariff X is active and is displayed.  
 TX flashes and TY is constantly lit = Tariff X is active, tariff Y is displayed.
- ⑦ **Mode indicator:** The arrow symbol changes with the display mode.  
 No arrow = 'Normal mode'  
 Arrow lights up = 'Alternative mode'  
 Arrow flashes = 'Instrument mode'
- ⑧ **Function indicator:** The arrow symbols rotate at a constant speed, if the current lies in at least one phase above the starting current.  
**Note:** The arrows rotate even if the direction of current flow is incorrect.
- ⑨ **Unit of measurement:** Indicates the unit of the measured value in the LCD display.

**Displayed energy:** The energy is displayed with a resolution of 0.1 kWh (kvarh). In 'Alternative mode', the consumption value is displayed with an additional decimal place after the point, e.g., 0.01 kWh (kvarh).

In the case of combination meters, the displayed consumption value alternates approx. every 6 seconds between active and reactive power. The type of value can be seen by the unit of measurement, i.e., kWh or kvarh.

In the case of tariff meters, the displayed consumption value also alternates approx. every 6 seconds between each of the four tariffs and the sum of the tariffs. Using the tariff indicators, it can be determined which tariff value is currently being shown.

In the case of transformer rated meters, all displayed consumption values and electrical measured variables are secondary measured values.

**Note:** The measurement of energy consumption takes place in all display and programming modes. In the event of voltage failure or disconnection of the device, the current measured consumption value is maintained, in spite of the LCD display being inactive.

### 3.2 Light sensor

The EIB Delta-Meters have a light sensor (see 'General description'). This has the same function as the 'SCROLL' button if a torch for example is shone on the sensor. This enables the meter readings to be queried both in the case of programmed devices and installed or sealed devices.

**It is not possible to modify any settings with the light sensor.**

### 3.3 Programming buttons

The various read-out options of the EIB Delta-Meter are activated using a menu-driven software. This menu is operated via two buttons:

**'SET' button:** It is used to activate the display menu [Menu mode] and the sub-menus [3 Error] and [4 Instr].

**'SCROLL' button:** It has two different functions depending on the length of the push button action:

- When the 'SCROLL' button is pressed briefly, you can jump between the individual items in the respective menu.
- A long push button action (> 3s) switches from 'Normal mode' to 'Alternative mode' and from 'Alternative mode' to 'Instrument mode'. In all other modes, a long push button action acts as a "Escape" function. (The software jumps back one menu level).

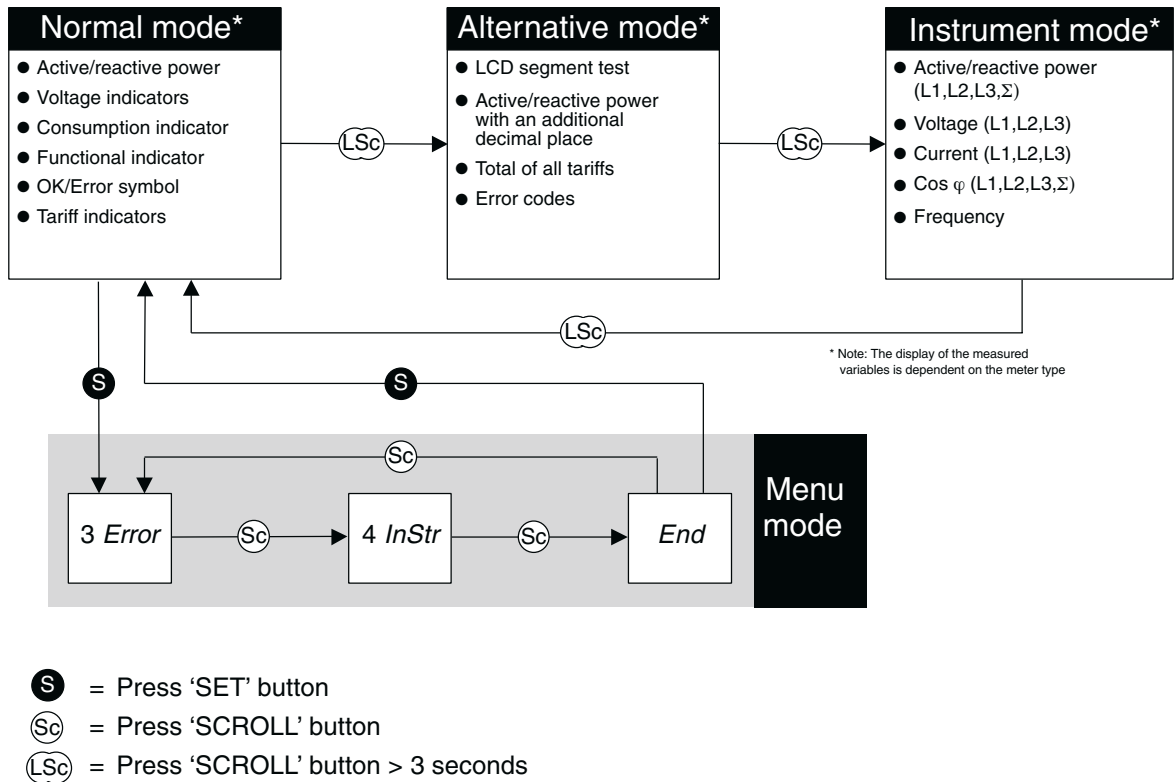
**Only one button may be pressed at a time.  
The commands are only carried out once the button has been released.**

If no buttons are pressed for two minutes during the programming, the EIB Delta-Meter cancels the action and jumps back one menu level. This is repeated until the meter is in 'Normal mode'.





3.4 Software menu



3.5 Installation self-test

The installation self-test checks the connection and wiring of EIB Delta-Meters and can detect the following installation errors:

- current or voltage connections that are missing or have reverse polarity
- current, voltage or frequency values that are outside the specified tolerance
- internal errors

The installation self-test is carried out automatically approx. every 8 seconds. If device or installation errors occur, they are reported on the LCD display with the 'Error' signal.

To simplify the fault removal process, the various types of errors are also displayed as installation error codes. These error codes can either be read out in 'Alternative mode' or Menu mode [3 Error]. A detailed description of the error codes and notes on remedying the fault can be found in section 5.1.

**Note:** So that the EIB Delta-Meters can successfully carry out the installation self-test, the meter must be connected with all phases and there must be a load current of at least 100 mA per phase in the secondary circuit.

### 3.6 Reading out error codes

In order to read out the error codes, it is necessary to carry out the push button actions in the sequence described, starting from 'Normal mode'. The descriptions should be used in connection with the software menu diagram in section 3.4.

In **Menu mode [3 Error]**, the following error codes are displayed.

Button	Number	Display/comment
–	–	'Normal mode' (starting position)
	x 1	[3 Error]
	x 1	Error codes are automatically displayed (one per second). If no errors are present, the text [no Err] is displayed.
	x n	Scrolls manually through the individual error codes
	x 1	Back to [3 Error]
	x 1	Back to 'Normal mode'

### 3.7 Network monitoring function

All electrical measured variables, which are measured by the EIB Delta-Meter in order to record the energy consumption, can be displayed on the LCD display. These values can be used for network monitoring and servicing purposes. The following table indicates which measured variables are available depending on the EIB Delta-Meter.

- W** – Active energy meter
- T** – Tariff meter
- K** – Combination meter

The electrical measured variables are generally displayed in the following format on the LCD display:

- Ux XXX.X V** U = Measured variable, e.g., voltage (U), current (A)
- x = Phase (1, 2, 3) or Total value (t)
- XXX.X = Measured value
- V = Unit of measurement

Measured variables	Meter type			Format	Unit	Example	Comment
	W	T	K				
Active power L1, L2, L3, Σ	■	■	■	Px XXXX Px XX.XX	W kW	P1 1250 W P2 14.50 kW	< 10.000 W ≥ 10.000 W
Reactive power L1, L2, L3, Σ			■	Px XXXX Px XX.XX	var kvar	P3 35 Var Pt 1.50 kVar	< 10.000 var ≥ 10.000 var
Voltage L1-N, L2-N, L3-N (L1-L2, L2-L3) <sup>1</sup>	■	■	■	Ux XXX.X	V	U1 230.4 V	<sup>1</sup> Three-wire meter
Current L1, L2, L3	■	■	■	Ax XX.XX	A	A3 22.93 A	
Power factor L1, L2, L3, Σ	■ <sup>2</sup>	■ <sup>2</sup>	■	Pfx X.XX		Pf1 0.95	<sup>2</sup> Only total power factor. The total power factor is calculated from the total active and reactive power. The power factor is positive in the first and fourth quadrants (active power consumption) and negative in the second and third quadrants.
Frequency	■	■	■	Fr XX.XX	Hz	Fr 50.03	

The measured variables are measured again approx. every 5 seconds and can either be read out in 'Instrument mode' or in Menu mode [4 *InStr*]. In the case of transformer rated meters all measured variables are secondary values.

The measuring accuracy of all the values corresponds to the requirements of the norm IEC 1036 within the supply voltage tolerance of  $\pm 20\%$  and the current range of  $0.05 I_b$  (nominal current) to  $I_{max}$  (limit current).

Measured variable	Tolerance
Frequency	$\pm 2\%^*$
Voltage	$\pm 2\%^*$
Current	$\pm 2\%^*$
Active power	$\pm 2\%^*$
Reactive power	$\pm 2\%^*$
Power factor	$\pm 1^\circ$

\* 1 % for class 1 meters

**3.8 Reading out electrical measured variables**

Up to 24 electrical measured variables can be displayed in **Menu mode** [4 *InStr*], depending on the EIB Delta-Meter. All electrical measured variables are secondary values.

Button	Number	Display/comment
–	–	'Normal mode' (starting position)
	x 1	[3 <i>Error</i> ]
	x 1	[4 <i>InStr</i> ]
	x 1	Electrical measured variables are automatically displayed (one every 7s).
	x n	Scrolls manually through the individual measured variables
	x 1	Back to [4 <i>InStr</i> ]
	x 1	Back to 'Normal mode'

## 4 EIB application software

### 4.1 General

Depending on the type of meter, the following three application programs are available for the EIB Delta-Meter electricity meters:

- Active energy meter/1.1
- Tariff meter/1.1
- Combination meter/1.1

**Active energy meter/1.1:** The application software “Active energy meter/1.1” can be used for all EIB Delta-Meter electricity meters except for the tariff and combination meters. This applies irrespective of other meter properties (e.g. whether the meter is a direct connected or transformer rated meter, is used for two-, three- or four-wire systems or which operating voltage the meter is connected to). The application software enables the transfer of the meter reading with various transmission procedures as well as the transfer of the instantaneous power and the status of the meter via the ABB i-bus® EIB.

**Tariff meter/1.1:** The application software “Tariff meter/1.1” is used with all tariff meters that have EIB capability, i.e., the following meter types:

DZ 4000 WT E

DZ 4010 WT E

In addition to transferring the meter readings (4 tariffs and sum), the meter status and instantaneous power, the tariffs can be controlled via the ABB i-bus® EIB with this application software.

**Combination meter/1.1:** The following combination meters are programmed using the application software “Combination meter/1.1”:

DZ 4000 K E

DZ 4010 K E

This application software enables the meter reading and instantaneous power to be read out via the ABB i-bus® EIB. This applies to the proportion of both active and reactive power consumption.

**Warning:** This device cannot be programmed correctly without Service Release B or higher of the EIB Tool Software ETS2 V1.1. It is therefore necessary to install Service Release B or higher on the commissioning PC before programming the application software. If this is not carried out, the device cannot function and can no longer be programmed. Service Release B or higher is available on the ABB CD-ROM and on the Internet page [www.eiba.com](http://www.eiba.com).

## 4.2 Communication objects

The three application programs “Active energy meter/1.1”, “Tariff meter/1.1” and “Combination meter/1.1” have various communication objects according to the functionality of the EIB Delta-Meter (see graphic).

Many of the communication objects are dynamic and only visible if the corresponding parameters have been activated in the application software. These communication objects are inactive or disabled at the start of the project design process. Only one group address can be assigned to each communication object.

Building View [EIB Delta-Meter]										
Building		Building part		Room		Device		Show Objects		
Phys. Addr.	Product	Order number	Medium Type	Program	Manufacturer					
no.	Function	Object name	Type							
01.01.001	EIB Delta-Meter	GHQ 630 1752 R0001	Twisted Pair	Active Energy Meter/1.1	ABB					
0	Output Telegram	Meter Reading, Active Energy	4 Byte							
1	Output Telegram	Instantaneous Power	2 Byte							
2	Input Telegram	Request Meter Reading	1 Bit							
3	Output Telegram	Fault	1 Bit							
4	Output Telegram	Status Byte	1 Byte							
5	Output Telegram	Communication Fault	1 Bit							
6	Input Telegram	Acknowledgement "Meter Reading Received"	1 Bit							
7	Input Telegram	Fault Acknowledgement	1 Bit							
01.01.002	EIB Delta-Meter	GHQ 630 1752 R0001	Twisted Pair	Tariff Meter/1.1	ABB					
0	Output Telegram	Meter Reading, Total	4 Byte							
1	Output Telegram	Meter Reading, Tariff 1	4 Byte							
2	Output Telegram	Meter Reading, Tariff 2	4 Byte							
3	Output Telegram	Meter Reading, Tariff 3	4 Byte							
4	Output Telegram	Meter Reading, Tariff 4	4 Byte							
5	Output Telegram	Instantaneous Power	2 Byte							
6	Input Telegram	Request Meter Readings	1 Bit							
7	Input Telegram	Switch Tariff	1 Byte							
8	Output Telegram	Fault	1 Bit							
9	Output Telegram	Status Byte	1 Byte							
10	Output Telegram	Communication Fault	1 Bit							
11	Input Telegram	Acknowledgement "Meter Reading Received"	1 Bit							
12	Input Telegram	Fault Acknowledgement	1 Bit							
01.01.003	EIB Delta-Meter	GHQ 630 1752 R0001	Twisted Pair	Combination Meter/1.1	ABB					
0	Output Telegram	Meter Reading, Active Energy	4 Byte							
1	Output Telegram	Meter Reading, Reactive Energy	4 Byte							
2	Output Telegram	Instantaneous Active Power	2 Byte							
3	Output Telegram	Instantaneous Reactive Power	4 Byte							
4	Output Telegram	Instantaneous Reactive Power	2 Byte							
5	Output Telegram	Reactive Power Type	1 Bit							
6	Input Telegram	Request Meter Readings	1 Bit							
7	Output Telegram	Fault	1 Bit							
8	Output Telegram	Status Byte	1 Byte							
9	Output Telegram	Communication Fault	1 Bit							
10	Input Telegram	Acknowledgement "Meter Reading Received"	1 Bit							
11	Input Telegram	Fault Acknowledgement	1 Bit							



**Meter reading [EIS 11; 32 bit counter]:** The measured energy consumption values or meter readings are transferred via the 4 byte output communication object “Meter reading”. The application software “Tariff meter/1.1” has five meter reading objects altogether, one for each of the four tariffs and one for the total. The application software “Combination meter/1.1” has one object for the active energy and one for the reactive energy. The transmitted data correspond to the values that are displayed on the LCD display. The sending behaviour of these objects is defined in the parameter window “Meter readings”.

Object type	Measuring range	Resolution	Unit
4-Byte	0 .. 999 999 990	10 Wh (varh)	Wh (varh)

**Instantaneous power (active/reactive) [EIS 10; 16 bit counter]:** The 2 byte output communication object “Instantaneous power” is used to transfer the instantaneous power or energy consumption. The sending behaviour of these objects is defined in the parameter window “Instantaneous power”.

Object type	Measuring range	Resolution	Unit
2-Byte	0 .. 65534 (65535 = Überlast)	1 W (var)	W (var)

The application software “Combination meter/1.1” has separate communication objects for the instantaneous active power and the instantaneous reactive power. In addition, it is possible to transfer the reactive power as:

- a 2 byte object [EIS 10; 16 bit counter] (see above) with a separate “Reactive power type” [EIS 1; switching] object in order to transfer the type of reactive power.  
Telegram value “0”: inductive reactive power  
Telegram value “1”: capacitive reactive power
- or as a 4 byte object with sign [EIS 11; 32 bit counter].

Object type	Measuring range	Resolution	Unit
4-Byte	– 65534 ..... + 65534	1 var	var

If the actual instantaneous power lies above 65534 W (var), the value 65535 (FF FF<sub>h</sub> or 7F FF FF FF<sub>h</sub> for the 4 byte object) is sent as an “overload signal”.

**Request meter reading [EIS 1; switching]:** The read request for the current meter readings of the EIB Delta-Meter is transferred to the meter via the 1 bit input communication object “Request meter reading”. Once a request signal telegram with the value “1” has been received, the meter reading is stored and sent on the bus once the transmission delay  $T_w$  has elapsed (if selected). This sending behaviour is defined in the parameter window “Meter readings”. The communication object is only visible if the option “Send on request” is selected.

Telegram value    “1”: Send meter reading  
                          “0”: No function

**Switch tariff [EIS 14; 8 bit counter]:** The 1 byte input communication object “Switch tariff” enables the control of four different tariffs of an EIB Delta-Meter tariff meter via the ABB i-bus® EIB. On receipt of a valid object value (1, 2, 3 or 4), the meter switches to the required tariff. Once the transmission delay  $T_w$  has elapsed (if selected), the current data of the old and new tariffs as well as the total of all the tariffs at the time of the change are sent on the bus.

Telegram value	“1”: Switch to tariff 1
	“2”: Switch to tariff 2
	“3”: Switch to tariff 3
	“4”: Switch to tariff 4
	“other values”: no function

Approximately 6 seconds after a reset or bus voltage recovery, the actual status of the communication object “Switch tariff” is queried via the bus. Once a response has been received, a corresponding tariff change is carried out and the current data and total of all the tariffs is sent on the bus. However, if there is no response after approximately a further 4 seconds, the meter switches to the last selected tariff (prior to the reset or bus voltage failure) and the data is sent. To guarantee this function the ‘update flag’ of the “switch tariff” communication object must be set to active (default setting).

The tariff control signal from the electricity supply company can be sent on the EIB by connecting a tariff decoder unit to a binary input via potential free contacts (1 per tariff). The required 8 bit value for switching the tariffs can be generated using a binary input Serie ET/S 6.xxx.x together with the applikation software “Value Edge Cyclic/3”.

**Acknowledgement “Meter reading received” [EIS 1; switching]:** If the function “Active acknowledgement “Meter reading received”” is activated, the EIB Delta-Meter expects an acknowledgement from the receiving EIB devices after *each* transmission of a meter reading. This confirms that the data has reached the recipient. If no acknowledgement is received after approx. 2 seconds after the meter reading has been sent, the transmission is repeated. The 1 bit input communication object is only visible if the parameter “Active acknowledgement “Meter reading received”” in the parameter window “Meter readings” is activated.

Telegram value	“1”: Meter reading received
	“2”: No function

**Communication fault [EIS 1; switching]:** If the EIB Delta-Meter has not received a telegram at the communication object “Acknowledgement “Meter reading received”” after sending the meter reading twice (see above), a telegram is sent from the 1 bit output communication object “Communication fault” to signal that there is a transmission fault. If a subsequent transmission of the meter reading is acknowledged correctly, this error message is removed. The communication object is only visible if the parameter “Active acknowledgement “Meter reading received”” in the parameter window “Meter readings” is activated.

Telegram value	“1”: Communication fault
	“0”: No communication fault

**Fault [EIS 1; switching]:** The 1 bit output communication object “Fault” sends the state of the EIB Delta-Meter via the ABB i-bus® EIB in the form of a group error message. An error message can have several causes and can be decoded with the help of the communication object “Status byte” or by reading out the error codes in the meter (see section 3.7). The sending behaviour of these objects is defined in the parameter window “Status”.

Telegram value	“1”: Fault
	“0”: No fault

**Fault acknowledgement [EIS 1; switching]:** The 1 bit input communication object enables the EIB Delta-Meter to be reset after an error has occurred and is only visible if the parameter “Fault acknowledgement” in the parameter window “Status” is activated. The error message is only reset after an acknowledgement if all the errors have previously been rectified.

Telegram value	“1”: Reset error message
	“0”: No function

**Status byte [Non EIS; 8 bit coded]:** Each EIB Delta-Meter has a 1 byte output communication object “Status byte” which can send the various status information of the meter via the ABB i-bus® EIB. Each individual bit of the 1 byte telegram corresponds to a specific meter state or error type. Whenever a new error is detected, the corresponding bit is set and the status byte is sent on the bus (if selected). The sending behaviour of this object is defined in the “Status” parameter window. The following applies for all the bits:

Bit value                    “1”: Error  
                                  “0”: No error

The following table represents the connection between the individual bits, the error type and the error codes in the meter.

Bit	Error type	Equivalent error code (see section 5.1 “Error codes”)
0 (LSB)	Phase voltage error	100, 101, 102
1	Overtoltage	103, 107, 111
2	Undervoltage	104, 108, 112
3	Overload	105, 109, 113
4	Frequency error	115, 116
5	Installation error	118, 119, 120, 121, 122
6	Negative active power	123, 124, 125, 126
7 (MSB)	Internal error	127, 128, 129 and unmentioned error codes

The status byte key table in section 4.8 enables the transmitted status byte value to be quickly converted to the individual error types.

### 4.3 Parameter options

During the initial configuration of the application software “Active energy meter/1.1”, “Tariff meter/1.1” and “Combination meter/1.1”, the parameter options are pre-programmed with a specific basic setting (in general, they are set to inactive or disabled).

To avoid a high bus load, it is important to only activate functions and parameters that are actually required. When selecting cyclic times or setting the sending behaviour dependent on variable measured values, the resulting bus traffic must also be taken into consideration to avoid communication problems.

The reaction of the EIB Delta-Meter to a Reset or the restoration of the bus voltage is dependent on the application software used and the parameter settings. This is described in detail in the respective sections concerning the communication objects, the parameter options and the parameter windows.

**4.4 Parameter window: General** The sending interval of the EIB Delta-Meter is defined in the “General” parameter window.

**Transmission delay:** To prevent any possible communication problems due to the simultaneous transmission of meter data, e.g., in installations where several EIB Delta-Meters are used and/or where communication takes place via area or line couplers, it is possible to send the telegrams of different meters with a time delay using the parameter “Transmission delay”. The delay influences the sending of the following telegrams: “Meter reading”, “Fault” and “Status byte”.

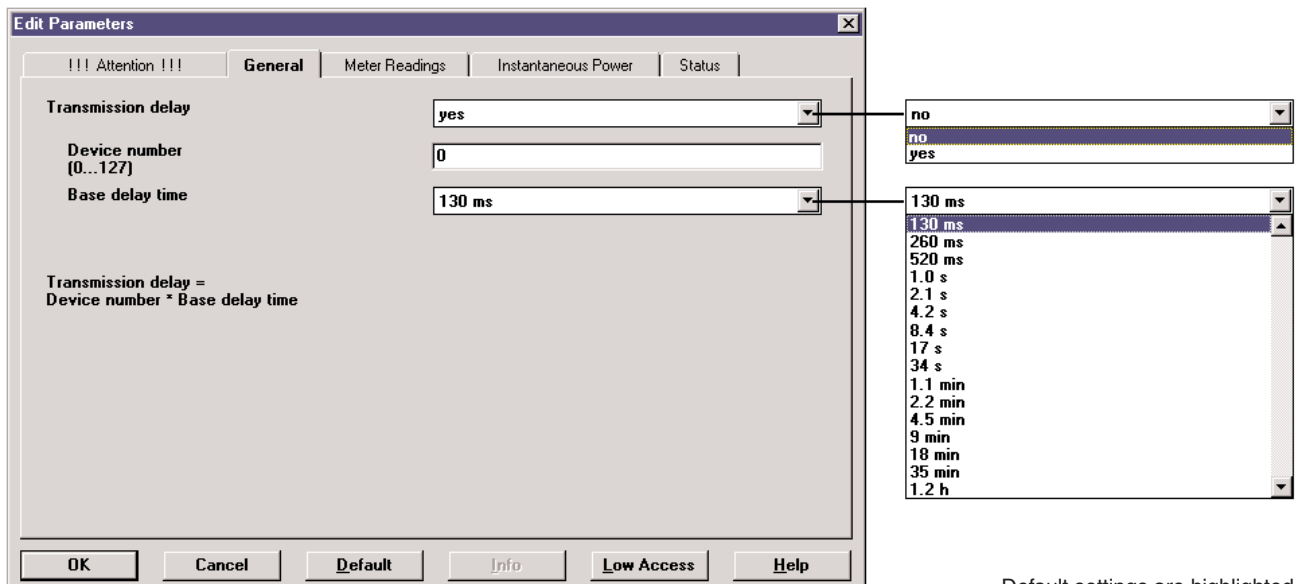
If “no” is selected, telegrams are sent without a delay via the ABB i-bus® EIB, i.e., telegrams are sent immediately after a meter reading request via the communication object “Request meter reading” is received or after a change in the fault status of the EIB Delta-Meter (if selected).

If “yes” is selected, information is sent after each meter reading request or change in the fault status via the ABB i-bus® EIB once a set period  $T_W$  has elapsed. The transmission delay  $T_W$  (tolerance  $\pm 1.5\%$ ) is produced from the set values:

$$\text{Transmission delay } T_W = \text{“Device number”} \times \text{“Base delay time”}.$$

In this way, it is possible to assemble groups of EIB Delta-Meters (up to 128 per group) with the same base delay time. A number is assigned to each of the Delta-Meters in the group using the parameter “Device number”. In the event of a simultaneous meter reading request via the communication object “Request meter reading”, the meters send their values in sequence according to their device number via the ABB i-bus® EIB.

If the options “Transmission delay” and “Send cyclically” are activated at the same time, the sending of the meter reading telegrams is only delayed once directly after a reset, bus voltage recovery or after a tariff change, i.e., after each of these events, the meter waits until the set transmission delay  $T_W$  has elapsed until it starts to send the telegrams cyclically. With each subsequent transmission, only the cyclic time is observed since the meters are already sending with a time delay with respect to one another.



Default settings are highlighted

## 4.5 Parameter window: Meter readings

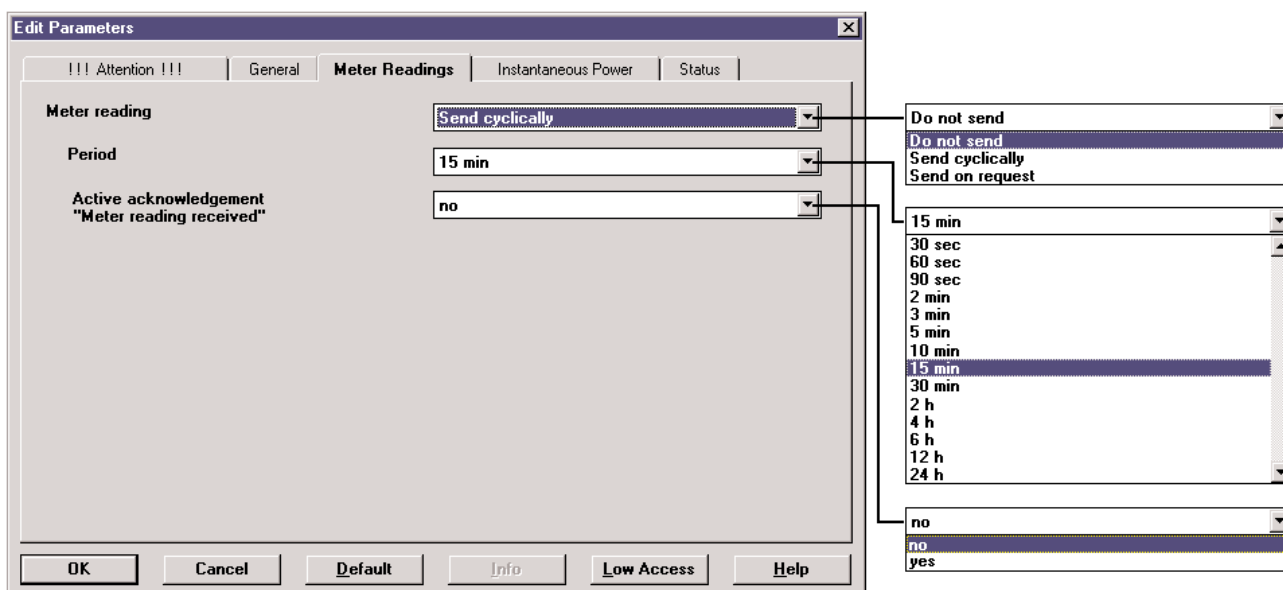
The sending behaviour of the communication objects “Meter reading” is defined in the parameter window “Meter readings”.

**Do not send:** If this setting is selected, the EIB Delta-Meter does not automatically send its meter reading on the bus. It is only possible to read out the current meter readings by reading out the object values via “Value\_Read”, e.g., using the EIB Tool Software ETS. The meter readings are updated every 8 seconds.

**Send cyclically:** In this setting, the meter readings are sent cyclically via the ABB i-bus® EIB. The sending interval (tolerance ±1.5%) is defined with the parameter “Period”. If several meters have the same cyclic time, they can send with a time delay  $T_w$  (if selected), in order to avoid possible communication problems.

**Send on request:** This setting enables the current meter readings to be actively read out using the communication object “Request meter reading”. Once a request telegram with the value “1” has been received, the meter reading is stored and sent after the transmission delay  $T_w$  (if selected) via the ABB i-bus® EIB. The transmission delay  $T_w$  prevents telegrams from being sent simultaneously if several meters react to the same meter reading request telegram.

**Active acknowledgement “Meter reading received”:** With the settings “Send cyclically” and “Send on request”, the user can choose to send with or without a receipt confirmation. If “yes” is selected, the EIB Delta-Meter expects to receive an acknowledgement telegram via the communication object “Acknowledgement “Meter reading received”” after *each* transmission of a meter reading. If an acknowledgement is not received after approx. 2 seconds, the meter reading is sent again. If the second repetition is not acknowledged, an error message is sent via the communication object “Communication fault”. During this period, the stored meter readings are maintained. They are only updated once a transmission has been acknowledged or a communication fault has been reported.



Default settings are highlighted



## 4.6 Parameter window: Instantaneous power

The sending behaviour of the communication objects “Instantaneous power” is defined in the parameter window “Instantaneous power”.

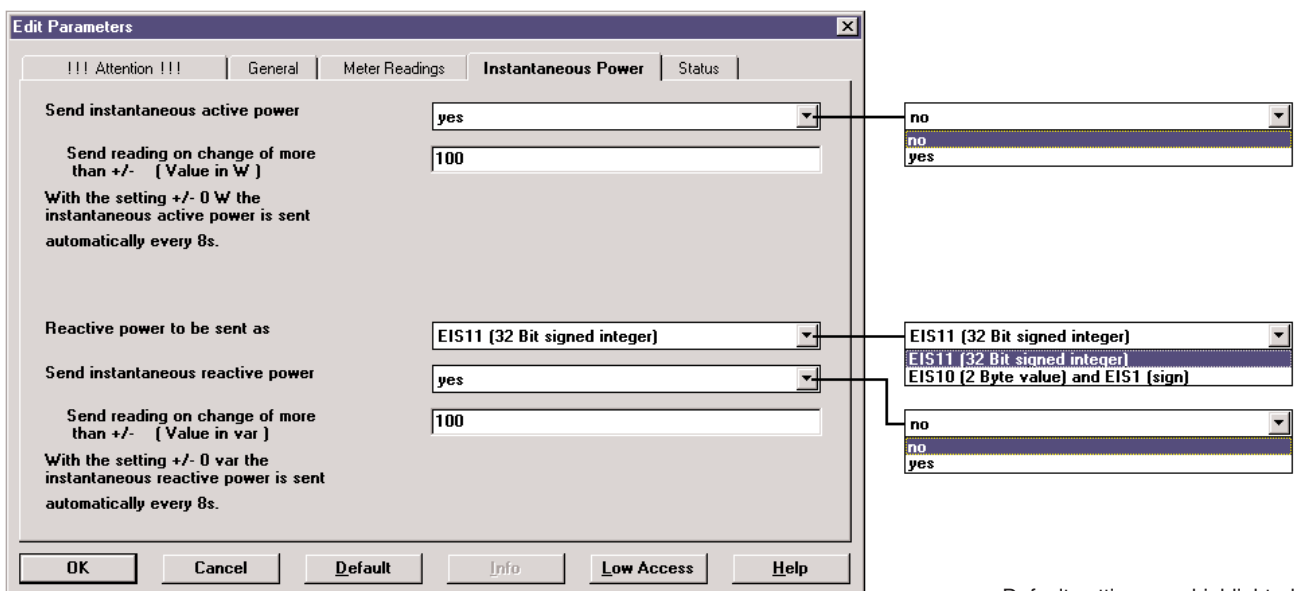
**Send instantaneous active/reactive power:** If “yes” is selected, the instantaneous power is transmitted on the bus. These values are updated every 8 seconds.

**Send reading on change of more than +/-:** The instantaneous power is sent via the ABB i-bus® EIB as a 2 byte telegram (also 4 byte for reactive power). In order to reduce telegram traffic, e.g., in installations where the energy consumption frequently fluctuates around an average value, the instantaneous power is only sent when there is a defined change compared to the last sent value. The size of this change can be set as a parameter. In the setting +/- 0 W (var), the new value is sent every 8 seconds.

**Note:** With large set values, the current instantaneous power can differ considerably from the last sent value.

After a reset or a restoration of the bus voltage, the instantaneous power will also only be sent on the EIB once the set difference value has been exceeded.

**Reactive power to be sent as:** Since the reactive power can be represented as both a positive value (inductive) and a negative value (capacitive), the combination meter also sends the reactive power type in addition to the measured value of the instantaneous power. In the setting “EIS 10 (2 byte value) and EIS 1 (sign)”, the polarity information is transmitted with a separate 1 bit telegram via the communication object “Reactive power type”. If the setting “EIS 11 (32 bit signed integer)” is selected, the power and the polarity information are sent in the form of a single 4 byte telegram.



Default settings are highlighted

## 4.7 Parameter window: Status

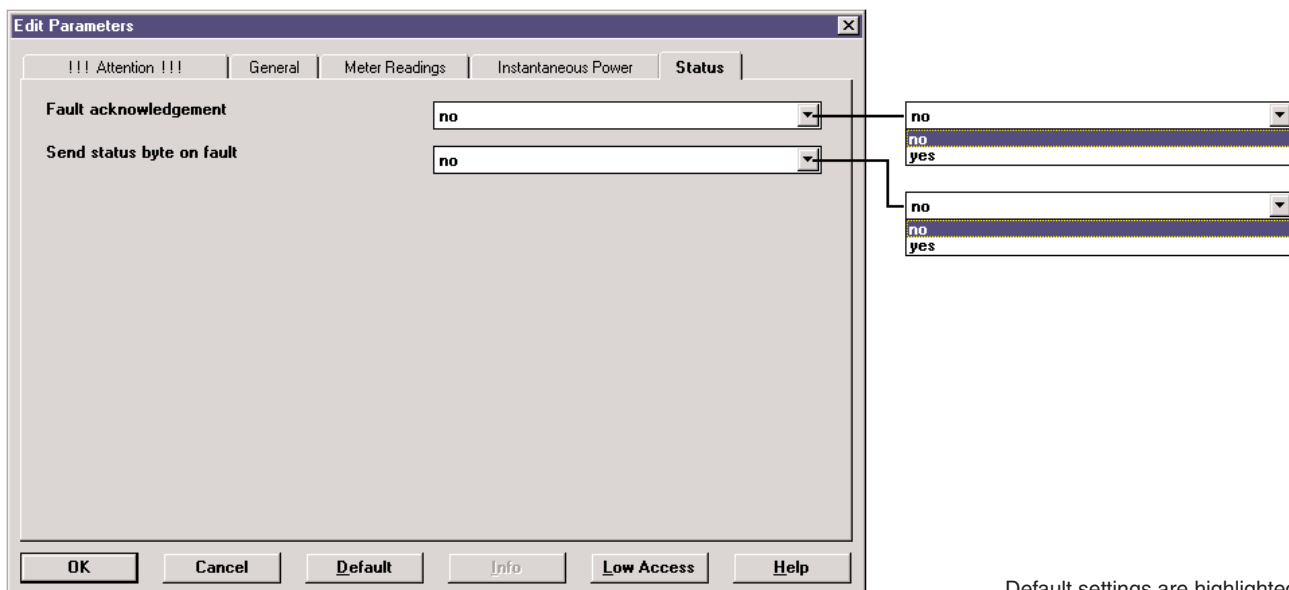
The behaviour of the communication objects “Fault”, “Fault acknowledgement” and “Status byte” is defined in the “Status” parameter window.

**Fault acknowledgement:** If “no” is selected, a telegram is sent via the communication object “Fault” via the ABB i-bus® EIB after the first occurrence of a fault in the meter and once the transmission delay  $T_W$  has elapsed (if selected). The corresponding bits in the status byte object are set at the same time. These bits are set or reset after each new fault or after each removal of an fault. If all faults have been rectified, a telegram with the value “0” is sent automatically via the communication object “Fault”.

If “yes” is selected, a telegram is also sent via the communication object “Fault” via the ABB i-bus® EIB after the first occurrence of a fault in the meter. This error message remains set however until all the faults are rectified and the error message has been reset via the communication object “Fault acknowledgement”. The corresponding bits in the status byte object are also set after the first occurrence of a specific fault and remain set until the relevant fault is rectified and an acknowledgement telegram has been received via the communication object “Fault acknowledgement”.

**Send status byte on fault:** If the setting “no” is selected, the status byte is not automatically sent via the ABB i-bus® EIB. In order to receive the current value of the status byte, the object value must be read out by “Value\_Read”, e.g., using the EIB Tool Software ETS.

If “yes” is selected, the status byte is sent after each change via the communication object “Status byte” via the ABB i-bus® EIB, once the transmission delay  $T_W$  has elapsed (if selected).



Default settings are highlighted



## 5 General

### 5.1 Error codes

Once the installation self-test has been carried out, possible errors are displayed in 'Menu mode' [**3 Error**] as installation error codes. The displayed error codes can have different meanings for two-wire, single-phase meters or three-wire and four-wire, polyphase meters.

- Err 100:** Phase voltage L1 is not available  
**Note:** Phase voltage L1 is not connected
- Err 101:** **Three-wire, polyphase meter:** Not used. (The absence of phase voltage L2 is also reported by phase angle error code 119).  
**Four-wire, polyphase meter:** Phase voltage L2 is not available.  
**Note:** Phase voltage L2 is not connected.
- Err 102:** Phase voltage L3 is not available.  
**Note:** Phase voltage L3 is not connected.
- Err 103:** **Two-wire, single-phase meter:** Voltage L1 lies above the given maximum value.  
**Three-wire, polyphase meter:** Voltage between phase L1 and L2 lies above the given maximum value.  
**Four-wire, polyphase meter:** Phase voltage L1 lies above the given maximum value.  
**Note:** Meter has the wrong nominal voltage value for this application. Wrong voltage transformer.  
**Risk of damage. Disconnect the voltage immediately.**
- Err 104:** **Two-wire, single-phase meter:** Voltage L1 lies below the given minimum value.  
**Three-wire, polyphase meter:** Voltage between phase L1 and L2 lies below the given minimum value.  
**Four-wire, polyphase meter:** Phase voltage L1 lies below the given minimum value.  
**Note:** Meter has the wrong nominal voltage value for this application. Wrong voltage transformer.
- Err 105:** Phase current L1 lies above the given maximum value.  
**Note:** Meter has the wrong nominal current for this application. Wrong current transformer.
- Err 107:** **Four-wire, polyphase meter:** Phase voltage L2 lies above the given maximum value.  
**Note:** Meter has the wrong nominal voltage value for this application. Wrong voltage transformer.  
**Risk of damage. Disconnect the voltage immediately.**
- Err 108:** **Four-wire, polyphase meter:** Phase voltage L2 lies below the given minimum value.  
**Note:** Meter has the wrong nominal voltage value for this application. Wrong voltage transformer.
- Err 109:** Phase current L2 lies above the given maximum value.  
**Note:** Meter has the wrong nominal current value for this application. Wrong current transformer.
- Err 111:** **Three-wire, polyphase meter:** Voltage between phase L1 and L2 lies above the given maximum value.  
**Four-wire, polyphase meter:** Phase voltage L3 lies above the given maximum value.  
**Note:** Meter has the wrong nominal voltage value for this application. Wrong voltage transformer.  
**Risk of damage. Disconnect the voltage immediately.**
- Err 112:** **Three-wire, polyphase meter:** Voltage between phase L1 and L2 lies below the given minimum value.  
**Four-wire, polyphase meter:** Phase voltage L3 lies below the given minimum value.  
**Note:** Meter has the wrong nominal voltage value for this application. Wrong voltage transformer.

<b>Err 113:</b>	Phase current L3 lies above the given maximum value. <b>Note:</b> Meter has the wrong nominal current for this application. Wrong current transformer.
<b>Err 115:</b>	System frequency lies above the given maximum value (> 65 Hz).
<b>Err 116:</b>	System frequency lies below the given minimum value (< 45 Hz).
<b>Err 118:</b>	<b>Two-wire, single-phase meter:</b> Phase angle between the voltage and current does not lie within the normal range. <b>Three-wire, polyphase meter:</b> Phase angles between phase voltages L1, L2 and phase current L1 do not lie within the normal range. <b>Four-wire, polyphase meter:</b> Phase angles between phase voltage L1 and phase current L1 do not lie within the normal range. <b>Note:</b> Polarity of the load current connection has been reversed. Direction of current flow in the current transformer is incorrect. Phase voltages have been wrongly connected.
<b>Err 119:</b>	<b>Four-wire, polyphase meter:</b> Phase angle between phase voltages L1 and L2 does not lie within the normal range. <b>Note:</b> Phase voltages have been wrongly connected.
<b>Err 120:</b>	<b>Four-wire, polyphase meter:</b> Phase angles between phase voltage L1 and phase current L2 does not lie within the normal range. <b>Note:</b> Polarity of the load current connection has been reversed. Direction of current flow in the current transformer is incorrect. Phase voltages have been wrongly connected.
<b>Err 121:</b>	<b>Three-wire, polyphase meter:</b> Phase angles between phase voltages L1 and L3 as well as L2 and L3 do not lie within the normal range. <b>Four-wire, polyphase meter:</b> Phase angle between phase voltage L1 and L3 does not lie within the normal range. <b>Note:</b> Phase voltages have been wrongly connected.
<b>Err 122:</b>	<b>Three-wire, polyphase meter:</b> Phase angles between phase voltages L1, L2 and phase current L3 do not lie within the normal range. <b>Four-wire, polyphase meter:</b> Phase angle between phase voltage L1 and phase current L3 does not lie within the normal range. <b>Note:</b> Polarity of the load current connection has been reversed. Direction of current flow in the current transformer is incorrect. Phase voltages have been wrongly connected.
<b>Err 123:</b>	<b>Two-wire, single-phase meter:</b> Negative active power. <b>Four-wire, polyphase meter:</b> Negative active power in phase L1. <b>Note:</b> Polarity of the load current connection has been reversed. Direction of current flow in the current transformer is incorrect. Phase voltages have been wrongly connected.
<b>Err 124:</b>	<b>Four-wire, polyphase meter:</b> Negative active power in phase L2. <b>Note:</b> Polarity of the load current connection has been reversed. Direction of current flow in the current transformer is incorrect. Phase voltages have been wrongly connected.
<b>Err 125:</b>	<b>Four-wire, polyphase meter:</b> Negative active power in phase L1. <b>Note:</b> Polarity of the load current connection has been reversed. Direction of current flow in the current transformer is incorrect. Phase voltages have been wrongly connected.
<b>Err 126:</b>	Total active power is negative. <b>Note:</b> Polarity of the load current connection has been reversed. Direction of current flow in the current transformer is incorrect. Phase voltages have been wrongly connected.
<b>Err 127, 128, 129:</b>	Internal error. Installation self-test could not be carried out. <b>Note:</b> Repeat the test. If the error message remains, contact your dealer.

**Error codes that have not been mentioned:**

Internal errors. Contact your dealer.

## 5.2 Selection table: Standard EIB Delta-Meters with network monitoring function

### Transformer rated meters for /1 A or /5 A current transformers

Voltage V	Current A	Class	Ordering info.		bbn 40 16779 EAN	Weight 1 Pc. kg	Pack- age (Pc.)
			Short code	Product code			

#### Active energy meters

1 x 230	2(6)	2	<b>DZ 2210 W E</b>	GHV 782 2100 R0100	<b>51128 5</b>	0,6	1
3 x 110	2(6)	2	<b>DZ 3110 W E</b>	GHV 783 1100 R0100	<b>51129 2</b>	0,6	1
3 x 400	2(6)	2	<b>DZ 3410 W E</b>	GHV 783 4100 R0100	<b>51130 8</b>	0,6	1
3 x 500	2(6)	2	<b>DZ 3510 W E</b>	GHV 783 5100 R0100	<b>51131 5</b>	0,6	1
3 x 230/400	1(6)	1	<b>DZ 4011 W E</b>	GHV 784 0101 R0100	<b>51132 2</b>	0,6	1
3 x 230/400	2(6)	2	<b>DZ 4010 W E</b>	GHV 784 0100 R0100	<b>51133 9</b>	0,6	1

#### Combination meters (active and reactive power)

3 x 230/400	2(6)	2	<b>DZ 4010 K E</b>	GHV 784 0100 R2100	<b>51134 6</b>	0,6	1
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#### Tariff meters (4 tariffs)

3 x 230/400	2(6)	2	<b>DZ 4010 WT E</b>	GHV 784 0100 R0140	<b>51135 3</b>	0,6	1
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### Direct connected meters

Voltage V	Current A	Class	Ordering info.		bbn 40 16779 EAN	Weight 1 Pc. kg	Pack- age (Pc.)
			Short code	Product code			

#### Active energy meters

1 x 230	5(65)	2	<b>DZ 2200 W E</b>	GHV 782 2000 R0100	<b>51143 8</b>	0,6	1
3 x 400	5(65)	2	<b>DZ 3400 W E</b>	GHV 783 4000 R0100	<b>51144 5</b>	0,6	1
3 x 230/400	5(65)	1	<b>DZ 4001 W E</b>	GHV 784 0001 R0100	<b>51145 2</b>	0,6	1
3 x 230/400	5(65)	2	<b>DZ 4000 W E</b>	GHV 784 0000 R0100	<b>51146 9</b>	0,6	1

#### Combination meters (active and reactive power)

3 x 230/400	5(65)	2	<b>DZ 4000 K E</b>	GHV 784 0000 R2100	<b>51147 6</b>	0,6	1
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#### Tariff meters (4 tariffs)

3 x 230/400	5(65)	2	<b>DZ 4000 WT E</b>	GHV 784 0000 R0140	<b>51148 3</b>	0,6	1
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### Accessories

Description	Ordering info.		bbn 40 16779 EAN	Weight 1 Pc. kg	Pack- age (Pc.)
	Short code	Product code			
Panel mounting kit for Delta-Meter	<b>DZ-FTB</b>	GH V780 0000 R0000	<b>48120 5</b>	0,21	1

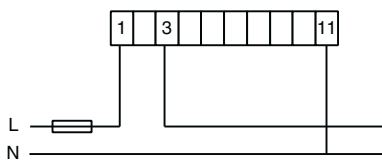
**5.3 Wiring diagrams: (with wiring diagram numbers according to DIN 43 856)**

**Direct connected meters**

**Transformer rated meters**

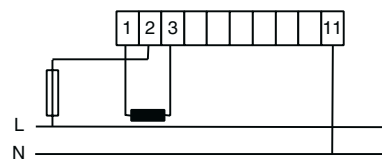
**Two-wire, single-phase voltage network**

DZ 2200/1  
Direct measurement up to 65 A



1600

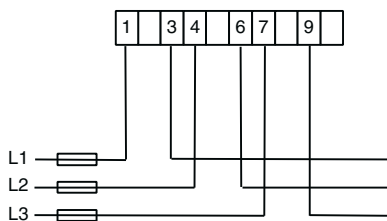
DZ 2210/1  
Measurement with current transformer



1610

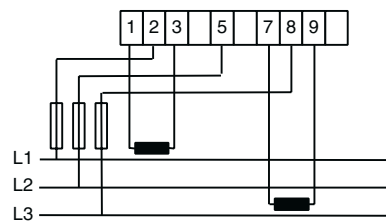
**Three-wire, polyphase voltage network**

DZ 3100/1, DZ 3400/1, DZ 3500/1  
Direct measurement up to 65 A



3600

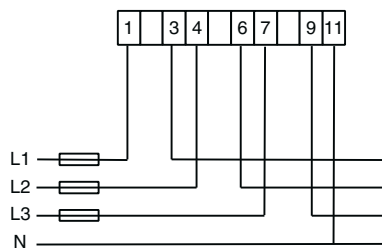
DZ 3110/1, DZ 3410/1, DZ 3510/1  
Measurement with current transformers



3610

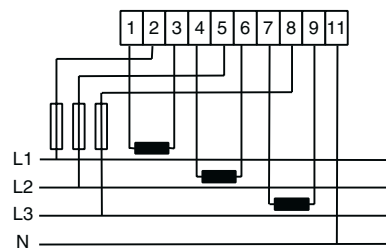
**Four-wire, polyphase voltage network**

DZ 4000/1  
Direct measurement up to 65 A



4600

DZ 4010/1  
Measurement with current transformers



4610



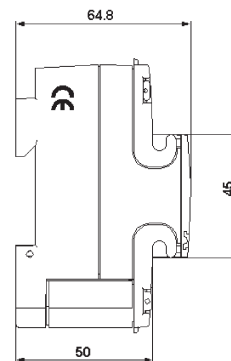
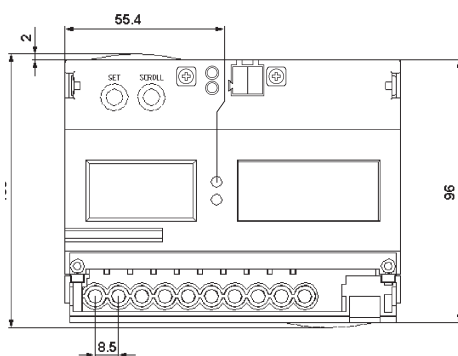
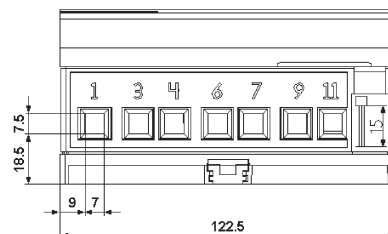
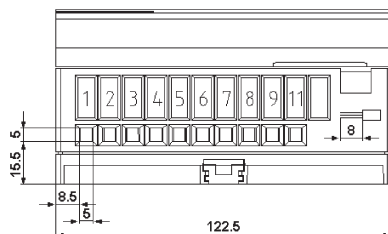
## 5.4 Dimension drawings

Dimensions in mm

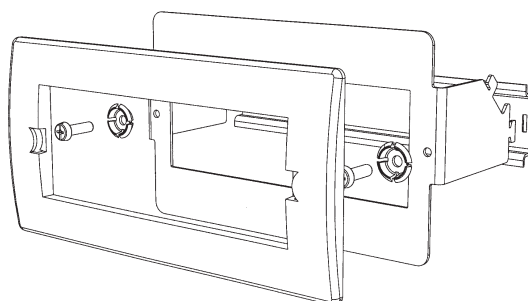
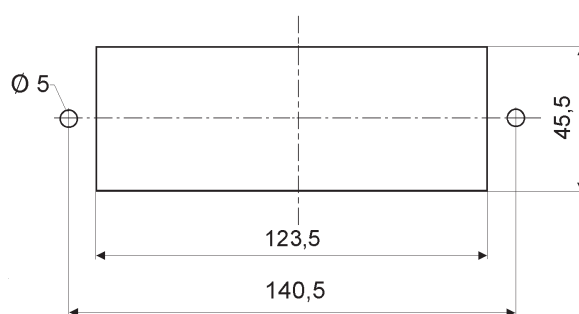
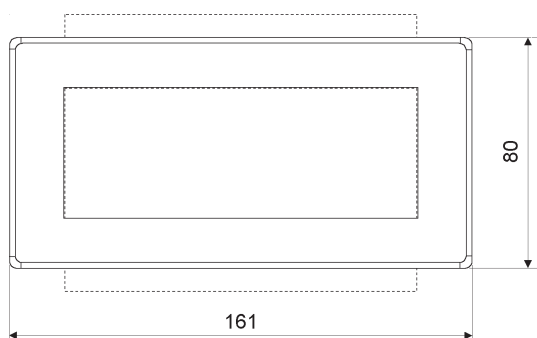
### Transformer rated meters

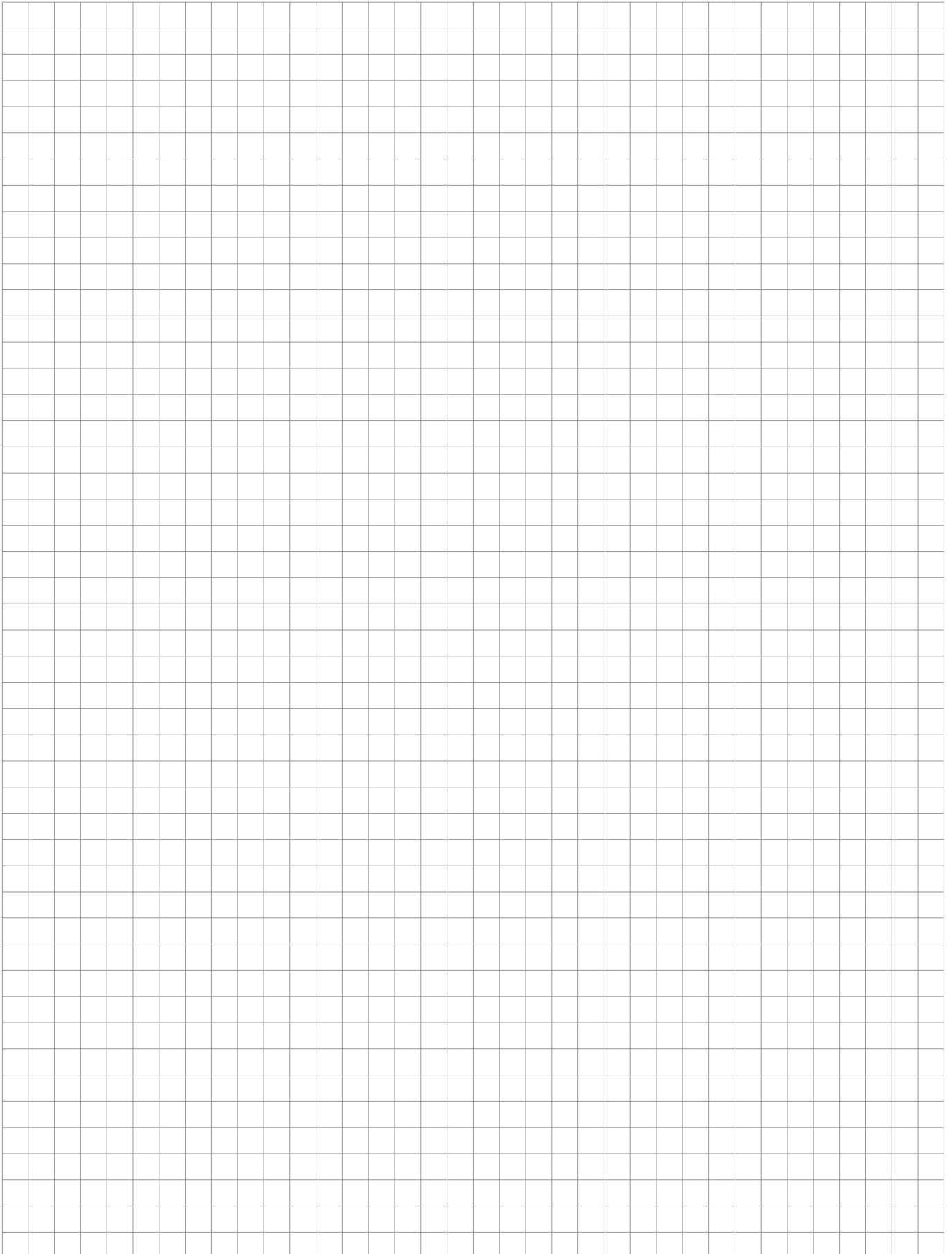
### Direct connected meters

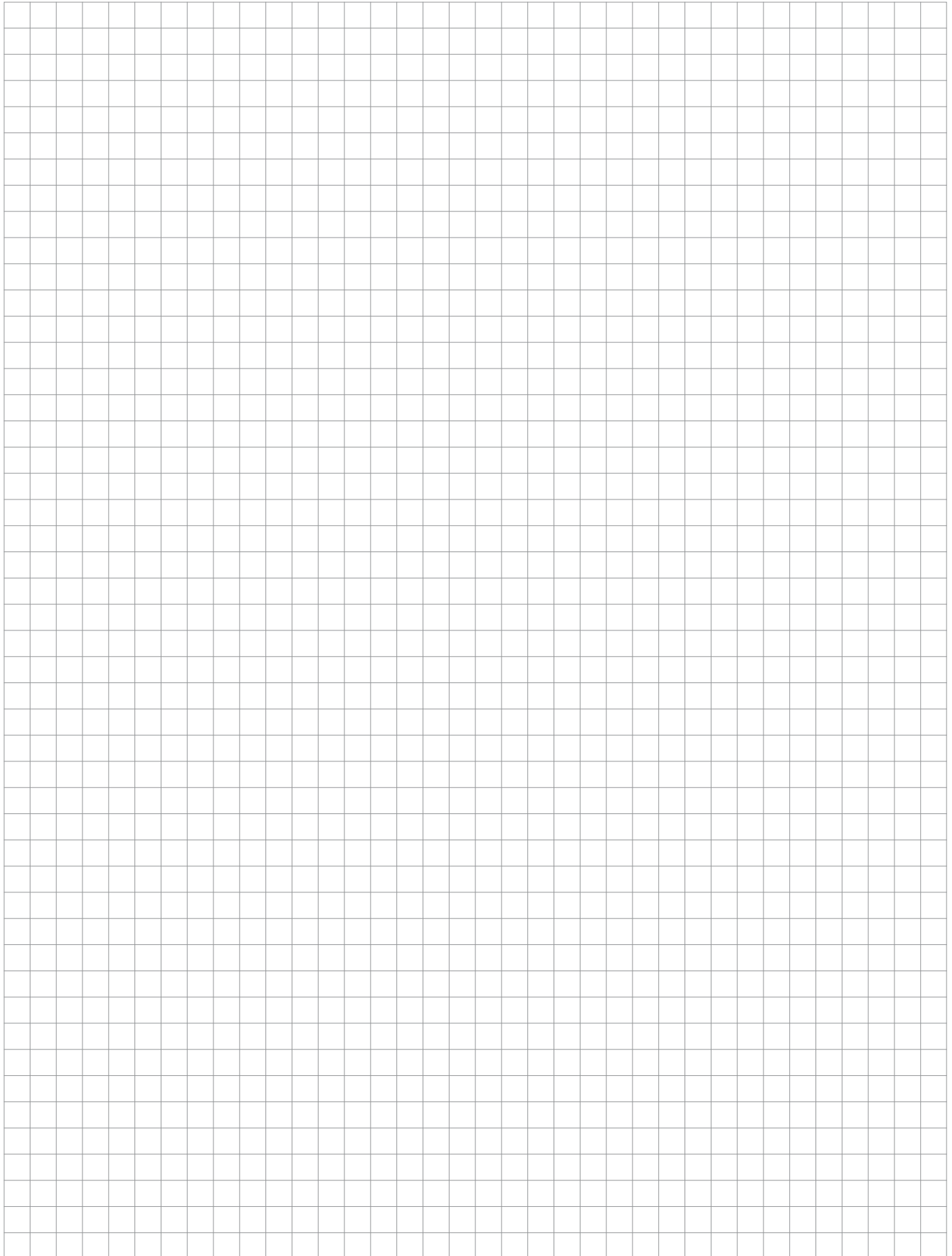
- EIB Delta-Meter**
- Single-phase meter
- Polyphase meter
- Transformer rated meter
- Direct connected meter



### Panel mounting kit









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Your EIB-Partner