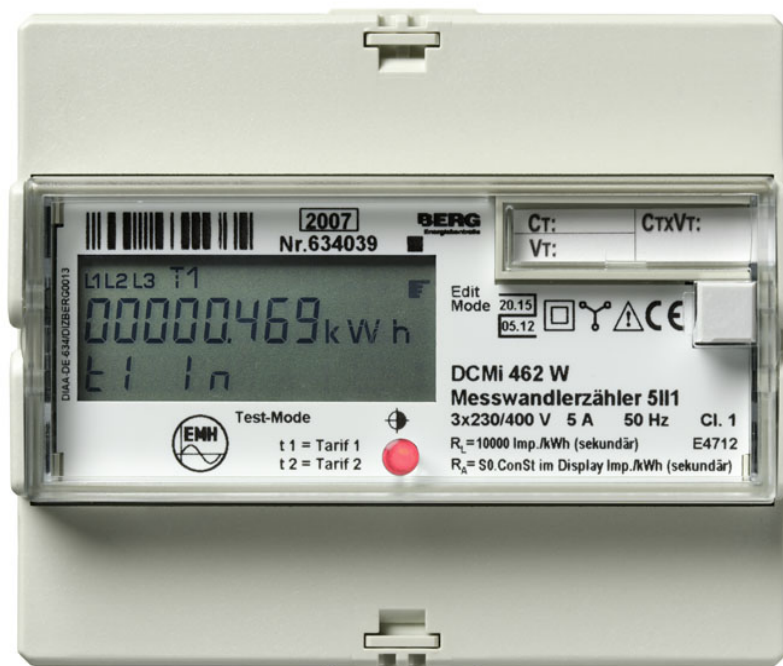


# Product manual for the BERG DCi - Meter

Installation | Device description | Operation



---

All of the contents published in this manual are copyright. Translating, reprinting, duplicating and also saving of this manual in data processors require the exclusive permission from BERG.

All of the trademarks named in this manual are the property of BERG or the respective title holders.

BERG Energiekontrollsysteme GmbH is certified accord. to DIN ISO 9001:2000 and continually endeavors to improve their products.

The contents of this manual and the technical specifications can be extended, altered or removed without prior notice.

The description of the product specifications in this manual does not represent part of a contract.

© 2008 BERG Energiekontrollsysteme GmbH. All rights reserved.

If you have any questions or inspirations you can contact us:

BERG GmbH  
Fraunhofer Str. 22  
D-82152 Martinsried  
GERMANY

Tel.: +49 89 379160-0  
Fax: +49 89 379160-199  
Service-Hotline: +49 1805 2374-50 (14Ct./Min.)  
[www.berg-energie.de](http://www.berg-energie.de)

---

## Contents page

<b>1</b>	<b>Prologue</b> .....	<b>5</b>
1.1	Safety tips .....	5
1.2	Maintenance and guarantee tips .....	5
<b>2</b>	<b>Mounting and installation</b> .....	<b>6</b>
2.1	Mounting the meter .....	6
2.2	Installation .....	7
2.2.1	Connection examples .....	8
<b>3</b>	<b>General description</b> .....	<b>10</b>
<b>4</b>	<b>Standards and regulations</b> .....	<b>11</b>
<b>5</b>	<b>Housing-, operation and display elements</b> .....	<b>12</b>
5.1	Overview .....	12
5.2	Display .....	13
<b>6</b>	<b>Technical description</b> .....	<b>14</b>
6.1	Technical data .....	14
6.2	Function circuit diagrams .....	15
6.2.1	Direct connected meter up to 65 A .....	15
6.2.2	Transformer operated meter up to 5 A .....	15
6.3	Inputs .....	16
6.4	Outputs.....	16
6.4.1	Secondary pulse output.....	16
6.4.2	Primary pulse output .....	16
6.4.3	Impulse-LED .....	17
6.5	Interfaces .....	17
6.5.1	M-Bus-interface .....	17
6.5.2	LON-interface .....	17
6.5.3	RS485-interface .....	18
6.6	Battery.....	19
6.7	Path separator.....	19
<b>7</b>	<b>Operation of the meter</b> .....	<b>20</b>
7.1	Display control.....	20
7.1.1	Standard menu.....	21
7.1.2	Test mode (for certification only) .....	24
7.1.3	Address menu .....	26
7.1.4	Edit menu .....	28
<b>8</b>	<b>Appendix</b> .....	<b>33</b>
8.1	EC Declaration of conformity.....	33
8.2	Declaration of Conformity to EC type-examination certificate .....	34

---

## Figure index

Figure 1: Dimensions (direct connected meter) .....	6
Figure 2: Housing-, operation and display elements .....	12
Figure 3: Layout of the display .....	13
Figure 4: Function circuit diagram (direct connected meter) .....	15
Figure 5: Function circuit diagram (transformer operated meter) .....	15
Figure 6: System layout - RS485-two wire bus .....	18
Figure 7: Detail drawing - RS485 terminating resistor .....	18
Figure 8: Path separator .....	19

## Table index

Table 1: Terminal dimensions, connection-cross sections, torques .....	8
Table 2: Housing- operation- and display elements .....	12
Table 3: Description of the display elements .....	13
Table 4: Technical data .....	14
Table 5: Specifications of the inputs .....	16
Table 6: Specifications of the outputs .....	16
Table 7: Specifications of the RS485-interface .....	18
Table 8: Error code description .....	20
Table 9: Standard menu .....	23
Table 10: Test mode .....	26
Table 11: Error code description .....	27
Table 12: Digitness of the energy registers .....	28
Table 13: Edit mode .....	32

## Abbreviations

A	Active energy
+A	Positive active energy (customer imports from utility)
-A	Negative active energy (customer exports to utility)
Cl.	Accuracy class
DIN	Deutsches Institut für Normung e.V. (German Institute for standards)
EN	European standards
EVU	Utility
IEC	International Electromechanical Commission
Imp.	Impulse
Imp./kWh	Impulse per kWh
L1, L2, L3	External conductor
LED	Light Emitting Diode
N	Neutral conductor
P	Active power
PTB	PTB (German certified body)
S0	Interface accord. to DIN 43 864

---

## 1 Prologue

This manual describes all designs of the DIZ meter (firmware version 3.03 and higher). Please note that the meters can be designed differently regarding, for example, configuration, interfaces in-/outputs etc. It is therefore possible that meter features are described here which do not apply to the meter(s) used by you.

### 1.1 Safety tips

The meters are to be used exclusively for measuring electrical energy and must only be operated within the specified technical data (see also nameplate).

When installing or changing the meter, the conductor to which the meter is connected must be de-energised. Contact to parts under voltage is extremely dangerous. Therefore the relevant back-up fuse is to be removed and stored so that other people cannot insert this unnoticed.

Before opening the meter, the secondary circuit of the current transformer must definitely be short circuited. The high voltage on the current transformer is extremely dangerous and destroys the current transformer.

With incorrect meter installation the S0-inputs can lead to line voltage.

**Attention: Danger!**

The local standards, guidelines, regulations and instructions are to be obeyed. Only authorized personnel are permitted to install the electricity meters.

With storage, transport and operation, the meter it is to be protected against dampness, dirt and damage. During operation, pay attention that the meter is sufficiently cooled.

### 1.2 Maintenance and guarantee tips

The meter is maintenance-free. With damages (e.g. due to transportation, storing) no repairs may be carried out independently.

As soon as the meter is opened, the guarantee claims cease. The same applies in case the defect can be traced back to external influences (e.g. lightning, water, fire, extreme temperatures and weather conditions, improper or negligent use or treatment).

## 2 Mounting and installation

### 2.1 Mounting the meter

Meters from the series DIZ are designed for mounting on DIN-rails TH 35-7.5 accord. to DIN 60715.

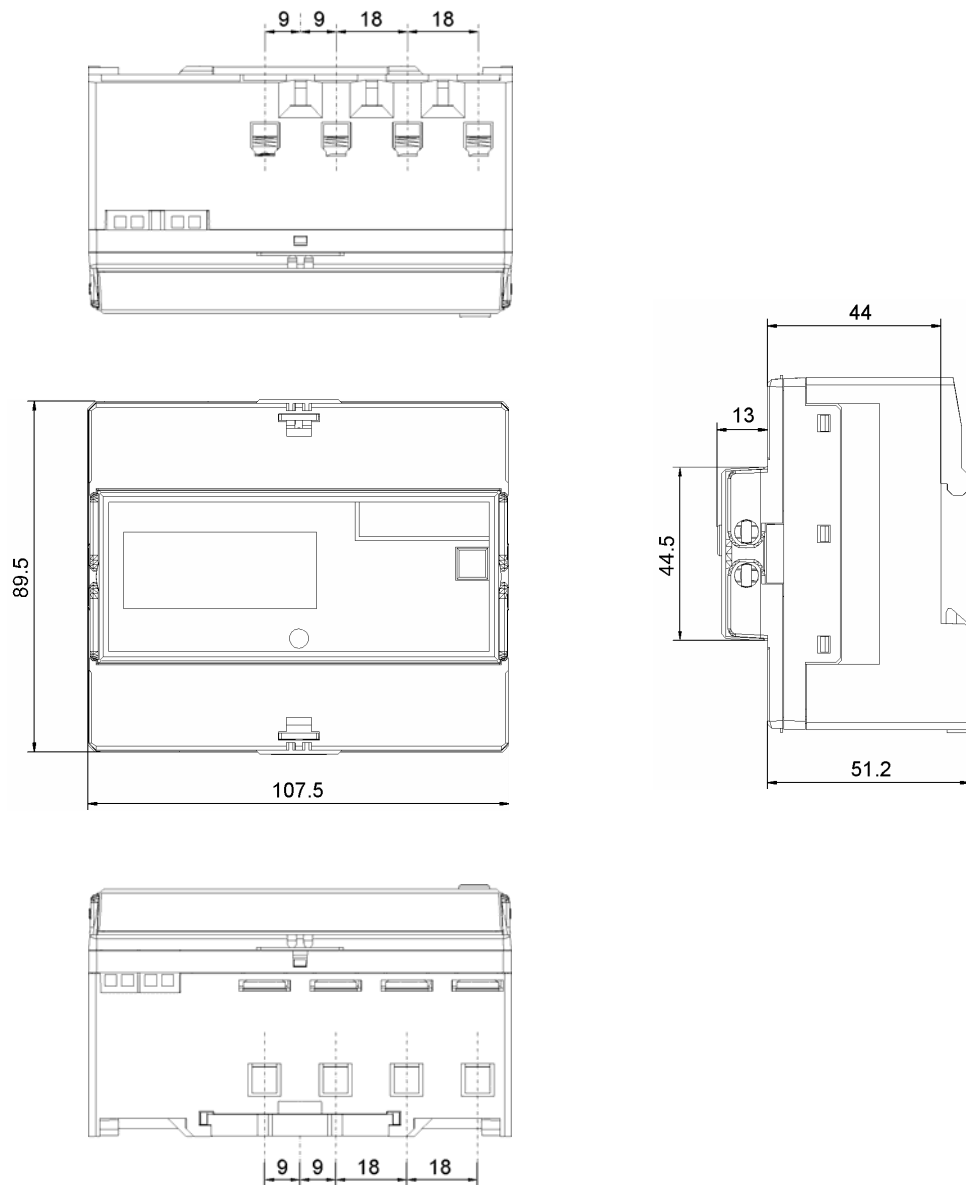


Figure 1: Dimensions (direct connected meter)

## 2.2 Installation

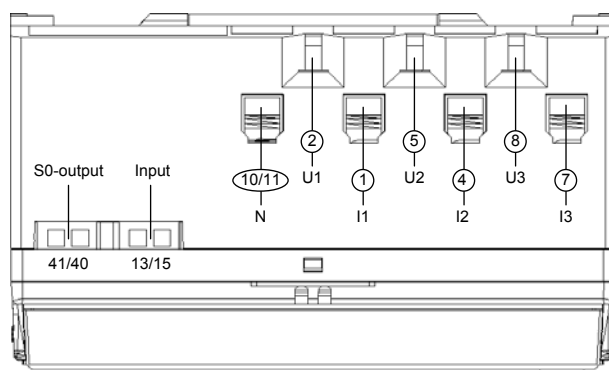
When installing the meter, please pay careful attention to the connection diagram which can be found on the inside the terminal cover. On page 8 you can find examples of connection diagrams.

The direct connected version from the series DIZ can be connected to a 3- or 4-phase busbar with a left-sided N-connection. The busbars are suitable e.g. for automatic circuit-breakers from AEG, Hager, Siemens, Moeller, Hager and Geyer.

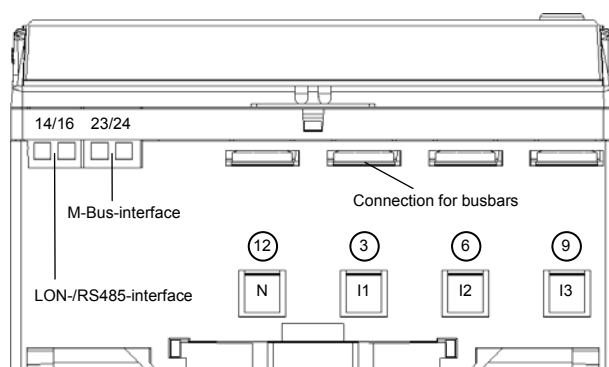
Meters for direct connection are to be protected against short circuits with a back-up fuse of 63 A and for transformer connected meters of < 10 A in the voltage path. The control input is to be protected with a back-up fuse of 0.5 A.

In order to protect the DIZ from unauthorized access, the meter can be equipped with a seal at the sealing eye can be sealed (see page 12).

The current and voltage supply inputs, the control input and the pulse output can be found on the top of the meter.



The current outputs, the optional electrical interface and, with direct connected meters, the connection for the busbars can be found on the bottom of the meter.



	Current terminals / N-terminal		Voltage terminals		Auxiliary terminals	
	up to 65 A	up to 5 A	up to 65 A	up to 5 A	up to 65 A	up to 5 A
Terminal dimensions W x H (d) mm	6.9 x 7.9	3.3 x 3.0	2.7 x 3.0	2.7 x 3.0	d = 2.5	d = 2.5
Maximum connection-cross section (mm <sup>2</sup> )	16	4	2.5	2.5	2.5	2.5
Maximum torques for terminals (Nm)	3.0	0.5	0.5	0.5	0.8	0.8

Table 1: Terminal dimensions, connection-cross sections, torques

**Note:**

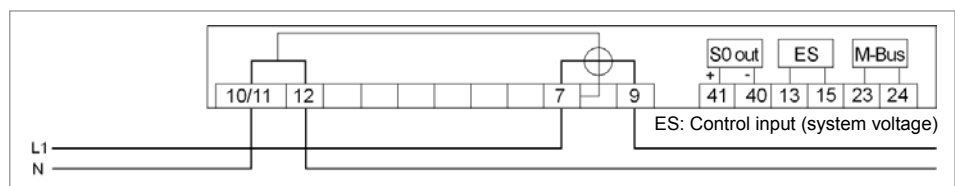
Please ensure when installing the meter that, after threading the connecting leads, the screws are tightened to the correct torque according to EN 60999 in order to guarantee a safe contact. The torque depends on the type of the connecting leads and the maximum current.

**In order to avoid damage to the meter the valid, maximum torque for the terminal clamps may not be exceeded.**

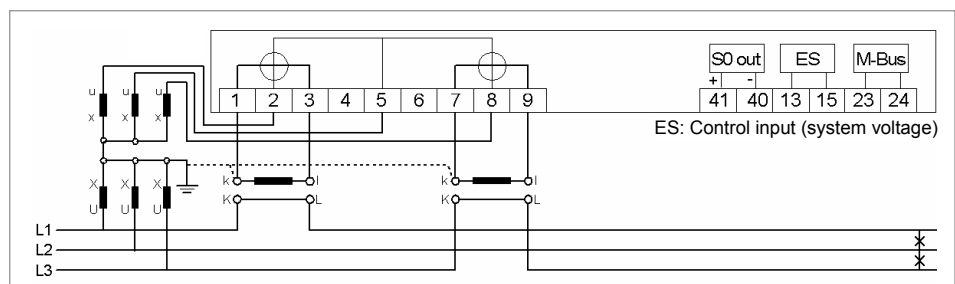
**2.2.1 Connection examples**

In the following you can find examples of some connection diagrams. When connecting a meter pay attention to the connection diagram which can be found on the inside of the terminal cover or in the delivery documents.

2-wire version, direct connection

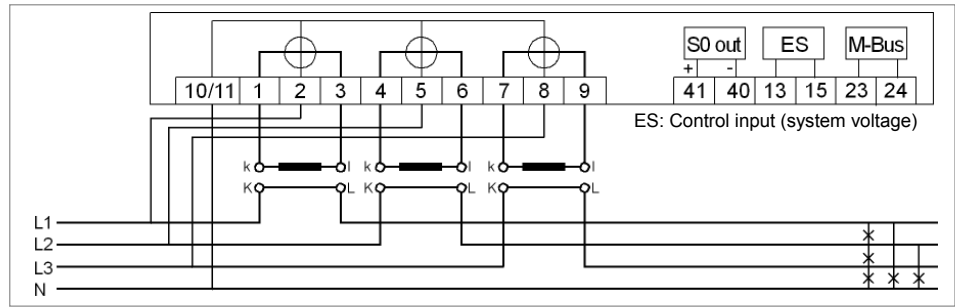


3-wire version, connected to current- and voltage transformer

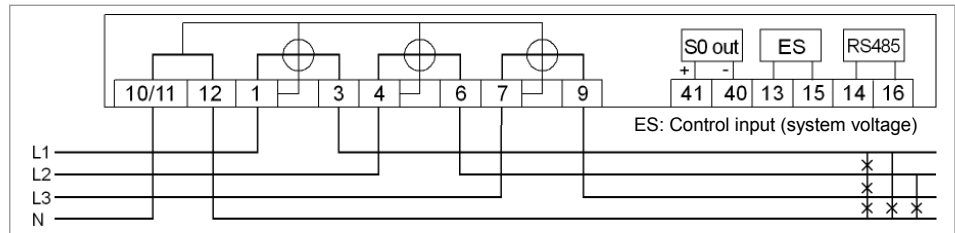




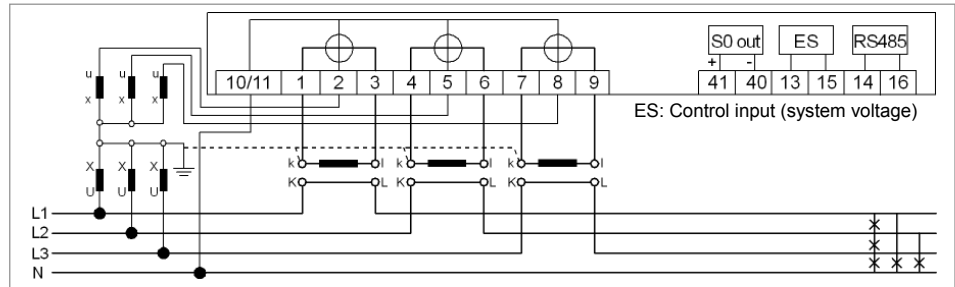
4-wire version, connected to a current transformer



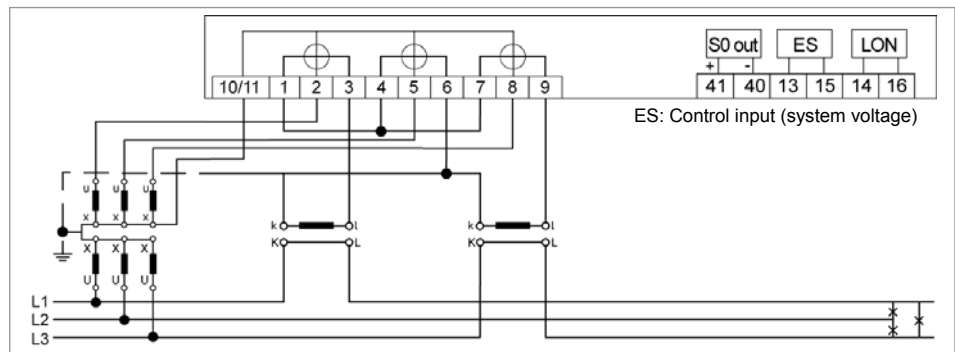
4-wire version, direct connection



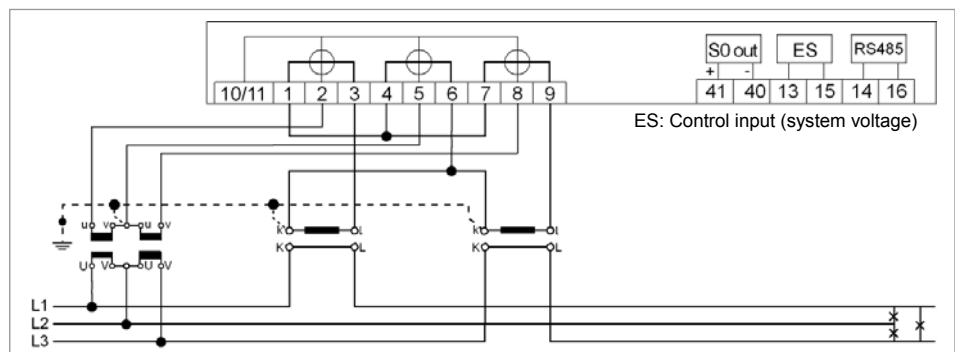
4-wire version, connected to current and voltage transformer



4-wire version, connected to current – and voltage transformers  
(3 voltage transformers) (auxiliary circuit with 2 current transformers)



4-wire version, connected to current- and voltage transformers  
(auxiliary circuit with 2 current transformers)



---

### 3 General description

The DIZ meter is a digital 1- or 2- tariff meter for measuring positive- and negative active energy in 2-, 3- and 4-wire networks. Tariff switching takes place via an external control input.

DIZ meters are principally used for energy data registration in the industry and building installation, switching stations and the field of energy supply.

The compact design of this meter allows "space saving" mounting (only 6 pitch wide) and also connection via cable bridges or DIN-Rail.

The DIZ meter in the transformer connected version is equipped with a transformer ratio which can be set for the registration of the real energy consumption. The transformer ratio can be set directly at the meter via the operation button (only with uncertified meters).

The energy consumption values are displayed with 8 digits on an LC-Display.

They can, however, also be given out via a secondary or primary pulse output and/or via an electrical interface (M-Bus, LON or RS485). With the secondary pulse output the pulse constants and pulse length can be set, with the primary pulse output they are fixed.

The DIZ is available in class accuracy 1 or 2 according to IEC 62053-21 resp. class accuracy B or A according to EN 50470-1, -3.

---

## 4 Standards and regulations

DIN EN 14908-1, -2 -3, -4	Open Data Communication in Building Automation, Controls and Building Management - Building Network Protocol
DIN EN 13757-2, -3	Communication systems for meters and remote reading of meters
EN 50470-1	Electricity metering equipment (a.c.) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)
EN 50470-3	Electricity metering equipment (a.c.) - Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)
DIN EN 60529	Degrees of protection provided by enclosures (IP code)
DIN EN 60715	Dimensions of low-voltage switchgear and control gear - standardized mounting on rails for mechanical support of electrical devices in switchgear and control gear installations
DIN EN 61000-3-2, 4-2, -4-3, -4-4, -4-5, -4-6, -4-11, -6-2	Electromagnetic compatibility (EMC)
IEC 60068-2-30	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
IEC 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
IEC 62053-21	Electricity metering equipment (a.c.) - Particular Requirements - Part 21: Static meters for active energy (classes 1 and 2)
ITU-T V.11	Electrical characteristics for balanced double-current interchange circuits operating at data signaling rates up to 10 Mbit/s
TIA/EIA-485	Electrical characteristics of generators and receivers for use in balanced digital multipoint systems

## 5 Housing-, operation and display elements

### 5.1 Overview

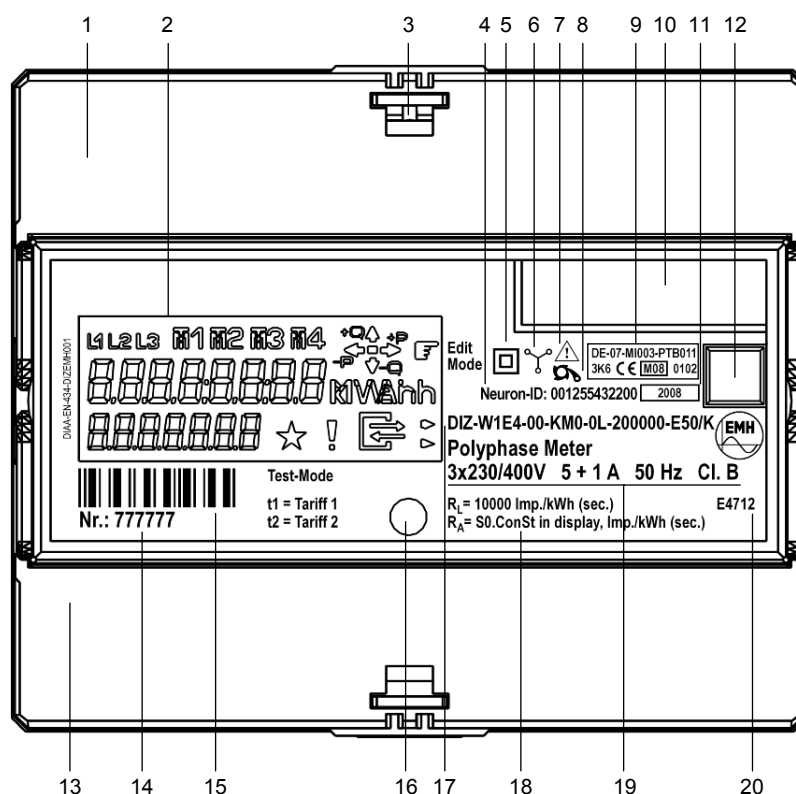


Figure 2: Housing-, operation and display elements



No.	Description
1	Foldaway terminal cover
2	LC-Display
3	Seal eye
4	Neuron-ID-number (meters with LON-interface only)
5	Protection class II
6	Type of network and load
7	Pay attention to package insert
8	Non-reverse ratchet or bidirectional meter (  )
9	EC type-examination certificate (comprising: first line: examination certificate number second line: temperature key, CE-sign, attribute of metrology + year of the judgment of conformity, designation of the notified body) or national approval sign (e.g. PTB:  )
10	Panel for instrument transformer nameplate
11	Model year
12	Call-up button for operating the meter
13	Foldaway terminal cover
14	Serial number
15	Bar code
16	Test LED
17	Type designation / -key
18	Pulse constants for LED and pulse output
19	Voltage, current, frequency and accuracy class
20	Contact sequence number

Table 2: Housing- operation- and display elements

## 5.2 Display

The DIZ meter has a liquid crystal display (LCD) with the following layout.

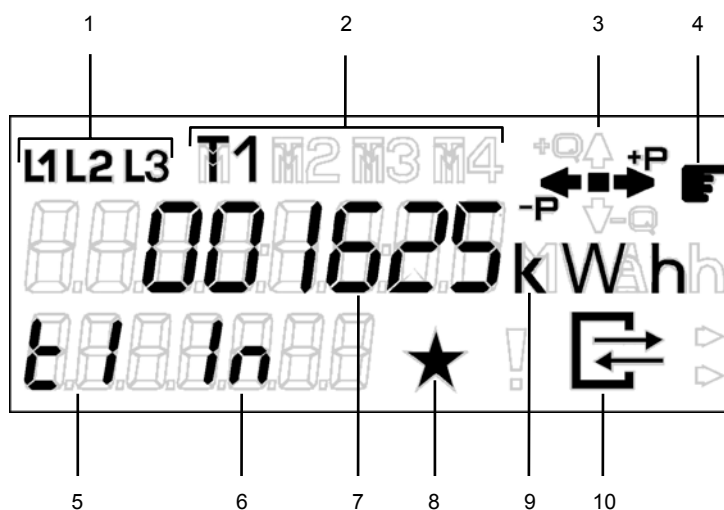


Figure 3: Layout of the display

Nr.	Description
1	<b>Phase display</b> L1, L2, L3 are continually lit up: Phase voltages are applied. L1, L2, L3 flash: Phase sequence of the voltage is wrong
2	<b>Display of active tariffs</b> T1: Tariff 1 is active T2: Tariff 2 is active
3	<b>Energy direction display</b> +P is continually lit up: Meter has now been started up and registers positive active energy. -P is continually lit up: Meter has now been started up and registers negative active energy. -P flashes: Non-reverse ratchet is active, energy is not registered.
4	<b>Hand-Symbol</b> flashes: Edit mode is active or was ended with "Escape". The edit data can still be changed (not certifiable). continually lit up: Edit mode was locked with "Close" and can only be reactivated with a user password (not certifiable) if the meters are configured in a fitting manner. off: Edit mode was locked with "Close" and cannot be reactivated (certifiable).
5	<b>Tariff display</b> Tariff designation of the displayed energy value
6	<b>Energy direction of the register</b> In: register for measuring positive active energy Out: register for measuring negative active energy
7	<b>Value range</b> Display the contents of the register
8	<b>Star-Symbol</b> flashes: Test mode active. Activation took place from out of the standard mode.
9	<b>Display of the units</b> Unit of the displayed value in the value range
10	<b>Communication symbol</b> Lights up when communication with the electrical interface

Table 3: Description of the display elements

## 6 Technical description

### 6.1 Technical data

		Transformer operated meter 5I11 A / 5 + 1 A and 1 A	Direct connected meter 5(65) A / 0.25 – 5(65) A
Voltage	4-wire meter	3x230/400 V, 3x290/500 V, 3x58/100 V, 3x63/110 V	3x230/400 V, 3x290/500 V
	3-wire meter	3x100 V, 3x110 V, 3x400 V, 3x500 V	3x400 V, 3x500 V
	2-wire meter	1x100 V, 1x110 V, 1x230 V	1x230 V
Starting current		2 mA	20 mA
Frequency		50 Hz, 60 Hz, 16 <sup>2</sup> / <sub>3</sub> Hz	
Accuracy	active energy	Cl. 1 or Cl. 2 accord. to IEC 62053-21 Cl. B or Cl. A accord. to EN 50470-1, -3	
Measuring types	active energy	+A (with non-reverse ratchet), option: -A	
Meter constants	LED	1 000...400 000 Imp./kWh (depending on meter type)	1 000...2 000 Imp./kWh (depending on meter type)
	primary output	1 Imp./kWh (fixed, pulse length 500 ms)	
	secondary output	100...200 000 Imp./kWh (depending on meter type)	10...2 000 Imp./kWh (depending on meter type)
	configuration ability	output pulse constant with certified version resp. with Declaration of Conformity of MID is fixed parameterisation, with uncertified version settable via mechanical button	
Energy registers	number	maximum 2 tariff register (T1 / T2) for each energy direction	
Control inputs for tariff switching (option)	number	maximum 1	
	system voltage	58...230 V AC	
Data retention time		without voltage in the FLASH / EEPROM, at least 20 years	
Display	LC-Display	8 digits, 3 with decimals digits	8 digits
	digit size in the value range	4 x 6 mm	
Operation	mechanical button	for operation of display	
Data interfaces (option)	M-Bus	accord. to DIN EN 13757-2, -3 (300...9600 baud)	
	LON	accord. to DIN EN 14908-1, -2, -3, -4	
	RS485	accord. to TIA/EIA-485 and ITU-T V.11 (300...9600 baud)	
Output (option)	number	maximum 1	
	Opto-MOSFET	maximum 250 V AC/DC, 100 mA for impulse transmission (fulfils S0-specifications)	
	S0-output	maximum 27 V DC, 27 mA (passive)	
Energy supply	switched-mode power supply	3-phase from the measuring voltage	
Power consumption per phase	voltage path	< 2.0 VA / < 1.0 W	
	current path	< 0.5 VA	< 2.5 VA
EMC-characteristics	isolation resistance	Isolation: 4 kV AC, 50 Hz, 1 min	
	surge voltage	EMV: 4 kV, Impulse 1.2/50 µs, 2 Ω ISO: 6 kV, Impulse 1.2/50 µs, 500 Ω	
	resistance against HF-fields	10 V/m (under load)	
Temperature range	operation / limit and storage	-25°C...+55°C / -40°C...+70°C	
Relative humidity		95%, non-condensing accord. to IEC 62052-11, EN 50470-1, IEC 60068-2-30	
Housing	dimensions	6 pitch = 107.5 x 89.5 x 64.2 mm (B x H x D)	
	class of protection	2	
	degree of protection housing / terminal block	IP 20	
	housing material	polycarbonate	
	fire characteristics	flame-inhibiting (without halogen)	
	weight	approx. 400 g	
Connection-cross section	current / neutral conductor	maximum 4 mm <sup>2</sup>	maximum 16 mm <sup>2</sup>
	voltage / auxiliary terminals	maximum 2.5 mm <sup>2</sup>	maximum 2.5 mm <sup>2</sup>
Further features		buffer battery for reading the display without power (option) measuring of instantaneous values of power, voltage and current  The meter can be connected to a 3- or 4-phase busbar with left-sided N connection. The busbars are suitable e.g. for automated devices from AEG, Siemens, Moeller, Hager and Geyer.	

Table 4: Technical data

## 6.2 Function circuit diagrams

### 6.2.1 Direct connected meter up to 65 A

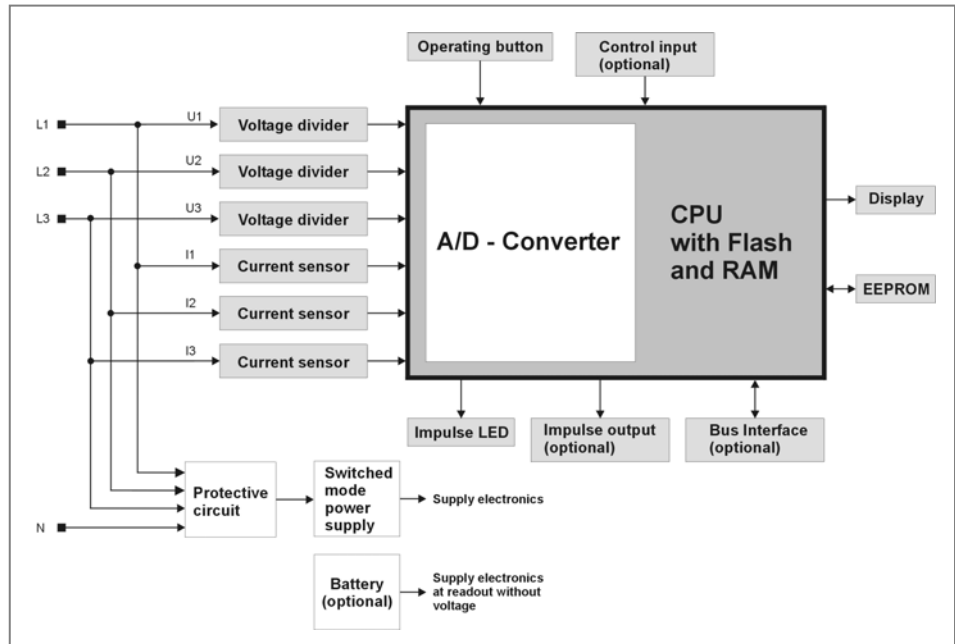


Figure 4: Function circuit diagram (direct connected meter)

### 6.2.2 Transformer operated meter up to 5 A

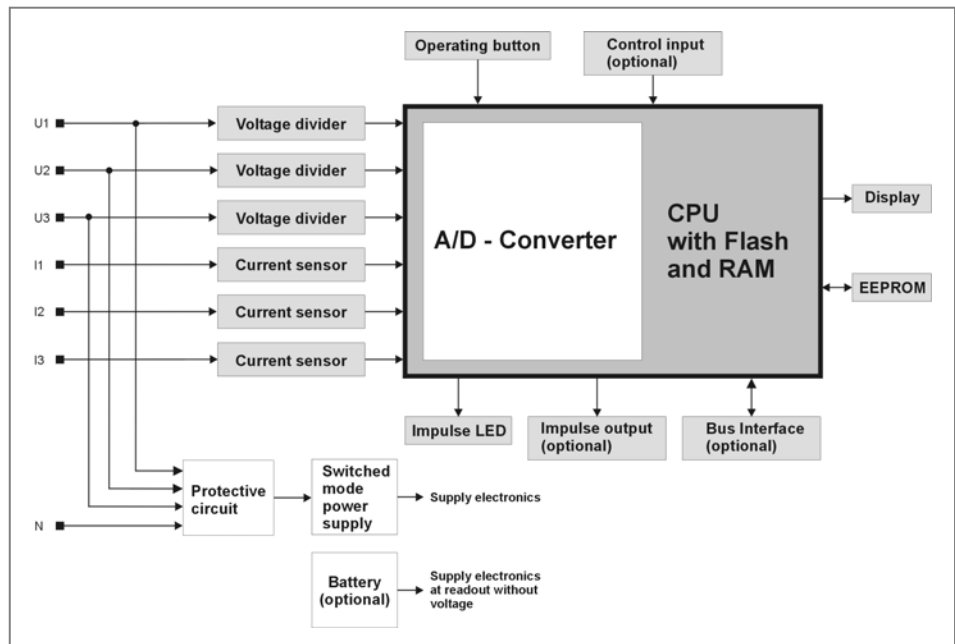


Figure 5: Function circuit diagram (transformer operated meter)

### 6.3 Inputs

In the two tariff version the DIZ meter has a control input (system voltage) for tariff switching.

Specifications	
System voltage	58...230 V AC (standard)

Table 5: Specifications of the inputs

### 6.4 Outputs

The DIZ has a potential free S0-output (accord. to DIN 43 864) or a potential free MOSFET-output (semi-conductor relay). The MOSFET-outputs can be designed as a make- or break contact.

Specifications	
Opto-MOSFET	max. 250V AC/DC, 100 mA (standard)
S0-output	max. 27 V DC, 27 mA (passive)

Table 6: Specifications of the outputs

#### 6.4.1 Secondary pulse output

If transformer ratios are set they do not have any effect on the impulse output.

The pulse time is 30, 50 or 100 ms depending on the meter design. The energy pulses ( $R_A$ ) are 10, 100, 200, 500, 1 000, 2 000, 5 000, 10 000, 20 000, 50 000, 100 000 or 200 000 Imp./kWh depending on the version and are always secondary based.

#### 6.4.2 Primary pulse output

Set transformer ratios effect the impulse output!

The pulse duration is fixed to 500 ms and the pulse value to 1 Imp./kWh.

**Note:** With a meter which has a configured primary pulse output the functions of the pulse output do not just depend on the momentary power, but also on the set total transformer factors. The transformer factors are to be selected by the user so that with a maximum load of the meter a sufficiently large pulse period is guaranteed. The pulse duration is set to 500 ms and cannot be changed.

#### Example:

Meter connection type: 4-wire

$$U_{\text{nom}} = 3 \times 230 / 400 \text{ V}$$

$$I_{\text{max}} = 5 \text{ A}$$

Output pulse value: 1 Imp./kWh with 500 ms pulse duration

Total transformer factors = U-factor x I-factor = e.g. 1000

$$P_{\text{max}} = U_{\text{nom}} \times 15\% \times I_{\text{max}}$$

$$P_{\text{max}} = 3 \times 230 \text{ V} \times 1.15 \times 5 \text{ A} = 3.968 \text{ kWh}$$

$$\text{Pulse frequency} = \text{impulse value} \times \text{transformer factors} / 3600 \text{ s}$$

$$\text{Pulse frequency} = 3.968 \text{ kWh} \times 1 \text{ Imp./kWh} \times 1000 / 3600 \text{ s}$$

$$\text{Pulse frequency} = 1.102 \text{ Hz} \Rightarrow \text{every } 907 \text{ ms a pulse}$$

With a fixed pulse duration of 500 ms the pulse period is 407 ms (907 ms-500 ms).



---

### 6.4.3 Impulse-LED

If transformer ratios are set, they do not have any effect on the Impulse-LED. The LED constant ( $R_L$ ) depends on the version and is always based on secondary values.

## 6.5 Interfaces

### 6.5.1 M-Bus-interface

The M-Bus interface is designed accord. to DIN EN 13757-2, -3. Via M-Bus the following parameters can be transmitted:

- Manufacturer identification, as an option freely selectable
- Medium
- Primary- and secondary addresses M-Bus
- Energy values
- Instantaneous value  $P_{Sum}$
- Error status

This data is emitted as a standard answer and can be displayed by customary tools such as "Lorus". Other parameters such as meter configuration or the edit data can only be read out by manufacturer specific M-Bus telegrams. In order to carry out this function the EMH DIZ-Tool must be installed on the readout device.

### 6.5.2 LON-interface

The LON-interface is designed according to DIN EN 14908-1, -2, -3, -4 and is based on the specification "LONMARK", which permits harmonisation of any LON-module in any environment. Each LON-module has a world-wide unique address (Neuron-ID). This address is specified during manufacturing and is imprinted on the meters nameplate. The DIZ-LON-Bus supports open net-topologies.

The following data can be called up via the LON-interface:

- Energy values
- Instantaneous values  $P_{Sum}$ ; single phases P, U and I
- Error status
- Transformer factors from U and I (To change this values is possible with activated edit-mode for units without legalization only.)

Further functions and details can be found in the LON-description for the DIZ meter.

The LON-interface which is galvanically separated from the meter is found at the auxiliary terminals 14 and 16.

### 6.5.3 RS485-interface

The electrical interface RS485 is a symmetrical two wire interface (half duplex) and is designed in accordance with TIA/EIA-485 / ITU-T V.11. The data protocol is the M-Bus protocol. The following parameters can be transferred via the RS485 interface:

- Manufacturer identification, as an option freely selectable
- Medium
- Primary- and secondary addresses M-Bus
- Energy values
- Instantaneous values  $P_{Sum}$  Error status
- Error status

The RS485 interface which is galvanically separated from the meter is found at the auxiliary terminals 14(A) and 16(B).

Features		
Number of connected meters	up to 32	
Maximum cable length	up to 1 000 m	
Data transmission rate	300 ... 9600 baud	
Signal according to TIA/EIA-485 / ITU-T V.11	logical "1" -0.3 V to -6 V	logical "0" +0.3 V to +6 V

Table 7: Specifications of the RS485-interface

#### RS485 Bus

Up to 32 devices can be operated by one RS485 Bus. Usually in a bus system the **first** and **last** device should be terminated with a terminating resistor between wire „A“ and „B“ in order to eliminate conduction reflections.

#### Bus structure:

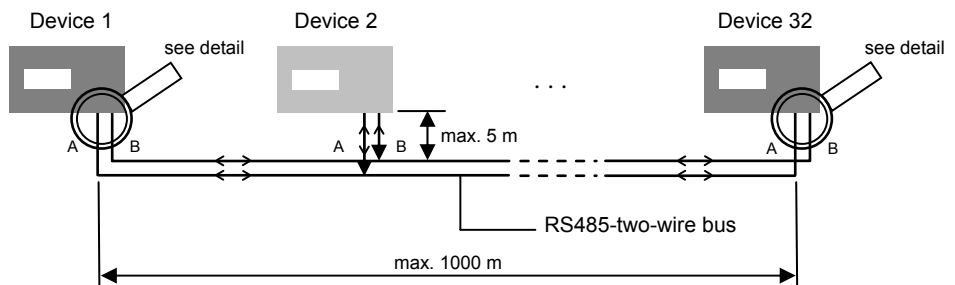
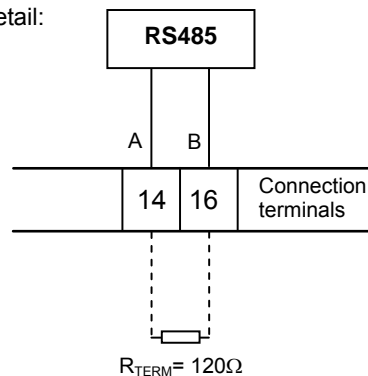


Figure 6: System layout - RS485-two wire bus

#### Detail:



#### Please note:

The terminating resistor may only be installed at the first and last device.

Figure 7: Detail drawing - RS485 terminating resistor

---

## 6.6 Battery

As an option, the DIZ meter can be equipped with an internal battery which allows a readout of the meter when it is switched off. As long as the meter operates continuously via the battery, the lifetime of the battery is at least 30 hours. With a de-energised read out once a month (approx. 5 min) the lifetime is approx. 30 years.

In the battery operation mode, the display switches off automatically 20 seconds after the last operation of the call-up button.

### Note:

The battery used in the DIZ meter is a lithium battery with a very low self-discharge. If the lithium batteries are stored or not used for a long time, a protective layer is formed on the internal contacts which prevents self-discharge. If the battery is used again, the protective layer must be degraded so that the total voltage is available. Thus it may be necessary that the call-up button has to be pressed longer ( $\leq 30$  seconds) to be able to operate the meter again.

## 6.7 Path separator

With a direct connected DIZ meter there is the possibility to separate the voltage path from the current path for test purposes. To do this, a special path separator is used which can be obtained as an accessory from EMH.

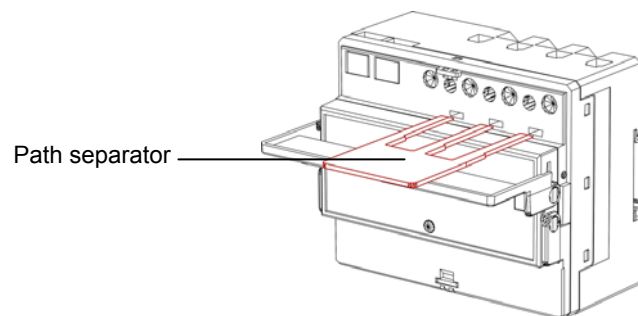


Figure 8: Path separator

---

## 7 Operation of the meter

The DIZ meter is operated via a mechanical button. With this button the display is controlled and settings in the edit mode can be carried out. If the meter is equipped with a battery, the standard menu can be shown in the display when the meter is switched off. However, the test mode, address menu (with meters with electrical interface) and edit menu are not available in this condition.

### 7.1 Display control

The following applies for operation of the meter via the call-up button:

- “short” operation ( $t_{\text{operation}} < 2 \text{ s}$ ) switches over to the next list value or menu option (only switches when the button has been released)
- “long” operation ( $2 \text{ s} \leq t_{\text{operation}} < 5 \text{ s}$ ) activates the momentary represented menu option (switches only after 2 seconds and not when button has just been released)
- “longer” operation ( $t_{\text{operation}} > 5 \text{ s}$ ) leads from every operation in the display mode to the standard display (activates the selected menu option after 2 seconds, only after 5 seconds does it go into the standard index)

During normal operation the meter is in the standard mode. If the meter is in a different condition, 5 minutes after the last operation of the button the display automatically returns to the standard display.

Meters with LON-interface are sending their Neuron-ID-number automatically to the LON-Software if the push-button is used. That simplifies the integration of the units into the bus-system.

In order to guarantee undisturbed operation of the meter a continual checking procedure of the

- checksum via the program code
- checksum via the parameter data
- checksum via the edit data

takes place during operation.

If an error occurs during this checking procedure, it is displayed as an error code in the display:

Error code	Explanation
00000001	Program code faulty
00000002	Parameter data faulty
00000003	Edit data faulty

Table 8: Error code description

If an error is shown in the display, the operation may be affected. Reset of the error code can only take place at the factory.

### 7.1.1 Standard menu

In the normal operation mode the meter is in the standard menu. In the display the energy value of the active tariff is displayed. To switch to the next menu option, press the button - short. At the end of the standard menu there is the possibility to change over to the test mode, address menu<sup>1</sup> or to the edit mode<sup>2</sup>, press the button - long. The possibility to switch to another menu/mode is represented in the display by "Go". With a longer pressing of the button (> 5 seconds) the display switches from every position in the standard mode back to the standard display. This also happens if the button is not operated for longer than 5 minutes.

**S** = short pressing of the button ( $t_{\text{operation}} < 2 \text{ s}$ )

**L** = longer pressing of the button ( $2 \text{ s} \leq t_{\text{operation}} < 5 \text{ s}$ )


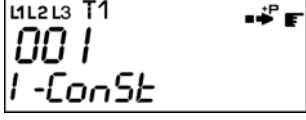
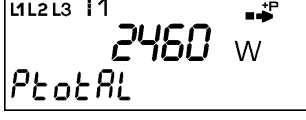
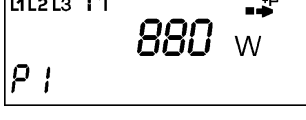
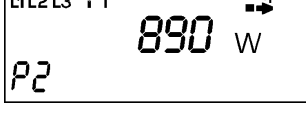
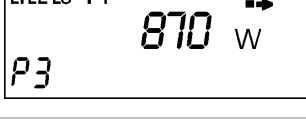



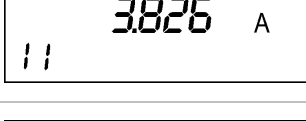

Standard menu		
Menu option	Display	Button (operation leads to the next menu option if not specified differently)
Standard display, active tariff		<b>S</b> or <b>L</b>
Display test		<b>S</b> or <b>L</b>
Tariff 1, positive active energy		<b>S</b> or <b>L</b>
Tariff 2, positive active energy (if configured)		<b>S</b> or <b>L</b>
Tariff 1, negative active energy (if configured)		<b>S</b> or <b>L</b>
Tariff 2, negative active energy (if configured)		<b>S</b> or <b>L</b>

continued on next page

<sup>1</sup> only with meters with electrical interface

<sup>2</sup> only with meters which are not certified and meters which have an edit mode which is not locked

continuation of the standard menu

U-Transformer constant (only with transformer meters)		S or L	
I-Transformer constant (only with transformer meters)		S or L	
Power P for all phases		S or L	
Power P for phase 1		S or L	With a negative performance display, the current transformer connection L1 (terminals 1-3) must be checked.
Power P for phase 2		S or L	With a negative performance display, the current transformer connection L2 (terminals 4-6) must be checked.
Power P for phase 3		S or L	With a negative performance display, the current transformer connection L3 (terminals 7-9) must be checked.
Voltage U for phase 1		S or L	
Voltage U for phase 2		S or L	
Voltage U for phase 3		S or L	
Current I for phase 1		S or L	
Current I for phase 2		S or L	

continued on next page

continuation of the standard menu

Current I phase 3		<input type="checkbox"/> S or <input type="checkbox"/> L
Output constant in Imp.kWh (only with meters with pulse output)		<input type="checkbox"/> S or <input type="checkbox"/> L
Pulse length in seconds (only with meters with pulse output)		<input type="checkbox"/> S or <input type="checkbox"/> L
Primary address (only with meters with M-Bus/RS485-interface)		<input type="checkbox"/> S or <input type="checkbox"/> L
Secondary address (only with meters with M-Bus/RS485-interface)		<input type="checkbox"/> S or <input type="checkbox"/> L
Baud rate M-Bus (only with meters with M-Bus/RS485-interface)		<input type="checkbox"/> S or <input type="checkbox"/> L
Error register		<input type="checkbox"/> S or <input type="checkbox"/> L
Firmware version		<input type="checkbox"/> S or <input type="checkbox"/> L
Activation of the test mode		<input checked="" type="checkbox"/> S To the next menu option <input type="checkbox"/> L Entry into the test mode (see chapter 7.1.2 Test mode (for certification))
Activation of the address menu		<input checked="" type="checkbox"/> S To the next menu option <input type="checkbox"/> L Entry into the address menu (see chapter 7.1.3 Address menu)
Activation of the edit mode		<input checked="" type="checkbox"/> S To the standard display <input type="checkbox"/> L Entry into the edit mode (see chapter 7.1.4 Edit mode)

Table 9: Standard menu

### 7.1.2 Test mode (for certification only)

A flashing star in the display shows that the meter is in the test mode.

In the standard display of the test mode both tariff registers (T1 and T2) of the momentary active energy direction or the last active energy direction are always displayed (if configured).

Representation of the energy values occurs with an increased resolution which means the tariffs are displayed with 7 digits and an additional 2 digits right of the decimal point (max. 5). Furthermore, the Test-LED flashes with a pulse frequency ten times higher and has a pulse length of 3 ms.

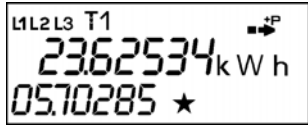

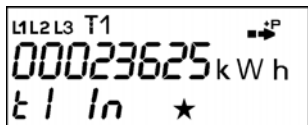
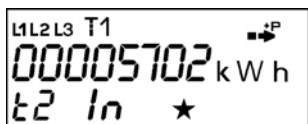
With a short pressing of the button the menu is switched to the next menu option. At the end of the test menu there is the possibility with a long pressing of the button to change over to the address menu<sup>1</sup> or into the edit mode<sup>2</sup>. The possibility to switch to another menu/mode is represented in the display with "Go". With a longer pressing of the button (> 5 seconds) the display switches from every position in the test mode back to the standard display.

To leave the test mode, press the button in the menu option "Escape".

The test mode is cancelled automatically after the return of voltage recovery, after the last pressing of the button or after 24 h. The display then switches into the standard display of the standard menu.

**S** = short pressing of the button ( $t_{\text{operation}} < 2 \text{ s}$ )

**L** = longer pressing of the button ( $2 \text{ s} \leq \text{operation} < 5 \text{ s}$ )

Test mode		
Menu option	Display	Button (operation leads to the next menu option if not specified differently)
Standard display 1. line: tariff 1 2. line: tariff 2 (if configured)		<b>S</b> or <b>L</b>
Leave test mode and change into the standard menu		<b>S</b> To the next menu option <b>L</b> Leave test mode
Tariff 1, positive active energy		<b>S</b> or <b>L</b>
Tariff 2, positive active energy (if configured)		<b>S</b> or <b>L</b>



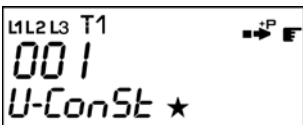
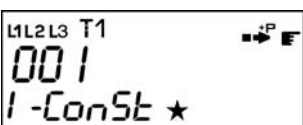
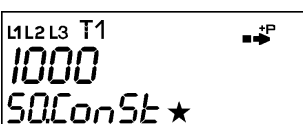
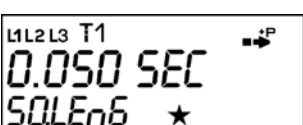
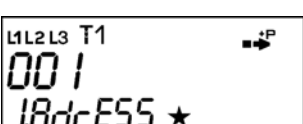
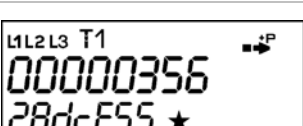
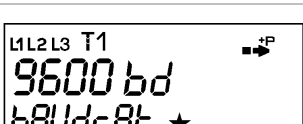
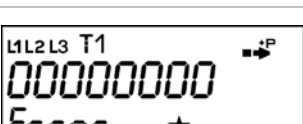
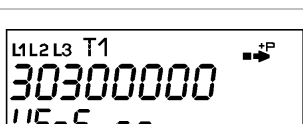
continued on next page

<sup>1</sup> only with meters with electrical interface

<sup>2</sup> only with meters which are not certified and meters which have an edit mode which is not locked



continuation of the test mode

<p>Tariff 1, negative active energy (if configured)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Tariff 2, negative active energy (if configured)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>U-Transformer constant (only with transformer meters)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>I-Transformer constant (only with transformer meters)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Output constant in Imp./kWh (only with meters with pulse output)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Pulse length in seconds (only with meters with pulse output)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Primary address (only with meters with M-Bus/RS485-interface)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Secondary address (only with meters with M-Bus/RS485-interface)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Baud rate M-Bus (only with meters with M-Bus/RS485-interface)</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Error register</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>
<p>Firmware version</p>		<p><input type="button" value="S"/> or <input type="button" value="L"/></p>

continued on next page

continuation of the test mode

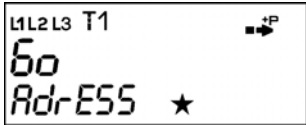

Activation of the address menu		<b>S</b> To the next menu option <b>L</b> Entry into the address menu (see chapter 7.1.3 Address menu)
Activation of the edit mode		<b>S</b> To the standard display <b>L</b> Entry into the edit mode (see chapter 7.1.4 Edit mode)

Table 10: Test mode

### 7.1.3 Address menu

The address menu is only available if the meter is equipped with an M-Bus- or RS485-interface. In the address menu, the primary address, secondary address and baud rate can be changed.

When the meter leaves the factory it has the following settings (standard):

Primary address: 001

Secondary address: 8 digits with leading zeros, e.g. 00390747 (serial no.)

Baud rate: 2400 baud

With a short pressing of the button the menu is switched to the next menu option. With a longer pressing of the button (> 5 seconds) the display switches from every position in the standard menu back to the standard display.

This also happens when the button is not operated for longer than 5 minutes.

At the end of the address menu there is the possibility to leave the address menu by means of a long pressing of the button (display "Escape") or, by means of a short pressing of the button to switch to the start of the address menu.

**S** = short pressing of the button ( $t_{\text{operation}} < 2 \text{ s}$ )

**L** = longer pressing of the button ( $2 \text{ s} \leq t_{\text{operation}} < 5 \text{ s}$ )

**Edit example:**

In the following table the value for the primary address is changed from 001 to 002. To change the secondary address and the baud rate the following method should be used.

Address menu		
Menu option	Display	Button (operation leads to the next menu option if not specified differently)
Activation of the address menu		<p><b>S</b> To the next menu option</p> <p><b>L</b> Entry into the address menu</p>
Primary address (can be set from 0 to 250)		<p><b>S</b> To the next menu option</p> <p><b>L</b> Edit value</p>
Edit the first digit (digit flashes)		<p><b>S</b> Increase digit by 1</p> <p><b>L</b> Edit next digit</p>
Edit the second digit (digit flashes)		<p><b>S</b> Increase digit by 1</p> <p><b>L</b> Edit next digit</p>
Edit the third digit (digit flashes)		<p><b>S</b> Increase digit by 1</p> <p><b>L</b> For taking over the value</p>
Edit the third digit (digit flashes)		<p><b>S</b> Increase digit by 1</p> <p><b>L</b> For taking over the value</p>
Take over value (all digit flash)		<p><b>S</b> Edit the first digit</p> <p><b>L</b> Take over the edited value, switch over to the next menu option</p>
Secondary address (settable from 0 to 99999999)		<p><b>S</b> To the next menu option</p> <p><b>L</b> Edit value</p>
Baud rate M-Bus (can be set to 300, 2400 and 9600 Baud)		<p><b>S</b> To the next menu option</p> <p><b>L</b> Edit value</p>
Leave address menu and change to the standard display		<p><b>S</b> To the start of the menu</p> <p><b>L</b> Leave address menu</p>

Table 11: Error code description

### 7.1.4 Edit menu<sup>1</sup>

The edit mode is only available for **uncertified meters**. After certification of the meter the values in the edit mode cannot be changed.

The status of the edit menu is shown by a hand symbol in the display:

- flashing hand symbol: Edit mode is active, the edit data can be changed
- continually lit up hand symbol: Edit mode is deactivated, it can however be activated with a configured password function by means of a password
- no hand symbol: Edit mode is deactivated and cannot be activated again

In the edit mode the following parameters can be changed:

**a) Voltage transformer ratio<sup>2</sup> VT 1<sup>3</sup>...999** (only integer values)

**b) Current transformer ratio<sup>2</sup> CT 1<sup>3</sup>...999** (only integer values)

**Note:**

If the transformer factors are changed on a meter which has already registered energy, the valency of the already registered energy remains the same. The new transformer factors are only considered after the changes.

**c) Digitness of the energy register**

The meter resolution can be changed manually via the display controls.

Possible values are:

- Direct connection meters: 8.0<sup>3</sup>, 7.1, 6.2
- Connected to transformer meters:
  - Secondary meters: 6.2, 5.3<sup>3</sup>, 4.4
  - Primary meters: Value and unit result from the set transformer factors for voltage (VT) and current (CT) according to the following table:

Transformer factor (VT x CT)	Register resolution "high"	Register resolution "default"	Register resolution "low"
≥ 1	4.4 kWh	5.3 kWh	6.2 kWh
≥ 10	5.3 kWh	6.2 kWh	7.1 kWh
≥ 100	6.2 kWh	7.1 kWh	8.0 kWh
≥ 1 000	4.4 MWh	5.3 MWh	6.2 MWh
≥ 10 000	5.3 MWh	6.2 MWh	7.1 MWh
≥ 100 000	6.2 MWh	7.1 MWh	8.0 MWh

Table 12: Digitness of the energy registers

**d) Pulse values for the pulse output<sup>4</sup>**

The value range is dependent on the version.

<sup>1</sup> the meter must be connected to voltage

<sup>2</sup> with transformer operated meters

<sup>3</sup> default value

<sup>4</sup> only with secondary outputs

---

#### e) Pulse duration<sup>4</sup>

The pulse time can be set in to 30 ms, 50 ms or 100 ms depending on the pulse value.

- 30 ms ( $f_{\max} = 16.7 \text{ Hz}$ )
- 50 ms ( $f_{\max} = 10 \text{ Hz}$ )<sup>2</sup>
- 100 ms ( $f_{\max} = 5 \text{ Hz}$ )

With a primary pulse output, the pulse value and the pulse duration cannot be changed. The pulse value is configured to 1 Imp./kWh and the pulse duration is fixed to 500 ms (see chapter 6.4 Outputs on page 16).

#### f) Change password

With a parameterized password function the password can be changed in the range from 000-999 to activate the edit mode.

There are 2 possibilities to lock the edit mode:

##### 1. Can be reactivated via password function

Leave the edit mode with "Close". A continually lit up hand-symbol is shown in the display. By inputting the password you can return back to the edit mode in order to change the edit data.

To input a new password proceed as with the input of the transformer factor.

##### 2. Irreversible

Leave the edit mode with "Close". The hand symbol is not shown in the display.

The edit mode cannot be activated anymore to change the edit data.

With a short press of the button you reach the next menu option and with a long press of the button the displayed value is edited. Depending on the meter design a new value will now be displayed. With a short press of the button it is possible to switch to the next value. With a longer press of the button the displayed value is taken over and it is switched over to the next menu option. To set all other values in the edit mode follow the same method.

When entering transformer factors all set digits flash at the end. To take over this new value press the button long.

With a longer pressing of the button the display jumps from every position of the standard menu back to the standard display. This also happens if the button is not operated for longer than 5 minutes.

At the end of the edit mode there are **two possibilities** to exit the edit mode. With a long pressing of the button and the display "Escape" the edit mode can be left. However, the menu can be called up again at any time.

1. With the display "Close", with a non-parameterised password function the edit menu is left and the edit status is irrevocably blocked (in hand-symbol in the display). The edit menu can definitely not be called up again. The display switches back to the standard display. In each case the edited data is taken over.
2. With the display "Close", with a non-parameterised password function, the edit menu is left, the user can however activate the edit status again with a password (flashing hand-symbol). The display switches back to the standard display. The edited data is taken over.

**Note:**

If the button is not operated for longer than 5 minutes, the display returns to the standard display. Thereby the edit mode is not locked which means the data can be edited again later.


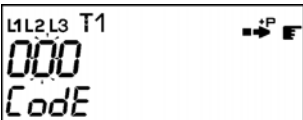
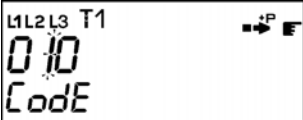
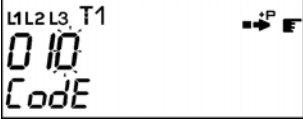
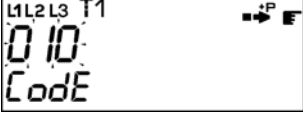

**S** = short pressing of the button ( $t_{operation} < 2 \text{ s}$ )

**L** = longer pressing of the button ( $2 \text{ s} \leq t_{operation} < 5 \text{ s}$ )

**Editing example:**

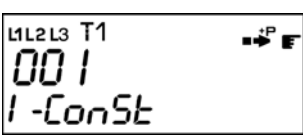


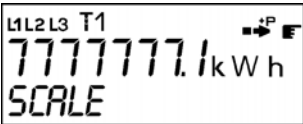
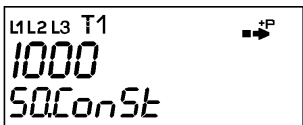
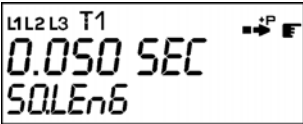
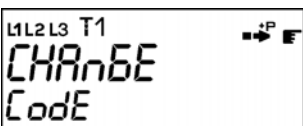
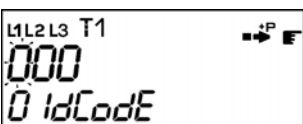

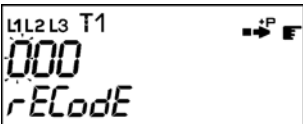
In the following table, as an example, the value for the display digitness of the energy register "Scale" is changed from 8.0 to 7.1. To change the transformer- and S0 constants and also the pulse length the same procedure applies.

If the password function is parameterised and the edit menu is locked with "Close", you must enter a 3 digit password for entry into the edit menu.

Edit mode		
Menu option	Display	Button (operation leads to the next menu option if not specified differently)
<b>Input password (if configured)</b>		
Edit the first digit (digit flashes)		<b>S</b> Increase digit by 1 <b>L</b> Edit next digit
Edit the second digit (digit flashes)		<b>S</b> Increase digit by 1 <b>L</b> Edit next digit
Edit the second digit (digit flashes)		<b>S</b> Increase digit by 1 <b>L</b> Edit next digit
Edit the third digit (digit flashes)		<b>S</b> Increase digit by 1 <b>L</b> Edit next digit
Take over value (all digits flash)		<b>S</b> Edit the first digit <b>L</b> Take over the edited value, switch over to the next menu option
U-Transformer constant (only with transformer meters)		<b>S</b> To the next menu option <b>L</b> Edit value



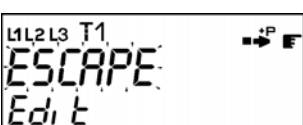
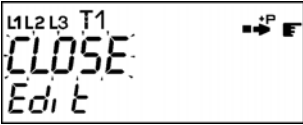
continued on next page

continuation of the edit mode

I-Transformer constant (only with transformer meters)		<input checked="" type="button" value="S"/> To the next menu option <input type="button" value="L"/> Edit value
<b>Example: Changing the register digitness</b>		
Display digitness of the energy register		<input checked="" type="button" value="S"/> To the next menu option <input type="button" value="L"/> Edit value
Set value (value flashes)		<input checked="" type="button" value="S"/> Next value <input type="button" value="L"/> Take over value
New set value		<input checked="" type="button" value="S"/> Next value <input type="button" value="L"/> Take over value
Output constant in Imp./kWh (only meters with secondary pulse output)		<input checked="" type="button" value="S"/> To the next menu option <input type="button" value="L"/> Edit value
Impulse length in seconds (only meters with secondary pulse output)		<input checked="" type="button" value="S"/> To the next menu option <input type="button" value="L"/> Edit value
<b>Changing password (if parameterised)</b>		
Change password?		<input checked="" type="button" value="S"/> To the display Escape (leave test mode) <input type="button" value="L"/> Edit password
First digit flashes		Input of the correct password (see table above)
Incorrect password		<input type="button" value="S"/> or <input type="button" value="L"/> To the display Escape (leave test mode)
Input of new password		Input of new password (see table above)  After take over you reach next menu option.

continued on next page

continuation of the edit mode

<p>Leave test mode and change to standard mode (only with an activated test mode)</p>		<p><b>S</b> To the next menu option</p> <p><b>L</b> Edit value</p>
<p>Leave edit mode</p>		<p><b>S</b> To start of the menu</p> <p><b>L</b> Edit value</p>
<p>"ESCAPE" flashes</p>		<p><b>S</b> To the display "CLOSE"</p> <p><b>L</b> Leave edit mode, change to standard display and take over all values</p>
<p>Leave edit mode "CLOSE" flashes</p>		<p><b>S</b> Back to the display "ESCAPE"</p> <p><b>L</b> Leave edit mode and lock it immediately. Return to start display and take over all values.</p>



**Attention:**  
 With a non-configured password function by means of a long pressing of the call-up button the edit mode is irrevocably locked, i.e. no more data can be edited!

Table 13: Edit mode



---

## 8 Appendix

### 8.1 EC Declaration of conformity

The manufacturer

**BERG Energiekontrollsysteme GmbH**  
**Fraunhofer Str. 22**  
**D-82152 Martinsried**

certifies that the following products

**Product designation:**

Electricity meter **DCi**

are in conformity with the specification of the EC Directive 93/68/EC.

**Statement relating to EMC Directive (89/336/EC)**

The electricity meter conform to the requirements of the EC Directive „Electromagnetic compatibility“ 89/336/EC, including those specified in standards EN 5502 2 +A1 +A2 and EN 61000-4-2, -3, - 4, -5, -6, -12.

The following standards are in use:

<b>EN 62052-11</b>	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
<b>EN 62053-21</b>	Electricity metering equipment (a.c.) - Particular Requirements - Part 21: Static meters for active energy (classes 1 and 2)
<b>EN13757-2-3</b>	Communication systems for meters and remote reading of meters - Part 2: Physical and link layer
<b>EN 1434</b>	Heat meters - Part 3: Data exchange and interfaces

---

## 8.2 Declaration of Conformity to EC type-examination certificate

The manufacturer

**BERG GmbH**  
**Fraunhofer Str. 22**  
**D-82152 Martinsried**

certifies that the following products

**Product designation:**

electricity meter **DCi**

corresponds the EC type-examination certificate DE-07-MI003-PTB011.

**Statement relating to Directive 2004/22/EC**

The electricity meter conform to the requirements of the Directive 2004/22/EC of the European Parliament and of the Council of 31 March 2004 on measuring instruments (OJ L 135 p. 1), implemented by the Fourth Ordinance for amending the Verification Ordinance dated 8 February 2007 (Federal Law Gazette I, p. 70).

The following standards are in use:

- |                   |   |
|-------------------|---|
| <b>EN 50470-1</b> | Electricity metering equipment (a.c.) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C) |
| <b>EN 50470-3</b> | Electricity metering equipment (a.c.) - Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)            |