

## Power Analyser

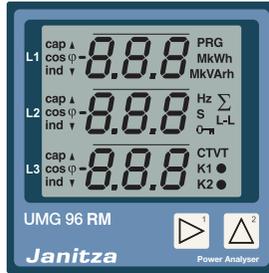
# UMG 96 RM-E

### Installation manual

Residual current monitoring (RCM)

Deutsche Version:  
siehe Vorderseite

- Installation
- Device settings



User manual:



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# Janitza®

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## General

### Disclaimer

The observance of the information products for the devices is a prerequisite for safe operation and to achieve the stipulated performance characteristics and product characteristics. Janitza electronics GmbH accepts no liability for injuries to personnel, property damage or financial losses arising due to a failure to comply with the information products. Ensure that your information products are accessible and legible.

Further information can be found on our website [www.janitza.com](http://www.janitza.com) at Support > Downloads.

### Copyright notice

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All rights reserved. Duplication, editing, distribution and any form of exploitation, also as excerpts, is prohibited.

### Subject to technical amendments

- Make sure that your device agrees with the installation manual.
- Read and understand first product-related documents.

- Keep product supporting documentation throughout the life available and, where appropriate, to pass on to subsequent users.
- Please inform yourself about device revisions and the associated adjustments to the product-related documentation on [www.janitza.com](http://www.janitza.com).

### Disposal

Please observe national regulations! If disposing of individual parts, please dispose of them in accordance with their nature and existing country-specific regulations, for example as:

- Electrical scrap
- Plastics
- Metals

Or, task a certified disposal business with the scrapping.

### Relevant laws, applied standards and directives

The laws, standards and directives for the device applied by Janitza electronic GmbH can be found in the declaration of conformity on our website.

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## Safety

### Safety information

The installation manual does not represent a full listing of all necessary safety measures required for safe operation of the device. Certain operating conditions may require further measures. The installation manual contains information that you must observe for your own personal safety and to avoid damage to property.

Symbols used:



This symbol is used as an addition to the safety instructions and warns of an electrical hazard.



This symbol is used as an addition to the safety instructions and warns of a potential hazard.



This symbol with the word **NOTE!** describes:

- Procedures that do not entail any danger of injury.
- Important information, procedures or handling steps.

Safety instructions are highlighted with a warning triangle and shown as follows, depending on the degree of hazard:



**DANGER!**

Indicates an immediately threatening hazard that leads to serious or even fatal injuries.



**WARNING!**

Indicates a potentially hazardous situation that could lead to serious or even fatal injuries.



**CAUTION!**

Indicates a potentially hazardous situation that could lead to minor injuries or damage to property.

### Measures for safety

When operating electrical devices certain parts of these devices inevitably carry dangerous voltages. This could result in serious bodily injury or damage to property if not handled properly:

- Before establishing electrical connections to the device, earth it at the ground wire connection if there is one.
- Hazardous voltages may arise in all circuit parts that are connected to the power supply.
- Even after disconnecting the supply voltage, there may still be hazardous voltages present in the device (capacitor storage).

- Do not operate equipment with current transformer circuits when open.
- Do not exceed the limit values stipulated in the user manual and on the rating plate - even during testing or commissioning.
- Observe the safety and warning information in the documents that belong to the devices!

### To protect your IT system, network, data communications and measurement devices:

- Notify your network administrator and/or IT manager.
- Always keep the measurement device firmware up to date and protect the communication to the measurement device with an external firewall. Close any unused ports.
- Take protective measures against viruses and cyber attacks from the Internet, e.g. through firewall solutions, security updates and antivirus programs.
- Eliminate security vulnerabilities and update or renew existing protection for your IT infrastructure.

### Qualified personnel

In order to avoid injuries to personnel and property damage, only qualified personnel with electrical training are permitted to work on the devices with knowledge

- of the national regulations for accident prevention
- of safety standards
- of installation, commissioning and operation of the device.

### Proper use

The device is

- intended for installation in switch cabinets and small installation distributors (please observe step 3 "Assembly").
- not intended for installation in vehicles! The use of the device in mobile equipment is considered to be non-standard environmental conditions and is therefore only permitted after separate agreement.
- not intended for installation in environments with hazardous oils, acids, gases, vapours, dusts, radiation, etc.

The prerequisites of faultless, safe operation of this device are proper transport and proper storage, set-up, installation, operation and maintenance.

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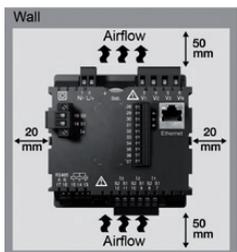
### Brief description of device

The UMG 96 RM-E is a multi-functional network analyser, which

- measures and monitors residual currents (RCM) and currents at the central grounding point (CGP). The residual current monitoring is carried out via an external residual current transformer (30 mA rated current) on the current measurement inputs I5 and I6.
- measures and calculates electrical variables such as voltage, current, power, energy, harmonics, etc. in building installations, on distribution units, circuit breakers and busbar trunking systems.
- displays and saves measurement results and transmits them via interfaces.

### Assembly

Install the UMG 96 RM-E in the weather-protected front panel of switch cabinets.



Cut-out size:  
92<sup>+0.8</sup> x 92<sup>+0.8</sup> mm

Ensure!

- Adequate ventilation
- The device is installed vertically!
- Observance of clearance to adjacent components!

Fig. Mounting position, rear view



#### NOTE!

If residual currents in electrical systems are monitored, the device (inputs I5/I6) can trigger warning pulses if a response threshold is exceeded. The warning pulses can provide an alarm before a protective device trips. The device does not provide protection against electric shock!



#### CAUTION!

**Damage to property due to disregard of the installation instructions**

Disregard of the installation instructions can damage or destroy your device. **Ensure that you have enough air circulation in your installation environment and in the event of high environmental temperatures, provide cooling if necessary.**



#### NOTE!

For further information on device functions, data and assembly, see the user manual.

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### Connecting the supply voltage

The supply voltage level for your device is specified on the rating plate. After connecting the supply voltage, an indication appears on the display. If no indication appears, check whether the supply voltage is within the rated voltage range.

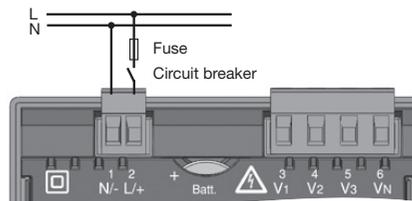


Fig. Connection of supply voltage.



#### WARNING!

**Danger of injury due to electrical voltage!**

Serious bodily injury or death can result from:

- Contact with bare or stripped live wires.
- Device inputs that are dangerous to touch.

**Render the system free of voltage before starting work! Check the system is free of electrical energy!**



#### CAUTION!

**Damage to property due to disregard of the connection conditions or impermissible overvoltage!**

Your device can be damaged or destroyed by a failure to comply with the connection conditions or by exceeding the permissible voltage range.

**Before connecting the device to the supply voltage, please check:**

- Voltage and frequency correspond to the details on the ratings plate! Limit values stipulated in the user manual have been complied with!**
- In building installations, the supply voltage must be protected with a UL/IEC approved circuit breaker / a fuse!**
- The isolation device**
  - must be installed near the device and in a location that is easily accessible for the user.
  - must be labelled to identify the respective device.
- Do not tap the supply voltage from the voltage transformer.**
- Provide a fuse for the neutral conductor if the neutral conductor terminal of the source is not grounded.**

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### Mains systems

Suitable network systems and maximum rated voltages (DIN EN 61010-1/A1):

Three-phase, four-conductor system with earthed neutral conductor	Three-phase, four-conductor system with non-earthed neutral conductor (IT networks)	Three-phase, three-conductor systems Non-earthed	Three-phase, three-conductor systems With earthed phase
$U_{L-N} / U_{L-L}$ 277 VLN / 480 VLL	$U_{L-N} / U_{L-L}$ 277 VLN / 480 VLL	$U_{L-L}$ 480 VLL	$U_{L-L}$ 240 VLL

Single-phase, two-conductor systems with earthed neutral conductor	Separated single-phase, three-conductor systems with earthed neutral conductor
$U_{L-N}$ 230 VLN	$U_{L-N} / U_{L-L}$ 240 VLN / 480 VLL

The device can be used in

- 2, 3 and 4 conductor networks (TN, TT and IT networks)
- residential and industrial applications.

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### Voltage measurement

The device has 3 voltage measurement inputs and is suitable for various connection variants, with direct connection or via voltage transformer.



**Danger of injury or damage to the device**

Disregard of the connection conditions for the voltage measurement inputs can result in injuries or to the device being damaged.

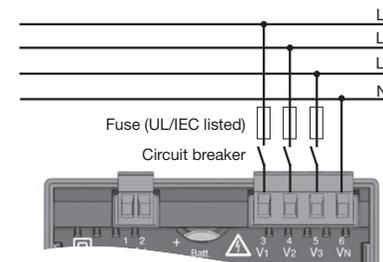
For this reason, note that:

- The voltage measurement inputs**
  - are not connected to DC voltage.
  - are equipped with a suitable, labelled fuse and isolation device located in the vicinity (alternative: circuit breaker) located nearby.
  - are dangerous to touch.
- Voltages that exceed the allowed network rated voltages must be connected via a voltage transformer.**
- Measured voltages and measured currents must derive from the same network!**



#### NOTE!

As an alternative to the fuse and circuit breaker, you can use a line safety switch.



Connection variant 3p 4w Voltage measurement (Addr. 509 = 0, standard setting)

The voltage measurement inputs are designed for measurements in low voltage networks, in which rated voltages of up to

- 277 V phase to earth and 480 V phase to phase in the 4-conductor system or
- 480 V phase to phase in the 3-conductor system occur.

The measurement and surge voltages meet overvoltage category 300 V CATIII.

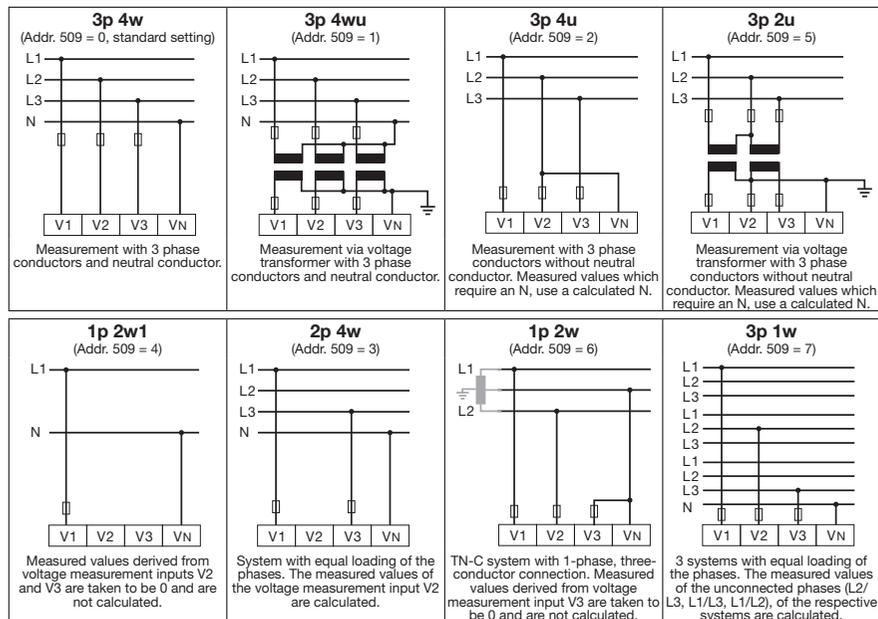


#### NOTE!

If the metering range is exceeded, the measurement device display shows "EEE". For further information, see the user manual.

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## Connection variants for voltage measurement



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## Current measurement I1, I2, I3

The UMG 96 RM-E

- is only approved for measuring current with a current transformer.
- is intended for the connection of current transformers with secondary currents of  $\dots/1$  A and  $\dots/5$  A.
- has the current transformer ratio set to 5/5 A as standard.



### Danger of injury due to electrical voltage!

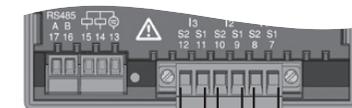
#### WARNING!

- Serious bodily injury or death can result from:
- Contact with bare or stripped live wires.
  - Current measurement inputs on the device and on the current transformer that are dangerous to touch.

**Render the system free of voltage before starting work! Check the system is free of electrical energy!**

**Earth your system! Use the earth connection points with earthing symbols for this! Earth the secondary windings of current transformers and all of the metal parts of the transformer that could be touched!**

Connection variant 3p 4w Current measurement (I1, I2, I3) via current transformer (Addr. 510 = 0, standard setting).



#### NOTE!

If the measurement range is exceeded, the measurement device display shows "EEE". Further information on this can be found in the user manual.



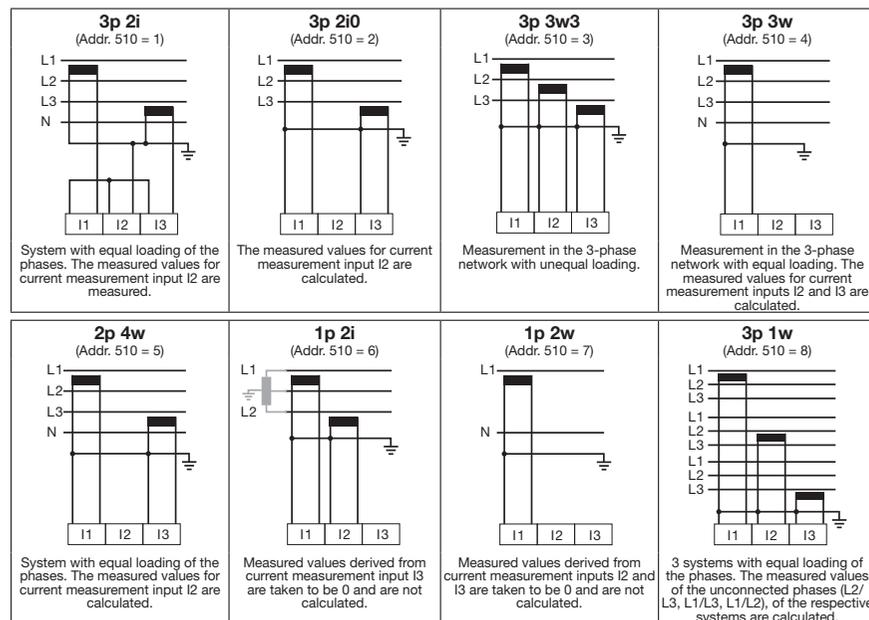
### Risk of injury due to large currents and high electric voltages!

#### WARNING!

Current transformers that are operated open in the secondary side (high voltage peaks) can cause severe bodily injuries or death. **Avoid operating current transformers when open, short circuit transformers that are unloaded!**

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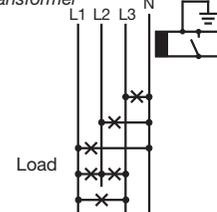
## Connection variants for current measurement I1, I2, I3



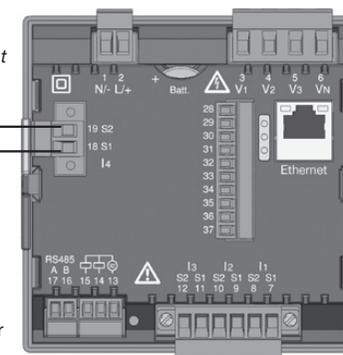
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## Current measuring I4

Connection variant for current measurement (I4) via current transformer



Current values but not power values can be calculated for current measurement input I4.



## Analogue inputs

The device has 2 analogue inputs (terminals 32 to 37), each for a

- temperature measurement or
- residual current monitoring.

Use of the analogue inputs:

Measurement	Terminal
Temperature	32/34 input 1 35/37 input 2
Residual current	32/33/34 input 1 35/36/37 input 2



#### NOTE!

The measurement input I4 does not require address setting on the device.



#### NOTE!

Further information on current data and current transformer data can be found in the user manual.



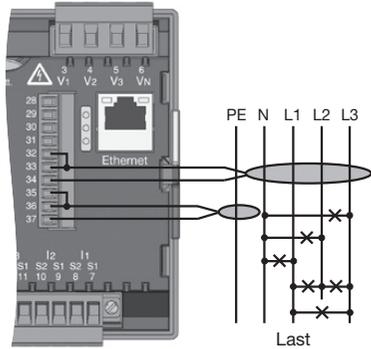
#### CAUTION!

### Damage to the device / your system due to short circuit

Inadequate insulation of the operating equipment on the analogue inputs relative to the mains supply circuits can lead to your device/system being damaged. **Ensure that there is reinforced or double insulation to the mains supply circuits!**

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### Residual current monitoring (RCM) via I5 and I6



The UMG 96RM-E measures residual currents in accordance with IEC/TR 60755 (2008-01),

type A and

type B.

Suitable residual current transformers with a rated current of 30 mA are connected to terminals 32 to 34 (I5) and terminals 35 to 37 (I6).

**NOTE!**

- The transformation ratios for the residual current transformer inputs can be individually configured via the software.
- A connection variant "UMG 96 RM-E with residual current monitoring via measurement inputs I5/I6" can be found in the user manual.
- Measurement inputs I5 and I6 do not require address setting on the device.

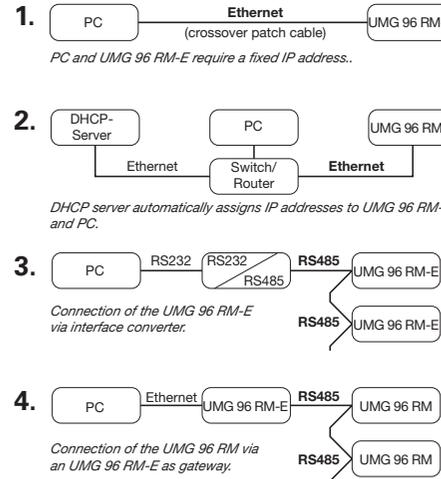
The UMG 96RM-E is suitable for use as a residual current monitoring device (RCM) as well as for monitoring

- AC
- pulsing DC, and
- DC.

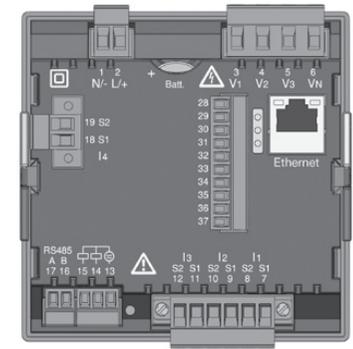
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### Establish connection to PC

The 4 most common connections for communication between PC and device:



More details on device configuration and communication can be found in section 14.



Recommendation for the Ethernet connection: Use at least a CAT5 cable!

**CAUTION!** Property damage due to incorrect network settings

Incorrect network settings can cause faults in the IT network!  
**Find out the correct Ethernet network settings for your device from your network administrator.**

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### Controls and button functions

The UMG 96 RM-E is operated with buttons 1 and 2, whereby the following distinctions are made:

- Short press (button 1 or 2): Next step (+1).
- Longer press (button 1 or 2): Previous step (-1).

The device differentiates between display and programming mode.

Measured values are arranged in measured value display profiles and can be conveniently adapted in the GridVis® software. Measured value display profile 1 is configured at the factory.

**Display mode**

- Buttons 1 and 2 can be used to scroll between the measured value indications.
- The measured value indication shows up to 3 measured values.
- A time for the automatic display change between the measured value indications can be configured in the GridVis® software.

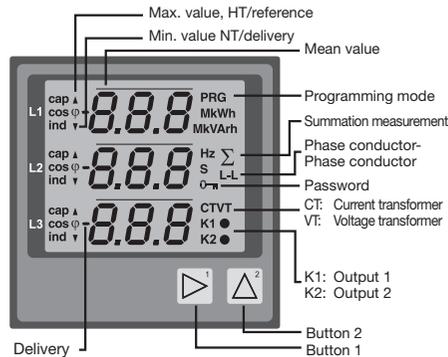


Fig. UMG 96 RM-E display

**NOTE!** More detailed information on operation, display and button functions for your device can be found in the user manual.

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### Programming mode

- Hold buttons 1 and 2 depressed simultaneously for 1 second to change between display mode and programming mode. The text PRG appears in the display.
- Configure the necessary settings for the operation of the device in programming mode.
- The programming mode can be protected with a user password.
- Button 2 switches between the programming menus:
  - Current transformer
  - Voltage transformer
  - Parameter list
  - TCP/IP device address
  - Subnet mask
  - Gateway address
  - Dynamic TCP/IP addressing (in/out)

The device switches from programming mode to display mode, if

- there is no button activity for 60 seconds.
- buttons 1 and 2 are pressed simultaneously for 1 second.

**NOTE!** The most important programming menus for a quick start: TCP/IP device address, subnet mask, gateway address (4th, 5th, 6th) and dynamic TCP/IP addressing (on/off) (7th) via the Ethernet interface, are explained here. More detailed information on the programming mode and interfaces can be found in the user manual for the device.

Example settings are selected for the device and the PC to implement the following settings:

- Device IP address: 192.168.1.116
- Subnet mask: 255.255.255.0
- PC IP address: 192.168.1.117
- Subnet mask: 255.255.255.0

**NOTE!** Changes are only applied after exiting the programming mode.

**NOTE!** The device is factory-set to dynamic IP allocation (on) (DHCP mode).

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## Programming current transformers

1. Switch to programming mode.
2. The symbols for Programming mode **PRG**, and for the current transformer **CT** appear.
3. Press button 1 - the first digit of the input field for the primary current flashes.
4. Use button 2 to select the value of the 1st. digit.
5. Use button 1 to change to the 2nd. digit.
6. Use button 2 to select the value of the 2nd. digit.
7. Use button 1 to change to the 3rd. digit.
8. Use button 2 to select the value of the 3rd. digit.
9. Confirm with button 1.
10. The complete number flashes.
11. Use button 2 to select the decimal place and thus the unit of the primary current.
12. Confirm with button 1.
13. The input range of the secondary current flashes.
14. Set the secondary current (value 1 A or 5 A) with button 2.
15. Confirm with button 1.
16. Exit programming mode by simultaneously pressing buttons 1 and 2 (1 sec.). Use button 2 to change to the input field for the voltage transformer.

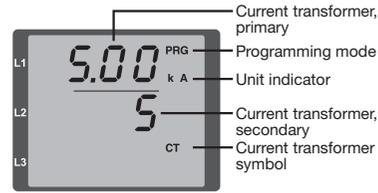


Fig. "Current transformer" input field

### NOTE!

- Changes are only applied after exiting the programming mode.
- Further information on current transformers and current transformer ratios can be found in the user manual.

### NOTE!

- Programming voltage transformers:**
- Change to programming mode for the voltage transformer.
  - The symbols **PRG** and **VT** appear in the display.
  - The procedure for the **voltage transformer programming** is analogous to that of the current transformer.
- Further information on voltage transformers and voltage transformer ratios can be found in the user manual.

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## Dynamic TCP/IP allocation via the Ethernet interface (DHCP mode)

With dynamic TCP/IP allocation (TCP/IP device address, subnet mask and gateway addresses) a network incorporates the device automatically when the device starts up. The reading out (or the allocation) of the dynamic TCP/IP settings is implemented in the same way as the "manual configuration" (see also step 16):

1. Switch to programming mode.
2. The symbols for programming mode **PRG**, and for the current transformer **CT** appear.
3. Pressing button 2 **six times** takes you to the dynamic TCP/IP allocation (**dYn IP**).
4. Press button 1 to activate the display "on" or "off" (display flashes).
5. Use button 2 to select "on" or "off".
6. Confirm your selection using the 1 button.
7. Exit programming mode by pressing buttons 1 and 2 simultaneously for 1 sec.

The dynamic IP allocation can be implemented via the software.

### NOTE!

The key symbol on the display indicates that dynamic TCP/IP allocation is active (**on**). When the device starts up, the DHCP server automatically allocates the TCP/IP device address, subnet mask and gateway address.



Fig. Subnet mask (**SUB**), Byte 0, value 255



Fig. Gateway (**GAT**), Byte 0, value 192



Fig. Dynamic assignment (**dYn IP**) of the TCP/IP address activated (**Standard setting**)



Fig. Dynamic assignment (**dYn IP**) of the TCP/IP address deactivated

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## Manual TCP/IP configuration via the Ethernet interface

Within an Ethernet network, each device has a unique TCP/IP address that can be assigned manually or from a DHCP server. The 4-byte-long device address (Byte 0 to 3) is appended within the TCP/IP configuration with the subnet mask and gateway details.

### Manual configuration (example) of the TCP/IP device address (Addr):

1. Switch to programming mode.
2. The symbols for programming mode **PRG**, and for the current transformer **CT** appear.
3. Pressing button 2 three times takes you to the TCP/IP settings. (Subnet mask, press **4x**, gateway **5x**)
4. Use button 1 to select the 1st. digit of Byte 0 (selection flashes).
5. Use button 2 to select the value.
6. Use button 1 to change to the 2nd. digit / 3rd. digit
7. Use button 2 to select the corresponding value.
8. Use button 1 to change to Byte 1
9. Select Bytes 1 to 3 in the same way.
10. Configure the subnet mask (display **SUB**) and gateway address (display **GAT**) in the same way.

### NOTE!

To ensure that a DHCP server does not overwrite the manual TCP/IP configuration, **deactivate the dynamic IP allocation (dYn, "off")** (see steps 14 and 17). Then exit programming mode and configure the TCP/IP address manually.



Designation  
Byte identifier of the address (e.g. Byte 0)  
Address value, Byte 0



Fig. TCP/IP address, Byte 1, value 168.  
A TCP/IP address consists of 4 bytes with the following structure (example):



Byte 0 Byte 1 Byte 2 Byte 3  
xxx.xxx.xxx.xxx  
192.168.001.116



Fig. TCP/IP address, Byte 2, value 001.

Fig. TCP/IP address, Byte 3, value 116.

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## Technical data

General information	
Net weight (with attached connectors)	approx. 370 g
Packaging weight (including accessories)	approx. 950 g
Battery	Lithium battery CR2032, 3 V (approval i.a.w. UL 1642)
Service life of background lighting	40000 h (after this period of time the background lighting efficiency will reduce by approx. 50%)

Transport and storage	
The following information applies to devices which are transported or stored in the original packaging.	
Free fall	1 m
Temperature	K55 (-25° C to +70° C)
Relative humidity	0 to 90% RH

Ambient conditions during operation	
The device is intended for weather-protected, stationary use. Protection class II i.a.w. IEC 60536 (VDE 0106, Part 1).	
Operating temperature range	K55 (-10° C .. +55° C)
Relative humidity	0 to 75% RH
Operating altitude	0 .. 2000 m above sea level
Degree of pollution	2
Mounting position	vertical
Ventilation	Forced ventilation is not required.
Protection against ingress of solid foreign bodies and water	
- Front side	IP40 i.a.w. EN60529
- Rear side	IP20 i.a.w. EN60529
- Front with seal	IP54 i.a.w. EN60529

Supply voltage	
Nominal range	<b>Option 230 V:</b> AC 90 V - 277 V (50/60 Hz) or DC 90 V - 250 V, 300 V CATIII <b>Option 24 V:</b> AC 24 V - 90 V (50/60 Hz) or DC 24 V - 90 V, 150 V CATIII
Operating range	±10% of the nominal range
Power consumption	<b>Option 230 V:</b> max. 7,5 VA / 4 W <b>Option 24 V:</b> max. 7,5 VA / 5 W
Internal fuse, not replaceable	Type T1A / 250 VDC / 277 VAC according to IEC 60127
Recommended over-current protection device for the line protection	<b>Option 230 V:</b> 6-16 A <b>Option 24 V:</b> 1-6 A (Char. B) (IEC/UL approval)

Voltage measurement	
3-phase, 4-conductor systems with rated voltages up to	277 V/480 V (+-10%)
3-phase, 3-conductor systems, unearthened, with rated voltages up to	IT 480 V (+-10%)
Overvoltage category	300 V CAT III
Rated surge voltage	4 kV
Protection of voltage measurement	1 - 10 A (With IEC / UL approval)
Measurement range L-N	0 <sup>1)</sup> to 300 Vrms (max. overvoltage 520 Vrms )
Measurement range L-L	0 <sup>1)</sup> to 520 Vrms (max. overvoltage 900 Vrms )
Resolution	0.01 V
Crest factor	2.45 (related to the measurement range)
Impedance	4 MOhm / phase
Power consumption	approx. 0.1 VA
Sampling rate	21.33 kHz (50 Hz), 25.6 kHz (60 Hz) for each measurement channel
Frequency range of the fundamental oscillation - resolution	45 Hz to 65 Hz 0.01 Hz

1) ... The device determines measured values only if the Voltage measurement input V1 voltage L1-N greater than 20 Vrms (4-wire measurement) or a voltage L1-L2 of larger 34 Vrms (3-wire measurement) is applied.

Current measurement I1 - I4	
Nominal current	5 A
Measurement range	0 - 6 Arms
Crest factor	1.98
Resolution	0.1 mA (display 0.01 A)
Overvoltage category	300 V CAT II
Rated surge voltage	2 kV
Power consumption	approx. 0.2 VA (Ri = 5 mΩ)
Overload for 1 sec.	120 A (sinusoidal)
Sampling rate	21.33 kHz (50 Hz), 25.6 kHz (60 Hz) for each measurement channel

Residual current monitoring I5 / I6	
Nominal current	30 mA rms
Measurement range	0 - 40 mA rms
Triggering current	50 μA
Resolution	1 μA
Crest factor	1.414 (related to 40mA)
Burden	4 Ohm
Overload for 1 sec.	5 A
Sustained overload	1 A
Overload for 20 ms	50 A

Digital outputs	
2 and 3 optional digital outputs, semiconductor relays, not short-circuit proof.	
Switching voltage	max. 33 V AC, 60 V DC
Switching current	max. 50 mAeff AC/DC
Response time	10/12 periods + 10 ms *
Pulse output (energy pulse)	max. 50 Hz

\* Response time e.g. at 50 Hz: 200 ms + 10 ms = 210 ms

Digital inputs	
3 optional digital inputs, semiconductor relays, not short-circuit proof.	
Maximum counter frequency	20 Hz
Input signal present	18V .. 28 V DC (typical 4 mA)
Input signal not present	0 .. 5 V DC, current less than 0.5 mA

Temperature measurement input	
2 optional inputs.	
Update time	1 second
Connectable sensors	PT100, PT1000, KTY83, KTY84
Total burden (sensor + cable)	max. 4 kOhm

Serial interface	
RS485 - Modbus RTU/Slave	9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps
Stripping length	7 mm

Ethernet connection	
Connection	RJ45

Cable length (digital inputs and outputs, temperature measurement input)	
Up to 30 m	Unshielded
More than 30 m	Shielded

Terminal connection capacity (residual current or temperature measurement inputs and digital inputs / outputs)	
Single core, multi-core, fine-stranded	0.2 - 1.5 mm <sup>2</sup> , AWG 28-16
Terminal pins, core end sheath	0.2 - 1.5 mm <sup>2</sup>
Tightening torque	0.2 - 0.25 Nm
Stripping length	7 mm

Terminal connection capacity (power supply voltage)	
Conductors to be connected. Only one conductor can be connected per terminal!	
Single core, multi-core, fine-stranded	0.2 - 2.5 mm <sup>2</sup> , AWG 26 - 12
Terminal pins, core end sheath	0.2 - 2.5 mm <sup>2</sup>
Tightening torque	0.4 - 0.5 Nm
Stripping length	7 mm

Terminal connection capacity (serial interface)	
Single core, multi-core, fine-stranded	0.2 - 1.5 mm <sup>2</sup> , AWG 28 - 16
Terminal pins, core end sheath	0.2 - 1.5 mm <sup>2</sup>
Tightening torque	0.2 - 0.25 Nm
Stripping length	7 mm

Terminal connection capacity (current measurement)	
Conductors to be connected. Only one conductor can be connected per terminal!	
Single core, multi-core, fine-stranded	0.2 - 2.5 mm <sup>2</sup> , AWG 26-12
Terminal pins, core end sheath	0.2 - 2.5 mm <sup>2</sup>
Tightening torque	0.4 - 0.5 Nm
Stripping length	7 mm

Terminal connection capacity (voltage measurement)	
Conductors to be connected. Only one conductor can be connected per terminal!	
Single core, multi-core, fine-stranded	0.08 - 4.0 mm <sup>2</sup> , AWG 28-12
Terminal pins, core end sheath	0.2 - 2.5 mm <sup>2</sup>
Tightening torque	0.4 - 0.25 Nm
Stripping length	7 mm

 **NOTE!**  
Further technical data can be found in the user manual for the device.



## Procedure in the event of faults

Possible fault	Cause	Remedy
No display	External fusing for the power supply voltage has tripped.	Replace fuse.
No current display	Measurement voltage is not connected.	Connect the measuring-circuit voltage.
	Measurement current is not connected.	Connect measuring-circuit current.
Current displayed is too large or too small.	Current measurement in the wrong phase.	Check connection and correct if necessary.
	Current transformer factor is incorrectly programmed.	Read out and program the current transformer transformation ratio at the current transformer.
	The current peak value at the measurement input was exceeded by harmonic components.	Install current transformer with a larger transformation ratio.
Voltage displayed is too large or too small.	The current at the measurement input fell short of.	Install current transformer with a suitable transformation ratio.
	Measurement in the wrong phase.	Check connection and correct if necessary.
Voltage displayed is too small.	Voltage transformer incorrectly programmed.	Read out and program the voltage transformer transformation ratio at the voltage transformer.
	Overrange.	Install voltage transformers.
"EEE" in the display	The peak voltage value at the measurement input has been exceeded by harmonic components.	<b>Caution!</b> Ensure the measurement inputs are not overloaded.
"EEE bA*" in the display	See „error messages“ in the user manual.	
Device still does not work despite the above measures.	Battery capacity is too low	Replace battery (see "Replacing the battery" in the user manual).
	Device defective.	Send the device to the manufacturer for inspection and testing along with an accurate fault description.