Part. no. 3303389

Doc. no. 2.061.064.4.e 03/2023

www.janitza.de

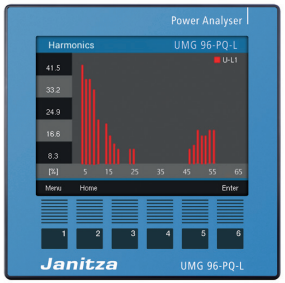
German version: see rear side

Power Analyzer

UMG 96-PQ-L

Installation manual

Installation and device settings



The device fronts can deviate!

User Manual:

Janitza electronics GmbH
Vor dem Polstück 6
D-35633 Lahnau | Germany
Support +49 6441 9642-22
info@janitza.com | www.janitza.com

Janitza®

1 General

Disclaimer
Compliance with the usage information for the devices is a prerequisite for safe operation and attaining the stated performance characteristics and product features. Janitza electronics GmbH assumes no liability for bodily injury, material damage or financial losses which result from disregard of the usage information.

Make sure that your usage information is readily available and legible.

Additional documentation can be found on our website at www.janitza.de under Support > Downloads.

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Subject to technical alterations.
- Make sure that your device matches the installation manual.
- First read and understand the documents associated with the product.
- Keep the documents associated with the product available for the entire service life and pass them on to any possible subsequent users.
- Please find out about device revisions and the associated amendments of the documentation associated with your product at www.janitza.de.

Disposal
Please abide by national regulations! Dispose of individual parts, as applicable, depending on their composition and existing country-specific regulations, e.g. as:
- Electronic waste
- Plastics
- Metals

or engage a certified disposal company to handle scrapping.

Relevant laws, standards and directive used
Please see the declaration of conformity on our website (www.janitza.de) for the laws, standards and directives applied for the device by Janitza electronics GmbH.

2 Safety

Safety information
The installation manual do not represent a compete set of all safety measures required for the operation of the device.
Special operating conditions can require additional measures. The installation instructions contain information which must be observed to ensure your personal safety and avoid material damage.

Symbols used on the device:

⚡	The additional symbol on the device itself indicates an electrical danger that can result in serious injuries or death.
⚠	This general warning symbol draws attention to a possible risk of injury. Be certain to observe all of the information listed under this symbol in order to avoid possible injury or even death.

Safety information in the installation manual is marked by a warning triangle and, in dependence on the degree of hazard, is displayed as follows:

⚠DANGER
Indicates an immediate threat of danger that leads to severe or fatal injury.

⚠WARNING
Indicates a possibly hazardous situation that can lead to severe injury or death.

⚠CAUTION
Indicates a possibly hazardous situation that can lead to minor injury or material damage.

ATTENTION
Draws attention to an immediately hazardous situation which, when disregarded, can lead to material or environmental damage.

INFORMATION
Indicates procedures in which there is **no** hazard of personal injury or material damage.

Safety measures
When operating electric devices, it is unavoidable for certain parts of these devices to conduct hazardous voltage. Consequently, severe bodily injury or material damage can occur if they are not handled properly:
- Before making connections to the device, ground the device by means of the ground wire connection, if present.
- Hazardous voltages can be present in all circuitry parts that are connected to the power supply.
- There can still be hazardous voltages present in the device even after it has been disconnected from the supply voltage (capacitor storage).

⚠WARNING
Risk of injury due to electrical voltage!
Severe bodily injury or death can result from:
· Touching bare or stripped leads that are energized.
· Device inputs that pose a hazard when touched.
Switch off your installation before commencing work! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts!

- Do not operate equipment with current transformer circuits when open.
- Do not exceed the limit values specified in the user manual and on the rating plate! This must also be observed during testing and commissioning!
- Take note of the safety and warning notices in the documents that belong to the device!

Qualified personnel
To avoid bodily injury and material damage, only qualified personnel with electrical training are permitted to work on the device who have knowledge of:
- the national accident prevention regulations.
- safety technology standards,
- installation, commissioning and operation of the device.

Intended use
The device is:
- Intended for installation in switchboard cabinets and small distribution boards. The mounting orientation is arbitrary (please observe step **3** "Mounting").
- Not intended for installation in vehicles! Use of the device in non-stationary equipment constitutes an exceptional environmental condition and is only permissible by special agreement.
- Not intended for installation in environments with harmful oils, acids, gases, vapors, dusts, radiation, etc.
- Designed as an interior meter.

Safe and trouble-free operation of the device presupposes proper transport, proper storage, set-up and assembly as well as operation and maintenance.

Incoming goods inspection
The prerequisites for trouble-free and safe operation of this device include proper transport, storage, setup and assembly, as well as proper operation and maintenance.

Exercise due caution when unpacking and packing the device, do not use force and only use suitable tools. Check the following:
- Visually inspect the devices for flawless mechanical condition.
- Check the scope of delivery (see user manual) for completeness before you begin installing the device.

If it can be assumed that safe operation is no longer possible, the device must be taken out of operation immediately and secured against unintentional start-up.

It can be assumed that safe operation is no longer possible if the device, for example:
- has visible damages,
- no longer functions despite an intact power supply,
- was subjected to extended periods of unfavorable conditions (e.g. storage outside of the permissible climate thresholds without adjustment to the room climate, condensation, etc.) or transport stress (e.g. falling from an elevated position, even without visible external damage, etc.).

3

Brief device description

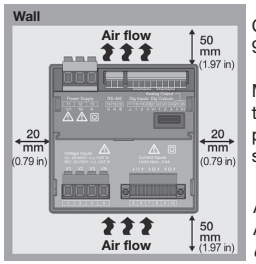
The device is a multifunctional network analyzer that:
- Measures and calculates electrical quantities such as voltage, current, frequency, power, work, harmonics current, etc. in building installations, at distribution boards, circuit breakers and busbar trunking systems.
- Displays and stores measurement results and transmits them via interfaces.
- Can optionally record power quality according to IEC 61000-4-30 Class S.

Determining the product variant

Variant	Grid system, Supply	Part No. on rating plate
UMG 96-PQ-L (without class S)	TN / TT, 230 V	5236001
	TN / TT, 24 V	5236002
	TN / TT / IT, 230 V	5236005
UMG 96-PQ-L Class S according to IEC 61000-4-30	TN / TT, 230 V	5236021
	TN / TT, 24 V	5236022
	TN / TT / IT, 230 V	5236025

Mounting

Install the device in the weatherproof front panel of switchboard cabinets.



Cutout dimensions:
$92^{+0.8}$ x $92^{+0.8}$ mm

Maintain the distances to neighboring components required for sufficient ventilation!

Fig. Mounting orientation Rear view of UMG 96-PQ-L

⚠CAUTION

Material damage due to disregard of the installation instructions!
Disregard of the installation instructions can damage or destroy your device.
Provide adequate air circulation in your installation environment and cooling, as needed, when the ambient temperatures are high.

ⓘ *INFORMATION*

More information on device functions, data and installation as well as the battery used in the device can be found in the user manual.

4

Applying the supply voltage

The level of the supply voltage for your device can be found on the rating plate. After connecting the supply voltage, the display becomes active. If no display appears, check whether the supply voltage is within the nominal voltage range.

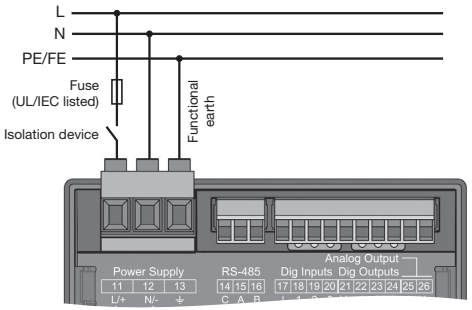


Fig. Supply voltage connection.

⚠CAUTION

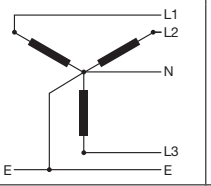
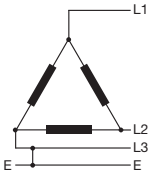
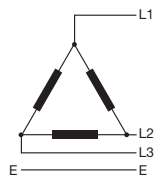
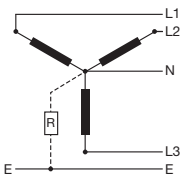
Material damage due to disregard of the connection conditions or impermissible overvoltages
Disregard of the connection instructions or exceeding the permissible voltage range can damage or destroy your device.

Before connecting the device to the supply voltage, please note:
- **Voltage and frequency must correspond to the specifications on the rating plate! Observe limit values as described in the user manual!**
- **In the building installation, secure the supply voltage with a UL/IEC listed line circuit breaker/fuse!**
- **Observe the following for the isolation device**
  - **Install it close to the device and easily accessible for the user.**
  - **Mark it for the respective device.**
- **Do not tap the supply voltage from the voltage transformers.**
- **Provide a fuse for the neutral conductor if the neutral conductor terminal of the source is not grounded!**

5

Grid systems

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

	UMG 96 PQ-L (all variants)		UMG 96 PQ-L (IT variants only)	
	Three-phase 4-conductor systems with grounded neutral conductor 	**Three-phase 3-conductor systems** with grounded phase 	**Three-phase 3-conductor systems** ungrounded 	**Three-phase 4-conductor systems** with non-grounded neutral conductor **(IT networks)** 
IEC	U_{L-N} / U_{L-L}: 417 V_{LN} / 720 V_{LL}	U_{L-L}: 600 V_{LL}	U_{L-L}: 600 V_{LL}	U_{L-N} / U_{L-L}: 347 V_{LN} / 600 V_{LL}
UL	U_{L-N} / U_{L-L}: 347 V_{LN} / 600 V_{LL}	U_{L-L}: 600 V_{LL}	U_{L-L}: 600 V_{LL}	U_{L-N} / U_{L-L}: 347 V_{LN} / 600 V_{LL}

The device can be used in
- TN and TT networks
- IT networks (IT variants - part no.: **52360x5**)
- Residential and industrial areas

ⓘ *INFORMATION*

The variant of the **UMG 96-PQ-L can be identified based on the part number**. The part number can be found on the rating plate of your measurement device:
- **UMG 96-PQ-L: 52360x1/52360x2.**
- **UMG 96-PQ-L (IT variant): 52360x5.**

6 Voltage measurement

The device has 3 voltage measurement inputs and is suitable for various connection variants.

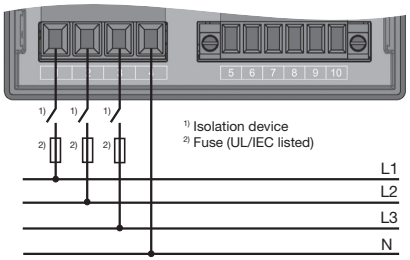
⚠DANGER

Risk of injury or damage to the device.
You can injure yourself or damage the device by not observing the connection conditions for the voltage measurement inputs. Therefore please abide by the following:

- **Do not apply a DC voltage**
  - **to the voltage measurement inputs.**
  - **Equip the voltage measurement inputs with a suitable, marked fuse and isolation device (alternatively: line circuit breaker) located nearby.**
  - **The voltage measurement inputs are dangerous to touch.**
- **Connect voltages that exceed the permissible nominal network voltages via a voltage transformer.**
- **Measured voltages and currents must originate from the same network.**

ⓘ *INFORMATION*

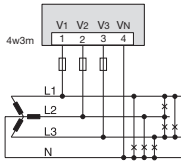
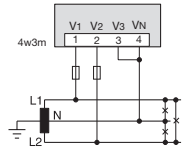
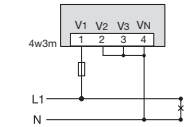
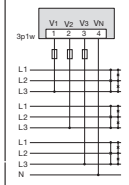
As an alternative to the fuse and isolation device, you can use a line circuit breaker.

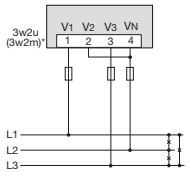
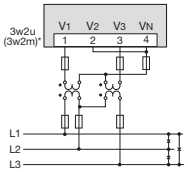


Connection variant "Direct voltage measurement in a three-phase 4-wire system"

The voltage measurement inputs are designed for measurements in low-voltage networks in which there are nominal voltages of up to 417 V phase to ground and 720 V phase to phase in the 4-wire system.
The rated and surge voltages correspond to the overvoltage category (see Technical Data).

7 Connection variants for voltage measurement

Three-phase 4-conductor system	Single-phase 3-conductor system	Single-phase 2-conductor system	Three-phase 3-conductor systems with symmetrical load
			
Voltage measurement in three-phase 4-conductor system	Voltage measurement in a single-phase 3-conductor system	Voltage measurement in a single-phase 2-conductor system	Per system, the power and energy of a phase are multiplied by 3. One of the neutral conductors must be connected. Only with balanced load

Three-phase 3-conductor system	
	
Three-phase 3-conductor system (asymmetrical load)	Three-phase 3-conductor system with voltage transformer
Only IT variants are suitable for TN, TT and IT networks!	

* Setting 3w2u or 3w2m depending on the connection of the current measurement (step **9**).

The selected connection variant (e.g. "4w3m") must be set in the device, see step **15.**

ⓘ *INFORMATION*

If the measuring range is exceeded, the device display shows the warning message *Overvoltage* or *Overcurrent* with an indication of the phase (further information in the user manual). Use button 5, *Alarms,* to acknowledge the warning message.

8 Current measurements I1, I2, I3

The device:

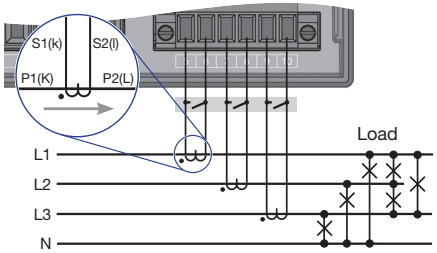
- Is only approved for current measurement via current transformers.
- Is designed for the connection of current transformers with secondary currents of ../1 A and ../5 A (preset current transformer ratio, 5/5 A).
- Does not measure DC currents.

The current transformers must have basic insulation according to IEC 61010-1:2010 for the nominal voltage of the circuit.

⚠WARNING

Risk of injury due to electrical voltage!
Severe bodily injury or death can result from:
· Touching bare or stripped leads that are energized.
· Device inputs that pose a hazard when touched.
Disconnect your system from the power supply before starting work! Secure it against being switched on! Check to be sure it is de-energized! Ground and short circuit! Cover or block off adjacent live parts! Ground the system!
Use the ground connection points with the ground symbol to do so!

Connection "Current measurement via current transformer"

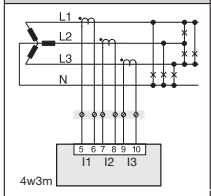
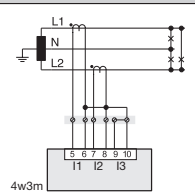
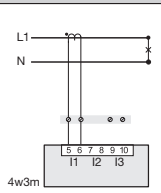


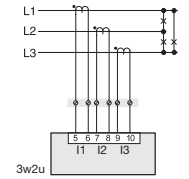
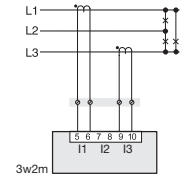
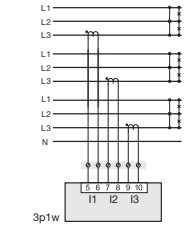
⚠WARNING

Of electrical currents and voltages!
Current transformers operated while exposed on the secondary side (high voltage peaks) can result in severe bodily injury or death.

Avoid exposed operation of current transformers and short circuit unloaded transformers!

9 Connection variants for current measurement

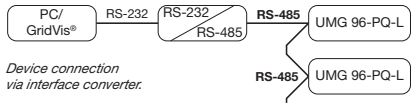
Three-phase 4-conductor system	Single-phase 3-conductor system	Single-phase 2-conductor system
		
Current measurement via current transformer in a three-phase 4-conductor system	Current measurement in a single-phase 3-conductor system	Current measurement in a single-phase 2-conductor system

Three-phase 3-conductor system		Three-phase three-conductor systems with symmetrical load
		
Current measurement via current transformer in a three-phase 3-conductor system	Aron circuit, current I2 is calculated for setting 3w2m	The device multiplies the power and energy of one phase by a factor of 3 to determine the total values of the system. Only use if the load in each system is symmetrical at all times! Current measurement in up to 3 symmetrically loaded systems

10 Establish the connection to the PC

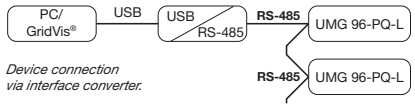
The most common connections for communication between the PC and the device:

1.



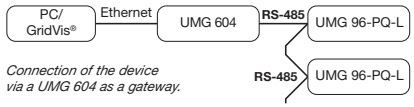
Device connection via interface converter.

2.



Device connection via interface converter.

3.



Connection of the device via a UMG 604 as a gateway.

As an option to these connection possibilities, an expansion module for the UMG 96-PQ-L offers an Ethernet interface for communication. Information on the **Expansion module with Ethernet interface** can be found in the usage information on the module.

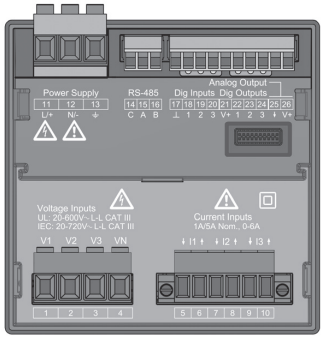


Fig. Rear of UMG 96-PQ-L

⚠CAUTION

Material damage due to incorrect network settings.
Incorrect network settings can cause faults in the IT network!
Consult your network administrator for the correct network settings for your device.

11 Example: PC connection via the RS485 interface and UMG 604 as the gateway

The PC connection of the device via the RS-485 serial interface with, for example, a UMG 604 as gateway (see step **10**) is a method for configuring the device(s) and reading out data.

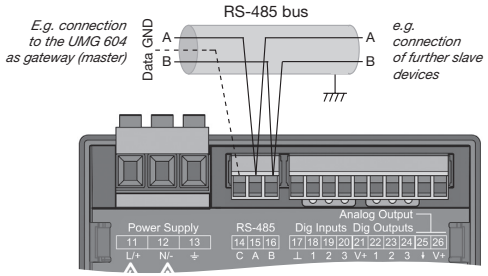
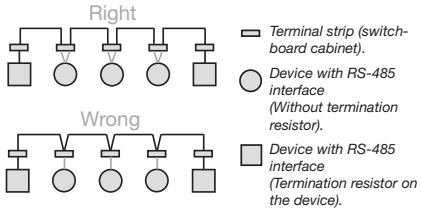


Fig. UMG 96-PQ-L

RS485 bus structure

- In a RS485 bus structure (line), all devices are connected according to the master-slave principle.
- A segment of an RS485 bus structure can contain up to 32 nodes/devices.
- At the beginning and end of a segment, terminate the cable with termination resistors (120 Ω, 0.25 W). The device does not contain a termination resistor.
- Use repeaters to connect segments if there are more than 32 nodes.
- For more information, e.g. cable type, refer to the user manual.



ⓘ INFORMATION

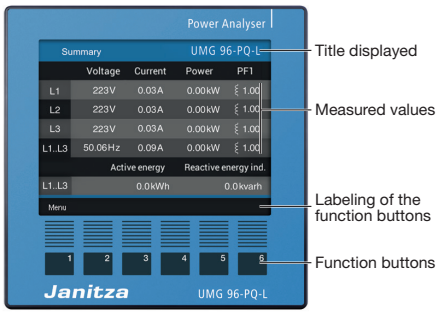
In the RS485 bus structure, use the corresponding menu items to assign the following to the slave devices
· Different device addresses.
· Device addresses that are different than the master device (UMG 604).
· The same transmission rate (baud rate).
· The same data framework.

12 Operation and button functions

The device is operated via 6 function buttons for
- Selecting measuring displays.
- Navigation within the menus.
- Editing device settings.

Button	Function
1	• *Display Menu* • *Exit* Menu • Cancel action (*ESC*)
2	• Go to the start screen (*Overview*). • Select position (to the left “ ◀ ”). • Configuration of a measuring display as the start screen (press until message appears).
3	• Select menu item or position (down “ ▼ ”). • Change (selection, number -1).
4	• Select menu item or position (up “ ▲ ”). • Change (selection, number +1).
5	• Select position (to the right “ ▶ ”).
6	• Confirm selection (*Enter*).

Fig. Standard display of UMG 96-PQ-L “Overview” measuring display



After a power recovery, the device starts with the measuring display *Overview* (default setting). Pressing function button 1 takes you to the menu selection (see the user manual for a description).

ⓘ INFORMATION

More information on the operation, display and button functions of your device can be found in the user manual.

13 Configuring the password

The meter has the option to lock the meter configuration with a password. After a password is configured, the meter prompts for a password each time the meter configuration is changed.

Setting range:	1-99999	= with password
	00000	= factory setting (no password)

1. Press button 1 to open the Menu.
2. Use buttons 3 (▼) and 4 (▲) to select the menu item *Configuration* and confirm with button 6 *Enter*.
3. The *Configuration* window appears.
4. In the *Configuration* window, use buttons 3 (▼) and 4 (▲) to select the item *System* and confirm with button 6, *Enter*.
5. The *System* window appears.
6. Use buttons 3 (▼) and 4 (▲) in the *System* window to select the item *Password* and confirm with button 6 *Enter*.
7. The digits of the item *Password* are displayed in yellow (yellow = editing mode).
8. Use buttons 2 and 5 to select the digit to be set. Use buttons 3 (▼) and 4 (▲) to change the digit (-1 / +1).
9. Confirm your entries with button 6 *Enter* or end the action by pressing button 1 *Esc*.
10. To return to the start screen, press button 1 twice *Esc* and then press button 2 *Home*.

ⓘ INFORMATION

· Ex works, the **UMG 96-PQ-L** has the **Password 00000** (no password).
· The measurement device locks the device configuration for 10 min. if the password is entered incorrectly 5 times.
· Write down your password and keep it safe!
· Without the password you cannot configure your device! Notify the device manufacturer’s Support if the password is lost!

14 Configuring the RS-485 connection

If the device is in the *Overview* measuring display, proceed as follows to configure an RS485 connection:

1. Press button 1 to open the Menu.
2. Use buttons 3 (▼) and 4 (▲) to select the menu item *Configuration* and confirm with button 6 *Enter*.
3. **If the device is password protected, enter the password at this point (see step 13).**
4. The *Configuration* window appears.
5. Use buttons 3 (▼) and 4 (▲) to select the item *Communication* and confirm with button 6 *Enter*.
6. The *Communication* window appears (see Fig.).
7. In the *Communication* window, configure the entries for the *Fieldbus* (RS485 connection), such as ***Device address***, ***Baud rate*** and ***Data frame*** by selecting the respective entry and confirming with button 6, *Enter*.
8. Use buttons 3 (▼) and 4 (▲) to change the setting of the selected entry.
9. Confirm your entries with button 6 *Enter* or end the action by pressing button 1 *Esc*.
10. To return to the start screen, press button 1 twice *Esc* and then press button 2 *Home*.

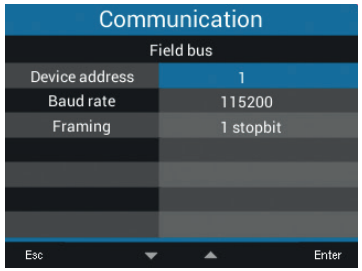


Fig. "Communication" window with the entries for configuring the RS-485 connection.

INFORMATION

Alternatively, all settings can be made conveniently in the device configuration of the GridVis® software!

15 Setting the connection variant

To calculate the power and energy values, you must set the installed connection variant in the device (see steps **7** and **9**).

1. Press button 1 to open the Menu.
2. Use buttons 3 (▼) and 4 (▲) to select the menu item *Configuration* and confirm with button 6 *Enter*.
3. **If the device is password protected, enter the password at this point (see step 13).**
4. The *Configuration* window appears.
5. Use buttons 3 (▼) and 4 (▲) to select the item *Measurement* and confirm with button 6 *Enter*.
6. The *Measurement* window appears.
7. Select the item *Connection variant* and confirm with button 6 *Enter*.
8. Use buttons 3 (▼) and 4 (▲) to select the connection variant.
9. Confirm your selection by pressing button 6 *Enter*.

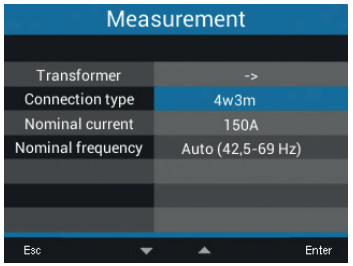


Fig. "Measurement" window with the configuration of the connection variant.

10. To set the transformers in the next step, press button 4 (▲).

Optional: To return to the start screen, press button 1 three times *Esc* and then press button 2 *Home*.

INFORMATION

More information on the settings can be found in the user manual.

16 Setting the current and voltage transformers

For correct measurement results, you must adjust the transformer ratios to the current and voltage transformers used.

1. Press button 1 to open the Menu.
2. Use buttons 3 (▼) and 4 (▲) to select the menu item *Configuration* and confirm with button 6 *Enter*.
3. **If the device is password protected, enter the password at this point (see step 13).**
4. The *Configuration* window appears.
5. Use buttons 3 (▼) and 4 (▲) to select the item *Measurement* and confirm with button 6 *Enter*.
6. The *Measurement* window appears.
7. In the *Measurement* window, select the item *Transformers* and confirm with button 6 *Enter*.
8. The configuration window appears with the transformer ratios for current and voltage transformers (see Fig.).

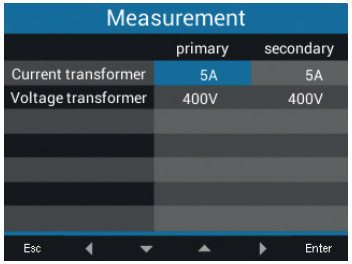


Fig. "Measurement" window with the configuration of the current and voltage transformers.

9. Use buttons 2 to 5 to select an entry for current or voltage transformer (primary or secondary side).
10. Confirm your selection with button 6 *Enter.*
11. Use buttons 2 and 5 to select the digit to be set. Use buttons 3 (▼) and 4 (▲) to change the digit (-1 / +1).
12. Confirm the entered value with button 6 (*Enter*).
13. To return to the start screen, press button 1 three times *Esc* and then press button 2 *Home*.

17 Technical data

General	
Net weight (with attached plug-in connectors)	approx. 250 g (0.55 lbs)
Package weight (incl. accessories)	approx. 500 g (1.1 lbs)
Battery	Type Lithium CR2032, 3 V (UL 1642 approved)
Data memory	64 MB
Backlight service life	40000 h (after 40000 h the backlight goes down to approx. 50%)
Impact resistance	IK07 according to IEC 62262

Transport and storage The following specifications apply for devices transported and stored in the original packaging.	
Free fall	1 m (39.37 in)
Temperature	-25 °C (-13 °F) to +70° C +70 °C (158 °F)
Relative air humidity (non-condensing)	0 to 90% RH

Environmental conditions during operation	
Install the device in a weather-protected and stationary location. Protection class II according to IEC 60536 (VDE 0106, Part 1).	
Rated temperature range	-10 °C (14 °F) to +55 °C (131 °F)
Relative air humidity (non-condensing)	0 to 75% RH
Operating elevation	0-2000 m (6562 ft) above sea level
Pollution degree	2
Mounting orientation	As desired
Ventilation	No forced ventilation required.
Protection against foreign matter and water - Front - Rear - Front with seal	 IP40 according to EN60529 IP20 according to EN60529 IP54 according to EN60529

Supply voltage	
Nominal range	**Option 230 V**: AC 90 V - 277 V (50/60 Hz) or DC 90 V - 250 V, 300 V CATIII
	Option 24 V: AC 24 V - 90 V (50/60 Hz) or DC 24 V - 90 V, 150 V CATIII
Operating range	+-10% of nominal range
Power consumption	**Option 230 V**: max. 4.5 VA / 2 W **Option 24 V**: max. 4.5 VA / 2 W
Internal fuse, not replaceable	Type T1A / 250 VDC / 277 VAC according to IEC 60127
Recommended overcurrent protective device for line protection	**Option 230 V**: 6 - 16 A **Option 24 V**: 1 - 6 A (Char. B)(IEC-/UL approval)

Current measurement	
Nominal current	5 A
Measuring range	0.005 - 6 A $_{rms}$
Crest factor (relative to nominal current)	2 (referenced to 6 A $_{rms}$)
Overload for 1 s	60 A (sinusoidal)
Resolution	0.1 mA (display 0.001 A)
Overvoltage category	300 V CAT II
Rated surge voltage	2.5 kV
Power consumption	approx. 0.2 VA (Ri=5 mΩ)
Sampling frequency	13.67 kHz
Sampling frequency (IT variant)	13.98 kHz
Fourier analysis	1st - 65th Harmonics

Voltage measurement	
Three-phase 4-conductor systems with rated voltages up to	417 V / 720 V (+-10%) according to IEC 347 V / 600 V (+-10%) according to UL
Three-phase 3-conductor systems with rated voltages up to	600 V (+10%)
Single-phase 2-conductor systems with rated voltages up to	480 V (+-10%)
Overvoltage category	600 V CAT III, 300 V CAT IV
Rated surge voltage	6 kV
Protection of the voltage measurement	1 - 10 A Tripping characteristic B (with IEC/UL approval)
Measuring range L-N	0[1] - 600 Vrms (max. overvoltage 800 Vrms)
Measuring range L-L	0[1] - 1040 Vrms (max. overvoltage 1350 Vrms)
Resolution	0.01 V
Crest factor	2.45 (referred to measuring range)
Impedance	3 MΩ/phase
Power consumption	approx. 0.1 VA
Sampling frequency	13.67 kHz
Sampling frequency (IT variant)	13.98 kHz
Frequency of fundamental oscillation - Resolution	45 Hz - 65 Hz 0.01 Hz
Fourier analysis	1st - 65th Harmonics

1) ... The device only determines measured values if a voltage L1-N of greater than 20 Veff (4-conductor measurement) or a voltage L1-L2 of greater than 34 Veff (3-conductor measurement) is applied to voltage measurement input V1.

Serial interface	
RS485 - Modbus RTU/Slave	9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps

Digital outputs 3 digital outputs, solid state relays, not short-circuit proof.	
Switching voltage	max. 33 V AC, 40 V DC
Switching current	max. 50 mAeff AC/DC
Response time	approx. 200 ms
Digital output (energy pulses)	max. 50 Hz

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

Cable length (digital inputs/outputs)	
Up to 30 m (32.81 yd)	Unshielded
Greater than 30 m (32.81 yd)	Shielded

Analog outputs	
External power supply	max. 33 V
Current	0 - 20 mA
Update time	1 sec
Load	max. 300 Ω
Resolution	10 bit

Terminal connection capacity (supply voltage) Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 - 4 mm², AWG 28-12
Wire ferrules (non-insulated)	0.2 - 2.5 mm², AWG 26-14
Wire ferrules (insulated)	0.2 - 2.5 mm², AWG 26-14
Tightening torque	0.4 - 0.5 Nm (3.54 - 4.43 lbf in)
Strip length	7 mm (0.2756 in)

Connecting capacity of the terminals (digital inputs/outputs, analog output) Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 - 1.5 mm², AWG 28-16
Wire ferrules (non-insulated)	0.2 - 1.5 mm², AWG 26-16
Wire ferrules (insulated)	0.2 - 1.5 mm², AWG 26-16
Tightening torque	0.2 - 0.25 Nm (1.77 - 2.21 lbf in)
Strip length	7 mm (0.2756 in)

Terminal connection capacity (serial interface) Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 - 1.5 mm², AWG 28-16
Wire ferrules (non-insulated)	0.2 - 1.5 mm², AWG 26-16
Wire ferrules (insulated)	0.2 - 1.5 mm², AWG 26-16
Tightening torque	0.2 - 0.25 Nm (1.77 - 2.21 lbf in)
Strip length	7 mm (0.2756 in)

Connecting capacity of the terminals (current measurement) Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 - 4 mm², AWG 28-12
Wire ferrules (non-insulated)	0.2 - 2.5 mm², AWG 26-14
Wire ferrules (insulated)	0.2 - 2.5 mm², AWG 26-14
Tightening torque	0.4 - 0.5 Nm (3.54 - 4.43 lbf in)
Strip length	7 mm (0.2756 in)

Connecting capacity of the terminals (voltage measurement) Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 - 4 mm², AWG 28-12
Wire ferrules (non-insulated)	0.2 - 2.5 mm², AWG 26-14
Wire ferrules (insulated)	0.2 - 2.5 mm², AWG 26-14
Tightening torque	0.4 - 0.5 Nm (3.54 - 4.43 lbf in)
Strip length	7 mm (0.2756 in)

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Procedure in the event of a malfunction

Failure mode	Cause	Remedy
No display	External fuse for the supply voltage has tripped.	Replace fuse.
No current display.	No measured voltage connected.	Connect measured voltage.
	No measured current connected.	Connect measured current.
Displayed current is too great or too small.	Current measurement on the wrong phase.	Check connection and correct if necessary.
	Current transformer factor incorrectly programmed.	Read and program the current transformer ratio on the current transformer.
	Current harmonic exceeds current peak value at measuring input.	Install current transformers with a higher current transformer ratio.
	The current at the measuring input is too low.	Install current transformers with a lower current transformer ratio.
Displayed voltage is too high or too low.	Measurement on the wrong phase.	Check connection and correct if necessary.
	Voltage transformer programmed incorrectly.	Read the voltage transformer ratio on the voltage transformer and program.
Displayed voltage is too low.	Overrange.	Use a voltage transformer.
	The voltage peak value at the measuring input was exceeded due to harmonics current.	**Attention!** Make sure that the measuring inputs are not overloaded.
Despite the above measures , the device does not function.	Device defective.	Send the device and error description to the manufacturer for inspection.

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