

Energy Analyzer UMG 96-EL

Installation manual

Installation and device settings



The device fronts can deviate!

User Manual:



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Janitza®

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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.

Further documentation can be found on our website www.janitza.com under Downloads.

Copyright notice

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All rights reserved. Any reproduction, processing, distribution or other use, in whole or in part, is prohibited.

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.com.

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.com) for the laws, standards and directives applied for the device by Janitza electronics GmbH.

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Safety

Safety information

The installation manual does not represent a complete 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.

ℹ 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).

- 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.

⚠ 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!

Intended use

The device is intended for the following uses:

- Use in residential and industrial areas
- Installation in weather-protected switchboard cabinets or small distribution boards
- Current measurement via external current transformers
- Measurement in 2, 3 and 4-conductor networks and TN, TT and IT networks

The device is **not** intended for:

- Operation outside the technical data range (measurement/operating voltage, overvoltage category, climatic conditions, power fuse, etc.)
- Installation in vehicles: Use of the device in non-stationary equipment constitutes an exceptional environmental condition and is only permissible by special agreement.
- Installation in environments with harmful oils, acids, gases, vapors, dusts, radiation, etc. or in potentially explosive atmospheres.

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

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.).

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Brief device description

The device is a multifunctional network analyzer that:

- Is designed to measure the power quality in low-voltage systems.
- Measures and calculates electrical variables such as voltage, current, frequency, power, work, harmonics, etc. in building installations, on distribution boards, circuit breakers and busbar trunking systems.
- Records energy consumption for cost center analysis.
- Displays and saves measurement results and transmits them via Ethernet (Modbus), e.g. to the building management system.

Measured voltages and currents must originate from the same network. For current measurement, external ± 1 A or ± 5 A current transformers (inductive current transformers) must be used.

INFORMATION

More information on assembly and the device itself can be found in the user manual.

Mounting

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

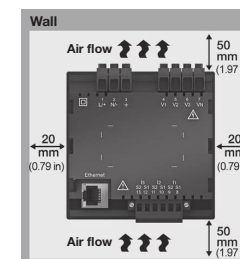


Fig. Mounting orientation, rear view

Cutout dimensions:
92 \pm 0.8 x 92 \pm 0.8 mm

- Observe the distances to neighboring components to ensure adequate ventilation!

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.

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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.

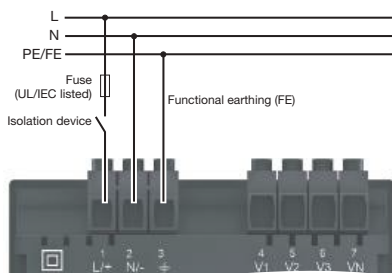


Fig. Supply voltage connection.

WARNING

Life-threatening danger due to electrical voltage if installed incorrectly!
Incorrect connection or exposed cable ends can result in parts being live.
• Check the wiring before switching on for the first time.

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!

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Grid systems

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

Three-phase 4-conductor systems with grounded neutral conductor <p>U_{L-N} / U_{L-L} 277 VLN / 480 VLL</p>	Three-phase 4-conductor systems with non-grounded neutral conductor (IT networks) <p>U_{L-N} / U_{L-L} 277 VLN / 480 VLL</p>	Three-phase 3-conductor systems not grounded (IT networks) <p>U_{L-L} 480 VLL</p>	Three-phase 3-conductor systems with grounded phase <p>U_{L-L} 480 VLL</p>
Single-phase 2-conductor systems with grounded neutral conductor <p>U_{L-N} 230 VLN</p>	Split single-phase 3-conductor system with grounded neutral conductor <p>U_{L-N} / U_{L-L} 240 VLN / 480 VLL</p>	The device can be used: <ul style="list-style-type: none"> • in 2, 3 and 4-conductor networks (TN, TT and IT networks) • in residential and industrial areas 	

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Voltage measurement

The device features 3 voltage measurement inputs that are suitable for different 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:

- Concerning the voltage measurement inputs:
 - Do not apply DC voltage to them.
 - Equip them with a suitable fuse and isolation device appropriately marked and located nearby (alternatively: line circuit breaker).
 - 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.

You can use a line circuit breaker instead of a fuse and an isolation device.

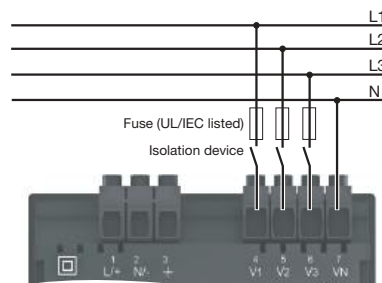


Fig. Voltage measurement connection variant 3p 4w (addr. 509 = 0, factory setting)

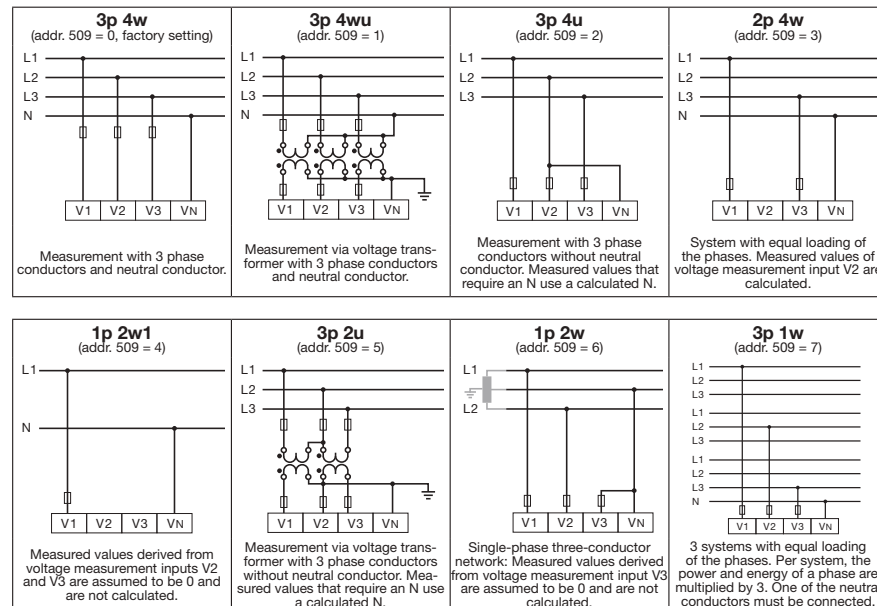
The voltage measurement inputs are designed for measurements in low-voltage networks in which the following nominal voltages occur:

- 277 V phase to ground and 480 V phase to phase in a 4-wire system or
- 480 V phase to phase in 3-wire system.

The rated and surge voltages correspond to the overvoltage category (see Techn. Data).

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Connection variants for voltage measurement



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Current measurement

Current transformers must be connected for current measurement.

- Current transformers with secondary currents of $\dots/1$ A or $\dots/5$ A are suitable (preset current transformer ratio 5/5 A).
- The current transformers must have basic insulation in accordance with IEC 61010-1 for the rated voltage of the circuit.

The device does not measure direct currents.

⚠ WARNING

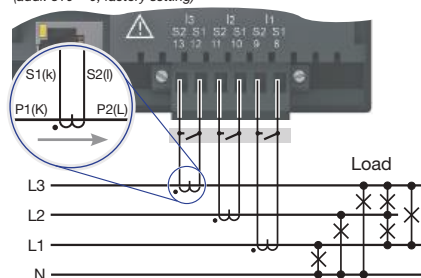
Risk of injury due to electrical voltage!

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!

Fig. Current measurement connection variant 3p 4w (addr. 510 = 0, factory setting)



⚠ WARNING

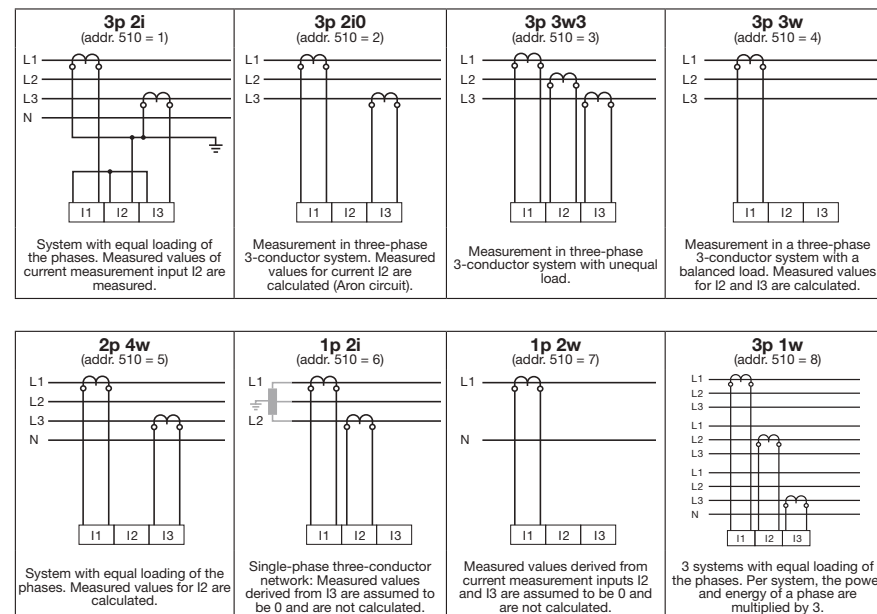
Of electrical currents and voltages!

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!**

Overrange measurements and errors are indicated on the display by "EEE".

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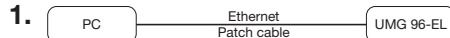
Connection variants for current measurement



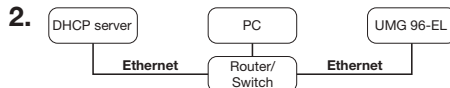
10

Establish the connection to the PC

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



The device requires a fixed IP address or the network connection of the PC must be configured so that the device is assigned an IP address via DHCP.



The DHCP server automatically assigns an IP address to the device.

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.



Fig. Ethernet interface

- Use at least CAT5 cable!
- The factory setting is DHCP (dynamic assignment of the IP address).
- The device supports IPv4.

GridVis Quick Guide

Explains how to create a new project in the GridVis software after connecting the PC, and how to add and configure the device:



wiki.janitza.de/x/jglgCQ

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Operation and button functions

The UMG 96-EL is operated using buttons 1 and 2:

- Press briefly (button 1 or 2):
Next step (+1).
- Long press (button 1 or 2):
Previous step (-1).

The device distinguishes between display mode and programming mode.

Display mode

- Use button 1 or 2 to scroll between different measuring displays.
- The display can switch between different measuring displays on a time-controlled basis. The time for this automatic **display change** is configurable.
- Measured values are organized in **display profiles**. Display profile 1 is preset. To display harmonics and comparators, switch to display profile 2.

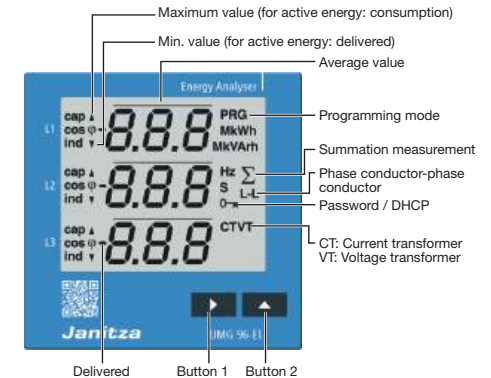


Fig. UMG 96-EL display

INFORMATION

Further information can be found in the user manual (available for download on the homepage).

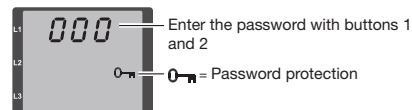
12

Programming mode

Use the programming mode to configure the settings of the device.

- Press and hold buttons 1 and 2 simultaneously for approx. 1 second to switch between the display mode and programming mode. The symbol **PRG** appears on the display.
- Press button 2 to switch between the programming menus.








If the programming mode is protected with a password, you must enter it when opening the mode:



The device switches from **programming mode** back to **display mode** when

- You press and hold buttons 1 and 2 simultaneously for approx. 1 second, or
- No buttons are pressed for 60 seconds.

Open the programming menu: **1 + 2**

1		CT: Current transformer ratio, primary/secondary
2		VT: Voltage transformer ratio, primary/secondary
3		Parameters: Submenu for setting Modbus parameters
4		Adr: IP device address (IPv4) (4 displays)
5		SUB: Subnet mask (4 displays)
6		GAt: Gateway (4 displays)
7		dYn IP: Dynamic/static address assignment

Exit the programming menu: **1 + 2**
Changes only take effect once you exit.

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Setting the current transformer (CT)

1. Press buttons 1+2 simultaneously for approx. 1 s – Open programming mode (symbols **PRG** and **CT** are displayed).
2. Press button 1 – The first digit of the primary current blinks.
3. Button 2 – Select the value of the 1st digit.
4. Button 1 – Go to the 2nd digit.
5. Button 2 – Select the value of the 2nd digit.
6. Button 1 – Go to the 3rd digit.
7. Button 2 – Select the value of the 3rd digit.
8. Button 1 – Confirm the entry. The complete number blinks.
9. Button 2 – Select the decimal place (unit of the primary current).
10. Button 1 – Confirm the entry. The secondary current blinks.
11. Button 2 – Set the secondary current (value 1 A or 5 A).
12. Button 1 – Confirm the entry.
13. Press buttons 1+2 simultaneously for approx. 1 s – Exit programming mode.
Or: Button 2 – Go to the next menu item, voltage transformer, in the programming menu.

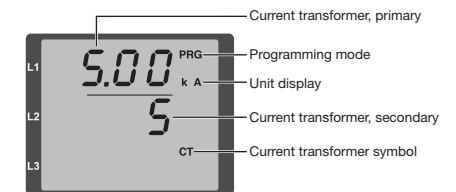


Fig. "Current transformer" input area

INFORMATION

- Changes only take effect after exiting the programming mode.
- Further information on current transformers and current transformer ratios can be found in the user manual.
- All settings can also be made in the device configuration of the GridVis® software!

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Setting the voltage transformer (VT)

- Press buttons 1+2 simultaneously for approx. 1 s – Open programming mode (symbols **PRG** and **CT** are displayed).
- Press button 2 – **VT** (voltage transformer) is displayed.
- Button 1 – The first digit of the primary voltage blinks.
- Button 2 – Select the value of the 1st digit.
- Button 1 – Go to the 2nd digit.
- Button 2 – Select the value of the 2nd digit.
- Button 1 – Go to the 3rd digit.
- Button 2 – Select the value of the 3rd digit.
- Button 1 – Confirm the entry. The complete number blinks.
- Button 2 – Select the decimal place (unit of the primary voltage).
- Button 1 – Confirm the entry. The secondary voltage blinks.
- Button 2 – Set the secondary voltage.
- Button 1 – Confirm the entry.
- Press buttons 1+2 simultaneously for approx. 1 s – Exit programming mode.
Or: Button 2 – Go to the next menu item, IP address, in the programming menu.

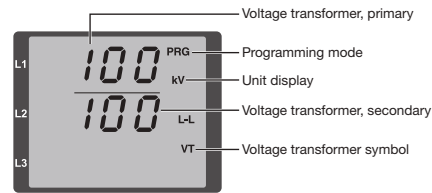


Fig. "Voltage transformer" input area

INFORMATION

- Changes only take effect after exiting the programming mode.
- Further information on voltage transformers and voltage transformer ratios can be found in the user manual.

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Setting up a dynamic or static IP address

The factory setting **DHCP** means that when the meter is started, it is automatically assigned an IP address, subnet mask and gateway address by the DHCP server in the network. Alternatively, you can assign a fixed IP address to the device (see table).

Reading out the current IP address

- Open the programming mode.
- Press button 2 **3x** – **Adr** is displayed.
- Press button 1 several times to display the complete address.

Assigning a static IP address

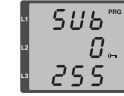
- Open the programming mode.
- Press button 2 **6x** – **dYn IP** is displayed.
- Button 1 – Select the **3rd** digit (blinks).
- Button 2 – Select the value 000 or 001 (see table).
- Button 1 – Confirm the entry.
- Press buttons 1+2 simultaneously for approx. 1 s – Exit programming mode.
- Continue with step 16.



Address assignment mode (**dYn IP**)
Standard factory setting: 002 = DHCP (automatic assignment)



IP address (**Adr**), divided into 4 displays, here: Byte 0, value 192
0 = DHCP is active. Changes are not saved.



Subnet mask (**Sub**), divided into 4 displays, here: Byte 0, value 255



Gateway (**GAt**), divided into 4 displays, here: Byte 0, value 192

Address assignment mode (dYn IP)	
000	static IP address
001	static IP address with Gratuitous ARP The device sends an ARP packet to the network once after switching on or if the network configuration is changed.
002	DHCP (Factory setting)

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Configuring a static IP address

Make sure that DHCP is disabled (see **Step 15** before you assign a manual address. The key symbol must no longer be displayed.

Manual configuration of the IP address

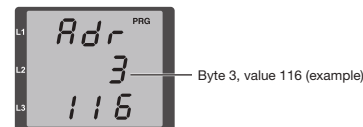
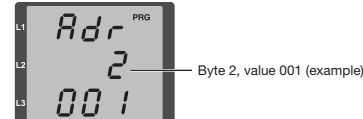
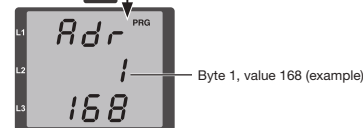
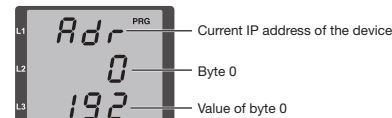
- Open the programming mode.
- Press button 2 **3x** – **Adr** is displayed.
- Button 1 – The 1st digit of byte 0 is selected and blinks.
- Button 2 – Select the value of the 1st digit.
- Button 1 – Go to the 2nd digit.
- Button 2 – Select the value of the 2nd digit.
- Button 1 – Go to the 3rd digit.
- Button 2 – Select the value of the 3rd digit.
- Button 1 – Confirm entry and go to byte 1.
- Select bytes 1 to 3 in the same way.

Continue the configuration in this manner. In step 2:

- For subnet mask **SUB**, press button 2 **4x**.
- For gateway **GAt**, press button 2 **5x**.

192.168.001.116 Example address (IPv4)

XXX.XXX.XXX.XXX
0 1 2 3 Byte allocation in the display



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Technical data

General	
Net weight (with attached plug-in connectors)	approx. 300 g (0.66 lbs)
Package weight (incl. accessories)	approx. 600 g (1.32 lbs)
Data memory	8 MB
Backlight service life	40 000 h (after 40 000 h, the backlighting 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 .. +70° C (-13 .. +158° F)
Relative humidity	0 .. 90% non-condensing

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 .. +55° C (+14 .. +131° F)
Relative humidity	0 .. 75% non-condensing
Operating elevation	0 .. 2000 m (6562 ft) above sea level
Pollution degree	2
Mounting orientation	As desired
Ventilation	No forced ventilation required
Foreign body/water protection	IP40 according to EN60529
- Front	IP20 according to EN60529
- Rear	IP54 according to EN60529
- Front with seal	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. 3.5 VA / 1.5 W Option 24 V: max. 2.5 VA / 1.5 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, Char. B Option 24 V: 1 .. 6 A, Char. B (IEC/UL approval)

Voltage measurement	
Three-phase 4-conductor systems with rated voltages up to	277 V / 480 V (+10%) (TN/TT)
3-phase 3-conductor systems, grounded/non-grounded with rated voltages up to	480 V (+10%) (TN/TT, IT)
Overvoltage category	300 V CAT III
Rated surge voltage	4 kV
Protection of the voltage measurement	1 .. 10 A Tripping characteristic B (with IEC/UL approval)
Measuring range L-N	0 ¹⁾ .. 300 V _{eff}
Measuring range L-L	0 ¹⁾ .. 510 V _{eff}
Max. overvoltage	L-N: 520 V _{eff} / L-L: 900 V _{eff}
Resolution	0.01 V
Crest factor	2.45 (referred to measuring range)
Impedance	3 MΩ/phase
Power consumption	approx. 0.1 VA
Sampling frequency (per measurement channel)	21.33 kHz (50 Hz) 25.6 kHz (60 Hz)
Frequency of fundamental oscillation	45 Hz .. 65 Hz
- Resolution	0.01 Hz
Fourier analysis of harmonics	1 .. 40th Harmonics

1) The UMG 96-EL can only determine measured values if a voltage L1-N of greater than 20 V_{eff} (4-wire measurement) or a voltage L1-L2 of greater than 34 V_{eff} (3-wire measurement) is present at voltage measurement input V1.

Current measurement	
Nominal current	5 A
Measuring range	0.005 .. 6 A _{eff}
Crest factor (relative to nominal current)	1.98
Overload for 1 s	120 A (sinusoidal)
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 (R _i = 5 mΩ)
Sampling frequency (per measurement channel)	21.33 kHz (50 Hz) 25.6 kHz (60 Hz)
Fourier analysis of harmonics	1 .. 40th Harmonics

Potential isolation and electrical safety of the interfaces

The Ethernet interface has:

- Double insulation to the inputs of the voltage and current measurement.
- Functional insulation relative to the supply voltage.

The interfaces of the connected devices require double or reinforced insulation to mains voltages (according to IEC 61010-1).

Connection capacity of the terminals (supply voltage)	
Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 .. 4 mm ² , AWG 24 .. 12
Terminal pins, wire ferrules	0.2 .. 2.5 mm ²
Tightening torque	0.4 .. 0.5 Nm (3.54 .. 4.43 lbf in)
Strip length	7 mm (0.276 in)

Connection capacity of the terminals (voltage measurement)	
Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 .. 4 mm ² , AWG 24 .. 12
Terminal pins, wire ferrules	0.2 .. 2.5 mm ²
Tightening torque	0.4 .. 0.5 Nm (3.54 .. 4.43 lbf in)
Strip length	7 mm (0.276 in)

Connection capacity of the terminals (current measurement)	
Connectible conductors. Only connect one conductor per terminal point!	
Single core, multi-core, fine-stranded	0.2 .. 4 mm ² , AWG 24 .. 12
Wire ferrules (non-insulated)	0.2 .. 4 mm ²
Wire ferrules (insulated)	0.2 .. 2.5 mm ²
Tightening torque	0.4 .. 0.5 Nm (3.54 .. 4.43 lbf in)
Strip length	7 mm (0.276 in)



Ethernet interface	
Connection	RJ45
Internet protocol	IPv4

INFORMATION

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

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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.	Set the transformer ratio of the current transformer correctly.
	The peak current value at the measurement input was exceeded due to harmonics.	Install current transformers with a larger transformer ratio.
	The current at the measurement input is too low.	Install current transformers with a smaller 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.	Set the transformer ratio of the voltage transformer correctly.
	Frequency could not be determined or is set incorrectly.	Set the frequency correctly.
Displayed voltage is too low.	Overrange.	Use a voltage transformer.
	The voltage peak value at the measurement input was exceeded due to harmonics current.	Attention! Do not overload the measurement inputs.
	Display of "EEE" without error code – Measuring range exceeded in the marked phase.	Set the connection variant for voltage measurement and current and voltage transformers correctly.
 	Display of "EEE" with error code.	See "Error messages" in the user manual.
	IP address is incorrect or already assigned. Or: A network switch requires authentication.	Correct the device IP address. Contact the network administrator.
	Device defective.	Send the device and error description to the manufacturer for inspection.
For further possible failure modes and remedies, see the user manual.		

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