

Power Analyser UMG 96 RM-EL Installation manual

Dispositivo Voltaje de alta Frecuencia

- Installation
- Device settings

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Subject to technical amendments

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

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1 General

Disclaimer
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2 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:

- 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).

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

3 Brief description of device

The UMG 96 RM-EL is a compact, multifunctional network analyser that:

- is designed for low voltage and medium voltage distribution systems.
- 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 measurement results and forwards them via interfaces.
- captures the energy consumption for cost centre analysis.
- is used as a measured value transducer for building management systems or PLC (Modbus).

Assembly
Install the device in a weather-protected front panel on switching cabinets.

- Ensure! Adequate ventilation
- install the device vertically!
- adhere to clearances from neighbouring components!

Damage to property due to disregard of the installation instructions
Disregard of the installation instructions can damage or destroy your device.

Damage to property due to disregard of the installation instructions
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.

4 Connecting the supply voltage

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

Danger of injury due to electrical energy!
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!
Your device can be damaged or destroyed by a failure to comply with the connection conditions or by exceeding the permissible overvoltage!
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.

5 Mains systems

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

- Three-phase four-conductor systems with earthed neutral conductor (TN networks)
- Three-phase three-conductor systems with earthed phase (TT networks)
- Three-phase three-conductor systems with earthed phase (IT networks)
- Single-phase two-conductor systems with earthed neutral conductor
- Separated single-phase three-conductor system with earthed neutral conductor

The device can be used in:
• 2, 3 and 4 conductor networks (TN, TT and IT networks)
• residential and industrial applications.

6 Voltage measurement

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

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.
- 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.

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

7 Connection variants for voltage measurement

Connection variants for voltage measurement (Addr. 509 = 0, default setting)

- 3p 4w (Addr. 509 = 0)
- 3p 4wu (Addr. 509 = 1)
- 3p 4u (Addr. 509 = 2)
- 3p 2u (Addr. 509 = 5)
- 1p 2w1 (Addr. 509 = 4)
- 2p 4w (Addr. 509 = 3)
- 1p 2w (Addr. 509 = 6)
- 3p 1w (Addr. 509 = 7)

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

8 Current measurement I1, I2, I3

The device is only approved for measuring current with a current transformer.

- is intended for connecting current transformers with secondary currents of ~1 A and ~5 A
- has the current transformer ratio 5/5 A set as standard.

Danger of injury due to electrical energy!
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!

NOTE!
If the metering range is exceeded, the measurement device display shows "EEE". For further information on this and on the current and current transformer data, see the user manual.

WARNING!
Risk of injury due to large currents and high electric voltages! Current transformers that are operated open in the secondary side (high-voltage peaks) can cause severe bodily injuries or death. Avoid opening current transformers when open, short circuit transformers that are unloaded!

9 Connection variants for current measurement I1, I2, I3

Connection variants for current measurement (Addr. 510 = 0, default setting)

- 3p 2i1 (Addr. 510 = 1)
- 3p 2i2 (Addr. 510 = 2)
- 3p 3w3 (Addr. 510 = 3)
- 3p 3w (Addr. 510 = 4)
- 2p 4w (Addr. 510 = 5)
- 1p 2i (Addr. 510 = 6)
- 1p 2w (Addr. 510 = 7)
- 3p 1w (Addr. 510 = 8)

NOTE!
Changes are only applied after exiting programming mode.

10 Establish connection to PC

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

- PC - Ethernet (crossover patch cable) - UMG 96 RM-EL. The PC and the UMG 96 RM-EL require a static IP address.
- DHCP-Server - Ethernet - Switch - Router - Ethernet - UMG 96 RM-EL. The DHCP server assigns IP addresses to the UMG 96 RM-EL and the PC automatically.

More information on device configuration and communication is provided as of step 12.

Recommendation for the Ethernet connection:
Use at least CAT5 cables!

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.

11 Controls and button functions

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

- Short press (button 1 or 2): value step (+/-)
- Long press (button 1 or 2): previous step (-/+)

The device differentiates between display and programming mode.

Measured values are arranged into measured value display profiles and can be adjusted easily in the software. Measured value display profile 1 is configured in the factory.

Display mode

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

NOTE!
For further information on operating, displays and button functions on your device, see the user manual.

12 Programming mode

Press and hold buttons 1 and 2 simultaneously for 1 second to switch between display mode and programming mode. The text "PRG" is shown on the display.

Configure the settings required to operate the device in programming mode.

- Programming mode can be protected with a user password.
- You can use button 2 to switch between the following programming menus:

- Current transformer
- Voltage transformer
- Parameter list
- Device TCP/IP address
- Subnet mask
- Gateway address
- Dynamic TCP/IP addressing

The device switches from programming mode to display mode if:

- no buttons are pressed for 60 seconds.
- buttons 1 and 2 are pressed simultaneously for 1 second.

NOTE!
Changes are only applied after exiting programming mode.

NOTE!
The following section explains the programming menu for the TCP/IP device address, the subnet mask, the gateway address (4, 5, 6) and dynamic TCP/IP addressing (7) via the Ethernet interface, which are most important for an installation manual.

For further information on programming menus and interfaces, see the device's user manual.

In order to make the following settings, sample settings for the device and the PC are selected:

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!
The device is set to dynamic IP assignment (002) in the factory. "DHCP mode" (see step 17).

13 Programming the current transformer

- Switch to programming mode.
- The symbols for programming mode PRG and for the current transformer CT appear.
- Press button 1 to confirm - the first digit of the input area for the primary current flashes.
- Use button 2 to select the value for the 1st digit.
- Use button 1 to move to the 2nd digit.
- Use button 2 to select the value for the 2nd digit.
- Use button 1 to move to the 3rd digit.
- Use button 2 to select the value for the 3rd digit.
- Press button 1 to confirm.
- The entire number flashes.
- Use button 2 to select the decimal places and therefore the unit of the primary current.
- Press button 1 to confirm.
- The input area for the secondary current flashes.
- Use button 2 to set the secondary current (value 1 A or 5 A).
- Press button 1 to confirm.
- Pressing buttons 1 and 2 simultaneously (1 sec.) exits programming mode. Use button 2 to switch to the input area for the voltage transformer.

NOTE!
Changes are only applied after exiting programming mode.

For further information on current transformers and current transformer ratios, see the user manual.

14 Programming the voltage transformer

- Switch to programming mode.
- The symbols for programming mode PRG and for the current transformer CT appear.
- Use button 2 to switch to programming mode for the voltage transformer.
- The symbols for programming mode PRG and for the voltage transformer VT appear.
- Press button 1 to confirm - the first digit of the input area for the primary voltage flashes.
- Use button 2 to select the value for the 1st digit.
- Use button 1 to move to the 2nd digit.
- Use button 2 to select the value for the 2nd digit.
- Use button 1 to move to the 3rd digit.
- Use button 2 to select the value for the 3rd digit.
- Press button 1 to confirm.
- The entire number flashes.
- Use button 2 to select the decimal places and therefore the unit of the primary voltage.
- Press button 1 to confirm.
- The input area for the secondary voltage flashes.
- Use button 2 to set the secondary voltage (value 10 V or 100 V).
- Press button 1 to confirm.
- Pressing buttons 1 and 2 simultaneously (1 sec.) exits programming mode. Use button 2 to switch to the input area for the current transformer.

NOTE!
Changes are only applied after exiting programming mode.

For further information on voltage transformers and voltage transformer ratios, see the user manual.

15 Manual TCP/IP configuration via the Ethernet interface

Each device within an Ethernet network has a unique TCP/IP address, which can be assigned manually or by 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 device's TCP/IP address (addr):

- Switch to programming mode.
- The symbols for programming mode PRG and for the current transformer CT appear.
- Pressing button 2 3 times takes you to the TCP/IP settings.
- (Press the subnet mask 4x and the gateway 5x) (selection flashes)
- Use button 2 to select the value.
- Use button 1 to move to the 2nd digit.
- Use button 2 to select the value.
- Use button 1 to move to the 3rd digit.
- Use button 2 to select the value.
- Use button 1 to move to the 4th digit.
- Use button 2 to select the value.
- Select bytes 1 to 3 in the same way.
- Configure the subnet mask (SUB on the display) and the gateway address (GAT on the display) in the same way.

NOTE!
In order to ensure that the DHCP server does not overwrite the TCP/IP configuration, set the dynamic TCP/IP assignment to "static IP address" ("000") (see step 17).

16 Dynamic TCP/IP assignment via the Ethernet interface (DHCP mode)

In dynamic TCP/IP assignment, (TCP/IP device address, subnet mask and gateway address), a network is chosen and the device automatically when starting the device.

The dynamic TCP/IP settings are read (or assigned) in the same way as "manual configuration" is carried out (see step 12 and 15):

- Switch to programming mode.
- The symbols for programming mode PRG and for the current transformer CT appear.
- Pressing button 2 6 times takes you to dynamic TCP/IP assignment (dYN IP).
- Use button 1 to select the 3rd digit (flashes).
- Use button 2 to select the value 002 (DHCP).
- Press button 1 to confirm your setting.
- Exit programming mode by pressing and holding buttons 1 and 2 simultaneously for 1 second.

Dynamic IP assignment can also be carried out via the GridVis® software.

NOTE!
The key icon on the display indicates that dynamic TCP/IP assignment is active (002). The DHCP server assigns the TCP/IP device address, the subnet mask and the gateway address when the device starts.

"Dynamic IP address assignment" table (dYN IP)

000	Static IP address
001	BOOTP
002	DHCP (default setting)
003	Static IP with ARP probe and gratuitous ARP
004	BOOTP with ARP probe and gratuitous ARP
005	DHCP with ARP probe and gratuitous ARP

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 Default setting: 002 to DHCP

17 Technical data

General information	
Net weight (with attached connectors)	approx. 300 g
Packaging weight (including accessories)	approx. 600 g
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.	
Class of pollution	2
Temperature	K55 (-25° C to +70° C)
Relative humidity	0 to 90% RH
Ambient conditions during operation	
The UMG 96 RM is intended for weather-protected, stationary use. Protection class II, IEC 60529 (IP20, IP30, IP40).	
Operating temperature range	K55 (-10° C to +55° C)
Relative humidity	0 to 75% RH
Operating altitude	0 to 2000 m above sea level
Degree of pollution	2
Mounting position	vertical
Ventilation	Forced ventilation is not required.
Protection against ingress of water	IP40 I.a.w. EN60529
Front side	IP20 I.a.w. EN60529
Rear side	IP54 I.a.w. EN60529
Front with seal	IP65 I.a.w. EN60529

18 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. Measurement current is not connected.	Connect the measuring-circuit voltage. Connect measuring-circuit current.
Current displayed is too large or too small	Current measurement in the wrong phase. Current transformer factor is incorrectly programmed. The current at the measurement input falls short of.	Check connection and correct if necessary. Read out and program the current transformer transformation ratio at the current transformer. Install current transformer with a suitable transformation ratio. Install current transformer with a suitable transformation ratio.
Voltage displayed is too large or too small	Measurement in the wrong phase. Voltage transformer incorrectly programmed.	Check connection and correct if necessary. Read out and program the voltage transformer transformation ratio at the voltage transformer. Install voltage transformers.
Voltage displayed too small	Overvoltage. The peak voltage value at the measurement input has been exceeded by harmonic components.	Check connection and correct if necessary. Send the device to the manufacturer for inspection and testing along with an accurate fault description.
"EEE" in the display	The metering range of the measurement input has been exceeded by harmonic components.	Send the device to the manufacturer for inspection and testing along with an accurate fault description.
Device still does not work despite the above measures.	Device defective.	Send the device to the manufacturer for inspection and testing along with an accurate fault description.

19 Terminal connection capacity (power supply voltage)

Conditions to be connected:
Only one conductor can be connected per terminal!

Rated current	5 A
Metering range	0 to 6 Amps
Single core, multi-core	0.2 - 2.5 mm ² , AWG 28 - 12
3-phase 3-conductor systems, not earthed, with rated voltages of up to	IT 480 V (U=10%)
Resolution	0.1 mA (display 0.01 A)
Overvoltage category	300 V CAT II
Measurement voltage surge	300 V CAT III
Power consumption	approx. 0.2 VA (R = 5 mΩ)
Overload for 1 sec.	120 A (short-circuit)
Frequency range of the fundamental oscillation	21.33 kHz (50 Hz), 25.6 kHz (60 Hz) for each measurement channel

Terminal connection capacity (current measurement)
Conditions to be connected:
Only one conductor can be connected per terminal!

Single core, multi-core	0.2 - 2.5 mm ² , AWG 28-12
Terminal pins, core and sheath	0.2 - 2.5 mm ²
Tightening torque	0.4 - 0.5 Nm
Stripping length	7 mm

Terminal connection capacity (voltage measurement)
Conditions to be connected:
Only one conductor can be connected per terminal!

Single core, multi-core	0.08 - 4.0 mm ² , AWG 38-12
Terminal pins, core and sheath	0.2 - 2.5 mm ²
Tightening torque	0.4 - 0.5 Nm
Stripping length	7 mm

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

20 Procedure in the event of faults

Possible fault	Cause	Remedy
No display	External fusing for the power supply voltage has tripped.	Replace fuse.
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Voltage displayed is too large or too small	Measurement in the wrong phase. Voltage transformer incorrectly programmed.	Check connection and correct if necessary. Read out and program the voltage transformer transformation ratio at the voltage transformer. Install voltage transformers.
Voltage displayed too small	Overvoltage. The peak voltage value at the measurement input has been exceeded by harmonic components.	Check connection and correct if necessary. Send the device to the manufacturer for inspection and testing along with an accurate fault description.
"EEE" in the display	The metering range of the measurement input has been exceeded by harmonic components.	Send the device to the manufacturer for inspection and testing along with an accurate fault description.
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