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Deutsche Version: siehe Vorderseite

Power Analyser

UMG 605-PRO

Installation manual

- Installation
- Device settings



User manual:

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Janitza®

1 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 at Support > Downloads.

Copyright notice
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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.
- 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.

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.

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:

⚡	This symbol is an addition to the safety instructions and indicates an electrical hazard.
⚠	This symbol is an addition to the safety instructions and indicates a potential hazard.
☞	This symbol with the word **NOTE!** describes: • Procedures that do not pose any risks of injures. • 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 imminent danger that causes severe or fatal injuries.
⚠ **WARNING!**	Indicates a potentially hazardous situation that can cause severe injuries or death.
⚠ **CAUTION!**	Indicates a potentially hazardous situation that can cause minor injuries or damage to property.

Measures for safety
When operating electrical devices certain parts of these devices inevitable carry dangerous voltages. This could result in serious bodily injury or damage to property if not handled properly:
- De-energise your device before starting work! Check that it is de-energised.
- 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.

3 Device short description

The device is a multifunctional network analyser that 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.

Prerequisite:
Measured voltages and measured currents come from the same network.

The devices supply measurement results that can be displayed, saved and transmitted via interfaces.

Assembly

The device will be installed in switch cabinets or in small installation distributors per DIN 43880 on a 35 mm mounting rail per DIN EN 60715. It can be installed in any position.



Fig. Device on mounting rail in accordance with DIN EN 60715.

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.

4 Connecting the supply voltage

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

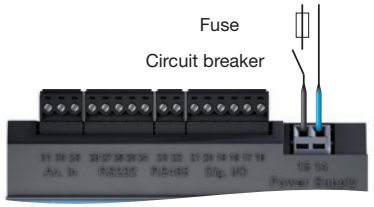


Fig. Connecting Uh supply voltage.

WARNING!

Risk of injury due to electric voltage!

Severe bodily injuries or death can occur due to:
- touching bare or stripped wires that are live.
- device inputs that are dangerous to touch.

De-energise your device before starting work! Check that it is de-energised.

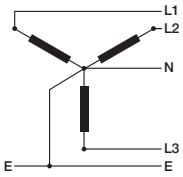
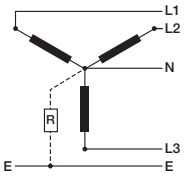
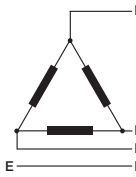
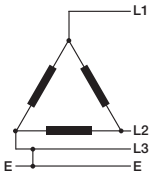
CAUTION!

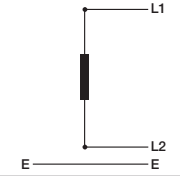
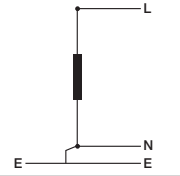
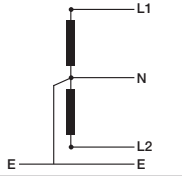
Damage to property due to not observing the connection conditions or impermissible overvoltages

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, note the following:
- **The voltage and frequency must meet the specifications on the rating plate! Adhere to the threshold values as described in the user manual!**
- **In building installations, the supply voltage must be protected with a UL/IEC approved circuit breaker / a fuse!**
- **The circuit breaker**
  - **must be easily accessible for the user and be installed close to the device.**
  - **must be labelled for the relevant device.**
- **Do not connect the supply voltage to the voltage transformers.**

5 Network systems

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

Three-phase four-conductor systems with earthed neutral conductor	**Three-phase four-conductor systems** with non-earthed neutral conductor (IT networks)	**Three-phase four-conductor systems,** not earthed	**Three-phase four-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} 480 VLL

Two-phase two-conductor systems, not earthed	**Single-phase two-conductor systems** with earthed neutral conductor	**Separated single-phase three-conductor systems** with earthed neutral conductor
		
U_{L-L} 480 VLL	U_{L-N} 480 VLN	U_{L-N} / U_{L-L} 277 VLN / 480 VLL

The device can be used in
- 2-, 3- and 4-conductor networks (TN, TT and IT networks)
- domestic and industrial settings

.

6 Voltage measurement

The device only determines measured values if measured voltage of >10 Veff is present on at least one voltage measurement input.

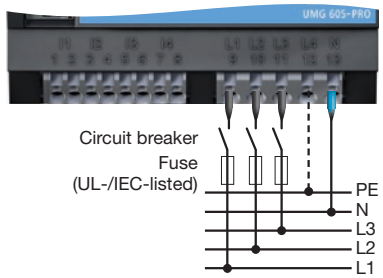
CAUTION!

Risk of injuries or damage to the device

Failure to observe the connection conditions for the voltage measurement inputs can cause injuries to you or damage to the device.
Therefore, note the following:
- **The voltage measurement inputs**
  - **must not be occupied with DC voltage.**
  - **must be provided with a suitable, labelled fuse that is positioned close by and a circuit breaker (alternatively: a line safety switch).**
  - **are dangerous to touch.**
- **Voltages that exceed the permissible network rated voltages must be connected via a voltage transformer.**
- **Measured voltages and currents must derive from the same network.**

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

"Voltage measurement in three-phase four-conductor system", without voltage transformer connection variant.



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.

7 Current measurement

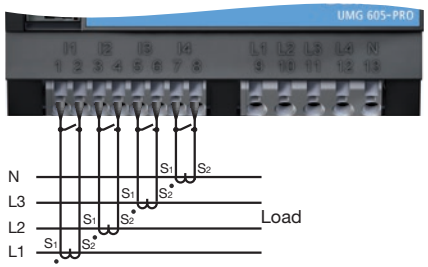
The device
- is only approved for measuring current with a current transformer.
- is intended for connecting current transformers with secondary currents of ../1 A and ../5 A.
- has the current transformer ratio set to 5/5 A as standard.

Risk of injury due to electric voltage!

WARNING!
Severe bodily injuries or death can occur due to:
- touching bare or stripped wires that are live,
- current measurement inputs that are dangerous to touch on the device and on the current transformers.

De-energise your device before starting work! Check that it is de-energised. Earth the system. To do this, use the earth connection points with the earthing symbol. Also earth the secondary windings on the current transformer and all metal parts on the transformer that are able to be touched.

"Current measurement in three-phase four-conductor system" and additional current measurements in the neutral conductor connection variant.



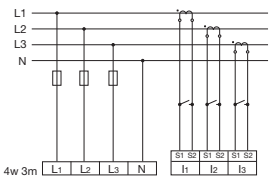
Risk of injury due to large currents and high electric voltages!

WARNING!
Current transformers operating with an open secondary circuit (high voltage peaks) can result in serious or even fatal injuries.
Avoid open operation of the current transformers - short-circuit unloaded transformers!

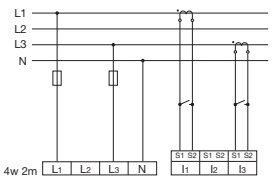
8 Baseline measurement, inputs 1-3

Setting range on the device: Address 110 (see step 13)

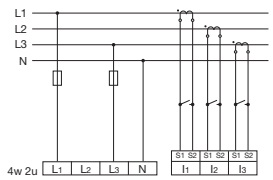
Three-phase four-conductor system



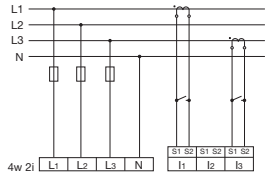
Address 110 - Set.: 0000
Measurement in the three-phase four-conductor system with asymmetric loading.



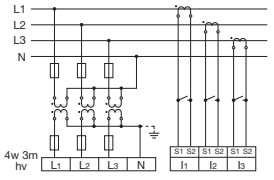
Address 110 - Set.: 0001
Measurement in the three-phase four-conductor system with symmetric loading.



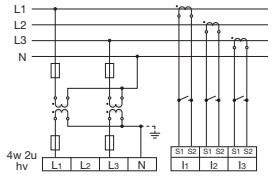
Address 110 - Set.: 0002
Measurement in the three-phase four-conductor system with asymmetric loading.



Address 110 - Set.: 0003
Measurement via 2 current transformers in the three-phase four-conductor system with symmetric loading.



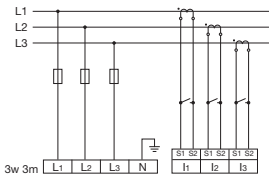
Address 110 - Set.: 0010
Measurement via 3 voltage transformers in the three-phase four-conductor system with asymmetric loading.



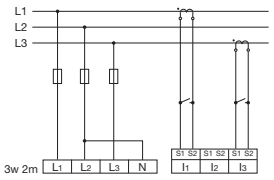
Address 110 - Set.: 0011
Measurement via 2 voltage transformers in the three-phase four-conductor system with asymmetric loading.

Setting range on the device: Address 110 (see step 13)

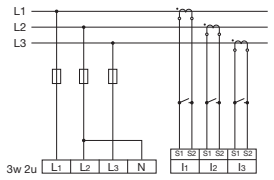
Three-phase three-conductor system



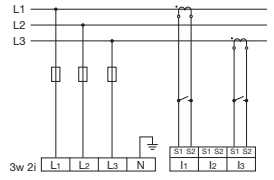
Address 110 - Set.: 0004
Measurement in the three-phase three-conductor system with asymmetric loading.



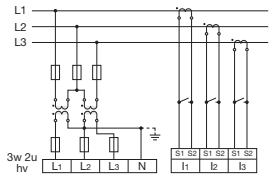
Address 110 - Set.: 0005
Measurement in the three-phase three-conductor system with asymmetric loading.



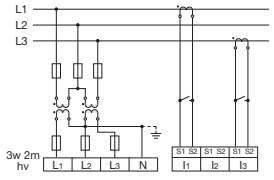
Address 110 - Set.: 0006
Measurement in the three-phase three-conductor system with asymmetric loading.



Address 110 - Set.: 0007
Measurement in the three-phase three-conductor system with asymmetric loading.



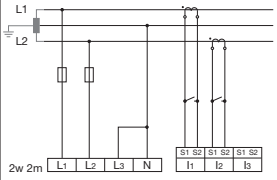
Address 110 - Set.: 0012
Measurement in the three-phase three-conductor system with asymmetric loading.



Address 110 - Set.: 0013
Measurement in the three-phase three-conductor
system with asymmetric loading.

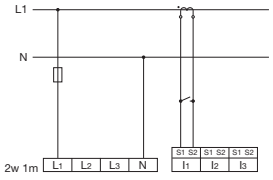
Setting range on the device: Address 110 (see step 13)

Single-phase three-conductor system



Address 110 - Set.: 0008
Measurement in the single-phase three-conductor system.
I3 and U3 are not calculated and set to zero.

Three-phase four-conductor system



Address 110 - Set.: 0009
Measuring one phase in three-phase four-conductor system

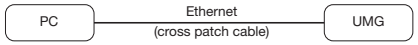
NOTE!
- If the measurement range is exceeded, the measurement device display shows "*EEEE*".
- For further information on the baseline measurement, see the user manual.
- A supporting measurement via input L4 is configured via address 111 on the device. For settings, diagrams and information on supporting.measurement, see the user manual.

RECOMMENDATION
Connect the protective earth (PE) to measurement input L4 for a PE/N measurement. Do not use a green and yellow wire for this as the conductor does not have any protective function! (See fig. "Connection variant in three-phase four-conductor system" in step 6).

9 Establish an Ethernet connection

The 3 most common connections for communication between PC and device:

1.



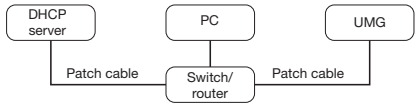
The PC and the UMG 605-PRO require a static IP address.

2.



The PC and the UMG 605-PRO require a static IP address.

3.



The DHCP server assigns IP addresses to the UMG 605-PRO and the PC automatically.



Ethernet connection

Recommendation:
Use at least CAT5 cables!

CAUTION! **Damage to property due to incorrect network settings**

Incorrect network settings can cause faults in the IT network!
Obtain information from your network administrator about the correct Ethernet network settings for your device.

10 Operation and button functions

The device is operated using buttons 1 and 2. The service button is designated for use by trained service employees only.

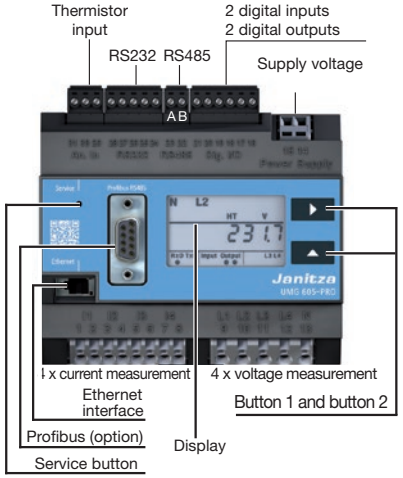
The device differentiates between **display** and **programming mode** (see step 11).
Button intervals:
Press the appropriate button for a short time:
- Scroll forwards.
- Digit/value +1.

Press the appropriate button for a long time:
- Scroll backwards.
- Digit/value -1.

To switch between **display mode** and **programming mode**, press and hold both buttons simultaneously for 1 second.

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!
For further information on button functions and parameter settings, see the user manual.

11 Display mode

After the power returns, the device is in **display mode**. In **display mode**:
- Use button 1 to select the phase for the measured values.
- Use button 2 to scroll between the measured values for current, voltage, power, etc.

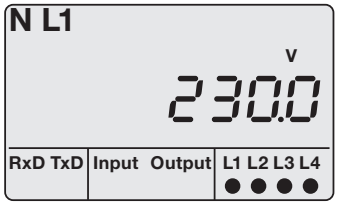


Fig. Display example for "Display mode", measured value displayed: U_{L1-N} = 230.0V.

NOTE!
For further information
- on measured value indications and the factory settings
- on parameter lists and addresses
- on the display password

is provided in the user manual.

Programming mode

The most important settings on the device are carried out in **programming mode** (**PRG**).

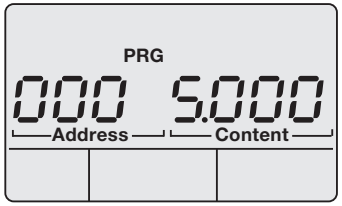


Fig. Display example for "Programming mode", address 000 with a content of 5,000.

When you press and hold buttons 1 and 2 simultaneously for approx. 1 second, the device switches to **programming mode** as long as no display password has been configured:
- The text **"PRG"** is shown on the display.
- The first digit in the address flashes.

NOTE!
You can make further settings in the GridVis® software.

12 Configuration of the voltage and current transformer ratio

Use device addresses 002 and 003 to configure the **voltage transformer ratio** for the baseline measurement.
The factory setting for the voltage transformer ratio for all voltage transformer inputs (baseline and supporting measurement) is 400 V/400 V (direct measurement).

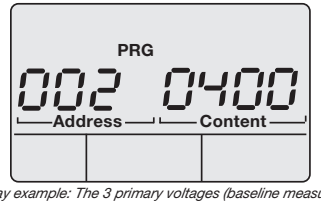
Address	Voltage transformer values
002	Baseline measurement L1 L2 L3 (primary)
003	Baseline measurement L1 L2 L3 (secondary)
012	Supporting measurement L4 (primary)
013	Supporting measurement L4 (secondary)

Parameter list excerpt of "voltage transformer values"

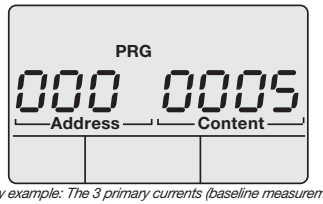
Use device addresses 000 and 001 to configure the **current transformer ratio** for the baseline measurement.
The factory setting for the current transformer ratio for all current transformer inputs (baseline and supporting measurement) is 5 A/5 A.

Address	Current transformer values
000	Baseline measurement L1 L2 L3 (primary)
001	Baseline measurement L1 L2 L3 (secondary)
010	Supporting measurement L4 (primary)
011	Supporting measurement L4 (secondary)

Parameter list excerpt of "current transformer values"



Display example: The 3 primary voltages (baseline measurement) on the voltage transformer are 400 V.



Display example: The 3 primary currents (baseline measurement) on the current transformer are 5 A.

NOTE!
For further information on voltage and current transformer ratios (baseline and supporting measurement), see the user manual.

13 Device settings for measurements

The 4 voltage and current measurement inputs on the device are divided into inputs for the:
- baseline measurement (L1-L3 and I1-I3) and
- supporting measurement (L4 and I4).

Measured voltage and measured current for measurement inputs 1-4 must derive from the same network.

Use measurement inputs L1-L3 and I1-I3 (baseline measurement) for three-phase network systems.

In **device address 110**, you can choose between 14 different measurements for the baseline measurement (see the adjacent table and the diagrams in **step 8**).

In **device address 111**, you can choose between the measurements for the supporting measurement.

NOTE!
For more settings, information and diagrams on **supporting measurement**, see the device's user manual.

Device settings for "baseline measurement"

Addr.	Content	Measurement (see step 8)
110	0000	4w3m (standard setting)
	0001	4w2m
	0002	4w2u
	0003	4w2i
	0004	3w3m
	0005	3w2m
	0006	3w2u
	0007	3w2i
	0008	2w2m
	0009	2w1m
	0010	4w3m_hv
	0011	4w2u_hv
	0012	3w2u_hv
	0013	3w2m_hv

Device settings for "supporting measurement"

Addr.	Content	Measurement
111	0000	2w1n (standard setting)
	0001	3w1m
	0002	4w1m

14 Configure the Ethernet connection

Static IP address (Addr. 205, content = 0)
In networks without a DHCP server, select the network address (see table) on the device.

BootP (Addr. 205, content = 1)
BootP enables a UMG 605-PRO to be integrated into an existing network fully automatically. However, BootP is an older protocol and does not provide the scope of functions provided by DHCP.

DHCP client (Addr. 205, content = 2)
DHCP makes it possible integrate a UMG 605-PRO into an existing network automatically without the need for any additional configuration.
When started, the UMG automatically obtains the IP address, the subnet mask and the gateway from the DHCP server. The default setting for the UMG 605-PRO is "DHCP client".

Zeroconf (Addr. 205, content = 3)
Setting to configure the UMG 605-PRO using the GridVis® software.

Addr.	Designation
203	RS485, Modus 0 = Modbus RTU/Slave 1 = Modbus RTU/Master 2 = Gateway-Transparent
204	RS232, mode 0 = Modbus RTU/slave (default setting) 3 = Debug 6 = SLIP
205	DHCP mode 0 = static IP address 1 = BootP 2 = DHCP client 3 = Zeroconf
300	IP address, xxx --- --- ---
301	IP address, --- xxx --- ---
302	IP address, --- --- xxx ---
303	IP address, --- --- --- xxx
304	IP mask, xxx --- --- ---
305	IP mask, --- xxx --- ---
306	IP mask, --- --- xxx ---
307	IP mask, --- --- --- xxx
310	IP gateway, xxx --- --- ---
311	IP gateway, --- xxx --- ---
312	IP gateway, --- --- xxx ---
313	IP gateway, --- --- --- xxx

15 Configuring the device as a "DHCP client" or with a "Static IP address"

To configure the device as a "DHCP client" or with a "Static IP address", first set **address 205 (DHCP mode)**:

1. Switch to programming mode as described (the first digit flashes).
2. Use button 2 to select the value **2**.
3. Use button 1 to move to the second digit.
4. Use button 2 to select the value **0**.
5. Use button 1 to move to the third digit.
6. Use button 2 to select the value **5**.
7. Address 205 is shown on the display.
8. Use button 1 to move to the settings for the DHCP mode content.

Then select the "DHCP client" or the "Static IP address" in DHCP mode as follows:

- **Set "DHCP client" (default setting)**
  1. Use button 2 to select value **2**, **"DHCP client"** (see table in step 15).
  2. Press button 1 to confirm your entry.
  3. The address display flashes.

You can continue to configure the addresses.

Setting the "Static IP address"
1. Use button 2 to select value 0, "Static IP" (see table in step 15).
2. Press button 1 to confirm your entry.
3. The address display flashes.

You can continue to configure the addresses.

NOTE!
Ensure that address 204 (RS232 mode) has the value 0 (default setting) to operate the device in DHCP client mode!

16 Configuring the "Static IP address"

If the device is accessed via a "Static IP address", the device requires settings for the:
1. **Device IP address.**
2. **Subnet mask.**
3. **Gateway address** (not required for configuration).

(see the table in step 14)

1. **Setting the device IP address**
   - Switch to programming mode (see step 11).
   - Select address 300 and enter the first 3 characters of the device IP address (see the table in step 14).
   - Select address 301 and enter the second 3 characters of the device IP address.
   - Complete the entries for addresses 302 and 303.
2. **Set the subnet mask**
   - Select the subnet mask via addresses 304 - 307 in the same way as the settings for the device IP address (see the table in step 14).
3. **Set the standard gateway**
   - Select the standard gateway (if present) via addresses 310 - 313 in the same way as the IP address (see the table in step 14).

Example:
Device IP address: 192.168.1.116
Subnet mask: 255.255.255.0

In this case, set the computer as follows:
IP address: 192.168.1.117
Subnet mask: 255.255.255.0

NOTE!
For more information about connection and communication of your device with the software, see the quick guide of software GridVis®.

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The most important technical data

General	
Net weight	350 g
Device dimensions	Approx. l = 107.5 mm, b = 90 mm, h = 82 mm (nach DIN 43871:1992)
Housing flammability class	UL 94V-0
Battery	Type Lithium CR2032, 3V (according to UL 1642)
Installed position	any
Fixing/mounting	35 mm top hat rail (according to IEC/EN 60999-1, DIN EN 50022)
Backlight lifetime	40000h (50% of initial brightness)

Ambient conditions during operation	
The device • weather-protected and used stationary. • fulfills conditions of use to DIN IEC 60721-3-3. • has protection class II according to IEC 60536 (VDE 0106, part 1). A PE terminal is not required!	
Operating temperature range	-10° C .. +55° C
Relative humidity	5 to 95% at 25°C without condensation
Operating altitude	0 .. 2000 m above sea level
Degree of pollution	2
Ventilation	No forced ventilation required.
Protection against ingress of solid foreign bodies and water	IP20 according to EN 60529 Sept. 2014, IEC 60529:2013

Transport and storage The following information applies to devices which are transported or stored in the original packaging:	
Free fall	1 m
Temperature	-20° C to +70° C

Supply voltage		230 V	90 V	24 V
Protection of the supply voltage		6 A, circuit breaker with tripping characteristic B (IEC-/UL approval)		
Installation overvoltage category	IEC	-	300 V CAT II	-
	IEC UL	300 V CAT II	-	150 V CAT II
Nominal range		95 V - 240 V (50/60 Hz) or DC 135 V - 340 V	50 V - 110 V (50/60 Hz) or DC 50 V - 155 V	20 V - 50 V (50/60 Hz) or DC 20 V - 70 V
Operating range		+-10% of the nominal range		
Power consumption		max. 3.2 W, max. 9 VA		max. 5 W, max. 8 VA

Voltage measurement	
3-phase 4-conductor systems with rated voltages (L-N/L-L)	max. 277 V/480 V
3-phase 3-conductor systems, not earthed (L-L) with rated voltages	max. 480 V
Overvoltage category	300 V CAT III
Measurement voltage surge	4 kV
Protection of voltage measurement	1 - 10 A (with IEC-/UL approval)
Resolution	0.01 V
Crest factor	2 (based on 480 Vrms)
Impedance	4 MOhm / phase
Power consumption	approx. 0.1 VA
Sampling rate	20 kHz / phase
Transients	>50 µs
Frequency of the mains frequency - Resolution	15 Hz to 440 Hz 0.001 Hz

Current measurement	
Nominal current	5 A
Rated current	6 A
Protection of current measurement when measuring directly (without a current transformer)	6 A, char. B (approved i.a.w. UL/IEC)
Crest factor	2 (based on 6 Amps)
Resolution on the display	10 mA
Overvoltage category	300 V CAT III
Measurement voltage surge	4 kV
Power consumption	approx. 0.2 VA (Ri = 5 mOhm)
Overload for 1 sec.	100 A (sinusoidal)
Sampling rate	20 kHz

Digital inputs 2 digital inputs.	
Pulse input (S0):	
Maximum counter frequency	20 Hz
Switching input:	
Response time (Jasic program)	200 ms
Input signal present	18 V to 28 V DC (typical 4 mA)
Input signal not present	0 to 5 V DC, current less than 0.5 mA

Digital outputs 2 digital outputs, semiconductor relay, not short-circuit proof.	
Switching voltage	max. 30 V AC, 60 V DC
Switching current	max. 50 mAeff AC/DC
Response time (Jasic program)	200 ms
Output of voltage dips	20 ms
Output of voltage exceedance events	20 ms
Pulse output (energy pulse)	max. 20 Hz

Temperature measurement input 3-wire measurement.	
Update time	approx 200 ms
Connectable sensors	PT100, PT1000, KTY83, KTY84
Total burden (sensor + cable)	max. 4 kOhm

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

RS232 interface 5 pin screw-type terminals.	
Protocol	Modbus RTU/slave
Transmission rate	9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps.

RS485 interface 2 pin screw-type terminals.	
Protocol	Modbus RTU/slave, Modbus RTU/master,
Transmission rate	9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps, 921.6 kbps

RS485 interface (optional) Connector, SUB D 9 pin	
Protocol, profibus (optional)	Profibus DP/V0 according to EN 50170
Transmission rate	9.6 kbaud up to 12 Mbaud

Ethernet interface 10/100Base-TX (optional)	
Connection	RJ45
Function	Modbus gateway, embedded Webserver (HTTP)
Protocols	TCP/IP, EMAIL (SMTP), DHCP-Client (BootP), Modbus/TCP (Port 502), Modbus RTU over Ethernet (Port 8000), FTP, ICMP (Ping), FTP, SNMP, NTP, TFTP.

Terminal connection capacity (supply voltage) Connectable conductors. Connect one conductor per terminal!	
Single core, multi-core, fine-stranded	0.08 - 2.5 mm², AWG 28-12
Terminal pins, core end sheath	1.5 mm² AWG 16

Terminal connection capacity (voltage and current measurement) Connectable conductors. Connect one conductor per terminal!	
Single core, multi-core, fine-stranded	0.08 - 4 mm², AWG 28-12
Terminal pins, core end sheath	0,25 - 2.5 mm²

Terminal connection capacity (digital inputs and outputs (I/Os)) Connectable conductors. Connect one conductor per terminal!	
Single core, multi-core, fine-stranded	0.08 - 1.5 mm², AWG 24-16
Terminal pins, core end sheath	0,2 - 1,5 mm²

Terminal connection capacity (temperature measurement input) Connectable conductors. Connect one conductor per terminal!	
Single core, multi-core, fine-stranded	0.08 - 1.5 mm², AWG 24-16
Terminal pins, core end sheath	0,2 - 1,5 mm²

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

18 Procedure in the event of faults

Possible fault	Cause	Remedy
No display	External fuse for the power supply voltage has tripped.	Replace fuse.
No current display	Measured voltage is not connected.	Connect the measured voltage.
	Measurement current is not connected.	Connect measurement 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 CT ratio at the current transformer.
"EEEE" and **"A"** in the display.	Current measurement range exceeded	Check the measuring-circuit current and if necessary install a suitable current transformer.
Voltage displayed is too large or too small.	Measurement in the wrong phase.	Check connection and correct if necessary.
	Voltage transformer incorrectly programmed.	Read out and program the voltage transformer ratio at the voltage transformer.
Voltage displayed is too small.	Measurement range exceeded.	Use voltage transformers.
	The peak voltage value at the measurement input has been exceeded by the harmonics.	**Please note!** Ensure the measurement inputs are not overloaded.
"EEEE" and **"V"** in the display.	Voltage measuring range exceeded	Check the measuring-circuit voltage and if necessary install a suitable voltage transformer.
„Error CF" in the display	The calibration data could not be read out.	Send device and error description for verification to the manufacturer.
Effective power, consumption/supply reversed.	At least one current transformer connection is mixed up/reversed.	Check connection and correct if necessary.
	A current path is assigned to the wrong voltage circuit.	Check connection and correct if necessary.

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