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## Power Analyser UMG 103-CBM Installation manual (firmware 2.0 and higher)

- Installation
- Device settings



User manual:  


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# Janitza®

Deutsche Version: siehe Vorwortseite

## 1 General

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

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

**Copyright notice**  
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**Subject to technical amendments**

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

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

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

- Electrical scrap
- Plastics
- Metals




Or, task a certified disposal business with the scrapping.

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




## 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 used as an addition to the safety instructions and warns of an electrical hazard.
-  This symbol is used as an addition to the safety instructions and warns of a potential hazard.
-  This symbol with the word **NOTE!** describes:
  - Procedures that do not entail any danger of injury.
  - Important information, procedures or handling steps.

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

-  Indicates an immediately threatening hazard that leads to serious or even fatal injuries.
-  Indicates a potentially hazardous situation that could lead to serious or even fatal injuries.
-  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).

**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 the device are proper transport and proper storage, set-up, installation, operation and maintenance.

**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.

## 3 Brief description of device

The device is a universal measurement device for low voltage distribution systems, which:

- 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.
- transmits measurement results via interface.

**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.

- The device fulfills the application conditions of DIN IEC 60721-3-3 and is intended for permanent installation in locations that are protected from the weather.
- It can be installed in any mounting position.
- Forced ventilation is not required.

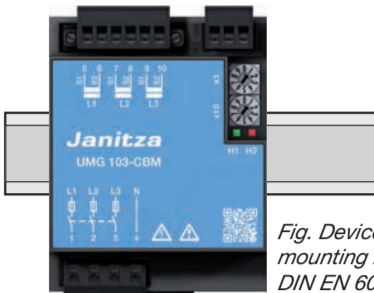


Fig. Device on mounting rail per DIN EN 60715.

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

## 4 Connecting the supply voltage

The device derives its supply voltage from the measurement voltage L1-N, L2-N and L3-N. In doing so, at least one phase lies within the nominal voltage range. The device requires a voltage of at least 100 V<sub>eff</sub> in at least one phase (L-N) for operation.

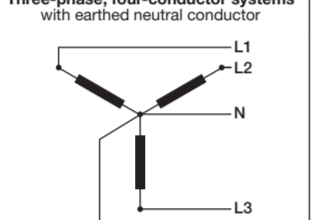
**WARNING!**  
Danger of injury due to electrical voltage!  
Serious bodily injury or death can result from:  
• Contact with bare or stripped live wires.  
• Device inputs that are dangerous to touch.  
**Render the system free of voltage before starting work! Check the system is free of electrical energy!**

**CAUTION!**  
Damage to property due to disregard of the connection conditions or impermissible overvoltage!  
Your device can be damaged or destroyed by a failure to comply with the connection conditions or by exceeding the permissible voltage range.  
**Before connecting the device to the supply voltage, please check:**

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

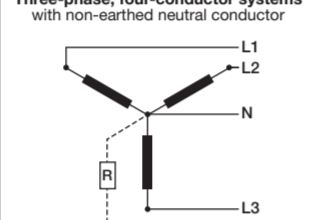
## 5 Mains systems

Suitable mains systems and max. rated voltages (DIN EN 61010-1/A1):



Three-phase, four-conductor systems with earthed neutral conductor

$U_{L-N} / U_{L-L}$   
277 VLN / 480 VLL



Three-phase, four-conductor systems with non-earthed neutral conductor

Connect in this grid system, the device only using a voltage transformer!

The device can be used in:

- TN and TT networks
- in residential and industrial applications.

## 6 Voltage measurement

The device derives its supply voltage from the measured voltage.

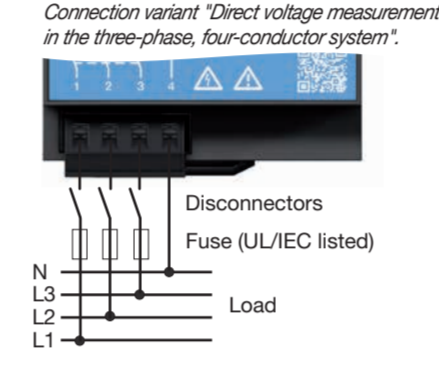
**CAUTION!**  
Danger of injury or damage to the device  
Disregard of the connection conditions for the voltage measurement inputs can result in injuries or to the device being damaged. For this reason, note that:

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

**NOTE!**  
Voltage transformer ratios can be configured via the software.

**NOTE!**  
Because the device derives the supply voltage from the measured voltage and burdens the voltage transformer with a non-linear current, the device is only partially suitable for use in medium and high voltage networks.

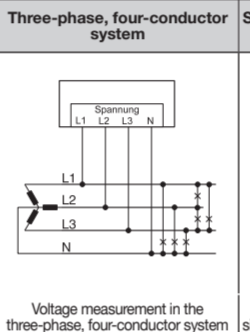
**Connection variant "Direct voltage measurement in the three-phase, four-conductor system".**



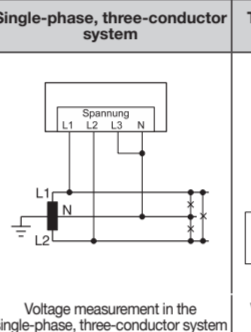
Disconnectors  
Fuse (UL/IEC listed)  
Load

- The device measures voltages L-N up to 277 V and L-L up to 480 V.
- The measurement and surge voltages meet overvoltage category 300 V CATIII.

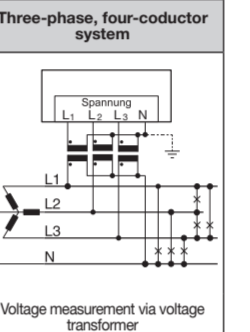
## 7 Connection variants for voltage measurement



Voltage measurement in the three-phase, four-conductor system



Voltage measurement in the single-phase, three-conductor system



Voltage measurement via voltage transformer

**NOTE!**  
Voltage transformer ratios can be configured via the software.

**NOTE!**  
Because the device derives the supply voltage from the measured voltage and burdens the voltage transformer with a non-linear current, the device is only partially suitable for use in medium and high voltage networks.

## 8 Current measurement

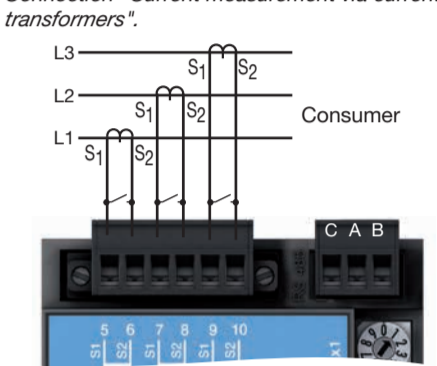
The device is:

- only approved for measuring current with a current transformer.
- intended for the connection of current transformers with secondary currents of ...1 A and ...5 A.
- has the current transformer ratio set to 5/5 A as standard.
- The current transformers must have a base insulation according to IEC 61010-1: 2010 for the nominal voltage of the circuit.

**WARNING!**  
Danger of injury due to electrical voltage!  
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 the 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!**  
Further information on current transformers can be found in the user manual.  
Current transformer ratios can be configured via the software.

**Connection "Current measurement via current transformers".**



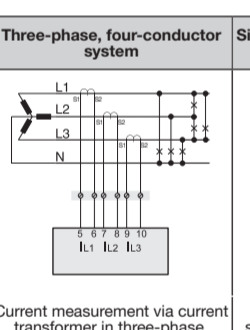
Consumer

**WARNING!**  
Danger of injury due to high currents and high electrical voltages!  
Current transformers operating with an open secondary circuit (high voltage peaks) can result in serious or even fatal injuries.  
**Avoid operation of the current transformers - short-circuit unloaded transformers!**

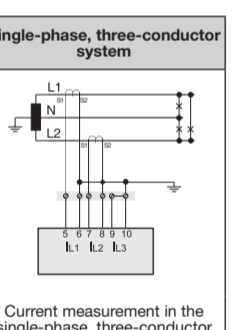
**NOTE!**  
Further information on current transformers can be found in the user manual.  
Current transformer ratios can be configured via the software.

## 9 Connection variants for current measurement

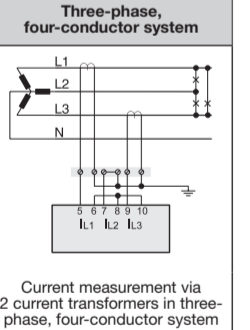
**NOTE!**  
If the range is exceeded, the red LED flashes. (see Step „connections and control elements“)



Current measurement via current transformer in three-phase, four-conductor system



Current measurement in the single-phase, three-conductor system



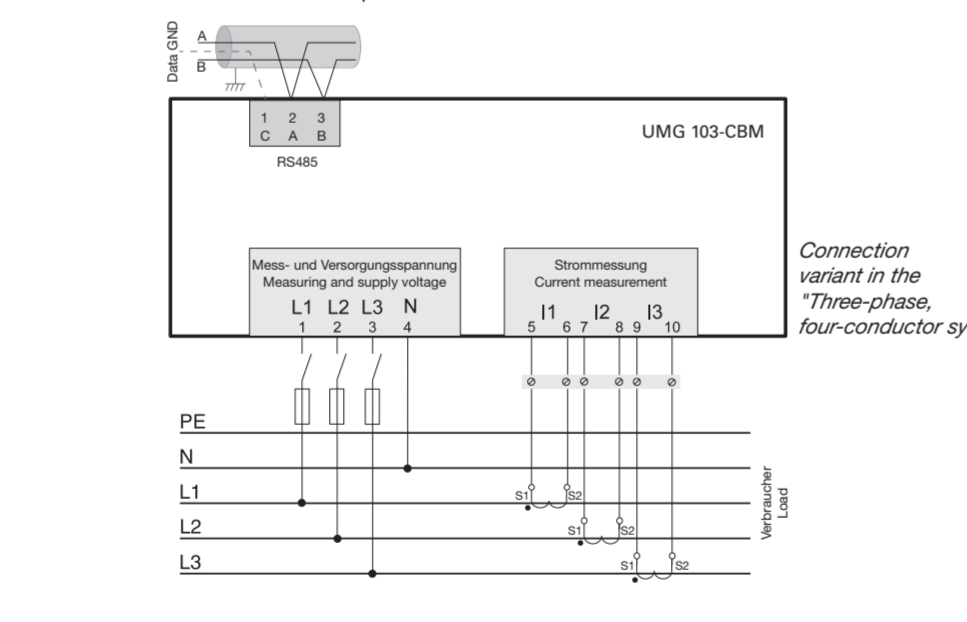
Current measurement via 2 current transformers in three-phase, four-conductor system

## 10 Typical connection variants

The following schematic shows a typical connection variant for the device with:

- Supply voltage and voltage measurement.
- Current measurement.
- RS485 interface with Modbus RTU protocol.

**Connection variant in the "Three-phase, four-conductor system".**



UMG 103-CBM

Meß- und Versorgungsanpannung  
Measuring and supply voltage

Strommessung  
Current measurement

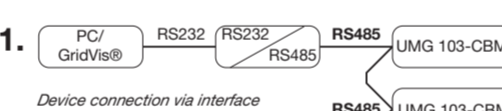
RS485

PE  
N  
L1  
L2  
L3

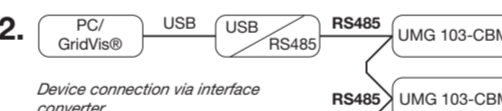
I1 I2 I3  
10 9 8 7 6 5 4 3 2 1

## 11 Establish connection to PC

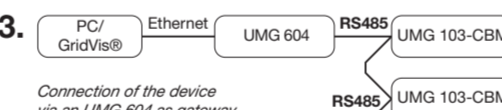
The 3 most common connections for communication between PC and device are described in the following:

- 

Device connection via interface converter

RS485 UMG 103-CBM
- 

Device connection via interface converter

RS485 UMG 103-CBM
- 

Connection of the device via an UMG 604 as gateway

RS485 UMG 103-CBM

**NOTE!**  
Install the "GridVis®" software on the PC to be used!




Fig. UMG 103-CBM

## 12 Example: PC connection via RS485 interface and UMG 604 as gateway

The PC connection of the device via the RS485 serial interface with, for example, an UMG 604 as gateway (see step "Established connection to PC") is a method

- for configuring the device(s)
- and reading out data.

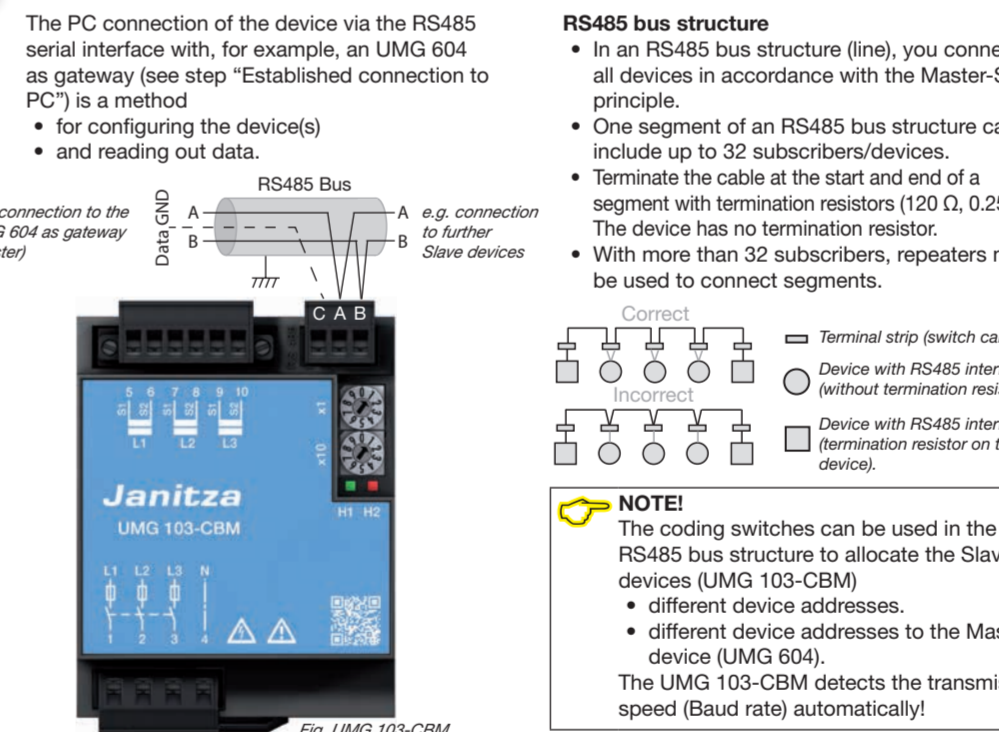
**RS485 bus structure**

- In an RS485 bus structure (line), you connect all devices in accordance with the Master-Slave principle.
- One segment of an RS485 bus structure can include up to 32 subscribers/devices.
- Terminate the cable at the start and end of a segment with termination resistors (120 Ω, 0.25 W).
- The device has no termination resistor.
- With more than 32 subscribers, repeaters must be used to connect segments.

**NOTE!**  
The coding switches can be used in the RS485 bus structure to allocate the Slave devices (UMG 103-CBM)

- different device addresses.
- different device addresses to the Master device (UMG 604).

The UMG 103-CBM detects the transmission speed (Baud rate) automatically!



e.g. connection to the UMG 604 as gateway (Master)

RS485 Bus

Connect

- Terminal strip (switch cabinet).
- Device with RS485 interface (without termination resistor).

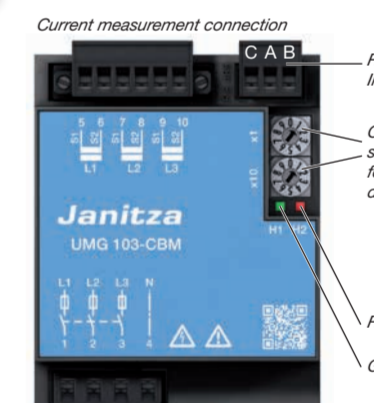
Incorrect

- Device with RS485 interface (termination resistor on the device).

Fig. UMG 103-CBM

## 13 Connections and control elements

**Current measurement connection**



RS485 interface  
Coding switches for setting the device address  
Red LED  
Green LED

**LEDs**

- The green LED illuminates. Measurement and supply voltages lie within the operating voltage range. The device is operational. The LED flashes for 0.5 sec. every 5 sec.
- The green LED flashes. Data transfer (RS485) is active.
- The LEDs flash at the same time. The data transfer (RS485) is faulty.
- The red LED illuminates. Fault in the device! Have the device checked by the manufacturer!
- The red LED flashes. At least one current measurement input or voltage measurement input exceeds the measurement range.
- The LEDs flash alternately. Firmware checksum fault! Operation is interrupted! Carry out a firmware update!

**Coding switches**  
You can configure the device address with the coding switches as follows:

- Configure the device addresses in the range of 01 to 99 with the coding switches.
- The device address 00 is reserved for service purposes (further information in the user manual).

x1 (1-9)  
x10 (10-90)

## 14 Technical data

**General information**

Net weight	200 g (0.44 lb)
Memory (Flash)	4 MB
Device dimensions	h = 98 mm (3.86 in.), w = 71.3 mm (2.81 in.), d = 46 mm (1.81 in.)
Horizontal pitch	4 HP

**Measurement data recording**

Battery (soldered)	BR 1632, 3V
Typical life expectancy	8 - 10 years

**Transport and storage**  
The following information applies to devices which are transported or stored in the original packaging.

Free fall	1 m (39.37 in.)
Temperature	-20 °C to +70 °C (-4 °F to 158 °F)

**Ambient conditions during operation**

- The device
  - is weatherproof and use stationary.
  - fulfills the conditions in accordance with DIN IEC 60721-3-3
  - has protection class II according to IEC 0538 (VDE 0106, part 1) and does not require a protective earth connection.
- Operating temperature range: -25 °C - +50 °C (-13 °F to 140 °F)
- Relative humidity: 5 to 95 % (at +25 °C / 77 °F) without condensation
- Operating altitude: 0 - 2000 m (1,24 mi) above sea level
- Degree of pollution: 2
- Housing flammability class: UL94V-0
- Installed position: any
- Fixing/mounting: 35 mm top hat rail (according to IEC/EN 60959-1, DIN EN 50022)
- Stress by impact: 2 pulses, IK07 according to IEC / EN 61010-1: 2010
- Ventilation: no external ventilation required.
- Protection against ingress of solid foreign bodies and water: IP20 according to EN 60529 September 2000, IEC 60529:1989

**Supply voltage**  
The device gets the supply voltage from the measuring voltage!

Supply from single phase	115 - 277 V (-10 %), 50/60 Hz
Supply from three phases	60 - 277 V (-10 %), 50/60 Hz
Power consumption	max. 1.5 VA

**Voltage measurement**  
3-phase, 4-conductor systems with rated voltages (L-N/L-L)

max. 277 V/480 V
------------------

Measurement in TT and TN networks

Rated surge voltage	4 kV
Protection of voltage measurement (with IEC / UL approval)	1 - 10 A Trip characteristic B, (with IEC / UL approval)
Overvoltage category	300 V CAT III
Resolution	0.01 V
Crest factor	2 (related to 240 Vrms)
Sampling rate	5.4 kHz
Frequency range of the fundamental oscillation	45 Hz - 65 Hz
Fourier analysis	1-40. Harmonic

**Current measurement**

Nominal current	5 A
Rated current	6 A
Crest factor	2 (related to 6 Arms)
Resolution	0.1 mA
Measuring range	0.005 - 6 Arms
Overvoltage category	300 V CAT II
Rated surge voltage	2 kV
Power consumption	approx. 0.2 VA (Ri=5 mΩ)
Overload for 1 sec.	60 A (sinusoidal)
Sampling rate	5.4 kHz

**Terminal connection capacity**  
Conductors to be connected. Only one conductor can be connected per terminal!

Single core, multi-con., fine-stranded	0.08 - 2.5 mm <sup>2</sup> , AWG 28 - 12
Tightening torque	max. 0.5 Nm (0.74 ft lb)
Stripping length	min. 8 mm (0.32 in.)

**RS485 interface**

Protocol, modbus RTU	Modbus RTU/Slave
Transfer rate	9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps, automatic detection

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

## 15 Procedure in the event of faults

Possible fault	Cause	Remedy
No LED lights	External fusing for the power supply voltage has tripped. Device is defective.	Replace fuse. Send device to the manufacturer for repair.
Measured current is too large or too small.*	Current measurement in the wrong phase. Current transformer factor programmed incorrectly. The peak current value at the measurement input has been exceeded by harmonic components.	Check connection and correct if necessary. Read out current transformer ratio and program. Install current transformers with a larger current transformer ratio.
Measured voltage is too large or too small.*	Underrange. Voltage measurement in the wrong phase. Voltage transformer incorrectly programmed.	Check connection and correct if necessary. Read out voltage transformer ratio and program.
Measured voltage is too small.*	Underrange. The peak current value at the measurement input has been exceeded by harmonic components.	Install voltage transformers. Attention: It must be ensured that the measuring inputs are not overloaded.
Active power is too large or too small.*	The programmed current transformer transformation ratio is incorrect.	Read out current transformer ratio and program with the software GridVis.
Active power imported supply / supply is reversed.	The current path is assigned to the wrong voltage path. The programmed voltage transformer transformation ratio is incorrect.	Check connection and correct if necessary. Read out voltage transformer ratio and program.
No connection with the device. Despite the measures above the device does not work.	At least one current transformer connection is mixed up/reversed. A current path is assigned to the wrong voltage path. RS485: Device address is incorrect or wrong protocol. Device is defective.	Check connection and correct, if necessary. Adjust the device address / select protocol. Send device and error description to verify the manufacturer.
* <b>CAUTION!</b>	<b>Material damage from overloaded measurement inputs!</b> Too high current and voltage values overload the measurement inputs. Observe the limits stated on the nameplate and in the user manual!	