Art. Nr. 33.03.345
Dok Nr. 2.057.002.1.i 05/2023

www.janitza.com

Power Analyser

UMG 103-CBM

Installation manual

(firmware 2.0 and higher)

- Installation
- Device settings

Deutsche Version: siehe Vorderseite



User manual:

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

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
© 2016 - Janitza electronics GmbH - Lahnau. All rights reserved. Duplication, editing, distribution and any form of exploitation, also as excerpts, is prohibited.

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 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:

⚠ **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 inevitable 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).
- 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!

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 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 fulfils 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.

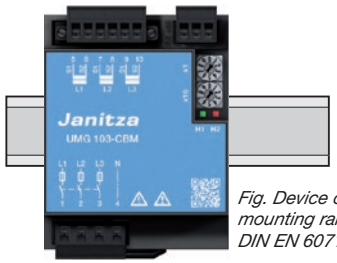


Fig. Device on mounting rail per DIN EN 60715.

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_{eff} 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!

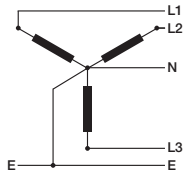
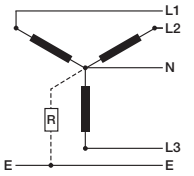
CAUTION! **Damage to property due to disregard of the connection conditions or impermissible overvoltage!**

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	**Three-phase, four-conductor systems** with non-earthed neutral conductor
	
U_{L-N} / U_{L-L} 277 VLN / 480 VLL	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

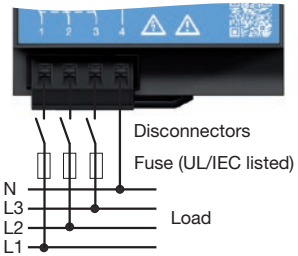
The device derives its supply voltage from the measured voltage.

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.**

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

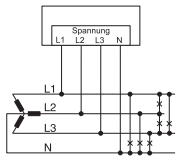
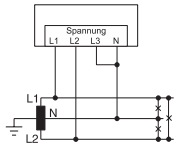
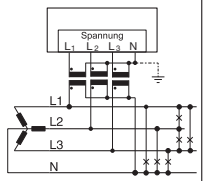


- The device measures voltages L-N up to 277 V and L-L up to 480 V.
- The measurement and surge voltages meet overvoltage category 300 V CATIII.

NOTE!

- A circuit breaker can be used as an alternative to a fuse and isolating device.
- If the range is exceeded, the red LED flashes (see step „connections and controls“).

7 Connection variants for voltage measurement

Three-phase, four-conductor system	Single-phase, three-conductor system	Three-phase, four-coductor system
		
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.

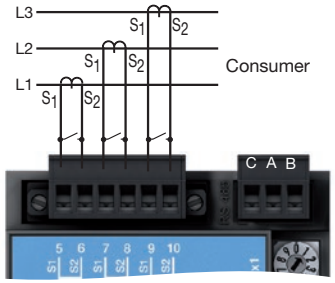
8 Current measurement

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

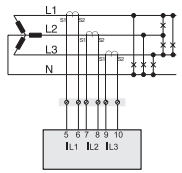
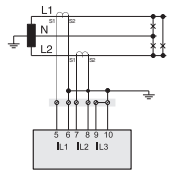
Connection "Current measurement via current transformers".

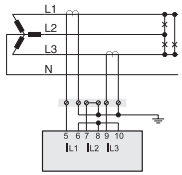


WARNING! **Danger of injury due to high currents and high electrical voltages!**
Current transformers operating with an open secondary circuit (high voltage peaks) can result in serious or even fatal injuries.
Avoid open operation of the current transformers - short-circuit unloaded transformers!

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

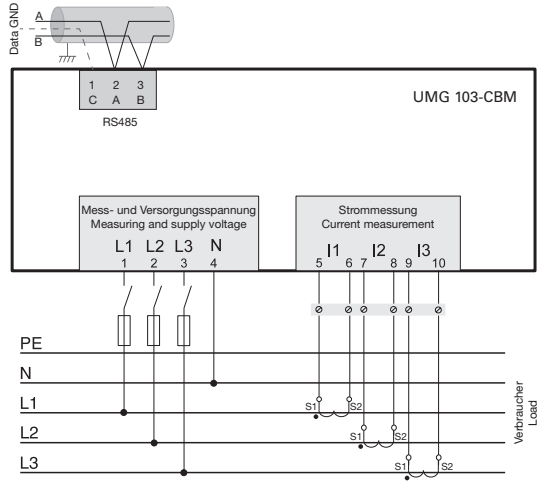
Three-phase, four-conductor system	Single-phase, three-conductor system
	
Current measurement via current transformer in three-phase, four-conductor system	Current measurement in the single-phase, three-conductor system

Three-phase, four-conductor system

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

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

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.

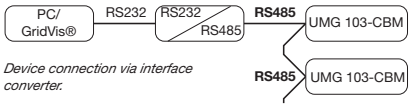


Connection variant in the "Three-phase, four-conductor system".

11 Establish connection to PC

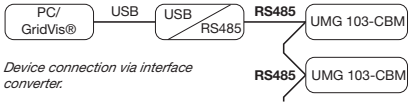
The 3 most common connections for communication between PC and device are described in the following:

1.



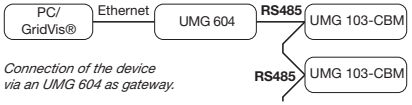
Device connection via interface converter.

2.



Device connection via interface converter.

3.



Connection of the device via an UMG 604 as gateway.

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.

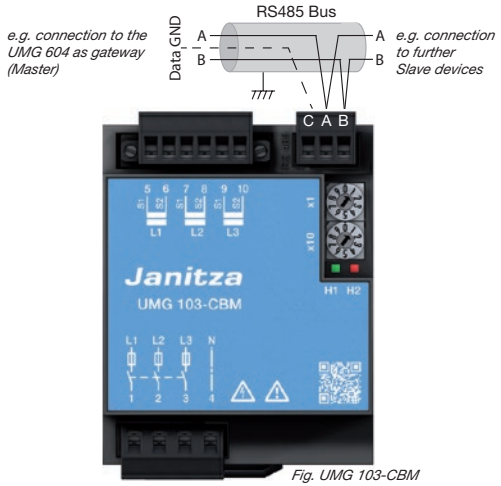
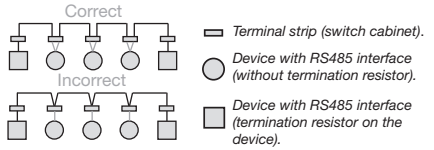


Fig. UMG 103-CBM

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.



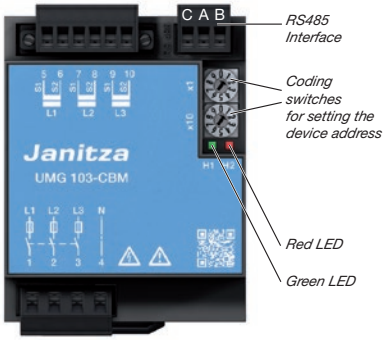
NOTE!
The coding switches can be used in the RS485 bus structure to allocate the Slave devices (UMG 103-CBM)

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

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

13 Connections and control elements

Current measurement connection



Connection of measurement voltage and supply voltage

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

x1 (1-9)  Configure the device addresses in the range of 01 to 99 with the coding switches.

x10 (10-90)  The device address 00 is reserved for service purposes (further information in the user manual).

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 secs.
- 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!

14 Technical data

General information	
Net weight	200 g (0.44 lb)
Device dimensions	h = 98 mm (3.86 in), w = 71.5 mm (2.82 in), d = 46 mm (1.18 in)
Horizontal pitch	4 HP

Ambient coditions during operation	
The device • weatherproof and use stationary! • fulfills the conditions in accordance with DIN IEC 60721-3-3 • has protection class II according to IEC 60536 (VDE 0106, part 1) and does not require a protective earth connection.	
Operating temperature range	-25 °C .. +60 °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 60999-1, DIN EN 50022)
Stress by impact	2 joules, IK07 according to IEC / EN61010-1: 2010
Ventilation	no external ventilation required.
Protection against ingress of solid foreign bodies and water	IP20 according to EN60529 September 2000, IEC60529:1989

Measurement data recording	
Memory (Flash)	4 MB
Battery (soldered) Typical life expectancy	BR 1632, 3V 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)

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	80 - 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
Networks	Measurement in TT and TN networks
Rated surge voltage	4 kV
Protection of voltage measurement	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 - resolution	45 Hz .. 65 Hz 0.01 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-core, fine-stranded	0.08 - 2.5 mm², 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.	Replace fuse.
	Device is defective.	Send device to the manufacturer for repair.
Measured current is too large or too small. *	Current measurement in the wrong phase.	Check connection and correct if necessary.
	Current transformer factor programmed incorrectly.	Read out current transformer ratio and program.
	The peak current value at the measurement input has been exceeded by harmonic components.	Install current transformers with a larger current transformer ratio.
	Underrange.	Install current transformers with a smaller current transformer ratio.
Measured voltage is too large or too small. *	Voltage measurement in the wrong phase.	Check connection and correct if necessary.
	Voltage transformer incorrectly programmed.	Read out voltage transformer ratio and program.
Measured voltage is too small. *	Underrange.	Install voltage transformers.
	The peak voltage value at the measurement input has been exceeded by harmonic components.	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.
	The current path is assigned to the wrong voltage path.	Check connection and correct if necessary.
	The programmed voltage transformer transformation ratio is incorrect.	Read out voltage transformer ratio and program.
Active power imported supply / supply is 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 path.	
No connection with the device.	RS485: Device address is incorrect or wrong protocol.	Adjust the device address / select protocol.
Despite the measures above the device does not work.	Device is defective.	Send device and error description to verify the manufacturer.
*... ⚠ CAUTION!	**Material damage from overloaded measurement inputs!** Too high current and voltage values overload the measurement inputs. Observe the limits stated on the nameplate and in the user manual!	

Janitza®