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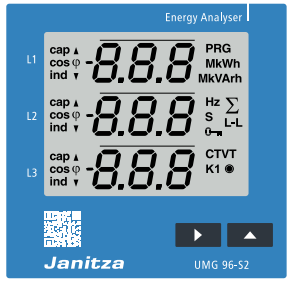
Deutsche Version: siehe Vorderseite

Energy Analyser

UMG 96-S2

Installation instructions

- Installation
- Device settings



User manual:

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Janitza®

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General information

Disclaimer
It is essential that the information products for the devices are observed to ensure safe operation and achieve the specified performance characteristics and product features. Janitza electronics GmbH assumes no liability for personal injuries, property damage and financial losses resulting from the failure to observe the information products.
Make sure that your information products are legible and accessible.

Further documentation can be found on our web site www.janitza.com under Support > Downloads.

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Subject to technical changes.
- Make sure that the installation instructions match your device.
- First, make sure you have read and understood the document accompanying the product.
- Keep the documents accompanying the product accessible through its service life and hand them over to the subsequent owner where applicable.
- Please refer to www.janitza.com for information concerning device revisions and the associated adjustments to the documentation accompanying the product.

Disposal
Please observe the national regulations.
Dispose of individual parts, where necessary, depending on the properties and existing country-specific regulations, e.g. as:
- Electronic waste
- Plastic
- Metal

or commission a certified disposal company with the scrapping.

Relevant laws, applied standards and directives
Please refer to the Declaration of Conformity on our web site (www.janitza.com) for the laws, standards and directives applied by Janitza electronics GmbH.

2

Safety

Safety instructions
The installation instructions do not include a complete list of all safety measures necessary for operating the device.
Special operating conditions may require additional measures. The installation instructions contain notes that must be observed for your personal safety and to prevent property damage.

Used symbols:

⚠	The additional symbol on the device itself indicates an electrical danger that can result in serious injuries or death.
⚠	The general warning symbol calls attention to possible risks of injury. Observe all the instructions listed under this symbol in order to prevent injuries or even death.

Safety instructions are highlighted by a warning triangle and are presented as follows depending on the level of risk:

Safety measures

⚠DANGER
Indicates an imminent danger that will result in serious and/or fatal injuries.

⚠WARNING
Indicates a potentially dangerous situation that can result in serious injuries or death.

⚠CAUTION
Indicates a potentially dangerous situation that can result in minor injuries or property damage.

ATTENTION
Indicates an imminently dangerous situation that can result in property damage or environmental damage in the event of noncompliance.

NOTE
Points out procedures during which a danger of injuries or property damage does **not** exist.

When operating electrical devices, specific parts of these devices inevitably carry dangerous voltage. As a result, serious bodily harm or property damage can occur if they are not handled correctly:
- Before connecting the device, ground it at the protective conductor terminal if available.
- Dangerous voltages may be present in all circuit parts connected to the voltage supply.
- There may still be dangerous voltages present in the device even after it is disconnected from the supply voltage (capacitor storage).
- Do not operate operating equipment with open current transformer circuits.
- Do not exceed the limit values specified in the user manual and on the rating plate. This must also be observed during inspections and commissioning.
- Observe the safety instructions and warning notices in the documents that accompany the devices.

Qualified personnel
To prevent personal injuries and property damage, only qualified personnel with electrical engineering training may work on the device. They must also have knowledge
- Of the national accident prevention regulations
- In safety technology standards
- In the installation, commissioning and operation of the device.

Intended use
The device is
- intended for installation in switching cabinets and small installation distributors. The device can be installed in any mounting position (please observe section 3 “Assembly”).
- not intended for installation in vehicles! Using the device in mobile equipment is considered an unusual environmental condition and is only permissible by special agreement.
- not intended for installation in areas exposed to harmful oils, acids, gases, vapors, dust and radiation, etc.

The prerequisites for smooth and safe operation of the device include proper transport, storage, setup and assembly, as well as proper operation and maintenance.

3 Brief device description

The UMG 96-S2 is a power analyzer that:

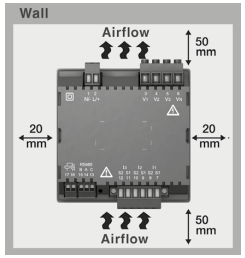
- measures and calculates electrical parameters, such as voltage, current, frequency, power, work, harmonics (up to the 15th, odd), etc. in building installations, on distribution units, circuit breakers and busbar trunking systems.
- displays measurement results and transfers them via interfaces.

⚠WARNING

Risk of injury due to defective devices.
Devices, which may have possibly been damaged due to an improper use, can no longer fulfill the safety regulations and represent a risk of injury.
Shut down the device immediately and secure it against inadvertent commissioning if the device:
• has visible damage,
• no longer functions despite an intact power supply,
• was exposed to a prolonged period of unfavorable conditions or transport stresses.

Assembly

Install the UMG 96-S2 in the weather-protected front panel of switching cabinets.



Cut-out size:
$92^{+0.8}$ x $92^{+0.8}$ mm

Please ensure the following:
Sufficient ventilation
- Observe the clearance to adjacent components.
- Can be installed in any position.

Fig. Installation position rear view of UMG 96-S2

ATTENTION

Noncompliance with the assembly instructions can damage or destroy your device.
Ensure sufficient air circulation in your installation environment and, where applicable, sufficient cooling with high ambient temperatures.

NOTE

You can find more detailed information about the device functions, data and assembly in 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, a display appears. If no display appears, check whether the supply voltage is within the rated voltage range.

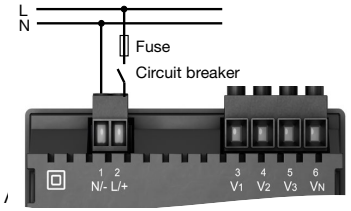


Fig. supply voltage connection.

⚠DANGER

Risk of injury due to electric voltage!
It may result in serious bodily harm or death due to:
- Touching live exposed or stripped cores.
- Device inputs that are dangerous to touch.

Before starting work, disconnect your system from the power supply. Verify that there is no current.

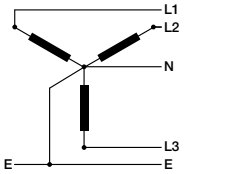
ATTENTION

Noncompliance of the connection conditions or exceeding the permissible voltage range can damage or destroy your device.
Before you connect the device to the supply voltage, please observe the following:
- **The voltage and frequency must comply with the specifications on the rating plate. Observe the limit values as described in the user manual.**
- **In building installations, secure the supply voltage with a UL/IEC-listed circuit breaker/fuse.**
- **The circuit breaker**
  - **must be easily accessible for the user and located in the vicinity of the device.**
  - **must be labeled for the respective device.**
- **Do not tap the supply voltage at the voltage transformers.**
- **Provide a fuse for the neutral conductor if the neutral conductor connection is not grounded to the source.**

5 Network systems

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

Three-phase 4-conductor systems
with grounded neutral conductor



IEC	U_{L-N} / U_{L-L}: 230 V_{LN} / 400 V_{LL}

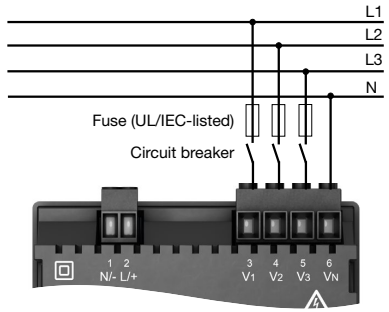
The device can be used
- in TN and TT networks
- residential and industrial sectors.

6 Voltage measurement

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

⚠CAUTION

Risk of injury or damage to device.
Noncompliance with the connection conditions for the voltage measurement inputs can injure you or damage the device.
Therefore, please note the following:
- **The voltage measurement inputs**
  - **must not be connected to DC current.**
  - **must be provided with a suitable, labeled fuse and circuit breaker (alternative: miniature circuit breaker) in their immediate vicinity.**
  - **are dangerous to touch.**
- **Voltages that exceed the allowed nominal network voltages must be connected via voltage transformers.**
- **Measured voltages and measured currents must originate from the same network.**

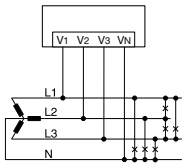
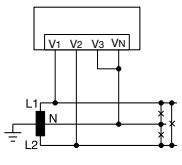


"Direct voltage measurement in a three-phase 4-conductor system" connection version

The voltage measurement inputs are designed for measurements in the low-voltage networks in which nominal voltages occur up to
- 230 V phase to ground and 400 V phase to phase in the 4-conductor system or
- 400 V phase to phase in the 3-conductor system.

The rated voltages and surge voltages correspond to overvoltage category 300 V CATIII.

7 Voltage measurement connection versions

Three-phase 4-conductor systems	Single phase 3-conductor systems
	
Voltage measurement in the three-phase 4-conductor system	Voltage measurement in the single-phase 3-conductor system

NOTE

You can easily configure the **voltage transformer ratios** via
- the device menu.
- the GridVis® software.

You can find more detailed information about the current and voltage transformer ratios and their setting in the user manual.

8 Current measurement I1, I2, I3

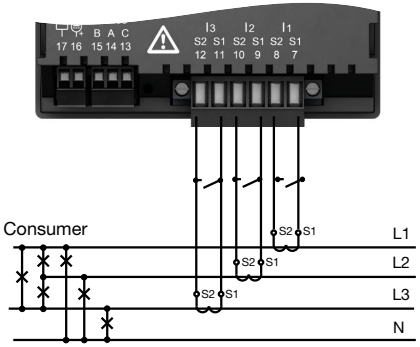
The device
- is only approved for a current measurement using the current transformer.
- is designed for the connection of current transformers with secondary currents of ../1 A and ../5 A.
- has the current transformer ratio set to 5/5 A by default.

⚠WARNING

Risk of injury due to electric voltage!
It may result in serious bodily harm or death due to:
- Touching live exposed or stripped cores.
- Device and current transformer inputs that are dangerous to touch.

Before starting work, disconnect your system from the power supply. Verify that there is no current.
Ground the system. Use the ground connection point with the ground symbol for this. Also ground the secondary windings of current transformers and all metal parts of the transformer accessible to contact!

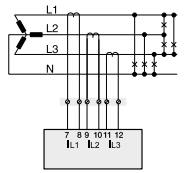
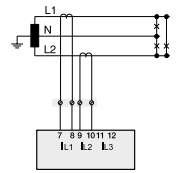
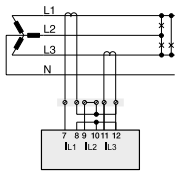
Connection
"Current measurement via current transformer"



⚠WARNING

Risk of injury due to high currents and high electrical voltages!
Open current transformers that are operated on the secondary side (high voltage spikes) can result in serious bodily harm or even death.
Avoid the open operation of the current transformers. Overloaded transformers short circuit!

9 Current measurement connection versions I1, I2, I3

Three-phase 4-conductor systems	Single phase 3-conductor systems	Three-phase 4-conductor systems
		
Current measurement via the current transformer in the three-phase 4-conductor system	Current measurement in the single-phase 3-conductor system	Current measurement via 2 current transformers in the three-phase 4-conductor system

NOTE

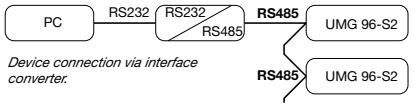
You can easily configure the **current transformer ratios** via
- the device menu.
- the GridVis® software.

You can find more detailed information about the current and voltage transformer ratios and their setting in the user manual.

10 Establishing the connection to the PC

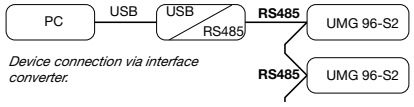
The most common connection for the communication between the PC and device:

1.



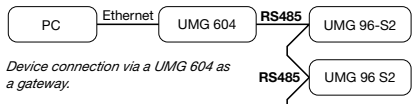
Device connection via interface converter.

2.



Device connection via interface converter.

3.



Device connection via a UMG 604 as a gateway.

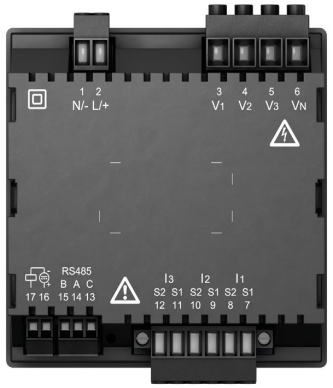


*Fig. Rear of **UMG 96-S2***

11 Operation and button functions

The operation of the device occurs via the keys 1 and 2 with following differences:

- briefly pressing (key 1 or 2): next step (+1).
- long pressing (key 1 or 2): previous step (-1).

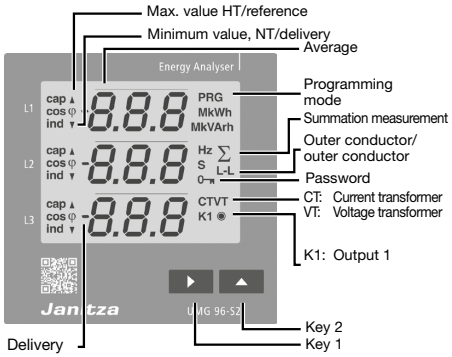
The device distinguishes between display mode and programming mode.

Display mode

- Page between the measured value displays using keys 1 and 2.
- The measured value display shows up to 3 measured values.
- A time for the automatic display change between the measured value displays can be configured in the GridVis® software.

Programming mode

- Hold down key 1 and 2 simultaneously for 1 second in order to switch between **display mode** and **programming mode**. The text **PRG** appears in the display.
- The settings necessary for the operation of the device are configured in programming mode.



- Programming mode can be protected with a user password.
- Switch between the programming menus using key 2:
  1. **Current transformer**
  2. **Voltage transformer**
  3. **Parameter list**

To switch from **programming mode** into **display mode**,

- press keys 1 and 2 simultaneously for 1 s.
- Do not press any keys for 60 s (automatic).

12 Programming the current transformer

1. Switch into programming mode.
2. The symbols **PRG** for the programming mode and **CT** for the current transformer appear.
3. Confirm with key 1 - the first number of the input area for the primary current flashes.
4. Select the value of the 1st number using key 2 .
5. Switch to the 2nd number using key 1 .
6. Select the value of the 2nd number with key 2 .
7. Switch to the 3rd number using key 1 .
8. Select the value of the 3rd number using key 2 .
9. Confirm using key 1.
10. The complete number flashes.
11. Select the decimal place and therefore the unit of the primary current using key 2.
12. Confirm using key 1.
13. The input area for the secondary current flashes.
14. Set the secondary current (value 1 A or 5 A) using key 2.
15. Confirm using key 1.
16. Exit programming mode by simultaneously pressing key 1 and 2 (1 s). Switch to the input area for the voltage transformer using key 2.

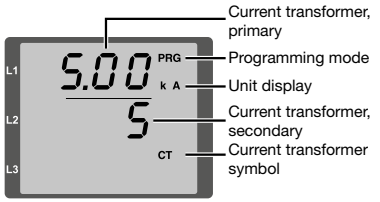


Fig. “Current transformer” input area

NOTE

Changes only become active after exiting programming mode.
Further information on the current transformers and current transformer ratios can be found in the user manual.

NOTE

Changes only become active after exiting programming mode.

NOTE

Next, the most important programming menus for a quick start, **Current transformer, Voltage transformer** and **Parameter list**, are explained.
Further information about the operation, displays and key functions of your device can be found in the user manual.

13 Programming the voltage transformer

1. Switch into programming mode.
2. The symbols **PRG** for the programming mode and **CT** for the current transformer appear.
3. Switch into programming mode for the voltage transformer using key 2.
4. The symbols **PRG** for the programming mode and **VT** for the voltage transformer appear.
5. Confirm with key 1 - the first number of the input area for the primary voltage flashes.
6. Select the value of the 1st number using key 2 .
7. Switch to the 2nd number using key 1 .
8. Select the value of the 2nd number with key 2 .
9. Switch to the 3rd number using key 1 .
10. Select the value of the 3rd number using key 2 .
11. Confirm using key 1.
12. The complete number flashes.
13. Select the decimal place and therefore the unit of the primary voltage using key 2.
14. Confirm using key 1.
15. The input area for the secondary voltage flashes.
16. Set the secondary voltage using key 2.
17. Confirm using key 1.
18. Exit programming mode by simultaneously pressing key 1 and 2 (1 s). Switch into programming mode for the parameter list using key 2.

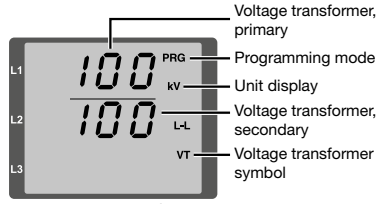


Fig. “Voltage transformer” input area

NOTE

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

14 Programming the parameters

1. Switch into programming mode.
2. The symbols **PRG** for the programming mode and **CT** for the current transformer appear.
3. Switch into programming mode for the parameter list by pressing key 2 twice.
4. The input area for the parameter list appears.
5. Confirm with key 1 - the first number of the parameter address flashes.

NOTE

- A comprehensive parameter list with setting ranges and default settings can be found in the user manual or the Modbus address list on our web site.
- The parameter addresses for the device address (000) and the baud rate (001) are explained next.

6. Select the value of the 1st number using key 2 .
7. Continue the procedure for the next numbers of the parameter address and for the parameter settings.
8. Exit programming mode by simultaneously pressing key 1 and 2 (1 s). Switch back to the input area for the current transformer using key 2.

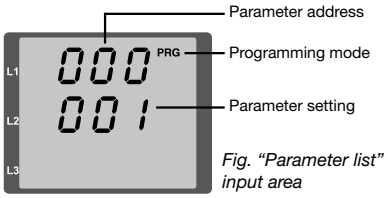


Fig. "Parameter list" input area

Setting the device address (parameter address 000)
A master device can distinguish the UMGs based on the device address in a master/slave network via the RS485 interface.
For devices within this network, make sure that for each parameter address 000

- different device addresses are assigned.
- the parameter setting of parameter address 000 is within the range of 1 to 247 (0 and 248 to 255 are reserved).

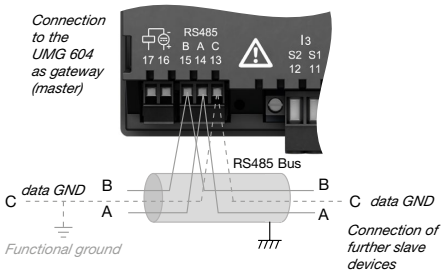
Setting the baud rate (parameter address 001)
For each device in a master/slave network via the RS485 interface:

- select a **uniform** baud rate (parameter address 001) (0= 9.6 kbps, 1=19.2 kbps, 2=38.4 kbps).
- select the number of stop bits (parameter address 002) (0=1 bit, 1=2 bits, 2=even parity, 3=odd parity).

Data bits (8) and parity (none) are set.

15 Example: PC connection via RS485 interface and UMG 604 as the gateway

The UMG 96-S2 communicates with a PC via the serial RS485 interface and a UMG 604 as a gateway:

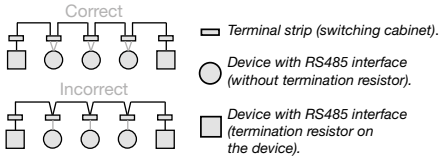


RS485 bus structure

- Connect all devices in the RS485 bus structure (line) according to the master/slave principle.
- A segment of a RS485 bus structure can contain up to 32 participants/devices.
- Terminate the cable with termination resistors (120 Ω, 0.25 W) at the beginning and end of a segment. The UMG 96-S2 does not contain a termination resistor.
- With more than 32 participants, use repeaters to connect segments.

NOTE

- To prevent the addition of residual current when using several devices, mount the data GND as a functional ground (see fig. on the left)!
- To prevent the measurement device from displaying a residual voltage, connect terminal „C" of the RS-485 interface of your measurement device as the functional earth (FE) to the PE conductor of your system. Use the color „pink" (DIN EN 60445/VDE 0197) for the functional earth lead.



NOTE

For the integration of the UMG 96-S2 into an RS485 bus structure (master/slave principle) with UMG 604 as the master device, first

- enter a **1** (Modbus RTU/master) in **Address 203** of the UMG 604!

16 Technical data

General information	
Net weight (with attached connectors)	Approx. 250 g (0.55 lb)
Packaging weight (including accessories)	Approx. 500 g (1.10 lb)
Impact resistance	IK07 according to IEC 62262

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	K55, -25 °C (-13 °F) up to +70 °C (158 °F)
Relative humidity	0 to 90% RH

Ambient conditions during operation Use the UMG 96-S2 in a weather-protected, stationary application. Protection class II in accordance with IEC 60536 (VDE 0106, Part 1).	
Operating temperature range	K55, -10° C (14 °F) .. +55° C (131 °F)
Relative humidity	0 to 75% RH
Operating altitude	0 .. 2000 m (1.24 mi) above sea level
Degree of pollution	2
Installation position	discretionary
Ventilation	No external ventilation required
Protection against foreign bodies and water - Front - Rear - Front side with sealing	 IP40 i.a.w. EN60529 IP20 i.a.w. EN60529 IP54 i.a.w. EN60529

Supply voltage	
Nominal range	**230 V**: AC 90 V - 265 V (50/60 Hz) or DC 90 V - 250 V, 300 V CATIII
Operating range	+-10% of nominal range
Power consumption	**230 V**: max. 1.5 VA / 0.5 W
Internal fuse, not exchangeable	Type T1A / 250 VDC / 277 VAC according to IEC 60127
Recommended overcurrent protection device for the line protection	**230 V**: 6-16 A (Char. B) (IEC-/UL approval)

Voltage measurement	
Three-phase 4-conductor systems with nominal voltages up to	230 V/400 V (+-10%) according to IEC
Overvoltage category	300 V CAT III
Rated surge voltage	4 kV
Fuse for the voltage measurement	1 - 10 A (with IEC/UL approval)
Measuring range L-N	0[1] .. 300 Vrms (max. overvoltage 400 Vrms)
Measuring range L-L	0[1] .. 425 Vrms (max. overvoltage 620 Vrms)
Limit value for the measuring range overflow U_{L-N}	> 300 Vrms
Resolution	0.01 V
Crest factor	1.9 (related to the measurement range)
Impedance	3 MΩ/phase
Power consumption	Approx. 0.1 VA
Sampling frequency	8 kHz
Frequency of the basic oscillation - resolution	 45 Hz .. 65 Hz 0.01 Hz

1) The device only determines the measured values if voltage L1-N is greater than 20 Veff (4-conductor measurement) or voltage L1-L2 is greater than 34 Veff (3-conductor measurement) on voltage measurement input V1.

Current measurement	
Rated current	x/1 and x/5 A
Measuring range	0.005 .. 6 Arms
Limit value for the measuring range overflow I	> 7 Arms
Crest factor (based on the rated current)	2
Resolution	1 mA (display 0.01 A)
Overvoltage category	300 V CAT II
Rated surge voltage	2 kV
Power consumption	approx. 0.2 VA (Ri=5 mΩ)
Overload for 1 s	60 A (sinusoidal)
Sampling frequency	8 kHz

Digital outputs 1 digital output, semiconductor relay, not short-circuit proof.	
Switching voltage	max. 60 V DC
Switching current	max. 50 mAeff DC
Pulse output (energy pulse)	Max. 12.5 Hz

Serial interface	
RS485 - Modbus RTU/slave	9.6 kbps, 19.2 kbps, 38.4 kbps
Stripping length	7 mm (0.2756 in)

Terminal connection capacity (supply voltage) Connectable conductors. Only one conductor can be connected per terminal.	
Single core, multi-core, fine-stranded	0.2 - 4 mm², AWG 28-12
Cable end sleeve (not insulated)	0.2 - 2.5 mm², AWG 26-12
Cable end sleeve (insulated)	0.2 - 2.5 mm², AWG 26-14
Tightening torque	0.4 - 0.5 Nm (3.54-4.43 lbf in)
Stripping length	7 mm (0.2756 in)

Terminal connection capacity (voltage measurement) Connectable conductors. Only one conductor can be connected per terminal.	
Single core, multi-core, fine-stranded	0.2 - 4 mm², AWG 28-12
Cable end sleeve (not insulated)	0.2 - 2.5 mm², AWG 26-14
Cable end sleeve (insulated)	0.2 - 2.5 mm², AWG 26 -14
Tightening torque	0.4 - 0.5 Nm (3.54-4.43 lbf in)
Stripping length	7 mm (0.2756 in)

Terminal connection capacity (current measurement) Connectable conductors. Only one conductor can be connected per terminal.	
Single core, multi-core, fine-stranded	0.2 - 4 mm², AWG 28-12
Cable end sleeve (not insulated)	0.2 - 4 mm² , AWG 26-12
Cable end sleeve (insulated)	0.2 - 2.5 mm², AWG 26-14
Tightening torque	0.4 - 0.5 Nm (3.54-4.43 lbf in)
Stripping length	7 mm (0.2756 in)

Terminal connection capacity (digital interface)	
Single core, multi-core, fine-stranded	0.2 - 1.5 mm², AWG 28-16
Cable end sleeve (not insulated)	0.2 - 1.5 mm² , AWG 26-16
Cable end sleeve (insulated)	0.2 - 1.5 mm², AWG 26-16
Tightening torque	0.2 - 0.25 Nm (1.77-2.21lbf in)
Stripping length	7 mm (0.2756 in)

Terminal connection capacity (serial interface)	
Single core, multi-core, fine-stranded	0.2 - 1.5 mm², AWG 28-16
Cable end sleeve (not insulated)	0.2 - 1.5 mm² , AWG 26-16
Cable end sleeve (insulated)	0.2 - 1.5 mm², AWG 26-16
Tightening torque	0.2 - 0.25 Nm (1.77-2.21lbf in)
Stripping length	7 mm (0.2756 in)

NOTE

More technical data can be found in the device user manual.

17 Procedure in the event of errors

Possible error	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 current transformer transformation ratio at the current transformer.
	Current harmonics exceed the current peak value at the measurement input	Install current transformer with a larger CT ratio.
	The current at the measurement input was not achieved.	Install current transformer with a smaller current transformer ratio.
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.	Install voltage transformers.
	The peak voltage value at the measurement input has been exceeded by harmonic components.	**Attention!** Ensure the measurement inputs are not overloaded.
Active power is too large or too small. *	The programmed voltage transformer transmission ratio is incorrect	Read the current transformer transmission ratio on the current transformer and program it in the GridVis software.
	A current path is assigned to the wrong voltage path.	Check connection and correct if necessary (GridVis).
	The programmed voltage transformer transmission ratio is incorrect	Read the voltage transformer transmission ratio on the voltage transformer and program it in the GridVis software.

Possible error	Cause	Remedy
Active power reference/delivery is reversed.	At least one current transformer connection is reversed.	Check connection and correct if necessary (GridVis).
	A current path is assigned to the wrong voltage path.	
No connection to the device	RS485: Device address incorrect or incorrect protocol	Set device address / select protocol
“StG onE“ in the display	Firmware update failed.	Renew firmware update via the GridVis® software.
"EE" in the display	See “Error messages” in the user manual.	
Device still does not work despite the above measures.	Device defective.	Send the device to the manufacturer for inspection and testing.

NOTE

Property damage due to overloaded measurement inputs!
Too high current and voltage values overload the measurement inputs.
Observe the limit values specified on the rating plate and in the user manual!

Janitza®