Smart Energy & Power Quality Solutions

UMG 96RM-PN – THE COMMUNICATIONS PROFESSIONAL

Multifunctional power measurement device with PROFINET interface

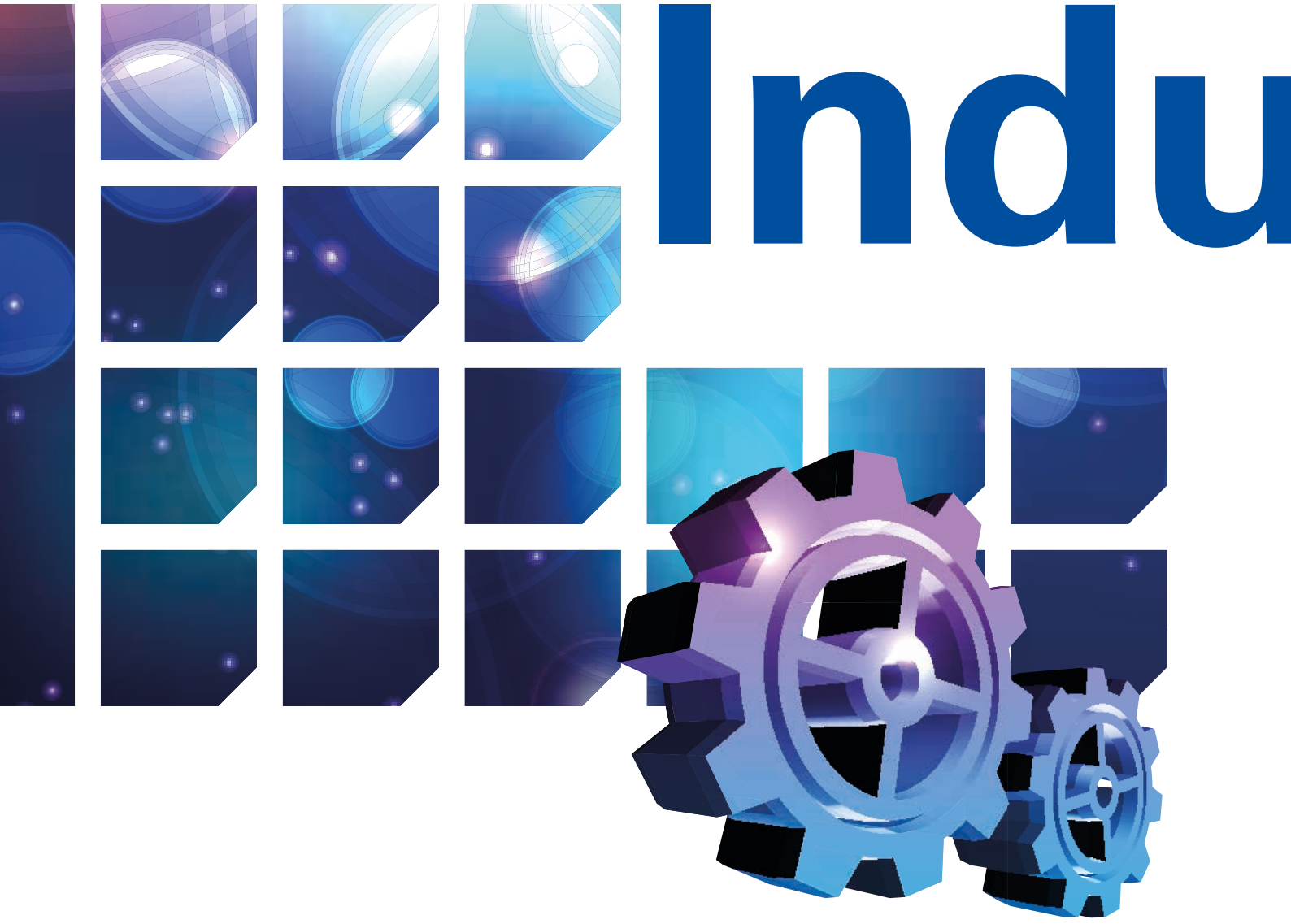
Janitza®

Industry 4.0 – Hi-tech in focus

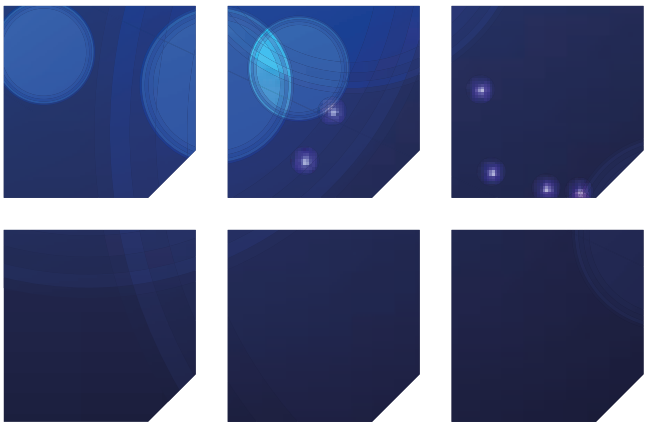
"Industry 4.0" is one of the most discussed buzzwords when it comes to the future of the industrial systems field. The aim is an intelligent factory in which IT and manufacturing interlink and support each other closely.

Numerous solutions have been developed up to now, not to mention the number of visions. However, only a few concise causes can be accounted for:

- Increasing use of IT technologies from the consumer sector in manufacturing
- Continuous automation solutions using field bus and network technology
- The trend towards highly-flexible large-volume production (mass customisation)
- The increasing requirements on resource efficiency, as well as those regarding materials and energy.



lstry 4.0



Nothing works without data
While the expectations on Industry 4.0 allow for a great deal of leeway, the prerequisites for even being able to work with this concept are already well defined. Important requirements are fine-tuned recording of energy consumption and monitoring the power quality. For Janitza this is neither new ground nor a vision but many years of common practice.

With the UMG measurement devices by Janitza, the user has full control over the entire measurement process: Electrical and energy parameters, data resolutions (different averaging times) and query intervals can be selected as required; also the application protocols such as FTP, Modbus, Profibus, PROFINET, HTTP/REST, BACnet, etc.

The range includes combi devices that capture both consumptions and the power quality. They are even documented lawfully depending on the device. One particular highlight of these devices is that they can also monitor residual currents, which increases system safety significantly. However, Janitza also offers cheaper data loggers with numerous inputs to capture many individual consumers.

Of course, all of the internet's options are also available here: A cloud solution and apps for the device's own homepage are part of the range of services.

UMG 96RM-PN – The communications professional

Communication from the machine to the web

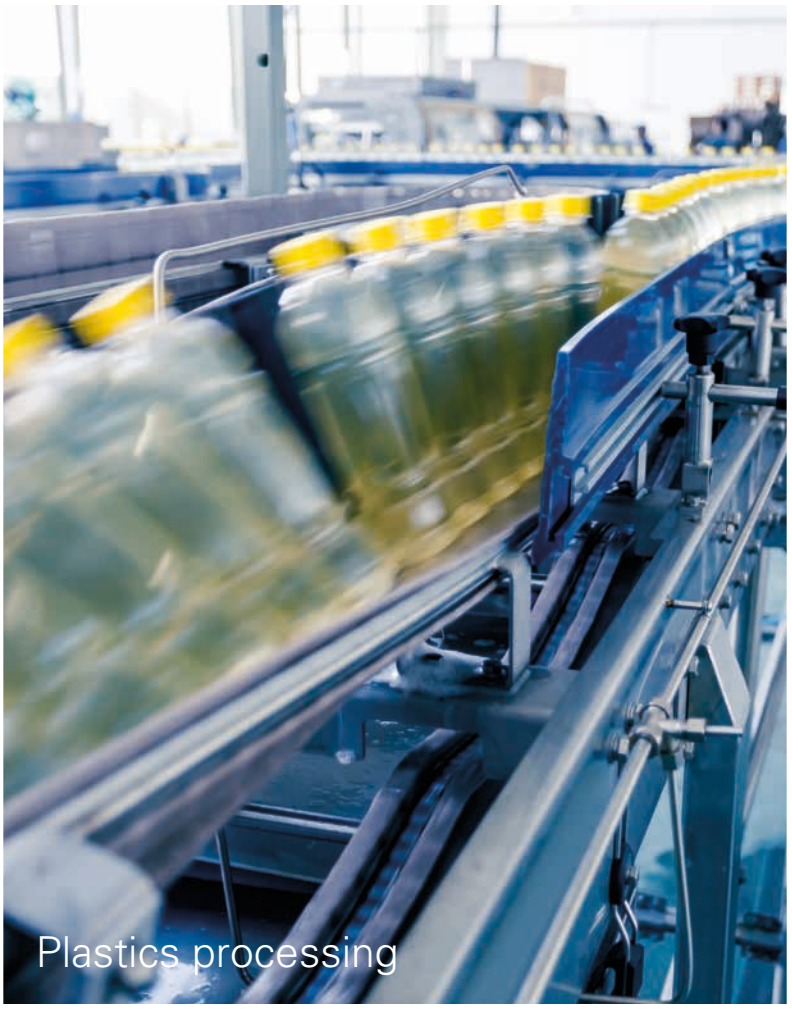
To bring Ethernet from the office to the system field requires a number of enhancements; the most important is real-time capability. Depending on the application, a marketable industrial Ethernet must handle safety applications or the entire range of drive technology, right up to synchronous motion control with cycle times of less than a millisecond. You can achieve this using a clever distribution of protocols via the OSI layered system structure. This results in many solutions. One of the most common is the open standard, PROFINET, which also provides a great deal of investment protection. Existing field bus systems such as Profibus DP, Profibus PA, AS interface and interbus can be included in the existing field devices without the need to make changes.

Capturing measured data using PROFINET

PROFINET already saves costs during installation, engineering and commissioning. The operator later benefits from its ease of extension and high availability thanks to subsystems that run autonomously. Accordingly, PROFINET is represented in all applications in machinery and system construction: In the automotive industry, the paper industry, plastics processing, conveyance technology, the food industry and process engineering.

It is obvious that this communication structure can also be used for capturing machine-oriented energy data. Janitza has used the tried and tested UMG 96 range of devices as a basis to develop a PROFINET specialist: The UMG 96RM-PN – a measuring device that is much more than a standard version with a flange-mounted PROFINET interface.


Automotive industry


Plastics processing

UMG 96RM-PN, the PROFINET specialist

The UMG 96RM-PN is equipped with two Ethernet interfaces that conform to PROFINET IO-IRT and an integrated switch. The familiar line topologies are used to display the structure of the field bus technology in a way that complies with standards. Parameters can be set and configuration carried out completely in the Step 7® environment or the TIA portal. All measured values are displayed directly in the PLC's process data channel. Its digital inputs and outputs can be used via both Modbus and PROFINET. Two analogue inputs are available for 0–30 mA or to capture temperatures. A separate 5A current measurement channel can monitor the neutral conductor, for example.

All relevant measurements can be displayed on the device's own homepage. A REST interface enables measured values and configuration parameters to be queried from the HTTP interface. A highlight is integrated residual current monitoring (RCM), which can be used to detect insulation faults at an early stage. This increases the system availability and reduces the risk of fire.

6 current channels

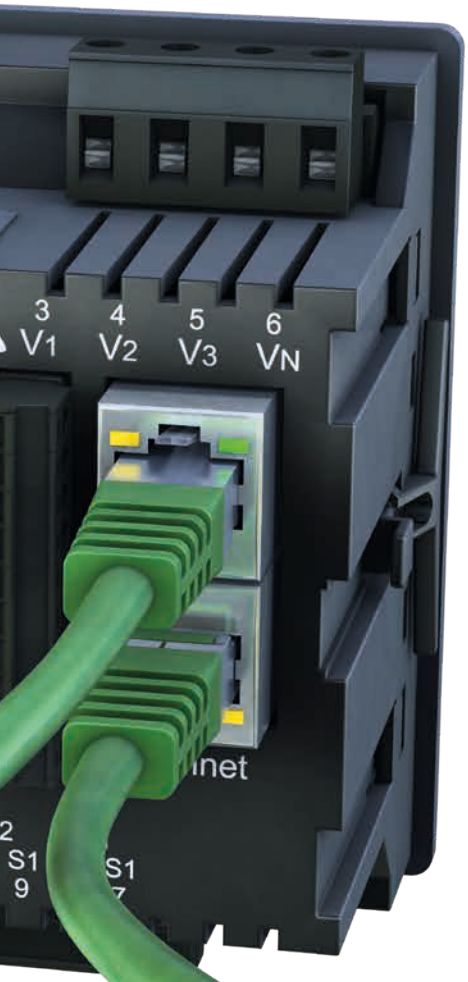
- Current measurement channel for phase L1
- Current measurement channel for phase L2
- Current measurement channel for phase L3
- Current measurement channel for neutral conductor
- 2 x RCM (optional thermistor input)

Interfaces

- 2 Ethernet interfaces that conform to PROFINET and integrated switch to set up line topologies
- Additional RS485 interface
- 2 digital outputs (pulse output, switch output, threshold value output, logic output)
- 3 additional digital inputs/outputs

REST interface

- Software interface to query measured values via an HTTP protocol, e.g. to include the measured data in higher-level software solutions (GLT, PLC, SCADA, etc.)
- Machine-machine communication thanks to a simple architecture model



RCM (residual current)

- Fire and device protection
- System safety
- Identifying insulation faults
- Safeguarding system availability

Web server

- Real-time display of current power / current and voltage values on the device homepage
- Device homepage can be called in the browser at any time
- Online measured values display

GridVis®-Basic

- Visualisation and evaluation of the measured values
- Simple report creation
- Setting up energy management systems in accordance with ISO 50001

Simple integration of measuring devices into the field bus level

Energy data capture has become increasingly important in recent years. This is less due to the cost factor itself, but more due to realising that only fine-tuned and highly temporally resolved energy data capture can enable the desired savings. To do this, the measurement technology must be integrated into existing systems – even in ongoing operation where possible.

PROFINET is ideal for this task as this standard enables it to be integrated into existing field bus systems such as Profibus DP, Profibus PA, etc. easily. This also allows measuring devices such as the UMG 96RM-PN to be integrated into the field bus level without complications.

Simple installation reduces the costs. Furthermore, migrating from centralised to decentralised structures is possible. Additional infrastructure components are not required, as the UMG 96RM-PN already has a switch and two PROFINET interfaces on board and, therefore, enables line structures to be set up.

The energy management system can be implemented easily based on this infrastructure. PROFINET can be used to feed the data captured in real-time to a centralised location, to save it centrally in databases and to make it available for further processing in an architecture that is as open as possible.

Janitza has the relevant solutions ready – from self-sufficient software to the cloud. The users can, therefore, implement their own independent energy management or revert to the service range from Janitza.

Controlling and visualising in parallel mode

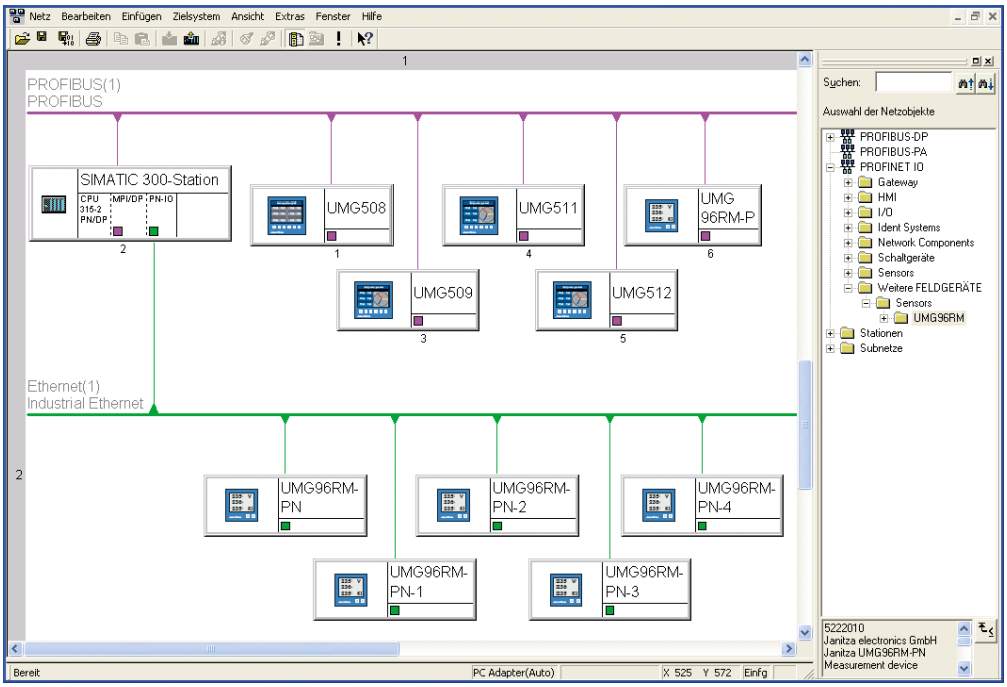
controlling

Real-time capable measured values capture by the machine or system controller

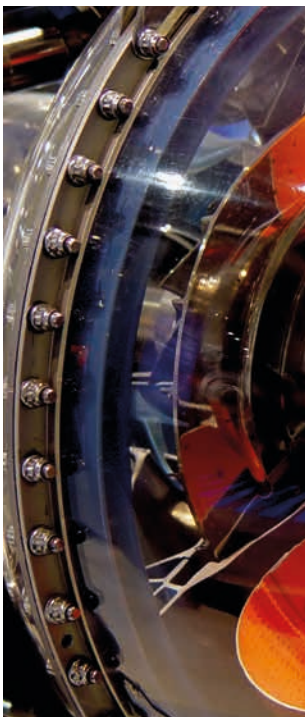
parallel

visualising

GridVis® web visualisation software to set up an energy management system



Complete integration of the Janitza measurement devices in the Step 7® software environment



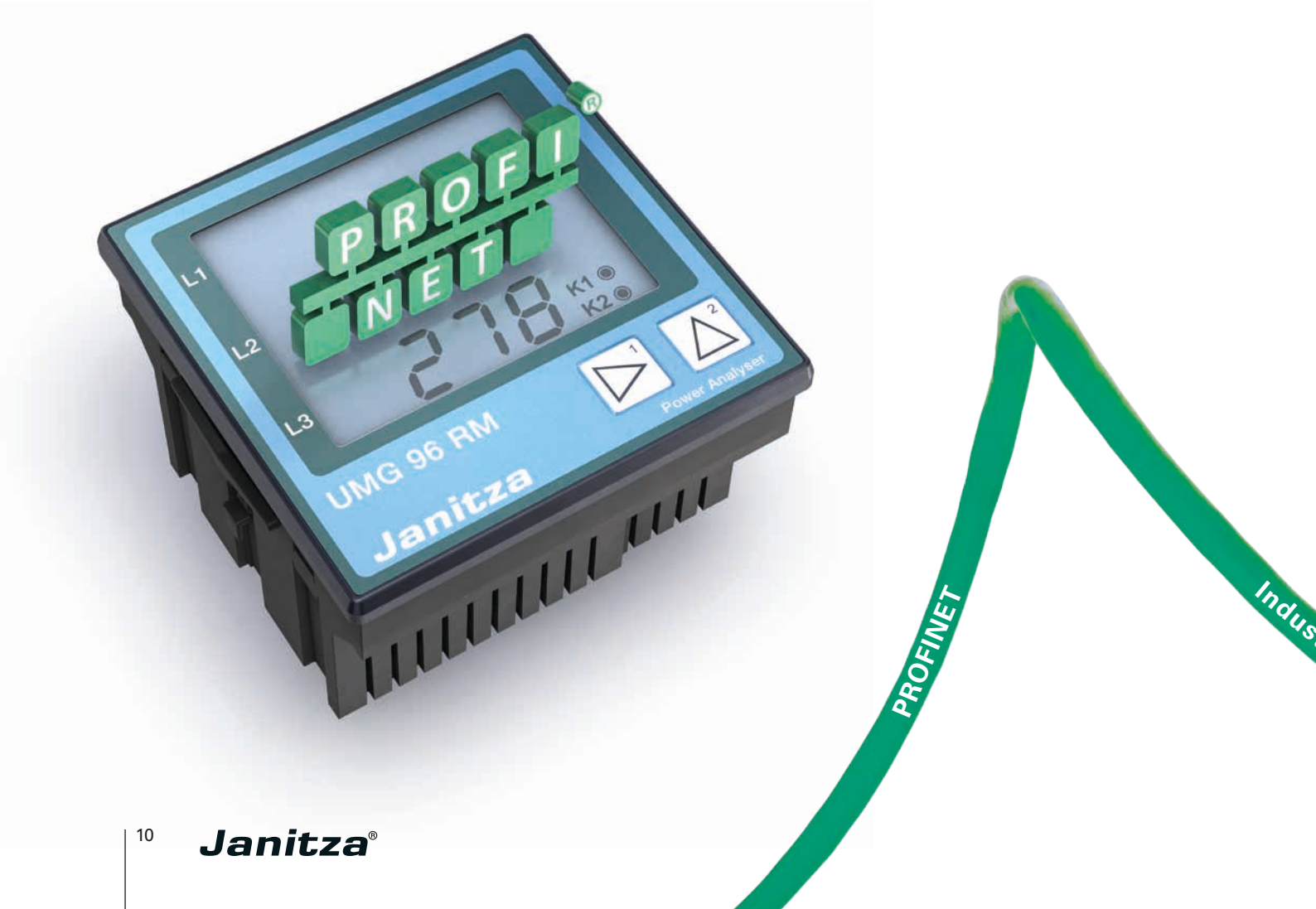
System safety thanks to residual current monitoring

The UMG 96RM-PN does not just enable continuous capture of consumers, but also enables residual current monitoring (RCM). RCM can be used to detect faults, which would only be partially perceived – or even entirely missed – by a single system. The user is therefore able to react before fuses or residual current devices (RCD) switch off affected systems or socket power circuits. This applies in particular to quietly rising residual currents (e.g. triggered by an insulation fault), overly high operating currents and any other overloading of system parts and consumers.

However, RCM can do even more: namely reduce the risk of fire. With a sufficiently high current flow (with a dead earth short or corresponding low-resistance short) the upstream protective device disconnects the electrical consumers from the mains. However, if the residual current is too low then the protective device will not trigger. If the recorded fault power exceeds a value of approx. 60 Watt (approx. 261 mA at 230 V), there is still a risk of fire.

By setting parameters (i.e. stipulating the typical residual current in "GOOD" condition) for the system in new condition and constant monitoring, all changes to the system state after the point of start-up can be detected. This also enables visualising creeping residual currents.

Therefore, RCM in the UMG 96RM-PN does not just increase the system availability, but also reduces the risk of fire.



100% conformity with the PROFINET standard, including PROFIenergy

The UMG 96RM-PN is certified for PROFINET and is suitable for using PROFIenergy. A PROFINET certificate attests to a response that conforms to standards in accordance with IEC 61158 within a PROFINET network and, therefore, guarantees a high standard of quality.

PROFIenergy is a profile for energy management in production systems, which is based on PROFINET. Energy consumers within the system can, therefore, be controlled using open and standardised commands. Using PROFIenergy means that external, hard-wired systems are no longer required.


Certificate

PROFIBUS Nutzerorganisation e.V. grants to

Janitza electronics GmbH
Vor dem Polstück 1, 35633 Lahnau, Germany

the Certificate No: **Z11193** for the PROFINET IO Device:

Model Name:	**UMG96RM-PN**
Revision:	**SW/FW: V1.0.0; HW: 01**
Identnumber:	**0x0293; 0x0008**
GSD:	**GSDML-V2.31-JanitzaelectronicsGmbH-UMG96RM-PN-20150902.xml**
DAP:	**DAP1, 0x00000001**

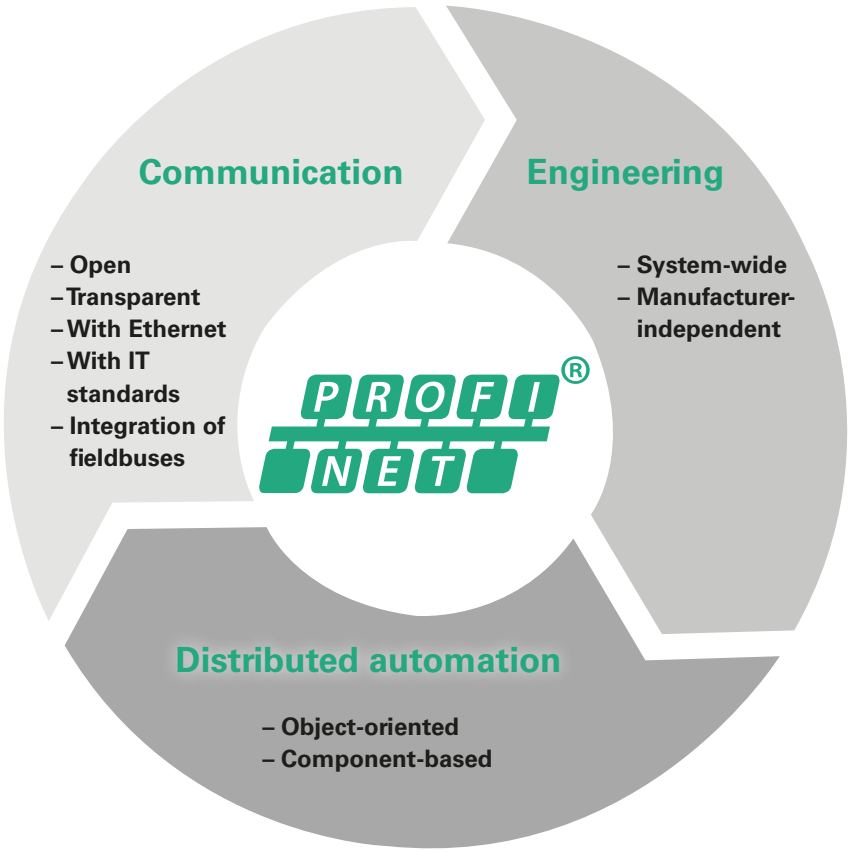
This certificate confirms that the product has successfully passed the certification tests with the following scope:

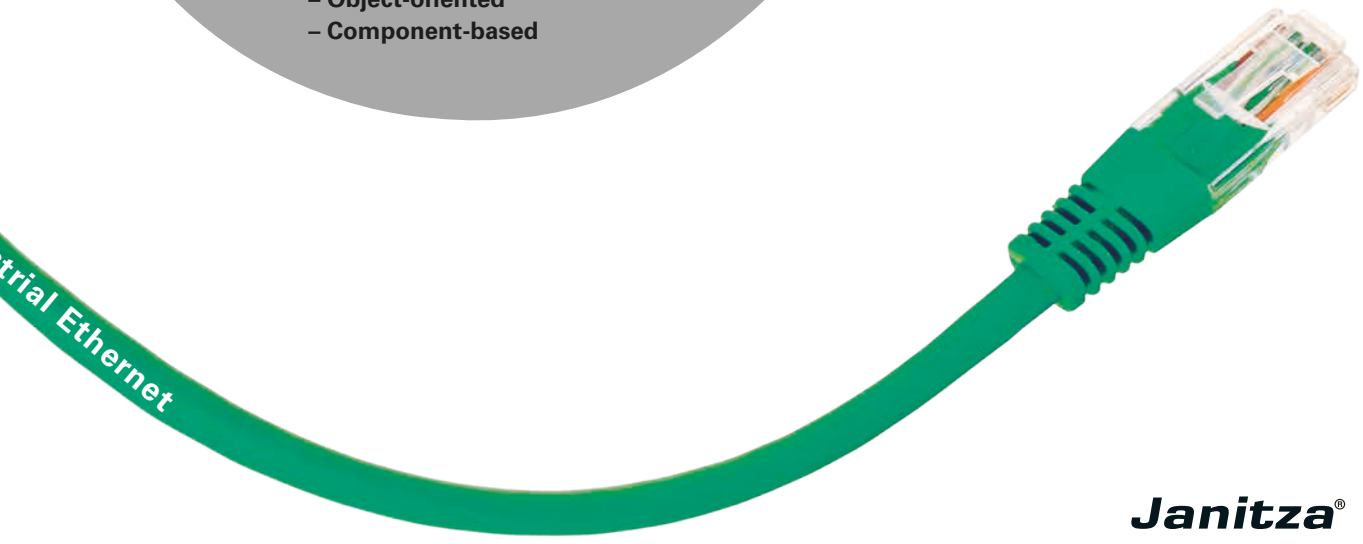
PNIO_Version	V2.2
Conformance Class	B Optional Features: MRP, FSU, 2.AR, DA_Access
PNIO_Tester_Version	V2.2.4
Tester	Phoenix TestLab GmbH, Blomberg, Germany PNE132121E01

This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".
For all products that are placed in circulation by September 10, 2018 the certificate is valid for life.

Board of PROFIBUS Nutzerorganisation e. V.

PROFIenergy





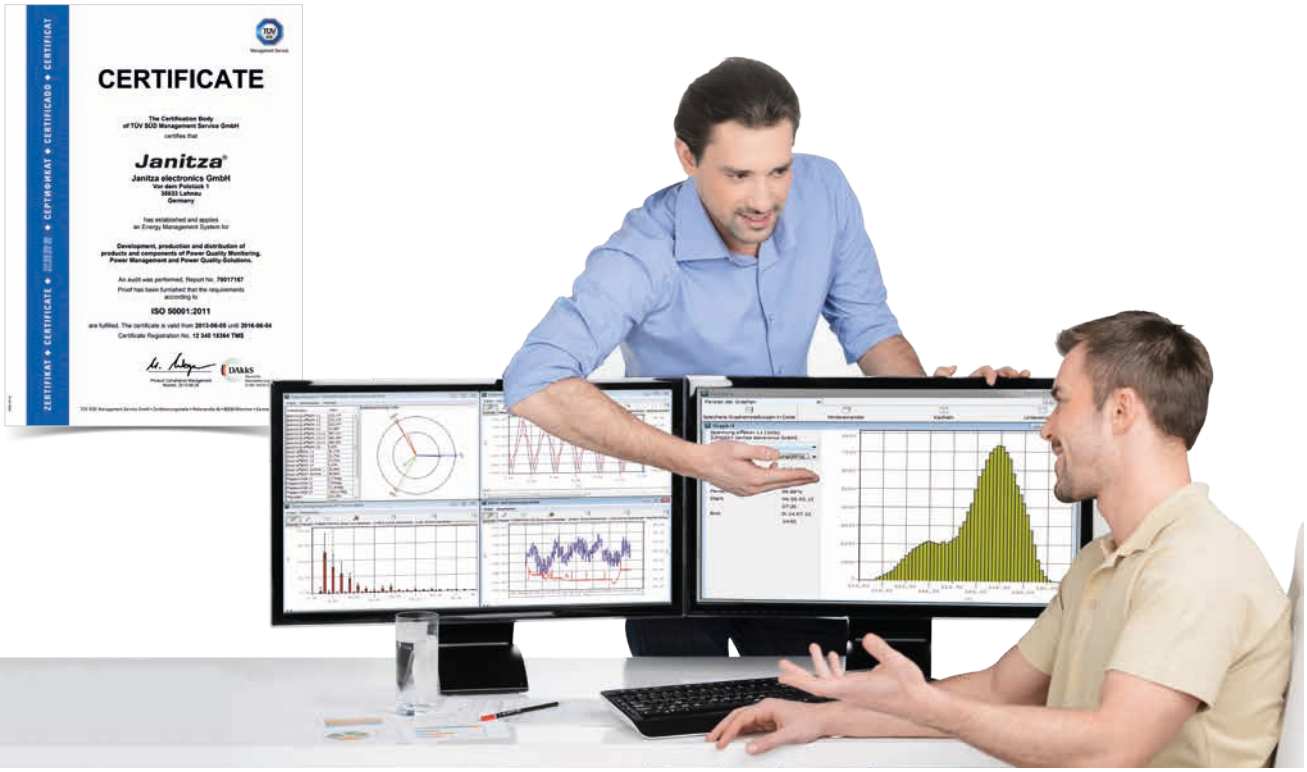
GridVis® – network visualisation software

With GridVis®, Janitza offers powerful, user-friendly software to develop energy and power quality monitoring systems. The basic software version GridVis®-Basic, which is supplied together with the measuring devices, is used both to program and configure the Janitza measuring devices, as well as to read out, save, display, process and analyse the measurement data. GridVis® is a comprehensive and scalable software solution for energy suppliers, industrial applications, facility management, the building market and infrastructure projects. GridVis® provides technicians and managers with the required data to identify potential energy savings, reduce energy costs, avoid production shut-downs and optimise utilisation of production resources.

- Intuitive operation
- Configuration of the measurement system and the UMG measurement devices
- Certified ISO 50001 EnMS software
- Automatic or manual readout of measurement data
- Graphical illustration of online and historical measurement data
- Comprehensive alarm management
- User management
- Generic Modbus devices, virtual meters
- Graphic user interface (topological view) for visualising real-time data and messages

- Minimum, average and maximum values can be displayed in a graph
- Statistical evaluation of the measured data
- Comprehensive export functions (e.g. Excel)
- Reports for energy usage and power quality (EN 50160, IEEE 519, EN 61000-2-4) manual or time-controlled with individual schedule
- Saving data in a central database including database management (e.g. MySQL / MS SQL / Derby / Janitza DB)
- Open system architecture and scalability

Various characteristics depend on the version



Device overview and technical data

	UMG 96RM-PN
Item number	**52.22.090**
Interfaces	RS485, Ethernet/PROFINET
Protocols	
PROFINET IO*1, PROFIenergy, TCP/IP, Modbus/TCP, Modbus/RTU (RS485), HTTP/REST	
Measured data recording	
Current measurement channel	4 + 2
Digital inputs and outputs	
Digital inputs	3*3
Digital outputs (as switch or pulse output)	2 (+3)*3
Mechanical properties	
Device dimensions in mm (W x H x D)*2 Device dimensions in inch (W x H x D)*2	96 x 96 x approx. 78 3.78 x 3.78 x ca. 3.07
General	
AC supply voltage	90 to 277 V AC
Supply voltage DC	90 ... 250 V DC
Use in low and medium voltage power grids	•
Accuracy of measurement with voltage	0.2 %
Accuracy of measurement with current	0.2 %
Accuracy of measurement with active energy (kWh, .../5 A)	Class 0.5S
Number of measurement points per period	426
Uninterrupted measurement	•
RMS - momentary value	
Current, voltage, frequency	•
Active, reactive and apparent power / total and per phase	•
Power factor / total and per phase	•
Energy measurement	
Active, reactive and apparent energy [L1,L2,L3, ∑ L1–L3]	•
Number of tariffs	8
Recording of the mean values	
Voltage, current / actual and maximum	•
Active, reactive and apparent power / actual and maximum	•
Frequency / actual and maximum	•
Requirement calculation mode (bi-metallic function) / thermal	•
Other measurements	
Operating hours measurement	•
Measurement of the power quality	
Harmonics per order / current and voltage	1st – 40th
Distortion factor THD-U in %	•
Distortion factor THD-I in %	•
Rotary field indication	•
Current and voltage, positive, zero and negative sequence component	•
Displays and inputs / outputs	
LCD display (with backlight), 2 buttons	•
Voltage inputs	L1, L2, L3 + N
Password protection	•
Programming / threshold values / alarm management	
Comparator (2 Groups with 3 comparators each)	•
Technical data	
Type of measurement	Continuous real effective value measurement up to the 40th harmonic
Nominal voltage, three-phase, 4-conductor (L-N, L-L)	277 / 480 V AC
Nominal voltage, three-phase, 3-conductor (L-L)	480 V AC
Measurement in quadrants	4
Networks	TN, TT, IT

Comment:
For detailed technical information, please refer to the operation manual and the Modbus address list.

• = included - = not included

*1 Use in PROFINET IRT networks possible. The measured values are provided via PROFINET RT communication. The device complies with conformance class CC-B.

*2 Accurate device dimensions can be found in the operation manual.

*3 Optionally 3 digital inputs or outputs (no pulse output)

Device overview and technical data

Measured voltage input	
Overvoltage category	300 V CAT III
Metering range, voltage L-N, AC (without transformer)	0*6 ... 300 Vrms
Metering range, voltage L-L, AC (without transformer)	0*6 ... 520 Vrms
Resolution	0.01 V
Impedance	4 MOhm / phase
Frequency measuring range	45 to 65 Hz
Power consumption	max. 7 VA / 4 W
Sampling frequency per channel (50 / 60 Hz)	21.33 / 25.6 kHz
Measured current input	
Rated current	1 / 5 A
Resolution	0.1 mA
Measurement range	0.005 ... 6 Amps
Overvoltage category	300 V CAT II
Measurement surge voltage	2 kV
Power consumption	approx. 0.2 VA (Ri = 5 mOhm)
Overload for 1 sec.	120 A (sinusoidal)
Sampling frequency per channel (50 / 60 Hz)	21.33 / 25.6 kHz
Residual current / thermistor input	
Analogue inputs	2 (for residual current or temperature measurement)
Measurement range, residual current input*4	0.05 to 30 mA
Digital inputs and outputs	
Digital inputs	
Input signal present	18 to 28 V DC (typical 4 mA)
Input signal not present	0 to 5 V DC, current < 0.5 mA
Digital outputs	
Switching voltage	max. 60 V DC, 33 V AC
Switching current	max. 50 mAeff AC / DC
Response time	10 / 12 periods + 10 ms
Pulse output (energy pulse)*5	Max. 50 Hz
Maximum line length	up to 30 m unscreened, from 30 m screened
Mechanical properties	
Weight	Approx. 0.3 kg
Protection class per EN 60529	Front: IP40; Back: IP20
Assembly per IEC EN 60999-1 / DIN EN 50022	Front panel installation
Cable cross section	
Supply voltage	0.2 to 2.5 mm²
Current measurement	0.2 to 2.5 mm²
Voltage measurement	0.08 to 4.0 mm²
Environmental conditions	
Temperature range	Operation: K55 (–10 ... +55 °C / +131 °F)
Relative humidity	Operation: 0 to 75 % RH
Operating altitude	0 to 2000 m above sea level
Pollution degree	2
Mounting position	any
Software GridVis® Basic*3	
Online and historic graphs	•
Databases (Janitza DB, Derby DB)	•
Manual reports (energy, power quality)	•
Topology views	•
Manual read-out of the measuring devices	•
Graph sets	•
Firmware	
Firmware update	Update via GridVis® software. Firmware download (free of charge) from the following website: http://www.janitza.de/downloads

Comment: For detailed technical information, please refer to the operation manual and the Modbus address list.

• = included - = not included

*3 Optional additional functions with the packages GridVis® Professional, GridVis® Enterprise and GridVis® Service.

*4 Example of residual current input 30 mA with 600/1 residual current transformer:
600 x 30 mA = 18,000 mA

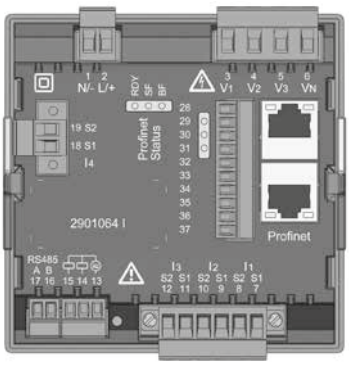
*5 Only digital outputs 1 and 2

*6 The UMG 96RM-PN can only detect measurements when a voltage L1-N greater than 20 V eff (4-wire measurement) at voltage input V1 or a voltage L1-L2 greater than 34 V eff (3-wire measurement) is applied.

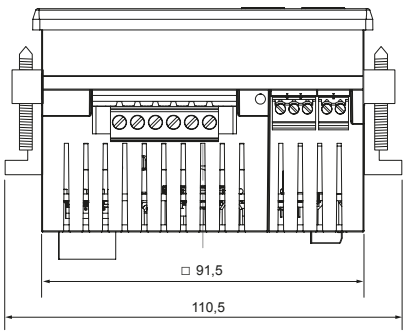
Dimension diagrams

All dimensions in mm

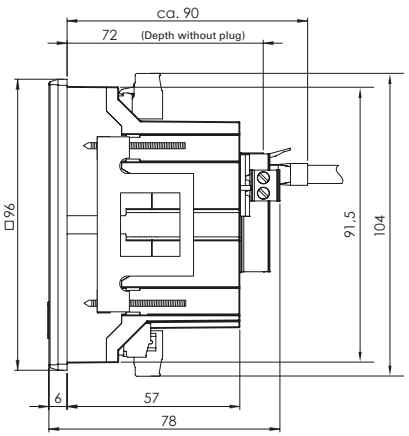
Rear view



View from below

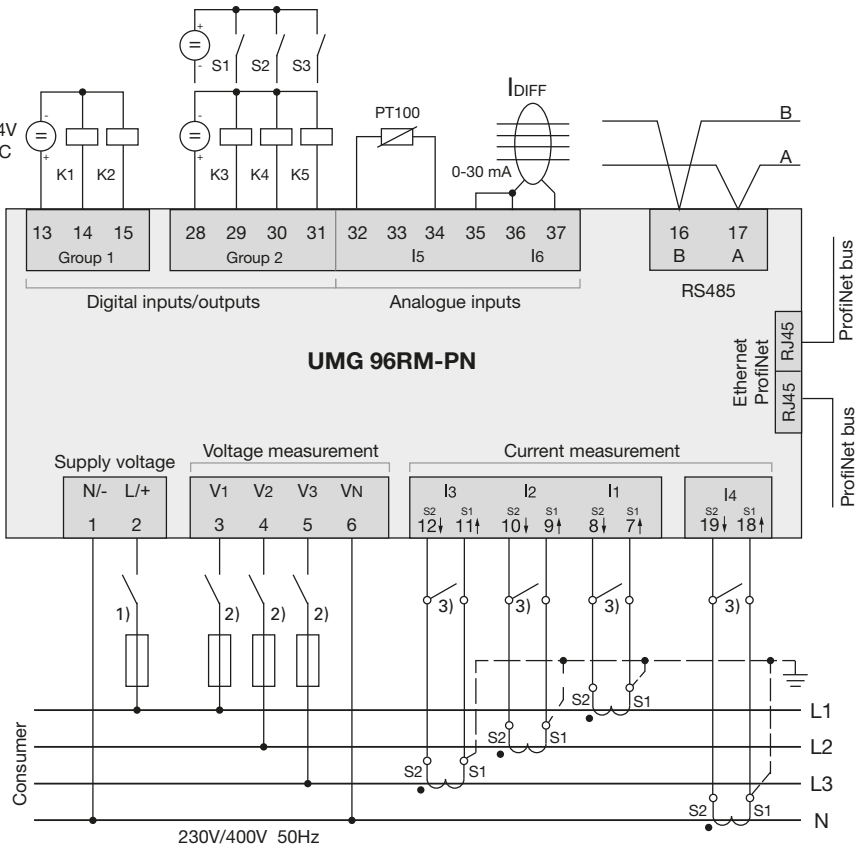


Side view



Connection variant

(with temperature and residual current monitoring)



1) UL/IEC-approved fuse (6A, type C)
2) UL/IEC-approved fuse (10A, type C)
3) Short circuit jumpers (external)

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