RCM modules

Residual current expansion modules for the UMG 96-PA (as of firmware 2.0) and UMG 96-PQ device series

User manual and technical data
- Module 96-PA-RCM
- Module 96-PA-RCM-EL

Fig.
UMG 96-PA with module 96-PA-RCM-EL
(with Ethernet interface)

Janitza®

3. Product description

3.1 Module description

The RCM module enhances the scope of functions of the basic device and is available in the following variants:

Part no.	Designation
52.32.011	**UMG 96-PA-RCM**
52.32.010	**UMG 96-PA-RCM-EL** (with Ethernet interface)

Fig. Module 96-PA-RCM-EL
(with Ethernet interface)

3.2 Module's scope of functions

· Neutral conductor measurement (I4 - current measurement).
· Residual current measurement (RCM) or DC power measurement via 2 analog inputs.
· Temperature measurement (1 analog input).

Both module variants are suitable for monitoring:
· Residual currents (RCM) - Type A, B and B+.
· AC currents.
· DC currents and pulsating DC currents.

The additional measurement results obtained from the module are output by basic device.

ⓘ *INFORMATION*

Because the modules are designed simply as plug-in modules (via a module connector) for one basic device, please also observe all usage information that belongs to your basic device! Take particular note of the insert entitled "Safety and warning notices"!

3.3 Incoming goods inspection

The prerequisites for trouble-free and safe operation of the modules include proper transport, storage, setup and assembly, as well as proper operation and maintenance.
Exercise due caution when unpacking and packing the device, do not use force and only use suitable tools.
Check:
· The modules by performing a visual inspection to ensure flawless mechanical condition.
· The scope of delivery (see user manual) with respect to completeness before beginning with assembly and installation.

If it must be assumed that safe operation of your basic device with module is not possible:
1. **Switch off the power to your system (your device)!**
2. **Secure it against being switched back on!**
3. **Check to be sure it is de-energized!**
4. **Ground and short circuit the system (device)!**
5. **Cover or block off adjacent live parts!**

Safe operation is impossible, if, for example, the device with module:
· has visible damage,
· no longer functions despite an intact power supply,
· was subjected to extended periods of unfavorable conditions (e.g. storage outside of the permissible climate thresholds without adjustment to the room climate, condensation, etc.) or transport stress (e.g. falling from an elevated position, even without visible external damage, etc.).

ATTENTION
Improper handling may cause damage to the module and result in material damage! The contacts of the module connector can bend or break, which would destroy the module. · **Never touch or manipulate the contacts of the module connector!** · **Never use force to press the module connector plug into the socket!** · **When handling, transporting and storing the module, protect the contacts of the module connector!**

3.4 Intended use

The **modules 96-PA-RCM** and **96-PA-RCM-EL**
· Are intended as plug-in modules for a basic
  device (of the UMG 96-PA or UMG 96-PQ de-
  vice series) in switchboard cabinets and small
  distribution boards. The mounting orientation is
  arbitrary (please observe the usage information
  associated with the basic device).
· Must only be mounted on basic devices that
  are disconnected from the power supply (see
  "Mounting" step).

The basic device with attached module is:
· **Not** intended for installation in vehicles! Use of
  the basic device with module in non-stationary
  equipment is considered an exceptional envi-
  ronmental condition and is only permissible by
  special agreement.
· Not intended for installation in environments with
  harmful oils, acids, gases, vapors, dusts, radia-
  tion, etc.

3.5 Overview of module functions

· 3 analog inputs for:
  - 2x residual-current and current measurement
    with cable break detection.
  - 1x temperature measurement
· I4 current measurement channel for I4 current
  measurement via a current transformer (.../5 A or
  .../1 A)

Communication:
· Modbus RTU protocol (RS-485 interface of the
  basic device).
· Only **Module 96-PA-RCM-EL:**
  RJ45 Ethernet interface

**Important module performance characteristics
can be found in chap. „11. Technical data for
the module" on page 46.**

3.6 EU conformity declaration

Please see the EU declaration of conformity post-
ed at www.janitza.de for the laws, standards and
directives applied by Janitza electronics GmbH for
the devices. The CE conformity marking require-
ments for the device arise from the EU conformity
declaration and the laws, standards and directives
mentioned therein.

3.7 Scope of delivery

Quan-tity	Part no.	Designation
1	52.32.011	Module 96-PA-RCM
or		
1	52.32.010	Module 96-PA-RCM-EL

1	33.03.374	Installation instructions DE/EN
1	33.03.342	Safety information, 12 languages
1	10.01.873	Screw terminal, plug-in, 6-pole (temperature, I5, I6/U6)
1	10.01.875	Screw terminal, plug-in, 2-pole (current measurement, I4)

The screw terminals required for the device are
included in delivery.

3.8 Operating concept

There are several options for programming the
device with module or reading out the measured
values, e.g. via the
· buttons on the basic device,
· GridVis® network analysis software,
· RS-485 interface or Ethernet interface.

ⓘ *INFORMATION*

**Please observe the usage information of your
basic device (without module)!
Basic or identical information and chapters,
such as
· Commissioning
· Configuration
· Technical data
· Error messages
· Procedure in the event of a malfunction, etc.
can be found in the usage information of your
basic device.**

**A list of parameters and Modbus addresses with
data on your basic device with module is avail-
able for you as a download at www.janitza.de.**

3.9 GridVis network analysis software

With the GridVis® software, you have the perfect tool for programming, reading out and visualizing measurement data (download at www.janitza.de).

Performance characteristics of the GridVis® software
· Device configuration.
· Graphic display of measured values
· Report and read-out functions
· Alarm management.

Connections to the PC (GridVis® software)
Connections for communication between the PC and the device with module can be found in chap. „5. Installation" on page 22.

ⓘ *INFORMATION*

This user manual describes the module and provides information on the operation of the module via the basic device.
The GridVis® software has an "online help" feature.

ATTENTION

Material damage due to security vulnerabilities in programs, IT networks and protocols.
Security vulnerabilities can lead to data misuse and faults and even the standstill of your IT infrastructure.
To protect your IT system, network, data communications and measurement devices:
· **Inform your network administrator and/or IT representative.**
· **Always keep the meter firmware up to date and protect the communication to the meter with an external firewall. Close unused ports.**
· **Take protective measures against viruses and cyber attacks from the Internet, e.g. through firewall solutions, security updates and virus protection programs.**
· **Close security vulnerabilities and update or renew existing protection for your IT infrastructure.**

5.4 Connection option with terminal assignment
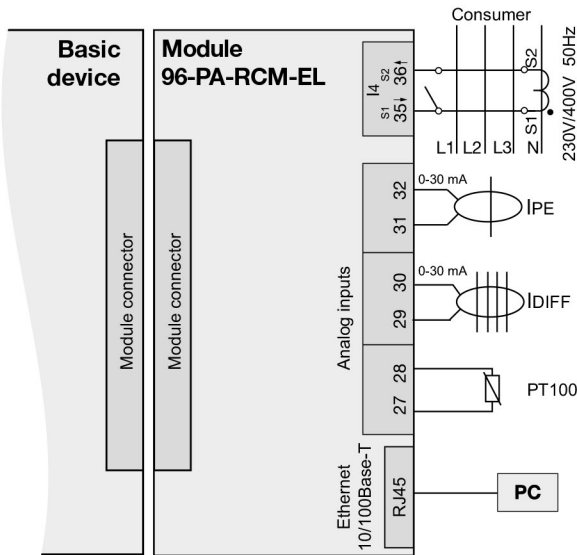
Connection variant with module 96-PA-RCM-EL:

Fig. Connection variant:
Basic device with module 96-PA-RCM-EL

Terminal	Description
RJ45	Ethernet interface (only module 96-PA-RCM-EL)
27 / 28	Temperature measurement
29 / 30 and 31 / 32	Each with residual current measurement with cable break detection
or	
29 / 30 and 31 / 32	Residual current measurement (I_{DIFF}) and current measurement PE (I_{PE}) (see left connection variant)
or	
29 / 30 and 31 / 32	DC current measurement I5 and DC voltage measurement U6
35 / 36	Current measurement I4

ⓘ *INFORMATION*

You can find more detailed information about voltage measurement, current measurement and connection variants in the documentation of the basic device.
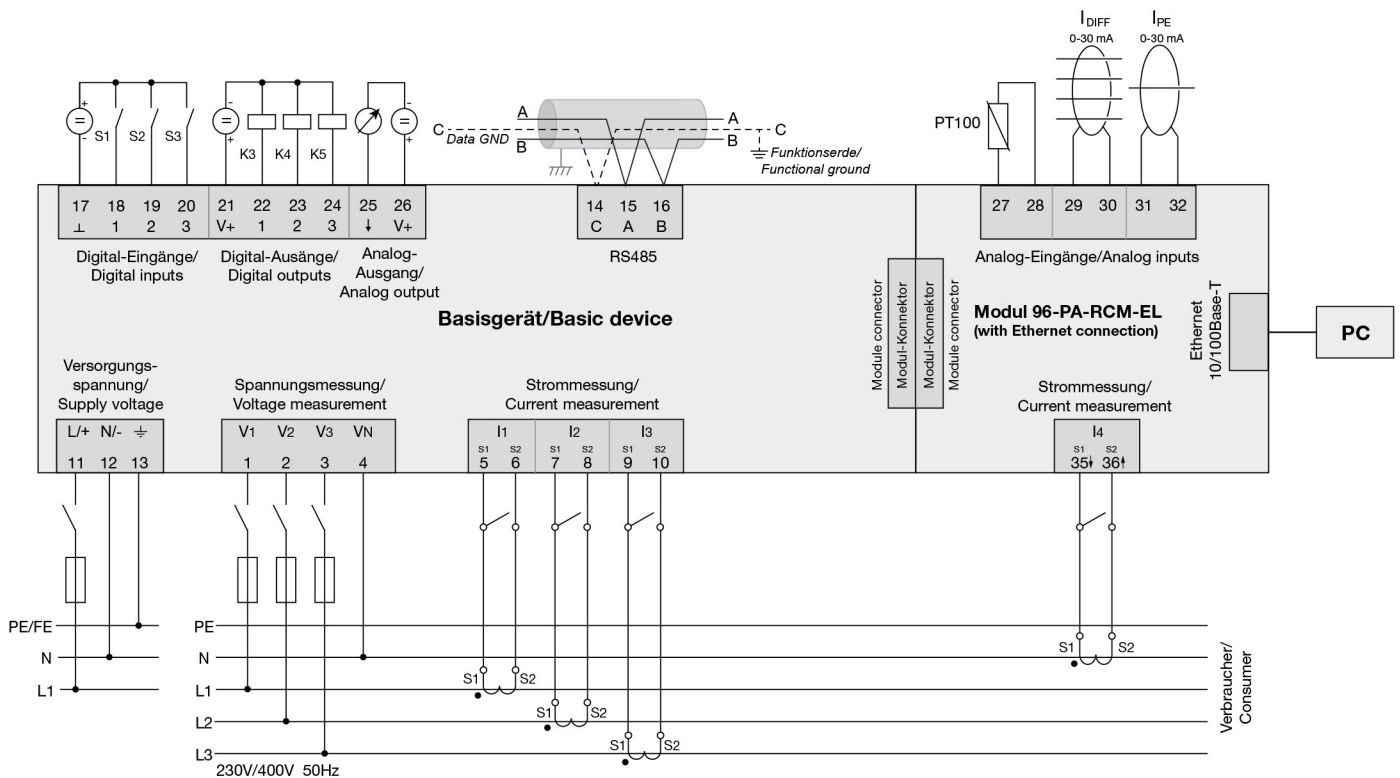
5.5 Connection example of basic device with module

Fig. Connection example "Basic device with module 96-PA-RCM-EL"
Information on overcurrent devices can be found in the user manual of your basic device

11. Technical data for the module

11.1 Technical data

General	
Net weight of **module** (with attached plug-in connectors)	78 g (0.17 lbs)
Impact resistance	IK07 according to IEC 62262

Transport and storage The following specifications apply for devices transported and stored in the original packaging.	
Free fall	1 m (39.37 in)
Temperature	K55 -25° C (-13 °F) to +70° C (158 °F)
Relative air humidity (non-condensing)	0 to 90% RH

Environmental conditions during operation, see the usage information for your basic device.

Analog inputs	
Differential or current signals	2x
Temperature measurement	1x

Residual current input	
Nominal current	30 mA$_{rms}$ | 0...20 mA | 4...20 mA
Measuring range	0 .. 30 mA$_{rms}$
Operating current	50 µA
Resolution	1 µA
Cable break detection (failure monitoring)	Can be activated
Crest factor	1.414 (relative to 30 mA)
Load	4 Ω
Overload for 1 s	1 A
Constant overloaded	200 mA
Measurement of residual currents	According to IEC/TR 60755 (2008-01): Type A Type B and B+

Temperature measurement	
Update time	200 ms
Suitable thermal sensor	PT100, PT1000, KTY83, KTY84
Total burden (thermal sensor and lead)	max. 4 kΩ

Thermal sensor type	Temperature range	Resistance range	Measurement uncertainty
PT100	-99 °C (-146.2 °F) ... +500 °C (932 °F)	60 Ω ... 180 Ω	±1.5% rng
PT1000	-99 °C (-146.2 °F) ... +500 °C (932 °F)	600 Ω ... 1.8 kΩ	±1.5% rng
KTY83	-55 °C (-67 °F) ... +175 °C (347 °F)	500 Ω ... 2.6 kΩ	±1.5% rng
KTY84	-40 °C (-40 °F) ... +300 °C (572 °F)	350 Ω ... 2.6 kΩ	±1.5% rng

Current measurement I4	
Nominal current	5 A
Measuring range	0.005 .. 6 A_{rms}
Crest factor	2 (relative to 6 A_{rms})
Overvoltage category	300 V CAT II
Power consumption	approx. 0.2 VA (Ri = 5 mΩ)
Sampling frequency	8.33 kHz
Resolution	16 bit
Rated surge voltage	2.5 kV
Overload for 1 s	60 A (sinusoidal)

Ethernet interface (only module 96-PA-RCM-EL)		
Connection	RJ45	
Functions	Modbus gateway	
Protocols	ARP, IPv4, ICMP (ping)	
	TCP, UDP	Port: Application specific
	Modbus TCP	Port: 502
	Modbus UDP	Port: 502
	DHCP/BootP	Port: 67/68 (UDP)
	DNS server	Port: 53 (UDP)
	NTP server	Port: 123 (UDP)

Terminal connection capacity – Analog inputs (residual current, current signals, temperature) Connectible conductors. Connect one conductor per terminal position!	
Single core, multi-core, fine-stranded	0.2 - 1.5 mm², AWG 28-16
Wire ferrules (non-insulated)	0.2 - 1.5 mm², AWG 26-16
Wire ferrules (insulated)	0.2 - 1.5 mm², AWG 26-16
Tightening torque	0.2 - 0.25 Nm (1.77 - 2.21 lbf in)
Strip length	7 mm (0.2756 in)

Terminal connection capacity (current measurement I4) Connectible conductors. Connect one conductor per terminal position!	
Single core, multi-core, fine-stranded	0.2 - 4 mm², AWG 28-12
Wire ferrules (non-insulated)	0.2 - 4 mm², AWG 26-12
Wire ferrules (insulated)	0.2 - 2.5 mm², AWG 26-14
Tightening torque	0.4 - 0.5 Nm (3.54 - 4.43 lbf in)
Strip length	7 mm (0.2756 in)

Cable lengths for analog input, residual current input, temperature measurement input, current measurement input I4	
Up to 30 m (32.81 yd)	Unshielded
Greater than 30 m (32.81 yd)	Shielded

Potential isolation and electrical safety of the temperature measurement input
The temperature measurement input has: · Double insulation relative to the current measurement inputs, voltage measurement inputs and the supply voltage. · No insulation relative to the residual current input (RCM). · A functional isolation relative to the Ethernet interface. The external temperature sensor must have double insulation relative to hazardous contact voltage (according to IEC 61010-1:2010).

11.2 Performance characteristics of functions

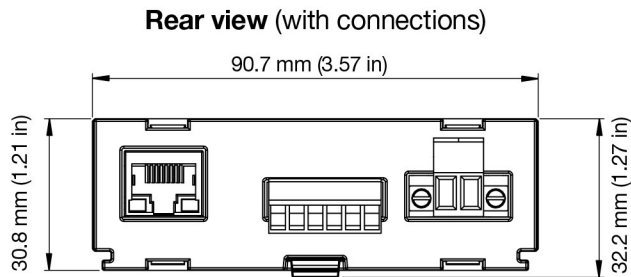| Function	Symbol	Accuracy class	Measuring range	Display range
Neutral conductor current I4, measured	I_N	1 (IEC61557-12)	0 .. 6 A_{rms}	0 A .. 999 kA
Neutral conductor current I4, calculated	I_{Nc}	1.0 (IEC61557-12)	0.03 .. 25 A	0.03 A .. 999 kA
Residual currents I5, I6	I_{Diff}	1 (IEC61557-12)	0 .. 30 mA_{rms}	0 A .. 999 kA
Temperature	T	-	See temperature sensor types	0 °C ... +100 °C (32 °F ... 212 °F)

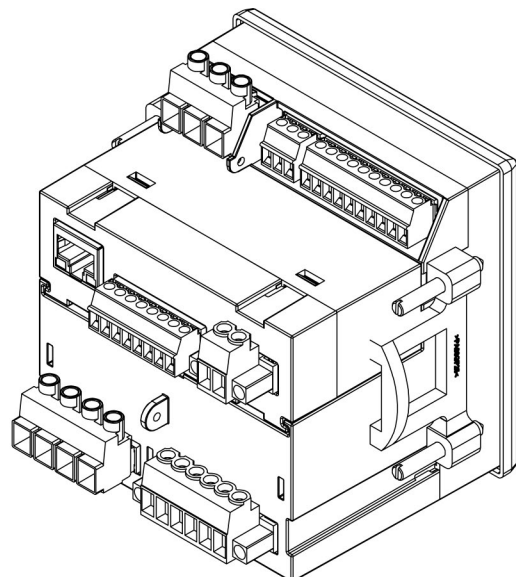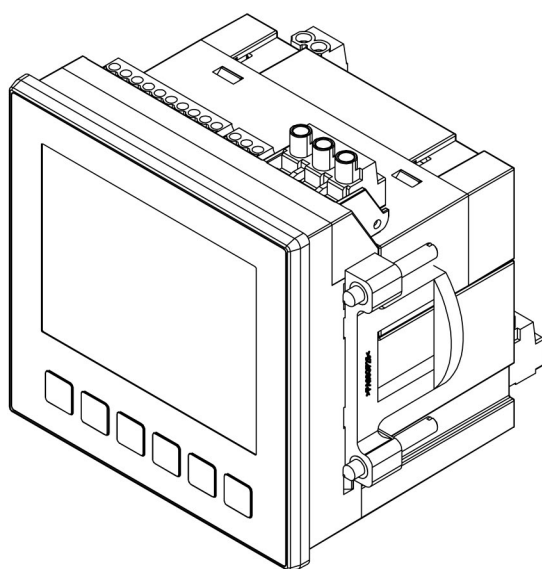Table of module-relevant "Performance characteristics of functions".

12. Dimensional drawings and views

12.1 Dimensional drawings

· All specifications in mm (in).
· The figures show the module 96-PA-RCM-EL and serve the purpose of illustration.
· The views shown are not true to scale.

Rear view (with connections)

90.7 mm (3.57 in)

30.8 mm (1.21 in)

32.2 mm (1.27 in)

Side view

45.8 mm (1.8 in)

17.2 mm (0.68 in)

58.5 mm (2.3 in)

Top view
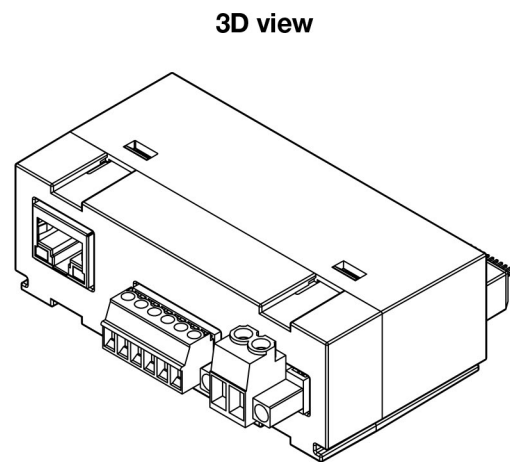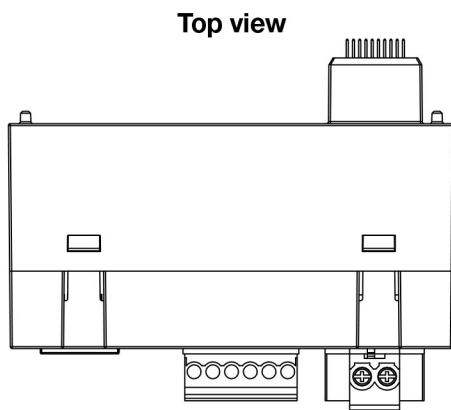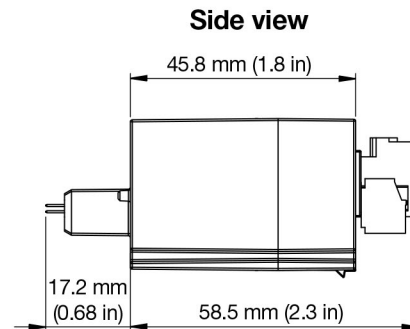
3D view

12.2 3D views of basic device with module

13. Dismounting

Dismounting module 96-PA-RCM or
96-PA-RCM-EL:

1. Disconnect the system (basic device) from the power supply!
2. Unsnap your module by carefully lifting the snapping mechanism (using your fingernail or a screwdriver, if necessary) and pull it out of the slot.

ATTENTION
Handling your module too roughly may cause damage to the module and result in material damage! When snapping in the module, the snapping mechanism can be damaged or broken off. · **Lift the snapping mechanism with care and using only slight pressure! Preferably use your fingernail (or a screwdriver, if necessary) to do so.**

| ATTENTION |
|---|
| **Dismounting or disconnecting the module while it is communicating with the basic device will result in a device fault!**
If communication between the basic device to the module is lacking or faulty during operation, a warning signal will appear on the display of the basic device (see section „8.4 Module-relevant alarms" on page 38)!
· Disconnect your system (the basic device) from the power supply prior to dismounting or disconnecting the module!
· Prior to remounting, it may be necessary to restart the basic device (see section **„8.3 Restarting the basic device" on page 37)!** |
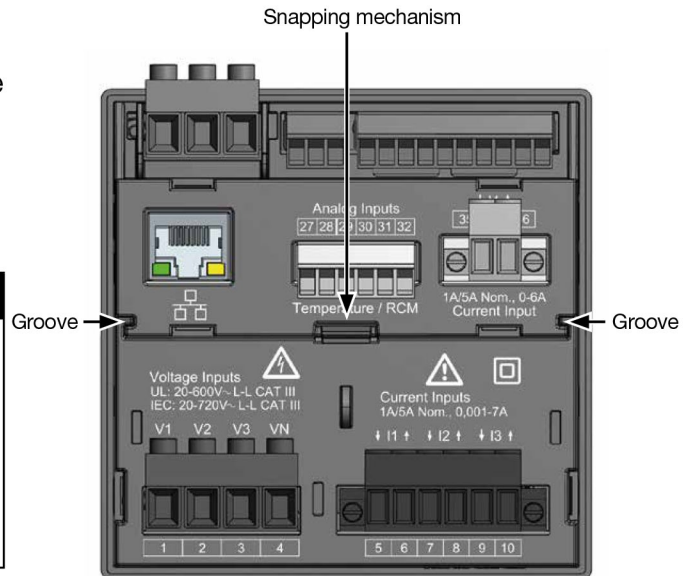
Fig. Rear view of basic device with module, snapping mechanism and groove

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