

IOA MCR-RPSS-I-I

Repeater power supply

Data sheet
109161_en_01

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1 Description

The repeater power supply and input signal conditioner are designed for electrically isolated operation of measuring transducers and mA current sources.

The 2-conductor measuring transducers are supplied with power, and analog 0/4 mA ... 20 mA measured values are electrically isolated and transferred to the controller.

You can operate the output of the module actively or passively.

The analog measured value can be overlaid with digital (HART) communication signals on the field or controller side and transmitted bidirectionally.

You can plug the device into the base elements of the VIP I/O marshalling product portfolio.

The devices are certified for safety-related applications up to SIL 2 in accordance with IEC/EN 61508.

Features

- 0/4 mA ... 20 mA input, powered and not powered
- Measuring transducer supply voltage >21 V
- 0/4 ... 20 mA output, active up to 600 Ω load or passive
- Bidirectional HART signal transmission
- Error indication according to NAMUR NE 43
- SIL 2 / SC3 in accordance with IEC/EN 61508
- Installation in Ex zone 2 permitted
- Safe 3-way electrical isolation
- Housing width of 10 mm



Make sure you always use the latest documentation.

It can be downloaded from the product at phoenixcontact.com/products.

This document is valid for the products listed in the “Ordering data” chapter.

2 Table of contents

1	Description	1
2	Table of contents	2
3	Ordering data	3
4	Technical data	5
5	Safety regulations and installation notes	9
5.1	Installation notes	9
5.2	Installation in the Ex area (zone 2)	9
5.3	Installation in areas with a danger of dust explosions (zone 22)	9
5.4	Safety-related applications (SIL)	9
6	Installation	10
6.1	Connection notes	10
6.2	Electrostatic discharge	10
6.3	Structure	10
6.4	Basic circuit diagram with connection terminal blocks	11
6.5	Input	11
6.6	Output	11
6.7	HART signal transmission	11
6.8	Dimensions	11
6.9	Power supply	11
6.10	Mounting	12
6.11	LED status indicators	12
7	Safety-related applications	13
8	Digital nameplate	13
9	Revision history	13

3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Repeater power supply and input signal conditioner, HART-transparent, for VIP I/O marshalling base elements: Transmits 0/4 mA ... 20 mA signals to a load (active or passive). 3-way electrical isolation, SIL 2, SC 3 in accordance with IEC 61508	IOA MCR-RPSS-I-I	1085774	1
Accessories	Type	Item no.	Pcs./Pkt.
8-channel VIP I/O marshalling base element for universal use. All connections as screw connection technology. This module with the D-SUB 25 connector is pin compatible with the Foxboro I/A series DCS.	VIP/S/D25M/BASE 1-8/L/C/EX	2906595	1
16-channel VIP I/O marshalling base element for universal use. Plug-in field and supply terminals available as accessories. Either with screw or Push-in connection technology. Compatible with the Tricon CX DCS series (D-SUB 50).	VIP/MSTB/D50M/BASE/16CH/CX/EX	2908788	1
16-channel VIP I/O marshalling base element with 37-pos. D-SUB connector for universal use. Plug-in field and supply terminals available as accessories. Either with screw or Push-in connection technology.	BASE-MSTB/D37M/16CH/EX	1065476	1
8-channel VIP I/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 1–8.	VIP/S/MC/BASE 1-8/L/EX	2906596	1
8-channel VIP I/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 9–16.	VIP/S/MC/BASE 9-16/L/EX	2906630	1
8-channel VIP I/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 17–24.	VIP/S/MC/BASE 17-24/L/EX	2907024	1
8-channel VIP I/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 25–32.	VIP/S/MC/BASE 25-32/L/EX	2907025	1
8-channel VIP I/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 1–8 and painting.	VIP/S/MC/BASE 1-8/L/C/EX	2907186	1
8-channel VIP I/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 9–16 and painting.	VIP/S/MC/BASE 9-16/L/C/EX	2907187	1

Accessories	Type	Item no.	Pcs./Pkt.
8-channel VIPI/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 17–24 and painting.	VIP/S/MC/BASE 17-24/L/C/EX	2907209	1
8-channel VIPI/O marshalling base element for universal use. All connections as screw connection technology. With the COMBICON connector, compatible with the Honeywell C300 and RUSIO series. Marking for channels 25–32 and painting.	VIP/S/MC/BASE 25-32/L/C/EX	2907210	1
Marker for terminal blocks, Sheet, white, unlabeled, can be labeled with: BLUEMARK E.CARD, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: latching, for terminal block width: 6.2 mm, Number of individual labels: 80, text field height: 10.5 mm, text field width: 5.6 mm	UC-TM 6	0818085	10
Marker for terminal blocks, Sheet, blue, unlabeled, can be labeled with: BLUEMARK E.CARD, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: latching, for terminal block width: 6.2 mm, Number of individual labels: 80, text field height: 10.5 mm, text field width: 5.6 mm	UC-TM 6 BU	0818344	10
Zack marker strip, Strip, white, unlabeled, can be labeled with: PLOTMARK, CMS-P1-PLOTTER, mounting type: latching, for terminal block width: 5.08 mm, Number of individual labels: 10, text field height: 10.5 mm, text field width: 4.98 mm	ZB 5,08:UNBEDRUCKT	0809793	10
Marker pen, for manual labeling of unprinted Zack strips, smear-proof and waterproof, line thickness 0.5 mm	B-STIFT	1051993	10

4 Technical data

Hardware/firmware version

Hardware/firmware version (1085774) 00 / -

The technical data and safety characteristics are valid as of the specified HW/FW version.

Input data Repeater power supply operation

Description of the input	Active current input
Input signal	Current
Current input signal	4 mA ... 20 mA
Current limitation	23.5 mA
Transmitter supply voltage	> 21 V (20 mA) > 21 V (24 mA)
Underload/overload signal range	0 mA ... 23 mA (Extended transmission range for diagnostics)

Input data Signal conditioner operation

Description of the input	Passive current input
Current input signal	0 mA ... 20 mA 4 mA ... 20 mA
Voltage drop	< 3.5 V (in input isolating amplifier operation)
Underload/overload signal range	0 mA ... 24 mA (500 Ω)

Output data Repeater power supply operation

Output description	Current output (active and passive)
Current output signal	4 mA ... 20 mA (active) 4 mA ... 20 mA (Passive, external source voltage 19.2 V ... 26.4 V)
Underload/overload signal range	0 mA ... 24 mA (Extended transmission range for diagnostics)
Load/output load current output	$\leq 600 \Omega$ (20 mA)
Output ripple	< 20 mV _{rms}
Output behavior in the event of an error as per NE 43	0 mA (Cable break in the input) ≥ 22.5 mA (Cable short-circuit in the input)

Output data Signal conditioner operation

Output description	Current output (active and passive)
Current output signal	0 mA ... 20 mA (active) 4 mA ... 20 mA (active) 0 mA ... 20 mA (Passive, external source voltage 19.2 V ... 26.4 V) 4 mA ... 20 mA (Passive, external source voltage 19.2 V ... 26.4 V)
Underload/overload signal range	0 mA ... 22.5 mA (Extended transmission range for diagnostics)
Load/output load current output	$\leq 600 \Omega$ (20 mA)
Output ripple	< 20 mV _{rms}
Output behavior in the event of an error as per NE 43	0 mA (Cable break in the input) 0 mA (Cable short-circuit in the input)

Supply Repeater power supply operation

Nominal supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 30 V DC -20 % ... +25 %
Max. current consumption	< 62 mA (24 V DC / 20 mA / 600 Ω) < 77 mA (19.2 V DC / 20 mA / 600 Ω) < 54 mA (24 V DC / 20 mA / 250 Ω)
Power dissipation	
Output active	< 0.8 W (24 V DC / 20 mA / 600 Ω)
Output active	< 0.8 W (24 V DC / 20 mA / 250 Ω)
Passive output	< 1.2 W (24 V DC / 20 mA / 0 Ω)
Power consumption	
Output active	< 1.5 W (24 V DC / 20 mA / 600 Ω)
Output active	< 1.3 W (24 V DC / 20 mA / 250 Ω)

Supply Signal conditioner operation

Nominal supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 30 V DC -20 % ... +25 %
Max. current consumption	< 35 mA (24 V DC / 20 mA / 600 Ω) < 44 mA (19.2 V DC / 20 mA / 600 Ω) < 27 mA (24 V DC / 20 mA / 250 Ω)
Power dissipation	
Output active	< 0.6 W (24 V DC / 20 mA / 600 Ω)
Output active	< 0.6 W (24 V DC / 20 mA / 250 Ω)
Passive output	< 1 W (24 V DC / 20 mA / 0 Ω)
Power consumption	
Output active	< 0.8 W (24 V DC / 20 mA / 600 Ω)
Output active	< 0.6 W (24 V DC / 20 mA / 250 Ω)

General data

Transmission error, typical	< 0.05 % (of final value)
Maximum transmission error	< 0.1 % (of final value)
Signal transmission behavior	In = Out
Temperature coefficient, typical	< 0.004 %/K
Maximum temperature coefficient	< 0.01 %/K
Step response (10-90%)	< 200 µs (for jump 0 mA ... 20 mA, load 100 Ω) < 400 µs (for jump 4 mA ... 20 mA, load 600 Ω)
Reverse polarity protection	yes
HART function	HART transparency
Protocols supported	HART
Signal bandwidth	as per HART specifications
Mounting position	any
Degree of protection	IP20
Flammability rating according to UL 94	V0 (Housing)
Status display	Green LED (supply voltage)
Dimensions W/H/D	10.3 mm / 80.1 mm / 136 mm (IOA MCR-RPSS-I-I)
Type of housing	PA 6.6-FR

Ambient conditions

Ambient temperature (operation)	-40 °C ... 70 °C (Any mounting position)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Operating mode	Indoor use

Electrical isolation (≤ 2000 m above mean sea level)

Electrical isolation	3-way isolation
Overvoltage category	II (≤ 5000 m)
Pollution degree	2 (≤ 5000 m)
Input/output/power supply	
Standards/regulations	IEC/EN 61010-1
Rated insulation voltage	200 V _{rms}
Test voltage	2.3 kV AC (50 Hz, 60 s)
Insulation	Double/reinforced insulation
Input/output/power supply	
Standards/regulations	IEC/EN 60079-7
Rated insulation voltage	251 V _{rms} 355 V _p

Altitude range IEC/EN 61010-1

Height range	> 2000 m ... 3000 m
Ambient temperature (operation)	-40 °C ... 63 °C
Rated insulation voltage	150 V _{rms} (Input/output/power supply)
Insulation	Double/reinforced insulation
Height range	> 3000 m ... 4000 m
Ambient temperature (operation)	-40 °C ... 56 °C
Rated insulation voltage	150 V _{rms} (Input/output/power supply)
Insulation	Double/reinforced insulation
Height range	> 4000 m ... 5000 m
Ambient temperature (operation)	-40 °C ... 49 °C
Rated insulation voltage	150 V _{rms} (Input/output/power supply)
Insulation	Double/reinforced insulation

Altitude range IEC/EN 60079-7

Height range	> 2000 m ... 3000 m
Ambient temperature (operation)	-40 °C ... 63 °C
Rated insulation voltage	162 V _{rms} (Input/output/power supply) 230 V _p (Input/output/power supply)
Height range	> 3000 m ... 4000 m
Ambient temperature (operation)	-40 °C ... 56 °C
Rated insulation voltage	60 V _{rms} (Input/output/power supply) 84 V _p (Input/output/power supply)
Height range	> 4000 m ... 5000 m
Ambient temperature (operation)	-40 °C ... 49 °C
Rated insulation voltage	60 V _{rms} (Input/output/power supply) 84 V _p (Input/output/power supply)

Connection data

Connection method	Plug-in connection
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Conformance with EMC directive

Noise immunity according to EN 61000-6-2

When being exposed to interference, there may be minimal deviations.

Noise emission according to EN 61000-6-4

Conformance/approvals

CE

CE-compliant
and EN 61326

ATEX
PxCIF08ATEX2865955X

⊕ II 3 G Ex ec IIC T4 Gc

IECEx
IECEx BVS 08.0016X

Ex ec IIC T4 Gc

UL, USA/Canada
E330267

UL 61010-1
UL 61010-2-201
UL 61010-2-030
CAN/CSA No. 61010-1-12
CAN/CSA C22.2 No. 61010-2-201
CSA C22.2 No. 61010-2-030

Safety Integrity Level (SIL, IEC 61508)
1435.IM.131623/19, V1.0

2

Systematic Capability

3

Corrosive gas test

ISA S71.04.2013 G3 Harsh Group A

5 Safety regulations and installation notes

5.1 Installation notes

- The EPL Gc (ATEX category 3) device is suitable for installation in zone 2 potentially explosive areas. It satisfies the requirements of the following standards:
IEC/EN 60079-0, IEC/EN 60079-7
For detailed information, please refer to the declarations of conformity.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described.
- When installing and operating the device, observe the applicable regulations and safety directives (including national safety directives), as well as the generally recognized technical regulations.
- Observe the safety information, conditions, and limits of use specified in the product documentation. Comply with them.
- The device must not be opened or modified. Do not repair the device yourself, replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from violation.
- The IP20 degree of protection (IEC/EN 60529) specifies that the device is intended for use in a clean and dry environment. Do not subject the device to mechanical and/or thermal stress that exceeds the specified limits.
- The device complies with the EMC regulations for industrial areas (EMC class A). When using the device in residential areas, it may cause radio interference.
- The device must be stopped if it is damaged, has been subjected to an impermissible load, stored incorrectly, or if it malfunctions.
- Only use base elements that are approved for this item.

5.2 Installation in the Ex area (zone 2)

- Observe the specified conditions for use in potentially explosive areas. Install the device in a suitable, approved housing with a minimum degree of protection of IP54 that satisfies the requirements of IEC/EN 60079-7. Also observe the requirements of IEC/EN 60079-14.
- As a specific condition for safe use, the device must be mounted in an environment with pollution degree 2 or better. In a potentially explosive area, the device must be additionally mounted in housing with IP54 degree of protection that meets the requirements of IEC 60079-0.
- Plugging and unplugging operations are only permitted in potentially explosive areas when the power is disconnected.
- The device must be stopped and immediately removed from the Ex area if it is damaged, was subject to an impermissible load, stored incorrectly or if it malfunctions.

5.3 Installation in areas with a danger of dust explosions (zone 22)

- The device is not suitable for installation in zone 22.
- If, however, you wish to use the device in zone 22, you must install it in housing that complies with IEC/EN 60079-31. When doing so, observe the maximum surface temperatures. Observe the requirements of IEC/EN 60079-14.
- Connection to the intrinsically safe circuit in areas with a danger of dust explosions (zone 20, 21 or 22) is only permitted if the equipment connected to this circuit is approved for this zone (e.g., category 1D, 2D or 3D).

5.4 Safety-related applications (SIL)



NOTE: Risk of damage to equipment

When using the device in safety-related applications, observe the instructions in the SIL manual for the VIP I/O marshalling portfolio at www.phoenixcontact.com/products, as the requirements may differ for safety-related functions.

6 Installation

6.1 Connection notes



WARNING: Electrical danger due to improper installation

Observe the connection notes for safe installation in accordance with EN/UL 61010-1:

- Disconnecting devices and branch circuit protection with suitable AC or DC rating shall be provided in the building installation.
- The device is intended for installation in a control cabinet or in a comparable enclosure. The device may only be operated when it has been installed. The control cabinet must meet the requirements of UL/IEC 61010-1 in terms of protection against spread of fire and protection against electric shock or burn.
- Provide a switch/circuit breaker close to the device that is labeled as the disconnect device for this device (or the entire control cabinet).
- Provide for an overcurrent protection device ($I \leq 16\text{ A}$) in the installation.
- To protect the device against mechanical or electrical damage, install it in a suitable housing with appropriate degree of protection as per IEC 60529.
- During installation, servicing, and maintenance work, disconnect the device from all effective power sources, provided you are not dealing with SELV or PELV circuits.
- If the device is not used as described in the documentation, the intended protection can be negatively affected.
- The housing of the device provides a basic insulation against the neighboring devices for $300\text{ V}_{\text{eff}}$. If several devices are installed next to each other, this must be taken into account. If the neighboring device is equipped with basic insulation, no additional insulation is required.
- The voltages applied to the input, output, and power supply are extra-low voltages (ELV). Depending on the application, hazardous contact voltage ($>30\text{ V AC}/>60\text{ V DC}$) to ground may occur. Safe electrical isolation from the other connections exists for this case.

6.2 Electrostatic discharge



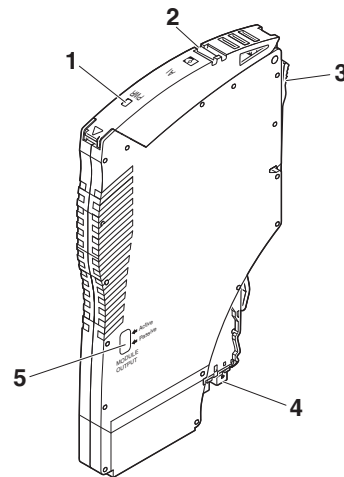
NOTE: Electrostatic discharge

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-2.

Take protective measures against electrostatic discharge before operating or installing the device.

6.3 Structure

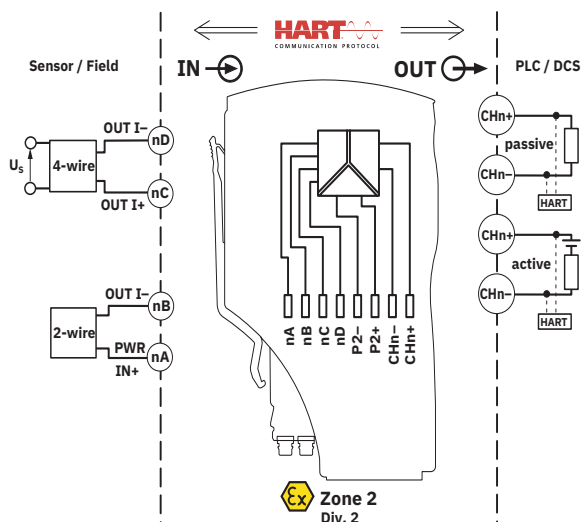
Figure 1 Structure



- 1 Green "PWR" LED, power supply
- 2 Module cover with integrated groove for custom marking
- 3 Release hook
- 4 Coding plug
- 5 DIP switch for setting the output on the controller side (active/passive)

6.4 Basic circuit diagram with connection terminal blocks

Figure 2 Basic circuit diagram



6.5 Input

- Repeater power supply operation (2-conductor transmitter or 2-conductor measuring transducer) at terminal block nA (+) and nB (-)
- Input signal conditioner operation (4-conductor transmitter or current sources) at terminal blocks nC (+) and nD (-)

6.6 Output

You can switch the output from passive (delivery state) to active using the switch on the side of the module.

Active

In active mode, the output acts as a power source.
The load connected is operated by the module.
The input card connected has to be passive.

Passive

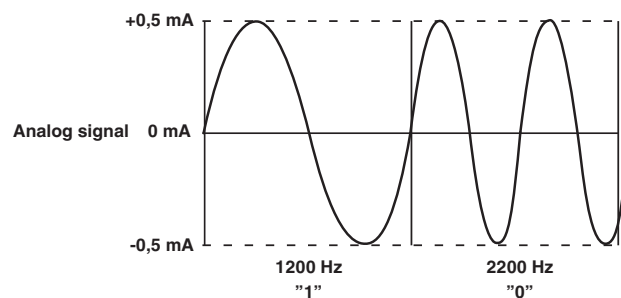
In passive mode, the output acts as a power sink.
The current circuit is fed externally and the module sets the current value.
The input card connected has to be active.

6.7 HART signal transmission

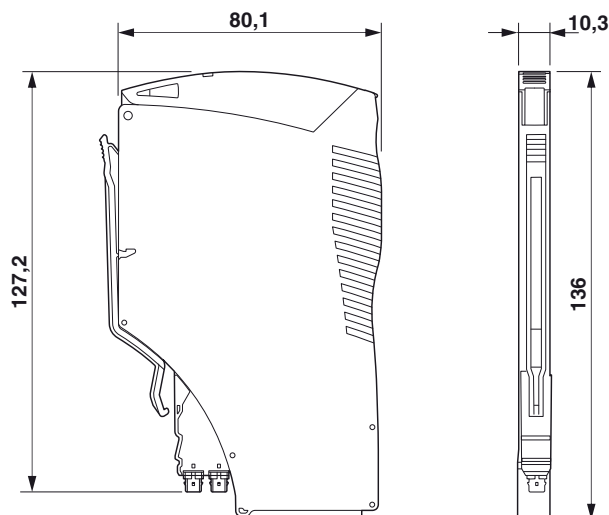
In the case of the HART protocol, a digital signal is modulated over the analog measuring signal. Data communication between the transmitter and the control device of the process control system can then take place.

Data communication is possible in repeater power supply operation and in isolator operation.

Figure 3 Signal transmission



6.8 Dimensions



6.9 Power supply

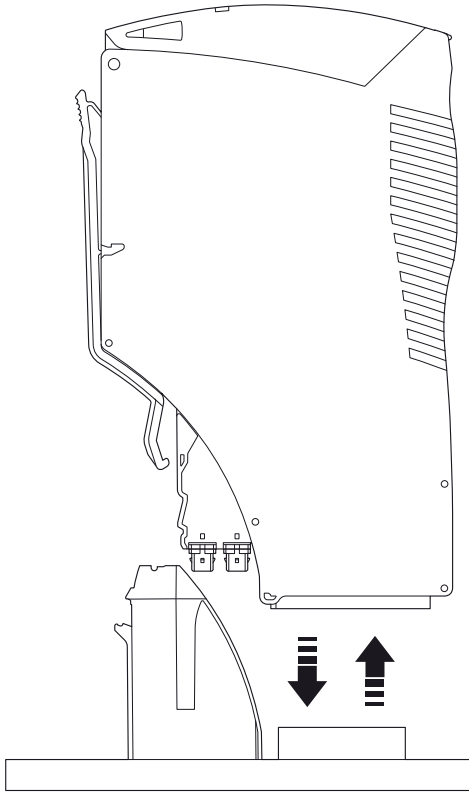
The device is supplied with power via the base element.
Observe the information on the packing slip of the selected base element, as well as the information in the VIP I/O-marshalling user manual.

108825 UM DE VIP I/O-Marshalling

6.10 Mounting

You can plug the device into the base elements of the VIP I/O marshalling product portfolio.

Figure 4 Mounting and removing



6.10.1 IOA... plug installation

1. Align the IOA.../EX plug with the desired slot on the base.
2. Push the plug into the slot on the base. Ensure that the orange latch snaps down over the catch on the base, securing the plug in place.



The IOA... plug is coded to match the base. The coding is transferred to the VIP/.../BASE.../EX base when first installed.

6.10.2 IOA... plug removal



DANGER

Do not remove the plug while the power is connected if the area is potentially explosive.

1. Grasp the IOA.../EX module, with one finger on the orange latch, and squeeze the latch to release it.
2. Pull the module straight out from the base. An indentation will be felt as the internal connections are separated.



If a different style of IOA... must be installed in a base after initial installation, the coding interface can be removed with a tool and a new IOA... installed with a different coding interface.

6.11 LED status indicators

LED	Color/status	Description
PWR	Green	Supply voltage
	On	Ready to operate

7 Safety-related applications

The following notes apply for the devices:

Designation	Item No.
IOA MCR-RPSS-I-I	1085774
IOA MCR-EX-RPSS-I-I	1085761

A hardware assessment (FMEDA report) is available for the devices listed above: 1435.IM.131623/19



All further information on the device for safety-related applications can be found in the “VIP I/O marshalling safety characteristics (SIL)” user manual.

8 Digital nameplate

The digital nameplate provides the option of obtaining product-specific data related to a specific serial number.

If you scan the QR code (digital nameplate) on the device, you can, for example, retrieve documents on the production status as well as clearly identify the hardware and firmware status of the device at hand.

9 Revision history

Document revision	Hardware revision	Firmware revision	Date	Description
01	00	1.100	2025-05-22	Correction of the rated insulation voltage according to IEC/EN 61010-1
00	00	-	2025-03-26	First publication