

Technical Information

RLN22

NAMUR isolating amplifier

1- or 2-channel NAMUR isolating amplifier 24 V DC with relay signal output



Application

- Isolating amplifier for the transmission of binary switch signals
- Input for proximity sensors according to NAMUR (EN60947-5-6) and open contacts or contacts with resistive coupling elements
- Galvanic 3-way isolation
Suitable for safety-oriented applications up to SIL 2 in accordance with IEC61508
- Optionally with resistive coupling element for line monitoring of mechanical switching contacts
- Monitoring of input circuits for line faults such as breakage and short-circuit (LFD), disengageable
Group error message via DIN rail bus connector at power and error message module
- Output-side relay contacts as signal output, direction of action (operating or quiescent current behavior) can be selected via DIP switches
- For ambient temperatures -40 to 60 °C (-40 to 140 °F)

Your benefits

- Compact housing width: 12.5 mm (0.49 in)
- Installation in Ex zone 2 permitted in the option with Ex approval
- Simple and quick wiring with plug-in terminals, optional power supply and error message via DIN rail bus connector

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Function and system design

Product description

Product design

NAMUR isolating amplifier 1-channel

- With the "1-channel changeover" option, the 1-channel NAMUR isolating amplifier is designed for the operation of proximity switches (as per EN 60947-5-6 (NAMUR)) and open and mechanical contacts with resistive coupling elements. A relay (changeover) is available as the signal output.
- The device is optionally available with Ex approvals for the intrinsically safe operation of proximity switches installed in the hazardous area. Separate Ex documentation (XA) is supplied with these devices. Compliance with the installation instructions and connection data in this documentation is mandatory!
- A resistive coupling element (1 k Ω / 10 k Ω) is available as an optional accessory and can be used to monitor line faults of sensors with mechanical contacts. The resistive coupling element is installed onsite directly at the contact to be monitored or in the sensor connection compartment.

NAMUR isolating amplifier 2-channel

With the "2-channel, NO contact" option, the device has a second channel, which is galvanically isolated from channel 1, while maintaining the same width. A relay (NO contact) is available as the signal output. Otherwise, the function corresponds to the 1-channel device.

Dependability

We only provide a warranty if the device is installed and used as described in the Operating Instructions.

Input

Version

The following versions are available:

- 1-channel
- 2-channel

Input data

(floating switch contacts with resistive coupling elements to connect NAMUR proximity switches (IEC/EN 60947-5-6))

Switch points	Blocking: < 1.2 mA Conducting: > 2.1 mA	Line fault detection (response range)	Open circuit: 0.05 mA < I _N < 0.35 mA Short-circuit: 100 Ω < R _{sensor} < 360 Ω
Short-circuit current	~ 8 mA	Open-circuit voltage	~ 8 V _{DC}
Switching hysteresis	< 0.2 mA		

Output

Relay output data

Relay output data

Contact design	1-channel: 1 changeover 2-channel: 1 NO contact per channel	Mechanical operating life	10 ⁷ switching cycles
Switching voltage, maximum switching current	250 V _{DC} (2 A) / 120 V _{DC} (0.2 A) / 30 V _{DC} (2 A)	Recommended minimum load	5 V / 10 mA
Maximum switching capacity	500 VA	Switching frequency (no load)	≤ 20 Hz
Contact material	AgSnO ₂ , hard gold plated	Direction of action	Operating current or closed circuit current

Signal on alarm	Output behavior in an alarm condition	If line fault detection is switched on and the line to the sensor is disconnected or short-circuits, the relay de-energizes in such a way that the output is set to the safe, non-conducting state.
	Line break in input (response range)	$0.05 \text{ mA} < I_{\text{IN}} < 0.35 \text{ mA}$
	Monitored range for line break	$I_{\text{IN}} < 0.05 \text{ mA}$
	Line short circuit in input (response range)	$100 \Omega < R_{\text{sensor}} < 360 \Omega$
	Monitored range for short circuit	$R < 100 \Omega$

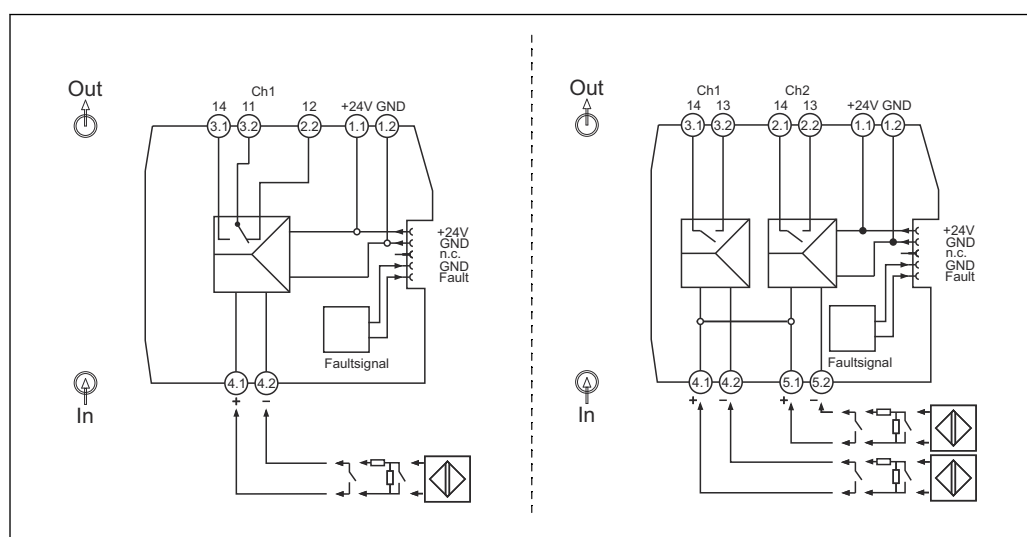
Ex connection data See associated XA Safety Instructions

Galvanic isolation	Input / output	Peak value as per EN 60079-11 375 V
	Input / power supply, DIN rail bus connector	Peak value as per EN 60079-11 375 V

Power supply

Terminal assignment

Quick wiring guide



A0042196

1 Terminal assignment of RLN22: 1-channel version (left), 2-channel version (right)

Connecting the supply voltage

Power can be supplied via terminals 1.1 and 1.2 or via the DIN rail bus connector.

Performance characteristics

Power supply

Supply voltage range	19.2 to 30 V _{DC} (24 V _{DC} (-20% / +25%))	Current consumption at 24 V _{DC}	1-channel: ≤ 21 mA 2-channel: ≤ 35 mA
Supply current to the DIN rail bus connector	Max. 400 mA	Power consumption at 24 V _{DC}	1-channel: < 0.65 W 2-channel: < 0.8 W
		Power loss at 24 V _{DC}	1-channel: < 0.65 W 2-channel: < 1 W

Terminals	Terminal design	Cable design	Cable cross-section
	Screw terminals Tightening torque: minimum 0.5 Nm/maximum 0.6 Nm	Rigid or flexible (Stripping length = 7 mm (0.28 in))	0.2 to 2.5 mm ² (24 to 14 AWG)
		Flexible with wire end ferrules (with or without plastic ferrule)	0.25 to 2.5 mm ² (24 to 14 AWG)
	Push-in spring terminals	Rigid or flexible (Stripping length = 10 mm (0.39 in))	0.2 to 2.5 mm ² (24 to 14 AWG)
		Flexible with wire end ferrules (with or without plastic ferrule)	0.25 to 2.5 mm ² (24 to 14 AWG)

Performance characteristics

Response time Following a change of state at the input, the output adopts the safe state in ≤ 40 ms.

Mounting

Mounting location The device is designed for installation on 35 mm (1.38 in) DIN rails in accordance with IEC 60715 (TH35).
 The device's housing provides basic insulation from neighboring devices for 300 Veff. If several devices are installed side by side, this must be taken into consideration and additional insulation must be provided if necessary. If the adjacent device also offers basic insulation, no additional insulation is required.

NOTICE

- ▶ When using in hazardous areas, the limit values of the certificates and approvals must be observed.

Installing a DIN rail device The device can be installed in any position (horizontal or vertical) on the DIN rail without lateral clearance from neighboring devices. No tools are required for installation. The use of end brackets (type "WEW 35/1" or equivalent) on the DIN rail is recommended to fix the device.

Environment

Important ambient conditions	Ambient temperature range	-40 to 60 °C (-40 to 140 °F)	Storage temperature	-40 to 80 °C (-40 to 176 °F)
	Degree of protection	IP 20	Overvoltage category	II
	Pollution degree	2	Humidity	10 to 95 % No condensation
	Altitude	$\leq 2\,000$ m (6 562 ft)		

Shock and vibration resistance Vibration resistance as per DNVGL-CG-0339 : 2015 and DIN EN 60068-2-27
 DIN rail device: 2 to 100 Hz at 0.7g (general vibration stress)
 Shock resistance as per KTA 3505 (section 5.8.4 Shock test)

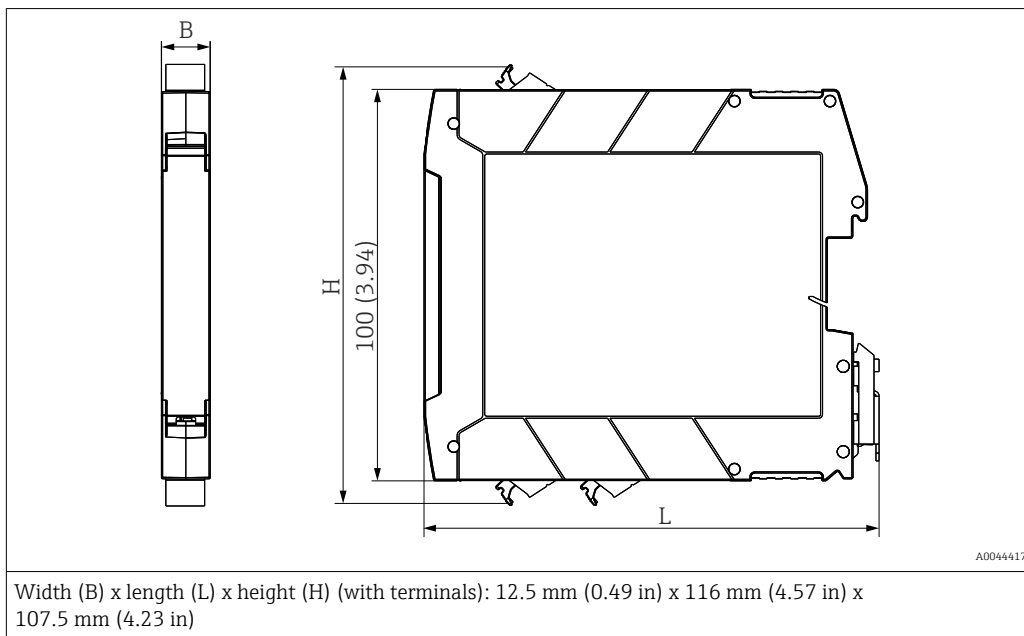
Electromagnetic compatibility (EMC) Interference immunity as per EN 61000-6-2
 Interference emission as per EN 61000-6-4

Mechanical construction

Design, dimensions

Dimensions in mm (in)

Terminal housing for mounting on DIN rail



Weight

Device with terminals (values rounded up):

1-channel: approx. 110 g (3.88 oz); 2-channel: approx. 120 g (4.23 oz)

Color

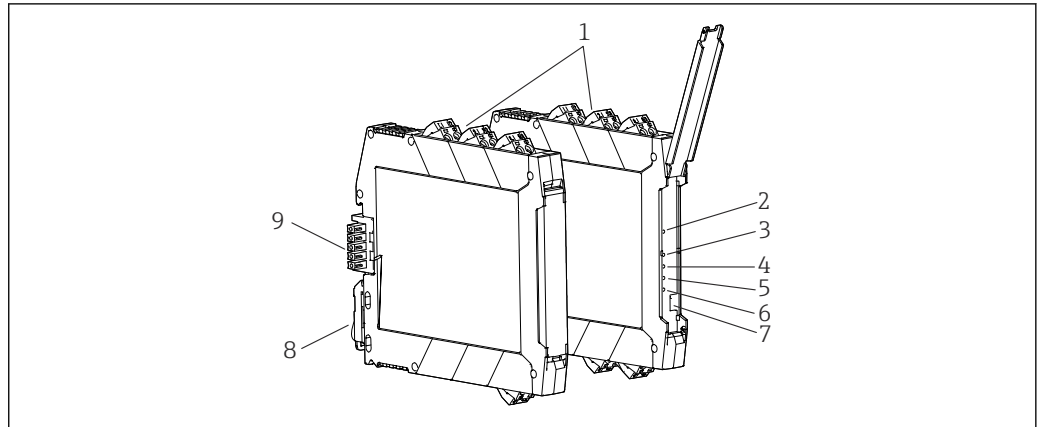
Light gray

Materials

All the materials used are RoHS-compliant.

Housing: polycarbonate (PC); flammability rating according to UL94: V-0

Display and operating elements




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2 Display and operating elements

- 1 Plug-in screw or push-in terminal
- 2 Green LED "On", power supply
- 3 Red LED "LF1", line fault of sensor cable 1
- 4 Red LED "LF2", line fault of sensor cable 2 (optional)
- 5 Yellow LED "OUT1", status relay 1
- 6 Yellow LED "OUT2", status relay 2 (optional)
- 7 DIP switches 1 to 4
- 8 DIN rail clip for DIN rail mounting
- 9 DIN rail bus connector (optional)

Local operation

Hardware settings / configuration

 Any device settings using the DIP switch must be made when the device is de-energized.

Direction of action

At the device, the direction of action (operating or closed circuit current behavior) can be selected and line fault detection can be enabled or disabled via DIP switches.

DIP switch 1 = channel 1; DIP switch 3 = channel 2 (optional)

All DIP switches are set to the "I" position when the device is delivered from the factory:

- I = normal phase (operating current behavior)
- II = inverse phase (closed circuit current behavior)

Line fault detection

DIP switch 2 = channel 1; DIP switch 4 = channel 2 (optional)

I = line fault detection switched off - **not permitted for safety-oriented applications!**

II = line fault detection switched on

If a line fault occurs, the relay is de-energized and the red LED "LF" flashes (NE 44).

An error message is transmitted to the power and error message module RNF22 via the DIN rail bus connector and forwarded as a group error message.

NOTICE

Error detection malfunctions

- ▶ For switch contacts with an open circuit, line fault detection (LF) must be disabled or the corresponding resistance circuit (1 kΩ/10 kΩ) must be provided directly at the contact. (📖 See the "Quick wiring guide" and "Accessories" sections of the Operating Instructions)

Truth table, 1-channel

Sensor at input		Input circuit	DIP switch Channel 1		Output Relay contact, changeover		LED	
Switch	NAMUR		1	2	NO 3.2/3.1	NC 3.2/2.2	OUT	LF
Open	Blocking	OK	I	I	Open	Closed		
Closed	Conducting	OK	I	I	Closed	Open	X	
Open	Blocking	OK	II	I	Closed	Open	X	
Closed	Conducting	OK	II	I	Open	Closed		
	Blocking	OK	I	II	Open	Closed		
	Conducting	OK	I	II	Closed	Open	X	
	Any state	Wire break	I	II	Open	Closed		X
	Any state	Short circuit	I	II	Open	Closed		X
	Blocking	OK	II	II	Closed	Open	X	
	Conducting	OK	II	II	Open	Closed		
	Any state	Wire break	II	II	Open	Closed		X
	Any state	Short circuit	II	II	Open	Closed		X

Truth table, 2-channel

Sensor at input		Input circuit	DIP switch Channel 1		DIP switch Channel 2		Output Relay contact	LED	
Switch	NAMUR		1	2	3	4		NO contact	OUT
Open	Blocking	OK	I	I	I	I	Open		
Closed	Conducting	OK	I	I	I	I	Closed	X	
Open	Blocking	OK	II	I	II	I	Closed	X	
Closed	Conducting	OK	II	I	II	I	Open		
	Blocking	OK	I	II	I	II	Open		
	Conducting	OK	I	II	I	II	Closed	X	
	Any state	Wire break	I	II	I	II	Open		X
	Any state	Short circuit	I	II	I	II	Open		X
	Blocking	OK	II	II	II	II	Closed	X	
	Conducting	OK	II	II	II	II	Open		
	Any state	Wire break	II	II	II	II	Open		X
	Any state	Short circuit	II	II	II	II	Open		X

Ordering information

Detailed ordering information is available from the nearest sales organization www.addresses.endress.com or in the Product Configurator under www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.

The **Configuration** button opens the Product Configurator.



Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Accessories

Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website:

www.endress.com.

Device-specific accessories	Type	Order code
	DIN rail bus connector 12.5 mm (x 1)	71505349
	Resistive coupling element, 1K/10K Ohm (x 1)	71505353
	System power supply	RNB22
	Power and error message module	RNF22

Service-specific accessories	Accessories	Description
	Configurator	<p>Product Configurator - the tool for individual product configuration</p> <ul style="list-style-type: none"> ■ Up-to-the-minute configuration data ■ Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language ■ Automatic verification of exclusion criteria ■ Automatic creation of the order code and its breakdown in PDF or Excel output format ■ Ability to order directly in the Endress+Hauser Online Shop <p>The Configurator is available on the Endress+Hauser website at: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.</p>
	W@M	<p>Life cycle management for your plant</p> <p>W@M offers assistance with a wide range of software applications over the entire process: from planning and procurement to the installation, commissioning and operation of the measuring devices. All the relevant information is available for every measuring device over the entire life cycle, such as the device status, device-specific documentation, spare parts etc.</p> <p>The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records.</p> <p>W@M is available: Via the Internet: www.endress.com/lifecyclemanagement</p>

Certificates and approvals



For the approvals available, see the Configurator on the specific product page:
www.endress.com → (search for device name)

CE mark

The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE-mark.

Functional safety A SIL version of the device is optionally available. It can be used in safety equipment in accordance with IEC 61508 up to SIL 2 .



Please refer to Safety Manual FY01035K for the use of the device in safety instrumented systems according to IEC 61508.



Protection against modifications:

As it is not possible to disengage the operating elements (DIP switches), a lockable control cabinet is required for use in SIL applications. The cabinet must be locked by key. A normal electrical cabinet key does not suffice for this purpose.

Documentation

The following document types are available in the Downloads section of the Endress+Hauser website (www.endress.com/downloads):



For an overview of the scope of the associated Technical Documentation, refer to the following:

- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the matrix code on the nameplate

Brief Operating Instructions (KA)

Guide that takes you quickly to the 1st measured value

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

Operating Instructions (BA)

Your reference guide

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.



The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

Supplementary device-dependent documentation

Additional documents are supplied depending on the device version ordered: Always comply strictly with the instructions in the supplementary documentation. The supplementary documentation is an integral part of the device documentation.



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