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Technical Information
RLN22

NAMUR isolating amplifier



NAMUR isolating amplifier, 1- or 2-channel with 24 V_{DC}, NAMUR or switching contact input as well as relay output; optionally available with SIL and Ex

Field of application

- Isolating amplifier for the galvanically isolated transmission of binary switching signals, also suitable for use in hazardous areas (Ex zone 2)
- Input for proximity sensors according to NAMUR (IEC 60947-5-6) and for contacts with or without resistor circuits
- Optionally available with resistive coupling element for cable monitoring of mechanical switching contacts
- Monitoring of the input circuits for line faults such as breakage and short-circuit (LFD), can be disabled
- Group error message from the connected isolating amplifiers via DIN rail bus connector to the power supply and error message module
- Output-side relay contacts as signal outputs; direction of action (operating current behavior or closed circuit current behavior) can be selected via DIP switches
- For ambient temperatures −40 to 60 °C (−40 to 140 °F)

Benefits

- Safe and reliable switching operations for confidence in critical applications
- Up to SIL 2 in accordance with IEC 61508 for high functional safety
- Compact housing width: up to 2 channels in just 12.5 mm (0.49 in) for efficient use of space in the control cabinet
- Quick and easy wiring using screw or push-in terminals
- Optional power supply and error message via DIN rail bus connector

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Table of contents

Function and system design 3
Product description 3
Reliability 3

Input 3
Version 3
Input data 3

Output 3
Relay output data 3
Failure signal 4
Ex connection data 4
Galvanic isolation 4

Electrical connection 5
Terminal assignment 5
Connecting the supply voltage 5
Performance characteristics 5
Terminals 5

Performance characteristics 6
Response time 6

Installation 6
Mounting location 6
Installing a DIN rail device 6

Environment 6
Important ambient conditions 6
Shock and vibration resistance 6
Electromagnetic compatibility (EMC) 6

Mechanical construction 7
Design dimensions 7
Weight 7
Color 7
Materials 7

Display and operating elements 8
Local operation 8
Truth table, 1-channel 9
Truth table, 2-channel 9

Certificates and approvals 9
CE mark 10
Functional safety 10

Ordering information 10

Accessories 10
Device-specific accessories 10
Service-specific accessories 10
Online tools 10

Documentation 11

Function and system design

Product description

Product design

NAMUR isolating amplifier 1-channel

- With the "1-channel change-over contact" 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 (change-over contact) 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 kΩ / 10 kΩ) 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 (normally-open contact) is available as the signal output. Otherwise, the function corresponds to the 1-channel device.

Reliability

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 60947-5-6))

Switch points	Blocking: < 1.2 mA Conducting: > 2.1 mA	Line fault detection (response range)	Open circuit: 0.05 mA < I_{IN} < 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 version	1-channel: 1 change-over contact 2-channel: 1 normally-open 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	AgSnO2, hard gold plated	Direction of action	Operating current or closed-circuit current

Failure signal

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 mA < I_{IN} < 0.35 mA
Monitoring range for open-circuit detection	I_{IN} < 0.05 mA
Line short circuit in input (response range)	100 Ω < R_{sensor} < 360 Ω
Monitoring range for short circuit	R < 100 Ω

Ex connection data

See associated XA Safety Instructions

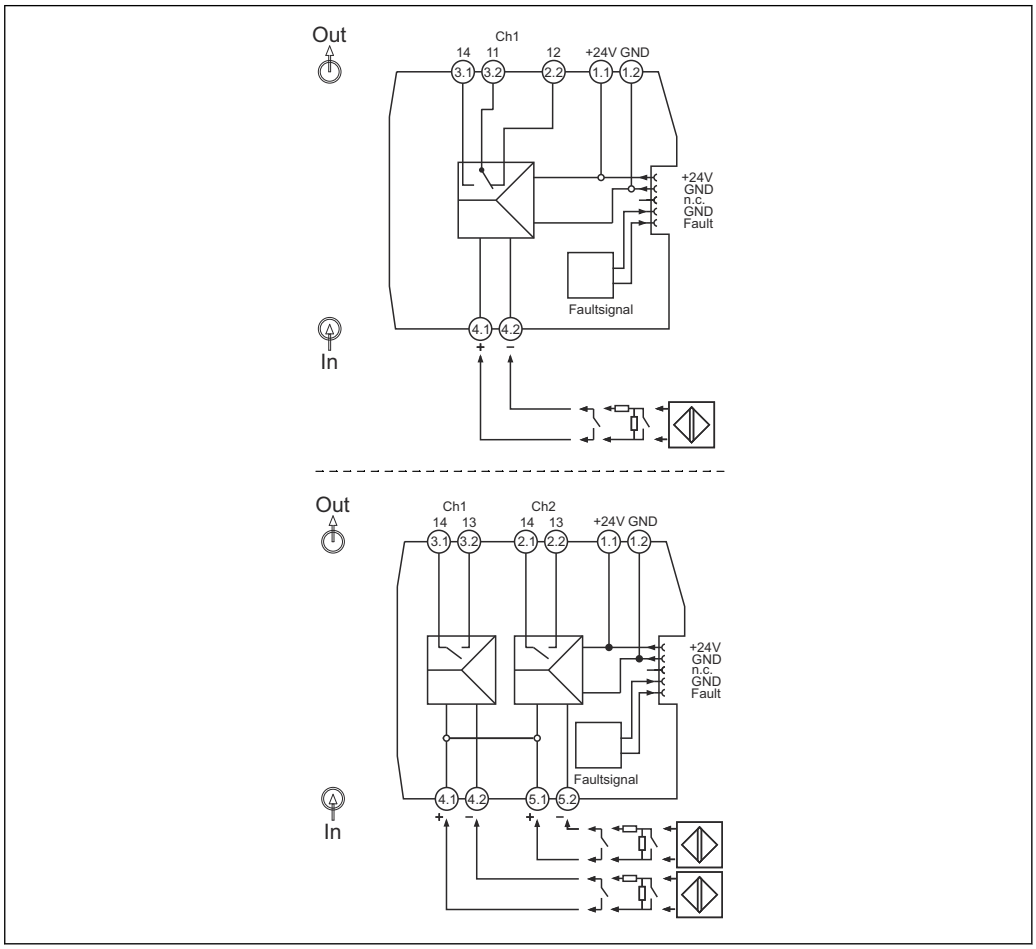
Galvanic isolation

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

Electrical connection

Terminal assignment

Quick wiring guide



1 Terminal assignment of RLN22: 1-channel version (top), 2-channel version (bottom)

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 version	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 mm² (24 to 14 AWG)
	Flexible with wire end ferrules (with or without plastic ferrule)	0.25 to 2.5 mm² (24 to 14 AWG)
Push-in spring terminals	Rigid or flexible (Stripping length = 10 mm (0.39 in)	0.2 to 2.5 mm² (24 to 14 AWG)
	Flexible with wire end ferrules (with or without plastic ferrule)	0.25 to 2.5 mm² (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.

Installation

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 similar) on the DIN rail is recommended as an end support for 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	≤ 2 000 m (6 562 ft)		

Shock and vibration resistance

Vibration resistance as per DNVGL-CG-0339 : 2015 and DIN IEC 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 IEC 61000-6-2

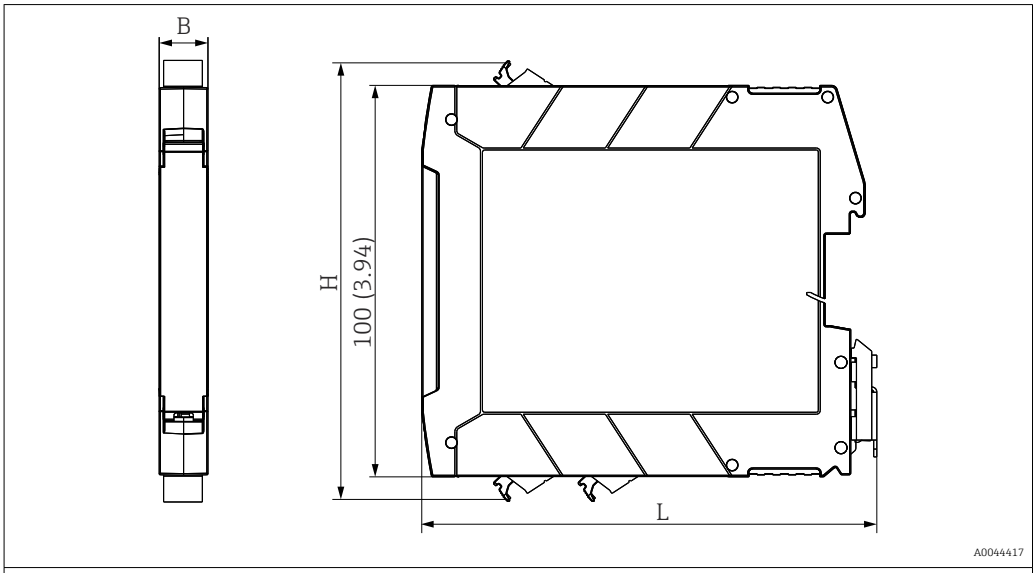
Interference emission as per IEC 61000-6-4

Mechanical construction

Design dimensions

Dimensions in mm (in)

Terminal housing for mounting on DIN rail



Width (B) x length (L) x height (H) (with terminals): 12.5 mm (0.49 in) x 116 mm (4.57 in) x 107.5 mm (4.23 in)

Weight

Device with terminals (values rounded up):

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

Color

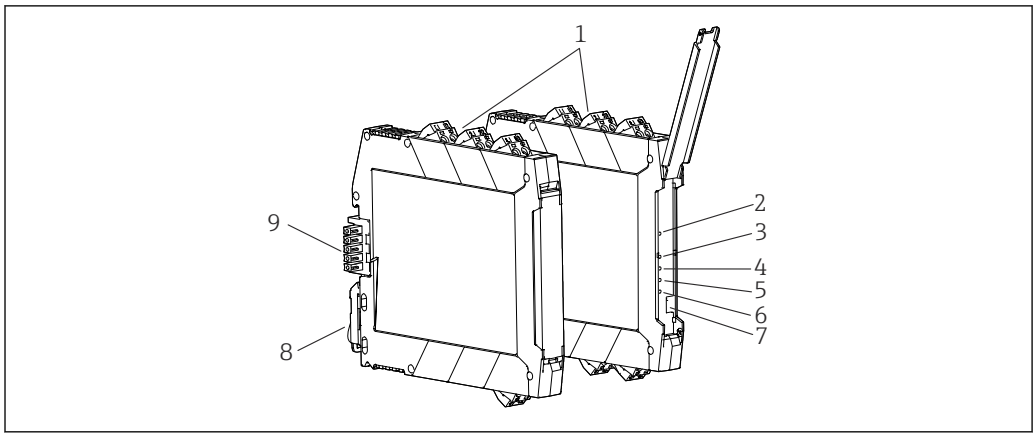
Light gray

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 (option)*
5 *Yellow LED "OUT1", status relay 1*
6 *Yellow LED "OUT2", status relay 2 (option)*
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**	**Status**	**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**	**Status**	**1**	**2**	**3**	**4**	**NO contact**	**OUT**	**LF**
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

Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

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

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 (SC 3).

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.

Ordering information

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

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

Accessories

The accessories currently available for the product can be selected at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Spare parts & Accessories**.

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

Configurator

Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: direct input of information specific to the measuring point, such as the 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

The Configurator is available at www.endress.com on the relevant product page:

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

Online tools

Product information about the entire life cycle of the device is available at:
www.endress.com/onlinetools

Documentation

The following document types are available in the Downloads area of the Endress+Hauser website (www.endress.com/downloads), depending on the device version:

Document type	Purpose and content of the document
Technical Information (TI)	**Planning aid** This document contains all the technical data on the product and provides an overview of everything that can be ordered with the product.
Brief Operating Instructions (KA)	The Brief Operating Instructions contain basic safety instructions, installation and connection conditions. They do not replace the Operating Instructions.
Operating Instructions (BA)	**Reference document** The Operating Instructions contain the information that is required in the various phases of the life cycle of the product: From product identification, incoming acceptance and storage, to installation, connection, operation and commissioning through to troubleshooting, maintenance and disposal.
Description of device parameters (GP)	**Reference for parameters** The document contains detailed explanations of readable or configurable parameters in the product. The description is aimed at those who work with the product over its entire life cycle and perform specific configurations.
Safety instructions (XA)	Safety Instructions for electrical equipment in hazardous areas are supplied with the product depending on the approval. They are an integral part of the Operating Instructions. The nameplate indicates the Safety Instructions (XA) that are relevant to the product.
Supplementary device-dependent documentation (SD/CY/ FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the product documentation.



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