

Technical Information

RN22

Active barrier



Active barrier, 1-/2-channel/SD for 4 to 20 mA, HART®-transparent with 24 V_{DC} as well as active/passive input and output, optionally available with SIL and Ex

Field of application

- 1- or 2-channel active barrier or signal doubler
- Transmission and galvanic isolation of analog 0/4 to 20 mA signals
- Bidirectional transmission of digital HART communication signals
- Power supply for loop-powered transmitters, supply voltage > 16.5 V
- Transmission and galvanic isolation of 4-wire analog signals
- For safety-oriented applications up to SIL 2 (SC 3) in accordance with IEC 61508 (optional)
- For ambient temperatures -40 to +60 °C (-40 to 140 °F)

Your benefits

- Input 0/4 to 20 mA, powered or non-powered
- Output 0/4 to 20 mA, active or passive
- Connection lugs integrated on front for HART communicators
- Optional installation in Ex zone 2, "ec" explosion protection
- Simple and quick wiring with plug-in terminals, optional power supply via DIN rail bus connector
- Compact housing width: 12.5 mm (0.49 in)

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Function and system design

Product description

Product design

Active barrier, 1-channel

- The active barrier is used for the transmission and galvanic isolation of 0/4 to 20 mA signals. The device has an active/passive current input to which a 2-wire or 4-wire transmitter can be directly connected. The output of the device can be operated actively or passively. The current signal is then available to the PLC/controller or to other instrumentation at plug-in screw terminals or optional push-in terminals.
- HART communication signals are transmitted bidirectionally by the device. Connecting points for connecting HART communicators are integrated into the front of the device.
- The device is optionally available as an "associated apparatus", which allows devices to be connected in Ex Zone 0/20 [ia] and operated in Ex Zone 2 [ec]. 2-wire transmitters are supplied with power, and transmit analog 0/4 to 20 mA measured values from the hazardous area to the non-hazardous area. These devices are accompanied by separate Ex documentation, which is an integral part of this manual. Compliance with the installation instructions and connection data in this documentation is mandatory!

Active barrier, 2-channel

With the "2-channel" option, the device has a second channel, which is galvanically isolated from channel 1, while maintaining the same width. Otherwise, the function corresponds to the 1-channel device.

Active barrier as signal doubler

With the signal doubler option, the active barrier is used for the galvanic isolation of a 0/4 to 20 mA signal, which is transmitted to two galvanically isolated outputs.

- Output 1 is HART-transparent. HART communication signals are transmitted bidirectionally between the input and output 1.
- As output 2 contains a HART filter, only the galvanically isolated analog 4 to 20 mA signal is transmitted.

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
- Signal doubler

Input data, measuring range

Input signal range (underrange / overrange)	0 to 22 mA
Function range, input signal	0/4 to 20 mA
Input voltage drop signal for 4-wire connection	< 7 V at 20 mA
Transmitter supply voltage	17.5 V $\pm$ 1 V at 20 mA Open-circuit voltage: 24.5 V $\pm$ 5 %

Output

Output data

Output signal range (underrange/overrange)	0 to 22 mA
Function range, output signal	0/4 to 20 mA

Transmission behavior	1:1 to input signal
NAMUR NE 43	A current at the input that is valid according to NAMUR NE 43 is transmitted to the output (within the specified measuring uncertainty range)
Maximum load, active mode	20 mA: $\leq 610 \Omega$ 22 mA: $\leq 550 \Omega$
Open-circuit voltage, active mode	17.5 V ($\pm 5\%$)
Maximum load, passive mode	$R_{\max} = (U_{\text{ext}} - 4 \text{ V}) / 0.022 \text{ A}$
External voltage, passive mode	$U_{\text{ext}} = 12 \text{ to } 30 \text{ V}$
Transmissible communication protocols	HART

Signal on alarm

Line break in input	Input 0 mA / output 0 mA
Line short circuit in input	Input > 22 mA / output > 22 mA

Ex connection data

See associated XA Safety Instructions

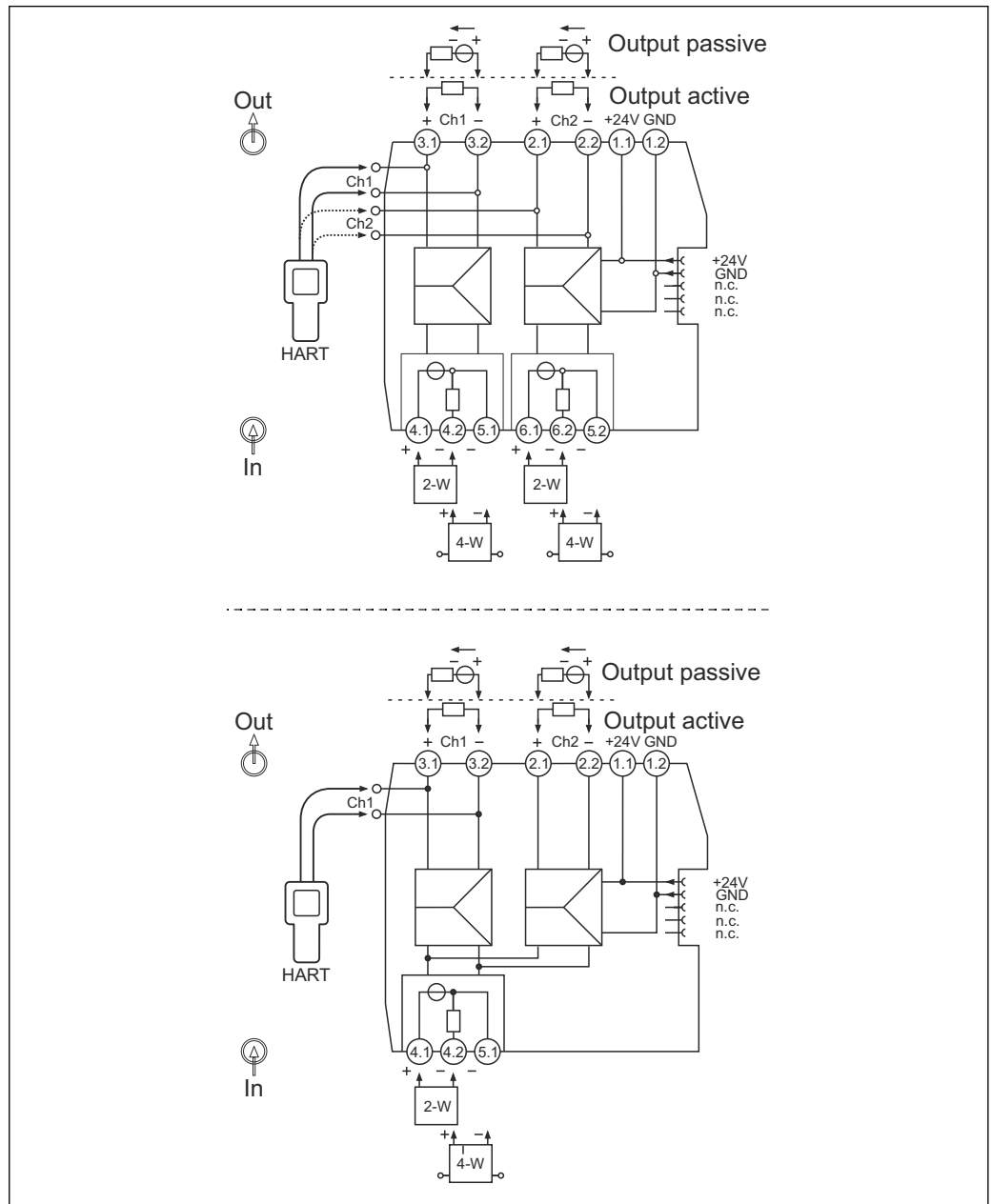
Galvanic isolation

Power supply / input; power supply / output Input / output; output / output	Testing voltage: 1500 V _{AC} 50 Hz, 1 min
Input / input	Testing voltage: 500 V _{AC} 50 Hz, 1 min

Power supply

Terminal assignment

Quick wiring guide



1 Terminal assignment: 1- and 2-channel version (top), signal doubler (bottom)

Connection for operation with active output:

1. Connect + to 3.1/2.1.
 2. Connect - to 3.2/2.2.
- ↳ The mode of operation switches automatically.

Connection for operation with passive output:

1. Connect + to 3.2/2.2.
 2. Connect - to 3.1/2.1.
- ↳ The mode of operation switches automatically.

i HART communicators can be connected to the HART connecting points. Ensure an adequate external resistance ($\geq 230 \Omega$) in the output circuit.

Connecting the supply voltage

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



The device may only be powered by a power unit with an energy-limited circuit in accordance with UL/EN/IEC 61010-1, Section 9.4 and the requirements of Table 18.

Performance characteristics*Power supply¹⁾*

Supply voltage	24 V _{DC} (-20% / +25%)
Supply current to the DIN rail bus connector	max. 400 mA
Power consumption at 24 V _{DC}	1-channel: ≤ 1.5 W (20 mA) / ≤ 1.6 W (22 mA) 2-channel: ≤ 3 W (20 mA) / ≤ 3.2 W (22 mA) Signal doubler: ≤ 2.4 W (20 mA) / ≤ 2.5 W (22 mA)
Current consumption at 24 V _{DC}	1-channel: ≤ 0.07 A (20 mA) / ≤ 0.07 A (22 mA) 2-channel: ≤ 0.13 A (20 mA) / ≤ 0.14 A (22 mA) Signal doubler: ≤ 0.1 A (20 mA) / ≤ 0.11 A (22 mA)
Power loss at 24 V _{DC}	1-channel: ≤ 1.2 W (20 mA) / ≤ 1.3 W (22 mA) 2-channel: ≤ 2.4 W (20 mA) / ≤ 2.5 W (22 mA) Signal doubler: ≤ 2.1 W (20 mA) / ≤ 2.2 W (22 mA)

- 1) The data apply to the following operating scenario: input active/output active/output load 0 Ω. When external voltages are connected to the output, the power loss in the device may increase. The power loss in the device can be reduced by connecting an external output load.

Power supply failure

To meet SIL and NE21 requirements, voltage interruptions of up to 20 ms must be bridged with a suitable power supply.

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 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)

Cable specification

A shielded cable is recommended for HART communication. Observe grounding concept of the plant.

Performance characteristics

Response time

Step response (10 to 90 %)	≤ 1 ms
Step response (10 to 90 %) signal doubler output 2 HART filter	≤ 40 ms

Reference conditions

- Calibration temperature: +25 °C ±3 K (77 °F ±5.4 °F)
- Supply voltage: 24 V_{DC}
- Output load: 225 Ω
- External output voltage (passive output): 20 V_{DC}
- Warm-up: > 1 h

Maximum measured error*Accuracies*

Transmission error	< 0.1 % / of full scale value (<20 μA)
Temperature coefficient	< 0.01 % /K

Long-term drift Max. ± 0.1 %/year (of full scale value)

Installation

Mounting location The device is designed for installation on 35 mm (1.38 in) DIN rails in accordance with IEC 60715 (TH35).

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.

-  When installing several devices side by side, it is important to ensure that the maximum side wall temperature of each device does not exceed 80 °C (176 °F). If this cannot be guaranteed, mount the devices at a distance from one another or ensure sufficient cooling.

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	5 to 95 %
	Altitude	≤ 2 000 m (6 562 ft)	Insulation class	Class III

Maximum temperature change rate 0.5 °C/min, no condensation permitted

Shock and vibration resistance Sinusoidal vibrations, in accordance with IEC 60068-2-6

- 5 to 13.2 Hz: 1 mm peak
- 13.2 to 100 Hz: 0.7g peak

Electromagnetic compatibility (EMC) **CE compliance**

Electromagnetic compatibility in accordance with all the relevant requirements of the IEC/EN 61326 series and NAMUR Recommendation EMC (NE21). For details, refer to the Declaration of Conformity.

- Maximum measured error < 1% of full scale value
- Strong, pulse-like EMC interference can result in transient (< 1 s) deviations in the output signal ($\geq \pm 1\%$)
- Interference immunity as per IEC/EN 61326 series, industrial requirements
- Interference emission according to IEC/EN 61326 series (CISPR 11) Group 1 Class A

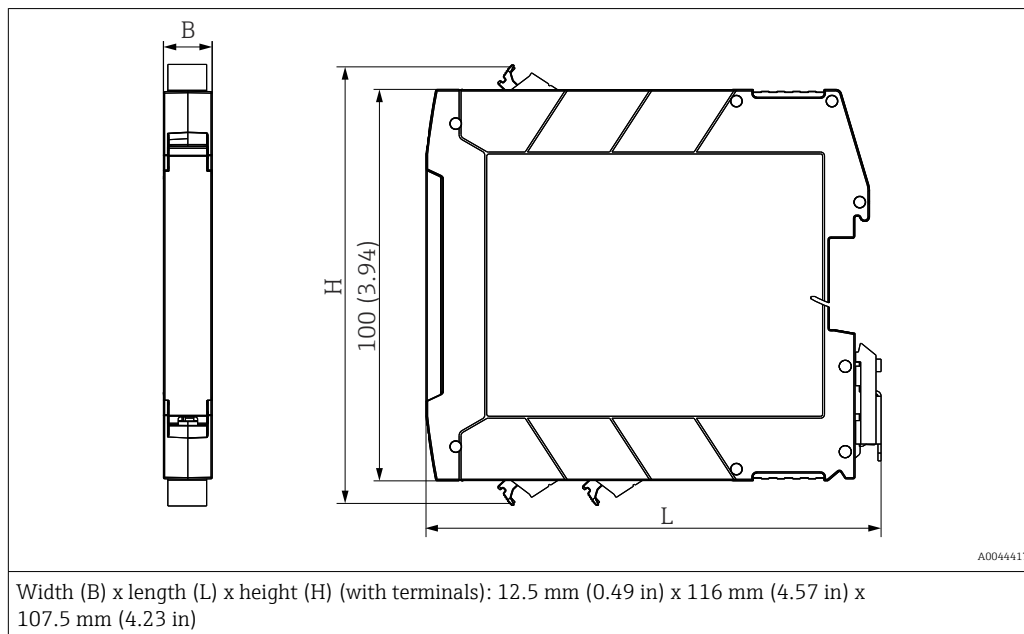
 This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

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. 105 g (3.7 oz); 2-channel: approx. 125 g (4.4 oz); signal doubler: approx. 120 g (4.23 oz)

Color

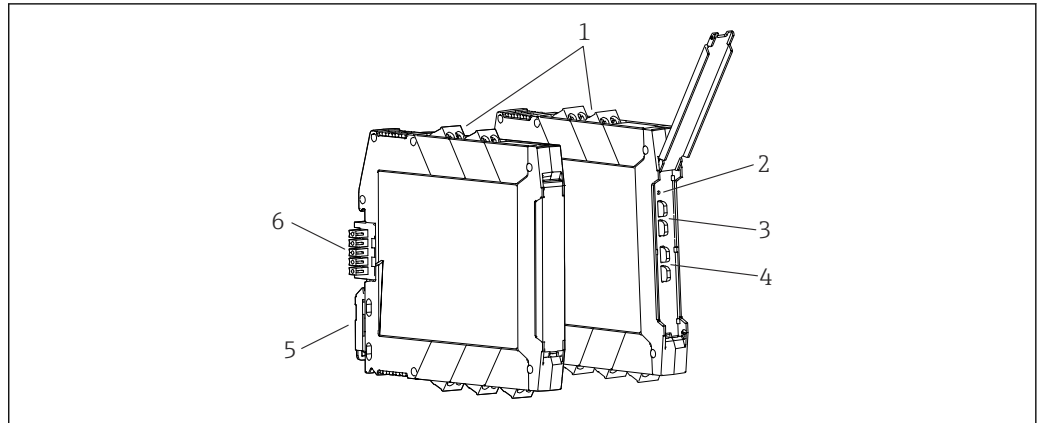
Light gray

Materials

All the materials used are RoHS-compliant.

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

Display and operating elements



A0040188

 2 Display and operating elements

- 1 Plug-in screw or push-in terminal
- 2 Green LED "On", power supply
- 3 Connection lugs for HART communication (channel 1)
- 4 Connection lugs for HART communication (channel 2, option)
- 5 DIN rail clip for DIN rail mounting
- 6 DIN rail bus connector (optional)

Local operation

Hardware settings/configuration

No manual hardware settings are required at the device for commissioning.

Attention must be paid to the different terminal assignment when connecting 2-/4-wire transmitters. At the output side, the connected system is detected and automatic switching takes place between the active and passive mode.

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**.



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

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

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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 (SC 3) .

 Please refer to Safety Manual FY01034K for the use of the device in safety instrumented systems according to IEC 61508.

Supplementary documentation

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

Document type	Purpose and content of the document
Technical Information (TI)	Planning aid for your device The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
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 document These Operating Instructions contain all the information that is required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning, through to troubleshooting, maintenance and disposal.

Document type	Purpose and content of the document
Description of Device Parameters (GP)	Reference for your parameters The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.
Safety Instructions (XA)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. These are an integral part of the Operating Instructions.  Information on the Safety Instructions (XA) that are relevant for the device is provided on the nameplate.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the device documentation.



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