

# Technical Information

## RN22

Active barrier or signal doubler, HART-transparent



1- or 2-channel active barrier for separation of 0/4 to 20 mA standard signal circuits, optionally available as a signal doubler, 24 V DC. HART-transparent

### Application

- 1- or 2-channel active barrier or signal doubler
- Transmission and galvanic isolation of analog 0/4 to 20 mA signals, optionally intrinsically safe [Ex-ia] from the hazardous area
- 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 IEC61508 (optional)
- For ambient temperatures -40 to +60 °C (-40 to 140 °F)

### Your benefits

- Input 0/4 to 20 mA, power-supplying or non power-supplying
- 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)

## Table of contents

<b>Function and system design</b> . . . . .	<b>3</b>	Functional safety . . . . .	9
Product description . . . . .	3	<b>Supplementary documentation</b> . . . . .	<b>10</b>
Dependability . . . . .	3	Brief Operating Instructions (KA) . . . . .	10
<b>Input</b> . . . . .	<b>3</b>	Operating Instructions (BA) . . . . .	10
Version . . . . .	3	Safety Instructions (XA) . . . . .	10
Input data, measuring range . . . . .	3	Supplementary device-dependent documentation . . . . .	10
<b>Output</b> . . . . .	<b>3</b>		
Output data . . . . .	3		
Signal on alarm . . . . .	4		
Ex connection data . . . . .	4		
Galvanic isolation . . . . .	4		
<b>Power supply</b> . . . . .	<b>4</b>		
Terminal assignment . . . . .	4		
Connecting the supply voltage . . . . .	4		
Performance characteristics . . . . .	5		
Power supply failure . . . . .	5		
Terminals . . . . .	5		
Cable specification . . . . .	5		
<b>Performance characteristics</b> . . . . .	<b>5</b>		
Response time . . . . .	5		
Reference operating conditions . . . . .	5		
Maximum measured error . . . . .	5		
Long-term drift . . . . .	5		
<b>Installation</b> . . . . .	<b>6</b>		
Mounting location . . . . .	6		
Installing a DIN rail device . . . . .	6		
<b>Environment</b> . . . . .	<b>6</b>		
Important ambient conditions . . . . .	6		
Maximum temperature change rate . . . . .	6		
Shock and vibration resistance . . . . .	6		
Electromagnetic compatibility (EMC) . . . . .	6		
<b>Mechanical construction</b> . . . . .	<b>7</b>		
Design, dimensions . . . . .	7		
Weight . . . . .	7		
Color . . . . .	7		
Materials . . . . .	7		
<b>Display and operating elements</b> . . . . .	<b>8</b>		
Local operation . . . . .	8		
<b>Ordering information</b> . . . . .	<b>8</b>		
<b>Accessories</b> . . . . .	<b>8</b>		
Device-specific accessories . . . . .	9		
Service-specific accessories . . . . .	9		
<b>Certificates and approvals</b> . . . . .	<b>9</b>		
CE mark . . . . .	9		

## 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- 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.

### 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
- 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 ±1 V at 20 mA Open-circuit voltage: 24.5 V ±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	$\leq 500 \Omega$
Open-circuit voltage, active mode	17.5 V ( $\pm 5\%$ )
Maximum load, passive mode	$R_{\max} = (U_{\text{ext}} - 2 \text{ V}) / 0.022 \text{ A}$
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

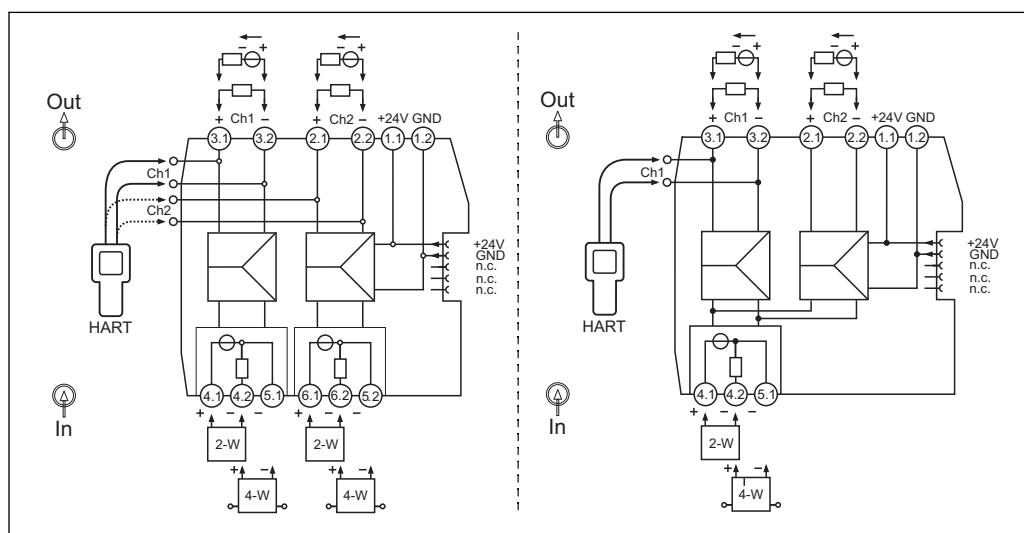
**Ex connection data** See associated XA Safety Instructions

Galvanic isolation	Power supply / input; power supply / output Input / output; output / output	Testing voltage: 3 000 V <sub>AC</sub> 50 Hz, 1 min
	Input / input	Testing voltage: 500 V <sub>AC</sub> 50 Hz, 1 min

## Power supply

### Terminal assignment

### Quick wiring guide



1 Terminal assignment: 1- and 2-channel version (left), signal doubler (right)

**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.

**i** 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 supply*<sup>1)</sup>

Supply voltage	24 V <sub>DC</sub> (-20% / +25%)
Supply current to the DIN rail bus connector	max. 400 mA
Power consumption at 24 V <sub>DC</sub>	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 <sub>DC</sub>	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 <sub>DC</sub>	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 for 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 design	Cable cross-section
<b>Screw terminals</b> 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 <sup>2</sup> (24 to 14 AWG)
	Flexible with wire end ferrules (with or without plastic ferrule)	0.25 to 2.5 mm <sup>2</sup> (24 to 14 AWG)
<b>Push-in spring terminals</b>	Rigid or flexible (Stripping length = 10 mm (0.39 in))	0.2 to 2.5 mm <sup>2</sup> (24 to 14 AWG)
	Flexible with wire end ferrules (with or without plastic ferrule)	0.25 to 2.5 mm <sup>2</sup> (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	≤ 50 ms

**Reference operating conditions**

- Calibration temperature: +25 °C ±3 K (77 °F ±5.4 °F)
- Supply voltage: 24 V<sub>DC</sub> / 230 V<sub>AC</sub>
- Output load: 225 Ω
- External output voltage (passive output): 20 V<sub>DC</sub>
- 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 to fix the device.

-  If several devices are installed side by side, it is important to ensure that the maximum side wall temperature of 85 °C (185 °F) is not exceeded. 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 measuring range
- Strong, pulse-like EMC interference can result in transient (< 1) deviations in the output signal ( $\geq \pm 1\%$ ).
- Interference immunity as per IEC/EN 61326 series, industrial requirements
- Interference emission as per IEC/EN 61326 series (CISPR 11) Group 1 Class A

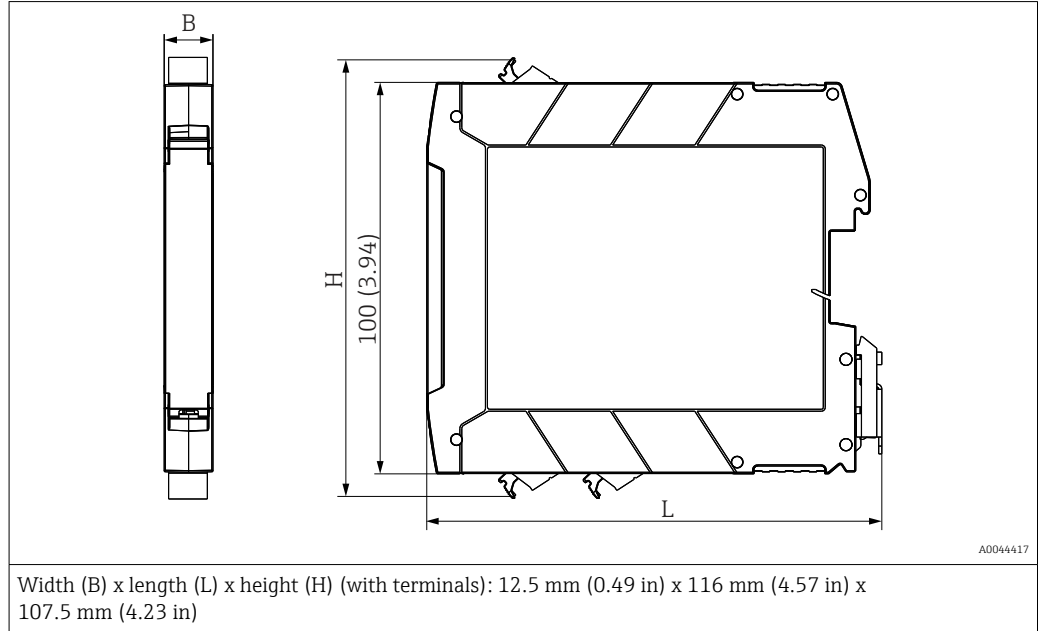
-  This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

## 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

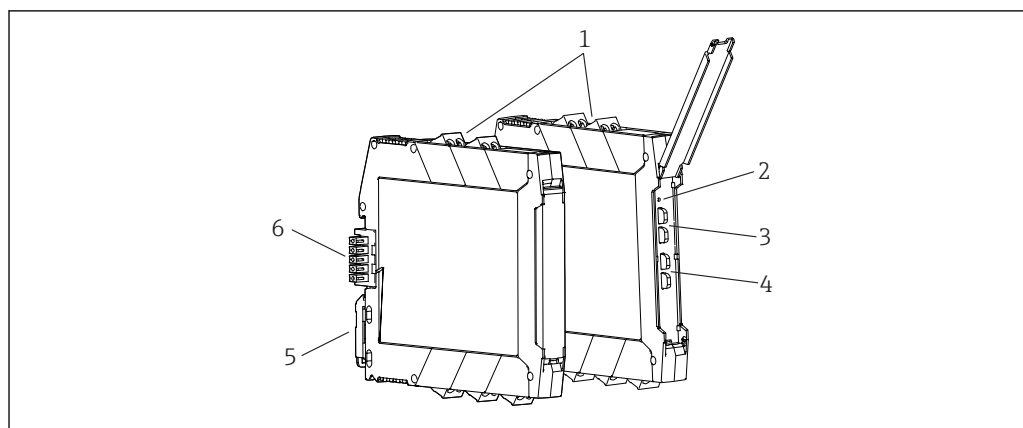
Light gray

### 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 for your nearest sales organization [www.addresses.endress.com](http://www.addresses.endress.com) or in the Product Configurator under [www.endress.com](http://www.endress.com) :

1. Click Corporate
2. Select the country
3. Click Products
4. Select the product using the filters and search field
5. Open the product page

The Configuration button to the right of the product image 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](http://www.endress.com).

#### 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

Accessories	Description
Configurator	<p>Product Configurator - the tool for individual product configuration</p> <ul style="list-style-type: none"> <li>▪ Up-to-the-minute configuration data</li> <li>▪ Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language</li> <li>▪ Automatic verification of exclusion criteria</li> <li>▪ Automatic creation of the order code and its breakdown in PDF or Excel output format</li> <li>▪ Ability to order directly in the Endress+Hauser Online Shop</li> </ul> <p>The Configurator is available on the Endress+Hauser website at: <a href="http://www.endress.com">www.endress.com</a>  -&gt; Click "Corporate" -&gt; Select your country -&gt; Click "Products" -&gt; Select the product using the filters and search field -&gt; Open product page -&gt; 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: <a href="http://www.endress.com/lifecyclemanagement">www.endress.com/lifecyclemanagement</a></p>

## Certificates and approvals

 For the approvals available, see the Configurator on the specific product page:  
[www.endress.com](http://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 types of documentation are available in the Download Area of the Endress+Hauser website ([www.endress.com/downloads](http://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](http://www.endress.com/deviceviewer)): Enter the serial number from nameplate
  - *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR 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.

---



[www.addresses.endress.com](http://www.addresses.endress.com)

---