

Technical Information

RN42

Active barrier



Active barrier, 1-channel for 4 to 20 mA, HART® transparent with 24 to 230 V_{AC/DC} and active/passive input and output, optionally available with SIL and Ex

Application

- 1-channel active barrier with wide range power supply
- 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
Connection sockets integrated on front for HART communicators
- Power supply of loop-powered transmitters
Transmitter supply voltage >16.5 V
- 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

- Wide range power supply of 19.2 to 253 V_{AC/DC}
- Input 0/4 to 20 mA, power-supplying or non power-supplying
- Output 0/4 to 20 mA, active or passive
- Optional installation in Ex zone 2, "ec" explosion protection
- Quick and easy wiring thanks to plug-in terminals (with screw or push-in technology)
- Compact housing width: 17.5 mm (0.69 in); option for installation rotated by 180° (terminals for power supply at top or bottom)

Table of contents

| | | | |
|---|----------|--|----------|
| Function and system design | 3 | Supplementary documentation | 9 |
| Product description | 3 | | |
| Dependability | 3 | | |
| Input | 3 | | |
| Version | 3 | | |
| Input data, measuring range | 3 | | |
| Output | 3 | | |
| Output data | 3 | | |
| Signal on alarm | 3 | | |
| Ex connection data | 4 | | |
| Galvanic isolation | 4 | | |
| Power supply | 4 | | |
| Terminal assignment | 4 | | |
| Connecting the supply voltage | 5 | | |
| Special connection instructions | 5 | | |
| Performance characteristics | 5 | | |
| Terminals | 5 | | |
| Cable specification | 5 | | |
| Performance characteristics | 5 | | |
| Response time | 5 | | |
| Reference conditions | 5 | | |
| Maximum measured error | 6 | | |
| Long-term drift | 6 | | |
| Mounting | 6 | | |
| Mounting location | 6 | | |
| Installing a DIN rail device | 6 | | |
| Environment | 6 | | |
| Important ambient conditions | 6 | | |
| Maximum temperature change rate | 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 | 7 | | |
| Local operation | 8 | | |
| Ordering information | 8 | | |
| Accessories | 8 | | |
| Service-specific accessories | 8 | | |
| Certificates and approvals | 8 | | |
| CE mark | 8 | | |
| Functional safety | 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/HART 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. Connection sockets 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/HART 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!

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

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 | $\leq 500 \Omega$ |
| Open-circuit voltage, active mode | 17.5 V ($\pm 5\%$) |
| Maximum load, passive mode | $R_{max} = (U_{ext} - 4 V) / 0.022 A$ |
| External voltage, passive mode | $U_{ext} = 12 \text{ to } 30 V$ |
| 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

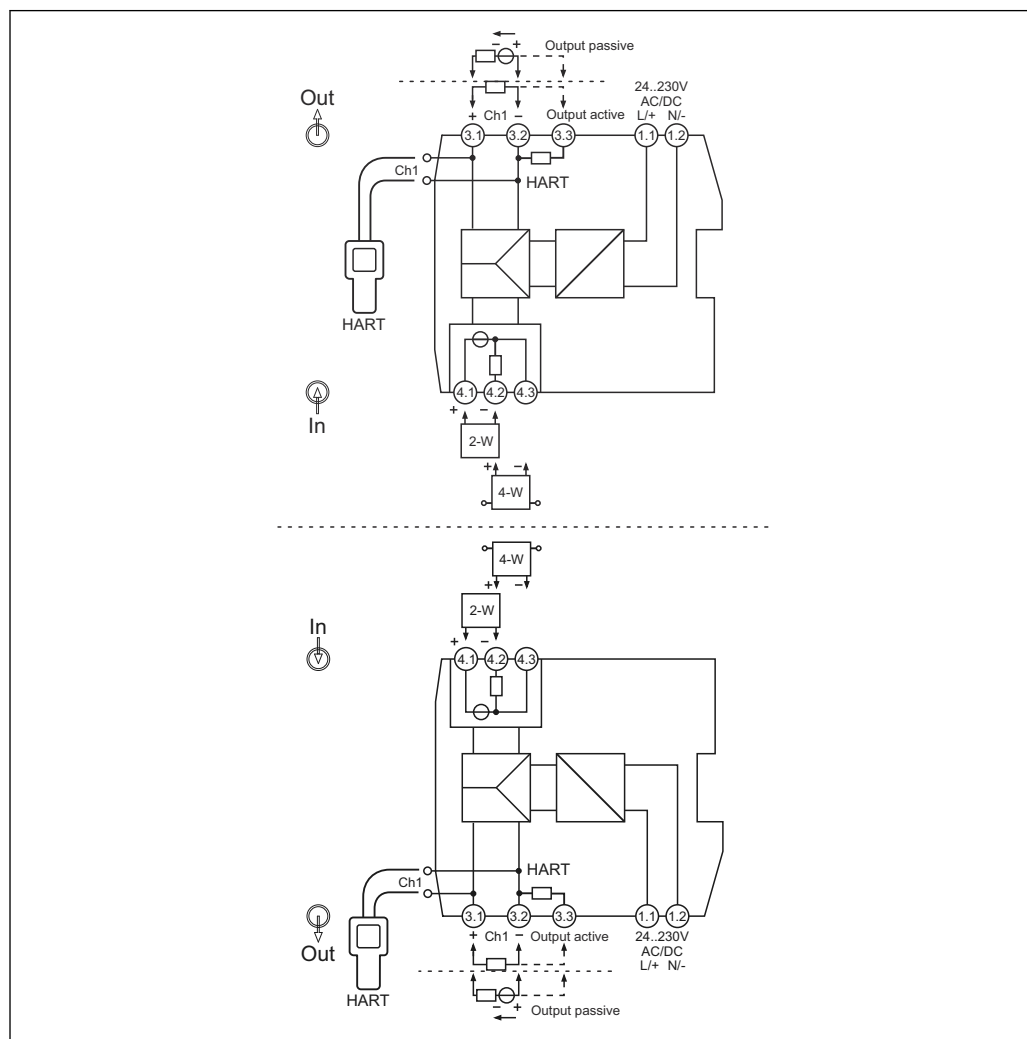
Galvanic isolation

| | |
|-------------------------------|---|
| Power supply for input/output | Testing voltage: 3 000 V _{AC} 50 Hz, 1 min |
| Input to output | Testing voltage: 1 500 V _{AC} 50 Hz, 1 min |

Power supply

Terminal assignment

Quick wiring guide



A0045153

1 Terminal assignment, top: power supply top; bottom: power supply bottom (option)

Connection for operation with active output:

1. Connect + to 3.1.
 2. Connect - to 3.2.
- ↳ Switching of the mode of operation occurs automatically.

Connection for operation with passive output:

1. Connect + to 3.2.

- 2. Connect - to 3.1.
 - ↳ Switching of the mode of operation occurs automatically.

i HART communicators can be connected to the HART connection sockets. Ensure that there is an adequate external load ($\geq 230 \Omega$) in the output circuit. If the external load is not sufficient, an internal 250Ω communication resistor can be added to the measuring loop via the alternative terminal assignment (terminal 3.3.) to use the HART connection sockets.

Connecting the supply voltage The power is supplied via terminals 1.1 and 1.2.

Special connection instructions

- Disconnecting units and auxiliary circuit protective systems with suitable AC or DC values must be provided in the building installation.
- A switch/power circuit breaker must be provided close to the device and clearly marked as a disconnecting unit for this device.
- An overcurrent protection unit ($I \leq 10 \text{ A}$) must be provided in the installation.

Performance characteristics *Power supply*¹⁾

| | |
|--|--|
| Supply voltage | 24 to 230 V _{AC/DC} (-20% / +10%, 0/50/60 Hz) |
| Power consumption | $\leq 4.9 \text{ VA} / 2.4 \text{ W}$ (20 mA); $\leq 5 \text{ VA} / 2.5 \text{ W}$ (22 mA) |
| Power loss | $\leq 2 \text{ W}$ (20 mA); $\leq 2.1 \text{ W}$ (22 mA) |
| Current consumption at 24 V _{DC} | $\leq 0.1 \text{ A}$ (20 mA); $\leq 0.1 \text{ A}$ (22 mA) |
| Current consumption at 230 V _{AC} | $\leq 0.02 \text{ A}$ (20 mA); $\leq 0.02 \text{ A}$ (22 mA) |

1) The data apply for the following operating scenario: input active / output active / output load 0Ω . 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.

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) |

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 %) | $\leq 1 \text{ ms}$ |
|----------------------|----------------------------|---------------------|

Reference conditions

- Calibration temperature: $+25 \text{ °C} \pm 3 \text{ K}$ ($77 \text{ °F} \pm 5.4 \text{ °F}$)
- Supply voltage: 230 V_{AC}
- 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)

Mounting

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.

- i** When installing several devices side by side, it is important to ensure that the maximum side wall temperature of 80 °C (176 °F) of the individual devices 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 % |
| Operating altitude, hazardous area version | ≤ 2 000 m (6 562 ft) | Operating altitude, non-hazardous area version | ≤ 4 000 m (13 123 ft) |
| | | Insulation class | Class II |

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 (≥ ±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

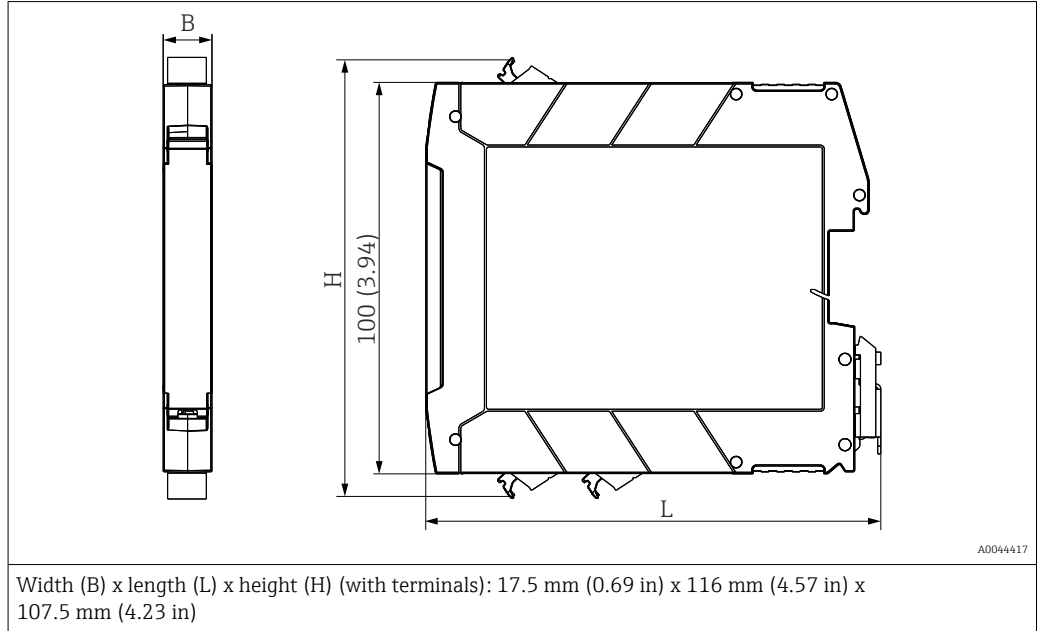
- i** This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

Mechanical construction

Design, dimensions

Dimensions in mm (in)

Terminal housing for mounting on DIN rail



Weight

Device with terminals (values rounded up):

Approx. 135 g (4.76 oz)

Color

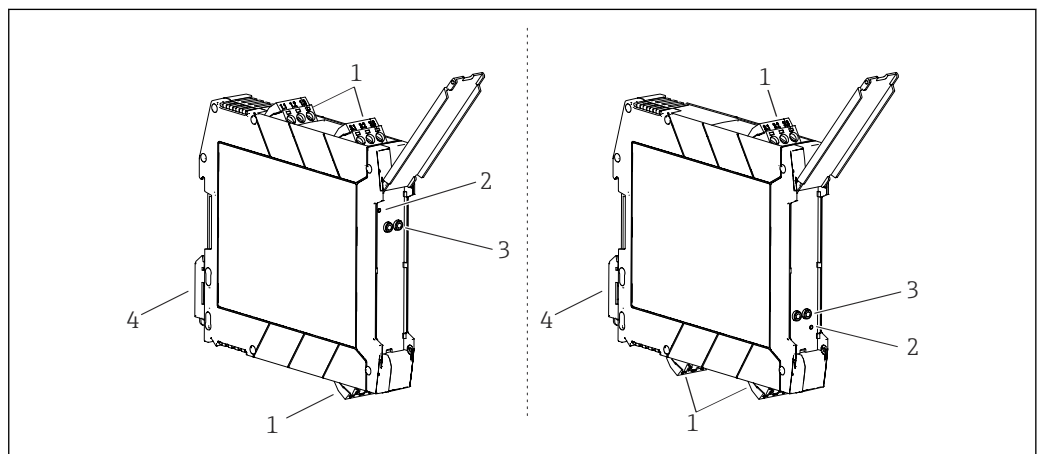
Light gray

Materials

All the materials used are RoHS-compliant.

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

Display and operating elements



2 Display and operating elements, left: power supply top; right: power supply bottom (option)

- 1 Plug-in screw or push-in terminal
- 2 Green LED "On", power supply
- 3 Connection sockets for HART communication (channel 1)
- 4 DIN rail clip for DIN rail mounting

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**.

Service-specific accessories**Configurator**

Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
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3. Select **Configuration**.

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. |
| 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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