Technical Information
Barrier RB223
One or two-channel barrier

Loop-powered barrier for the safe separation of 4 to 20 mA standard signal circuits

Application
- Separation of active 0/4 to 20 mA signals from transmitters, valves and adjusters

Your benefits
- Compact side-by-side housing
- Space-saving one-channel and two-channel version
- No power supply necessary
- International Ex approvals
  ATEX, FM, CSA
- Can be used up to SIL3
- Bidirectional HART® transmission
- Communication sockets for HART® + integrated HART® resistor for sensor configuration
Function and system design

Measuring principle
The passive barrier is used for galvanic isolation of active signal loops (0/4 to 20 mA) in three applications:

- Transmission from non-Ex-areas to Ex-areas, e.g. for active actuators, controllers or indicators
- Transmission from Ex-areas to non-Ex-areas for the linking of active, intrinsically safe loops in the Ex-area to a PLC
- Transmission of signals (0/4 to 20 mA) from the Ex-area to the non-Ex-area when an intrinsically safe transmitter in the Ex-area is supplied by a not intrinsically safe loop power supply in the non-Ex-area

The device has an analog input and an intrinsically safe analog output or an output and an intrinsically safe input. As an option the device is available as a 2-channel version. The barrier is used for intrinsically safe operation of sensors, valves and actuators.

The device is supplied from the current loop without a separate power supply.

Measuring system
The standard instrument has one analog input and one analog output. A two-channel instrument with two analog inputs and two analog outputs is available as an option.

Ex to nonEx:
Active 4-wire sensor, e.g. Promag 50

Passive current input, e.g. RIA15

NonEx to Ex:
Passive 2-wire sensor, e.g. TMT162

Active current input, e.g. SPS
Input

Direction of power transmission nonEx → Ex
- 0/4 to 22 mA, (for specified accuracy)
- 0 to 40 mA operating range
- Max. effective voltage < 26 V for specified accuracy
- \( I_{\text{max}} = 100 \text{ mA} \) (short-circuit current of protective diode in event of overvoltage)
- \( U_{\text{max}} = 30 \text{ V} \) (limiting voltage of protective diode)
- Reverse polarity protection
- \( R_i < 400 \Omega \) (without HART® resistor 232 \( \Omega \))

Direction of power transmission Ex → nonEx
- 0/4 to 22 mA, (for specified accuracy)
- Intrinsically safe [Ex ia] as per ATEX, FM, CSA
- 0 to 40 mA operating range
- Reverse polarity protection
- \( R_i < 120 \Omega \) (without HART® resistor 232 \( \Omega \))
- Max. effective voltage < 26 V

Output

Direction of power transmission nonEx → Ex
- 0/4 to 22 mA, (for specified accuracy)
- 0 to 40 mA operating range (max. current depends on the load)
- Max. load (load resistance) = 0 to 600 \( \Omega \)
- Intrinsically safe [Ex ia] as per ATEX, FM, CSA

Direction of power transmission Ex → nonEx
- 0/4 to 22 mA (for specified accuracy)
- 0 to 40 mA operating range (max. current depends on the load)
- Max. load (load resistance) = 0 to 600 \( \Omega \)

Galvanic isolation

Testing voltage:
- > 1.5 kV AC between input and output
- > 1.5 kV AC between the channels

Power supply

Electrical connection

[Diagram of electrical connections]

RB223 connection, Ex-nonEx two-channel
Supply voltage
The device is powered from the standard 0/4 to 20 mA current loop.

Starting current (intrinsic consumption)  
< 50 μA

Voltage drop  
< (1.9 V + 400 Ω x current loop) for nonEx → Ex  
< (3.9 V + 120 Ω x current loop) for Ex → nonEx

Power loss  
< 0.2 W for 20 mA (per channel) without HART® resistor  
< 0.3 W for 20 mA (per channel) with HART® resistor
Performance characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current transmission</td>
<td>$&lt; 10 \mu A \pm 0.15%$ of measured value</td>
</tr>
<tr>
<td>Load error</td>
<td>$\leq 0.02 %$ of measured value/100 $\Omega$</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>$\leq \pm 0.01 %/10$ K (0.0056%/10 °F)</td>
</tr>
<tr>
<td>Residual ripple at output</td>
<td>$&lt; 30$mV$_{\text{eff}}$ for 20 mA loop current and 600 $\Omega$ load</td>
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Transmission behavior

HART® protocol

Bidirectional transmission possible

Step-function response

| Settling time (10% to 90% of full scale value) | $< 0.5$ ms for 500 $\Omega$ load for nonEx $\rightarrow$ Ex |
|                                               | $< 0.3$ ms for 500 $\Omega$ load for Ex $\rightarrow$ nonEx |

Frequency response

| Large signal limit frequency | 650 Hz for 500 $\Omega$ load for nonEx $\rightarrow$ Ex |
|                            | 1300 Hz for 500 $\Omega$ load for Ex $\rightarrow$ nonEx |

Installation

Mounting

Mounting in a cabinet on a mounting rail TS 35 as per IEC 60715.

Orientation

No restrictions

Installation instructions

Installation and setup conditions as per IEC 60715.
**Environment**

<table>
<thead>
<tr>
<th><strong>Ambient temperature range</strong></th>
<th>-20 to +60 °C (-4 to +140 °F)</th>
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</thead>
<tbody>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-20 to +80 °C (-4 to 176 °F)</td>
</tr>
<tr>
<td><strong>Installation height</strong></td>
<td>As per IEC 61010-1: &lt; 3000 m above MSL</td>
</tr>
<tr>
<td><strong>Climate class</strong></td>
<td>As per IEC 60654-1 Class B2</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>IP 20</td>
</tr>
<tr>
<td><strong>Relative humidity</strong></td>
<td>&lt; 95 % (without condensation)</td>
</tr>
<tr>
<td><strong>Electrical safety</strong></td>
<td>Protection class III, pollution degree 2, overvoltage protection category II</td>
</tr>
<tr>
<td><strong>Electromagnetic compatibility (EMC)</strong></td>
<td>Interference immunity as per EN 61326 - series (industry) and NAMUR NE21</td>
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**Mechanical construction**

**Design, dimensions**

Housing for top-hat rail as per IEC 60715 TH35:

*Dimensions of RB223 in mm (in)*

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<tr>
<th><strong>Weight</strong></th>
<th>Approx. 150 g (5.29 oz.)</th>
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<tr>
<td><strong>Material</strong></td>
<td>Housing: plastic PC, UL 940</td>
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</table>
| **Terminals** | • Coded, pluggable screw terminal, core size 1.5 mm² solid, or 1.0 mm² strand with ferrule  
               • Communication socket on the front via 2 mm jack plug |
Human interface

Remote operation

HART® communication: Communication signals are transmitted bidirectionally.
Communication resistor: Resistor for HART® communication 232 Ω installed.
Communication sockets: Access for HART® communicator, e.g. DXR-275

Pay attention to voltage drop!

Certificates and approvals

CE mark


Ex approval

ATEX, FM and CSA approved associated apparatus

SIL

Can be used up to SIL3

Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser web site: www.endress.com → Choose your country → Products → Select measuring technology, software or components → Select product (picklists: measurement method, product family etc.) → Device support (right-hand column): Configure the selected product → The Product Configurator for the selected product is opened.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

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

The following accessories are available:

<table>
<thead>
<tr>
<th>Order code</th>
<th>Accessory</th>
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<tr>
<td>51002468</td>
<td>Protective housing IP66 for field mounting</td>
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Documentation

- Operating Instructions RB223 (BA00239R/09)
- ATEX Safety Instructions (XA00068R/09)
- Brochure "System Components and Data Managers" (FA00016K/09)
- SIL Safety Manual (SD00022R/00)
- Additional Ex approvals, FM/CSA Control Drawings