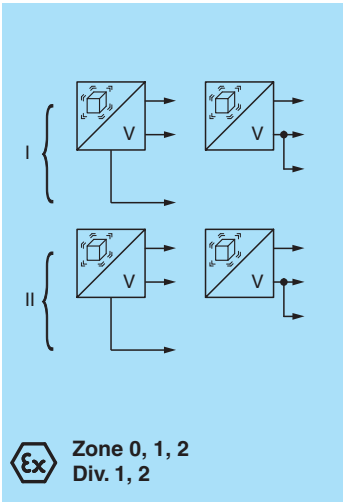
# Voltage Repeater
# HiD2096

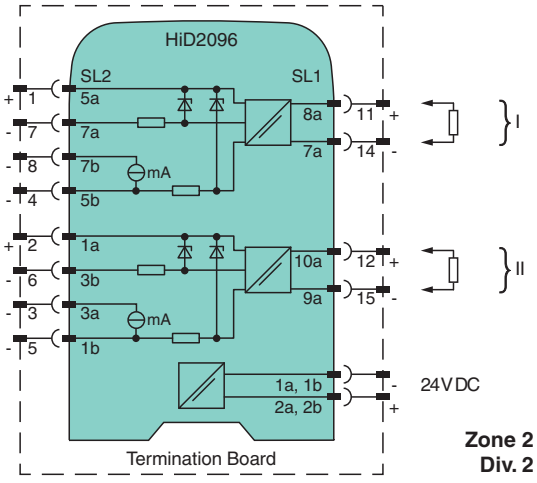
- 2-channel isolated barrier
- 24 V DC supply (bus powered)
- Voltage input 0 V ... -20 V
- Vibration sensor inputs
- Voltage/current field supply
- Voltage output 0 V ... -20 V
- Up to SIL 2 acc. to IEC/EN 61508

## Function

This isolated barrier is used for intrinsic safety applications.
It provides a floating output to power a vibration sensor (e. g., Bently Nevada) or accelerometer in a hazardous area and transfers the voltage signal from that sensor to the safe area.
The device is designed to provide a voltage or current supply to the vibration sensor. Depending on DIP switch setting the barrier provides 3.7 mA, 5.3 mA, or 9.0 mA supply current for 2-wire sensors, or 18 V at 20 mA for 3-wire sensors.
This barrier mounts on a HiD system termination board.

## Connection




## Technical Data

| | | |
|---|---|---|
| **General specifications** | | |
| Signal type | | Analog input |
| **Functional safety related parameters** | | |
| Safety Integrity Level (SIL) | | SIL 2 |
| **Supply** | | |
| Connection | | SL1: 1a(-), 1b(-); 2a(+), 2b(+) |
| Rated voltage | $U_r$ | 20.4 ... 30 V DC bus powered via Termination Board |
| Ripple | | within the supply tolerance |
| Power consumption | | ≤ 2.6 W |
| **Input** | | |
| Connection side | | field side |

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## Technical Data

| | |
|---|---|
| Connection | SL2:<br>5a (common), 5b or 7b (supply -), 7a (input -)<br>1a (common), 1b or 3a (supply -), 3b (signal -) |
| Input resistance | 10 kΩ terminals 5a and 7a and terminals 1a and 3b |
| Output rated operating current | SL2: 5a (common), 5b: > 10 mA at -21 V or > 20 mA at -18 V<br>SL2: 1a (common), 1b: > 10 mA at -21 V or > 20 mA at -18 V<br>SL2: 5a (common), 7b: 3.7 ± 0.26 mA, 5.3 ± 0.34 mA or 9.0 ± 0.55 mA, dependent on switch settings (see configuration)<br>SL2: 1a (common), 3a: 3.7 ± 0.26 mA, 5.3 ± 0.34 mA or 9.0 ± 0.55 mA, dependent on switch settings (see configuration) |
| Transmission range | 0 ... -20 V |
| **Output** | |
| Connection side | control side |
| Connection | SL1: 8a(+), 7a(-); 10a(+), 9a(-) |
| Voltage | 0 ... -20 V |
| Load | min. 9 kΩ |
| Output resistance | 24 Ω typ., 27 Ω maximum<br>Since this is much less than the end-to-end resistance of a zener barrier, it may be necessary to specify a monitor intended for use without a barrier. Please follow the advice of the monitor manufacturer. |
| **Transfer characteristics** | |
| Deviation | DC transfer error (with 10 kΩ load) < 10mV |
| After calibration | additional error with AC superimposed is ±5 mV at 20 °C (68 °F) at any point within the span, provided that the alternating component of the input voltage is not excessive, e. g.<br>- square waves (0 ... 20 kHz): 5 $V_{pp}$<br>- sine waves (0 ... 20 kHz): the full span of 20 $V_{pp}$ (= 100 g peak acceleration at 100 mV/g) is acceptable. |
| Influence of ambient temperature | (< 100 ppm of span)/K at any point within the span |
| Bandwidth | -0.1 dB at 10 kHz; -1 dB at 20 kHz |
| Time delay relative to input | 7.0 ± 0.3 µs |
| Ripple | in 200 kHz bandwidth < 20 $mV_{rms}$<br>in 20 kHz bandwidth < 3 $mV_{rms}$ |
| **Galvanic isolation** | |
| Output/power supply | functional insulation, rated insulation voltage 50 V AC |
| **Indicators/settings** | |
| Display elements | LED |
| Control elements | DIP switch |
| Configuration | via DIP switches |
| Labeling | space for labeling at the front |
| **Directive conformity** | |
| Electromagnetic compatibility | |
| Directive 2014/30/EU | EN 61326-1:2013 (industrial locations) |
| **Conformity** | |
| Electromagnetic compatibility | NE 21:2006<br>For further information see system description. |
| Degree of protection | IEC 60529 |
| Protection against electrical shock | UL 61010-1 |
| **Ambient conditions** | |
| Ambient temperature | -20 ... 60 °C (-4 ... 140 °F) |
| **Mechanical specifications** | |
| Degree of protection | IP20 |
| Mass | approx. 140 g |
| Dimensions | 18 x 114 x 130 mm (0.7 x 4.5 x 5.1 inch) (W x H x D) |
| Mounting | on termination board |
| Coding | pin 2 trimmed<br>For further information see system description. |
| **Data for application in connection with hazardous areas** | |
| EU-type examination certificate | BASEEFA 11 ATEX 0021X |
| Marking | ⟨Ex⟩ II (1)G [Ex ia Ga] IIC , ⟨Ex⟩ II (1)D [Ex ia Da] IIIC , ⟨Ex⟩ I (M1) [Ex ia Ma] I |

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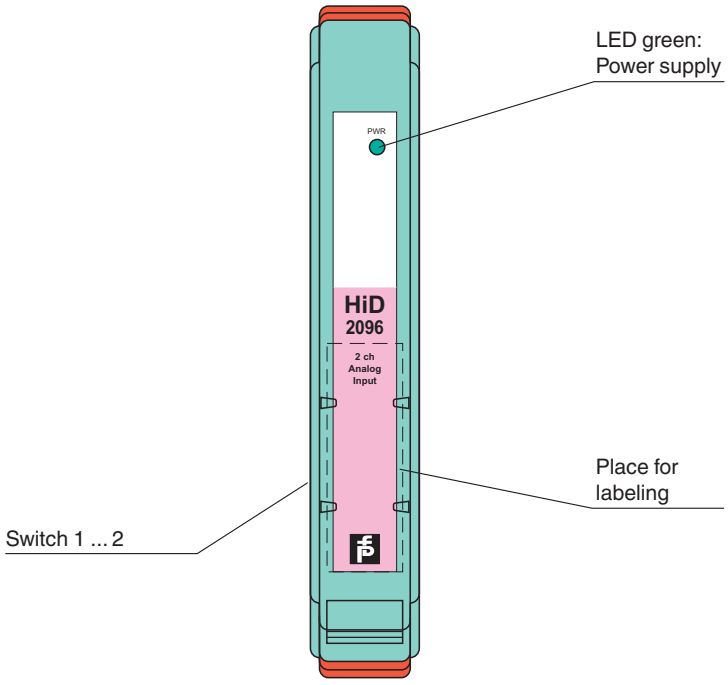
## Technical Data

| | | |
|---|---|---|
| Voltage | $U_o$ | 26.4 V |
| Current | $I_o$ | 93 mA |
| Power | $P_o$ | 583 mW |
| Output | | |
| Maximum safe voltage | $U_m$ | 253 V (Attention! The rated voltage is lower.) |
| Certificate | | BASEEFA 11 ATEX 0022X |
| Marking | | Ⓔx II 3G Ex ec IIC T4 Gc |
| Galvanic isolation | | |
| Input/Output | | safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V |
| Directive conformity | | |
| Directive 2014/34/EU | | EN IEC 60079-0:2018+AC:2020 , EN IEC 60079-7:2015+A1:2018 , EN 60079-11:2012 |
| **International approvals** | | |
| UL approval | | E106378 |
| Control drawing | | 116-0346 (cULus) |
| IECEx approval | | |
| IECEx certificate | | IECEx BAS 11.0012X<br>IECEx BAS 11.0013X |
| IECEx marking | | [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I<br>Ex ec IIC T4 Gc |
| **General information** | | |
| Supplementary information | | Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see www.pepperl-fuchs.com. |

## Assembly

**Front view**




## Configuration

Configure the device in the following way:
- Push the red Quick Lok Bars on each side of the device in the upper position.
- Remove the device from termination board.
- Set the switches according to the figure in the **Configuration** section.

**Note**

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## Configuration

The pins for this device are trimmed to polarize it according to its safety parameters. Do not change the setting. For further information see system description.

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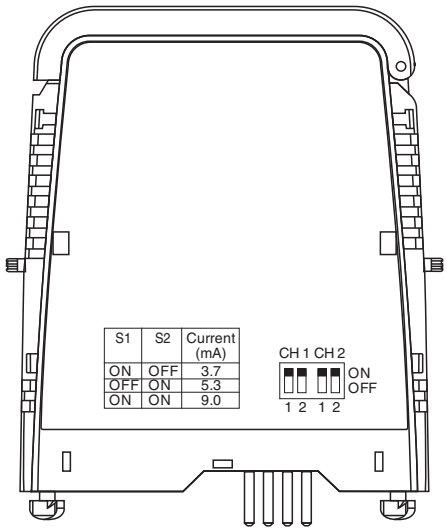
## Configuration




### Switch position

| Function | CH 1 | | CH 2 | |
|---|---|---|---|---|
| | S1 | S2 | S1 | S2 |
| Current 3.7 mA | ON | OFF | ON | OFF |
| Current 5.3 mA | OFF | ON | OFF | ON |
| Current 9.0 mA | ON | ON | ON | ON |

Factory setting: current 9.0 mA

## Additional Information

### Installation

*The terminal numbers below refer to channel 1. For channel 2 terminals see connection diagram and technical data.*

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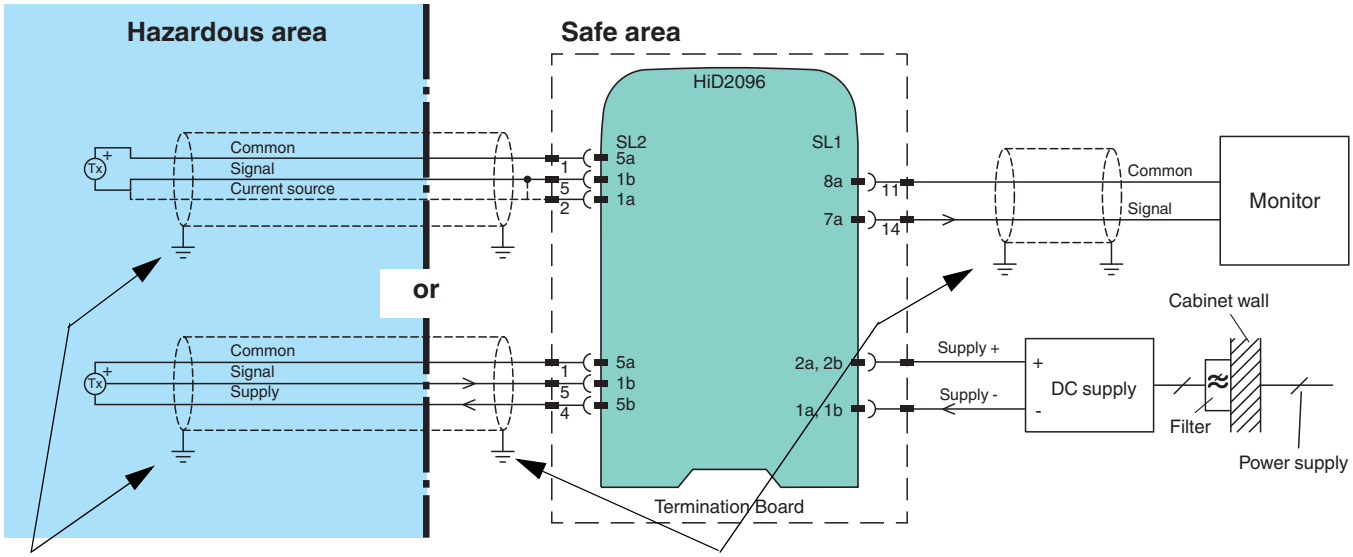


If the transducer and probe are isolated from ground, the cable screen may be left unconnected at this end but must be securely insulated. If the transducer circuitry is connected or decoupled to ground the screen must be securely grounded.

In general, please follow the recommendations of the transducer manufacturer.

Cable screens should be grounded in the gland where the cable enters the barrier cabinet.

## Function

**Vibration monitoring sensors with 2-wire connection:**

2-wire accelerometers and velocity indication devices are supplied with a fixed current and indicate what they are sensing by varying their own supply voltage - often by ±5 V about a quiescent level of about 10 V. Those sensors are connected to terminals 5a (1) and 7b (8) with a link between terminals 7b (8) and 7a (7).

Terminal 7b (8) provides a constant current which can be set by means of switches to approximately 3.7 mA, 5.3 mA or 9.0 mA. The switches are accessible via a hole situated in the side of the housing.

Example:

As an example, a 2-wire accelerometer requiring a minimum of 4 mA supply current (S1 = OFF, S2 = ON) and changing its own supply voltage by 100 mV for each "g" that it experiences would be connected between terminals 5a (1) and 7b (8) with a link between terminals 7b (8) and 7a (7). In that condition there may be around 10 V between terminals 5a (1) and 7b (8) under quiescent conditions. If it were capable of indication up to 50 g in each direction then the voltage between terminals 8a (11) and 7a (14) would vary between 5 V (indicating +50 g) and 15 V (indicating -50 g).

**Vibration monitoring sensors with 3-wire connection:**

Commonly 3-wire analog proximity sensors are used to indicate shaft proximity and can "see" movements due to vibration which they indicate as a varying voltage level on the 3rd wire. Those sensors are connected to terminals 5a (1), 5b (4) and 7a (7) with power supplied through terminals 5a (1) and 5b (4) and the signal connected to terminal 7a (7). For a 3-wire sensor taking 10 mA, terminal 5b (4) would be at approximately -21 V with respect to the common terminal 5a (1) and the signal on the 3rd wire, connected to terminal 7a (7), would be able to vary between 0 and -19 V, or so, with respect to common.

Terminal 5a (1), the most positive terminal on the hazardous side, is regarded as "common". There is an open circuit voltage of about 24 V DC between terminals 5a (1) and 5b (4) but terminal 5b (4) has a resistance of about 300 Ω in series with it so the voltage falls to about 21 V at 10 mA and about 18 V at 20 mA. The DC voltage at terminal 7a (7) (referred to the "common") is repeated at terminal 7a (14) using terminal 8a (11) as the "common" on the safe side of the circuit.

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