Voltage Repeater

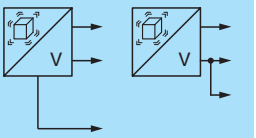
HiC2095

- 1-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

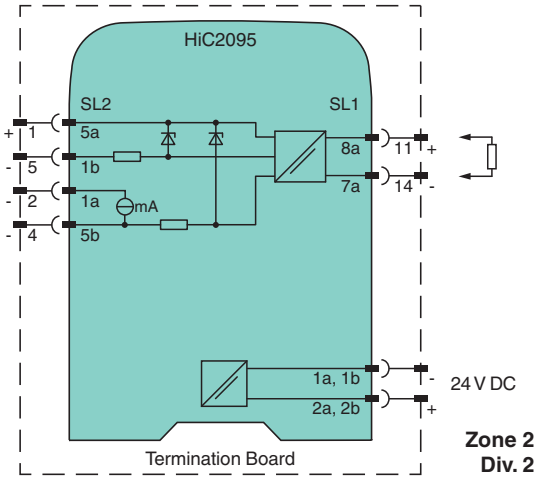
Function

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 HiC system termination board.

Connection



Zone 0, 1, 2
Div. 1, 2



Zone 2
Div. 2

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		≤ 1.3 W
Input		
Connection side		field side

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Technical Data

Connection		SL2: 5a (common), 1a or 5b (supply -), 1b (input -)
Input resistance		10 kΩ terminals 5a and 1b
Output rated operating current		SL2: 5a (common), 5b: > 10 mA at -21 V or > 20 mA at -18 V SL2: 5a (common), 1a: 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(-)
Voltage		0 ... -20 V
Load		min. 9 kΩ
Output resistance		24 Ω typ., 27 Ω maximum 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. - square waves (0 ... 20 kHz): 5 V_{pp} - 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} 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 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. 100 g
Dimensions		12.5 x 106 x 128 mm (0.5 x 4.2 x 5.1 inch) (W x H x D)
Mounting		on termination board
Coding		pin 2 trimmed 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)GD, I (M1) [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I (-20 °C ≤ T_{amb} ≤ 60 °C) , [circuit(s) in zone 0/1/2]
Voltage	U_o	26.4 V
Current	I_o	93 mA

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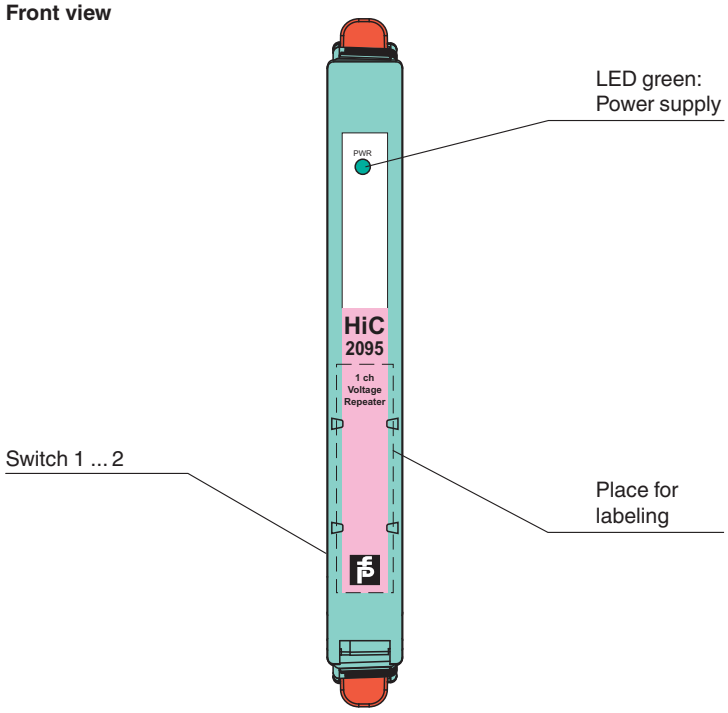
Technical Data

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 [device in zone 2]
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 60079-0:2012+A11:2013 , EN 60079-11:2012 , EN 60079-7:2015
International approvals		
UL approval		
Control drawing		116-0350 (cULus)
IECEx approval		
IECEx certificate		IECEx BAS 11.0012X IECEx BAS 11.0013X
IECEx marking		[Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I 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



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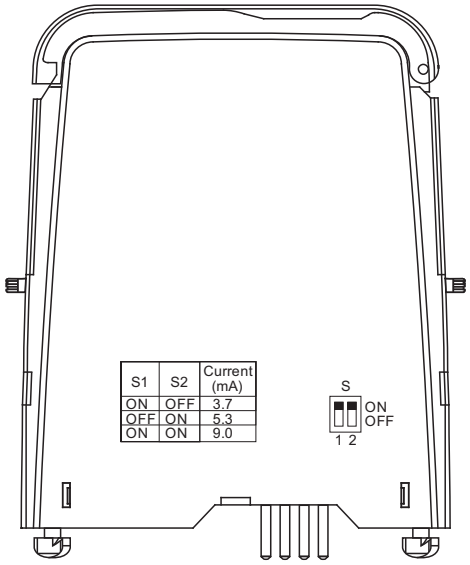
Configuration



Switch position

Function	S1	S2
Current 3.7 mA	ON	OFF
Current 5.3 mA	OFF	ON
Current 9.0 mA	ON	ON

Factory setting: current 9.0 mA

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 DIP switches according to the figure.

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

Additional Information

Installation

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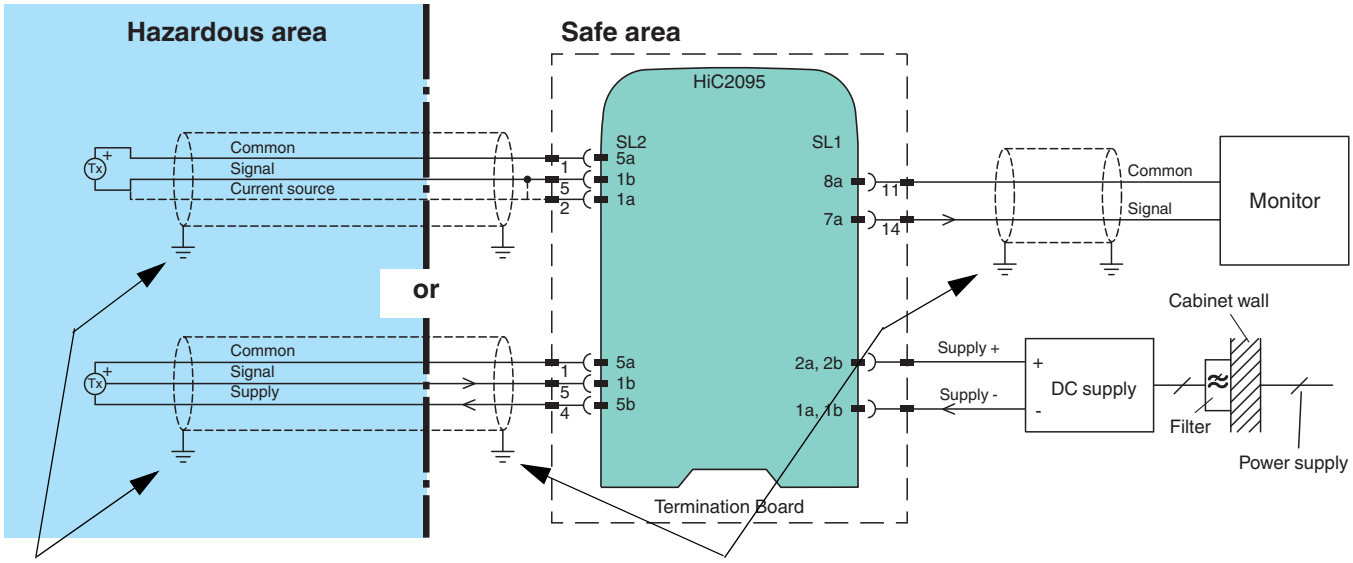

If the transducer and probe are isolated from ground, the cable screen may be left unconnected at this end but must be securely insulated. If the transducer circuitry is connected or decoupled to ground the screen must be securely grounded.

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 and 1a with a link between terminals 1a and 1b.

Terminal 1a 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 and 1a with a link between terminals 1a and 1b. In that condition there may be around 10 V between terminals 5a and 1a under quiescent conditions. If it were capable of indication up to 50 g in each direction then the voltage between terminals 8a and 7a 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, 5b and 1b with power supplied through terminals 5a and 5b and the signal connected to terminal 1b. For a 3-wire sensor taking 10 mA, terminal 5b would be at approximately -21 V with respect to the common terminal 5a and the signal on the 3rd wire, connected to terminal 1b, would be able to vary over the 0 to -19 V, or so, with respect to common.

Terminal 5a, 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 and 5b but terminal 5b 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 1b (referred to the "common") is repeated at terminal 7a using terminal 8a as the "common" on the safe side of the circuit.

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