Voltage Repeater

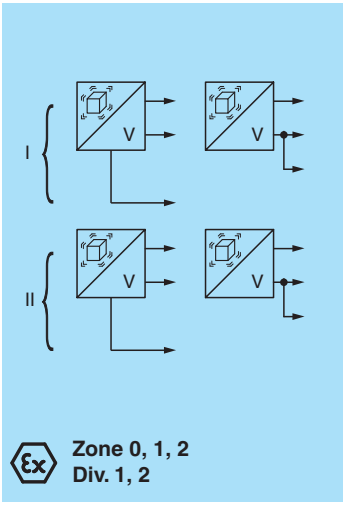
HiD2096

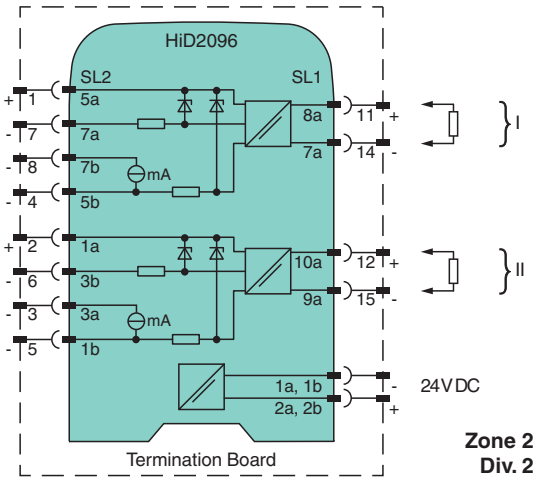
- 2-channel isolated barrier
- 24 V DC supply (bus powered)
- Voltage input 0 V ... -20 V
- Vibration sensor inputs
- Voltage/current field supply
- Voltage output 0 V ... -20 V
- Up to SIL 2 acc. to IEC/EN 61508

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		

Release date: 2022-01-05 Date of issue: 2022-01-05 Filename: 196196_eng.pdf

Technical Data

Connection side	field side
Connection	SL2: 5a (common), 5b or 7b (supply -), 7a (input -) 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 SL2: 1a (common), 1b: > 10 mA at -21 V or > 20 mA at -18 V 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) 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 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. 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 For further information see system description.
Data for application in connection with hazardous areas	
EU-type examination certificate	BASEEFA 11 ATEX 0021X

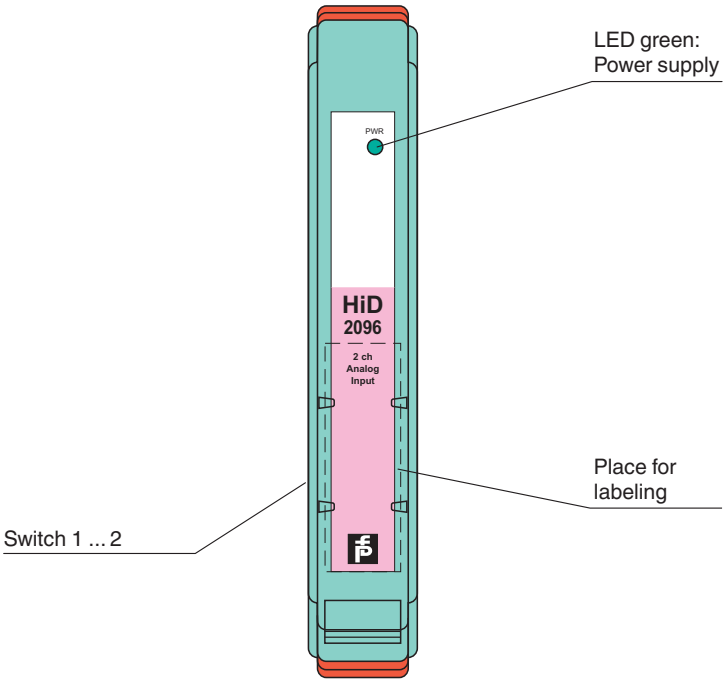
Release date: 2022-01-05 Date of issue: 2022-01-05 Filename: 196196_eng.pdf

Technical Data

Marking		Ⓔx 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
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		116-0346 (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.

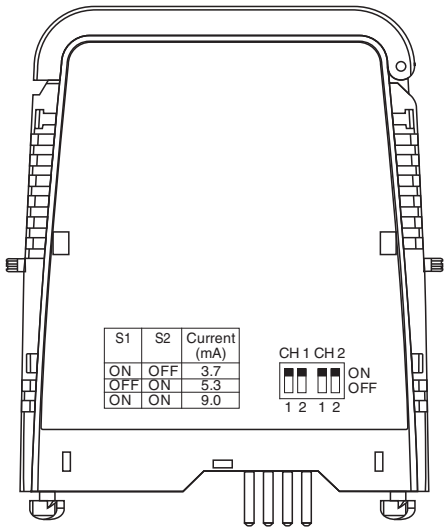
Assembly

Front view



Release date: 2022-01-05 Date of issue: 2022-01-05 Filename: 196196_eng.pdf

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

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

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

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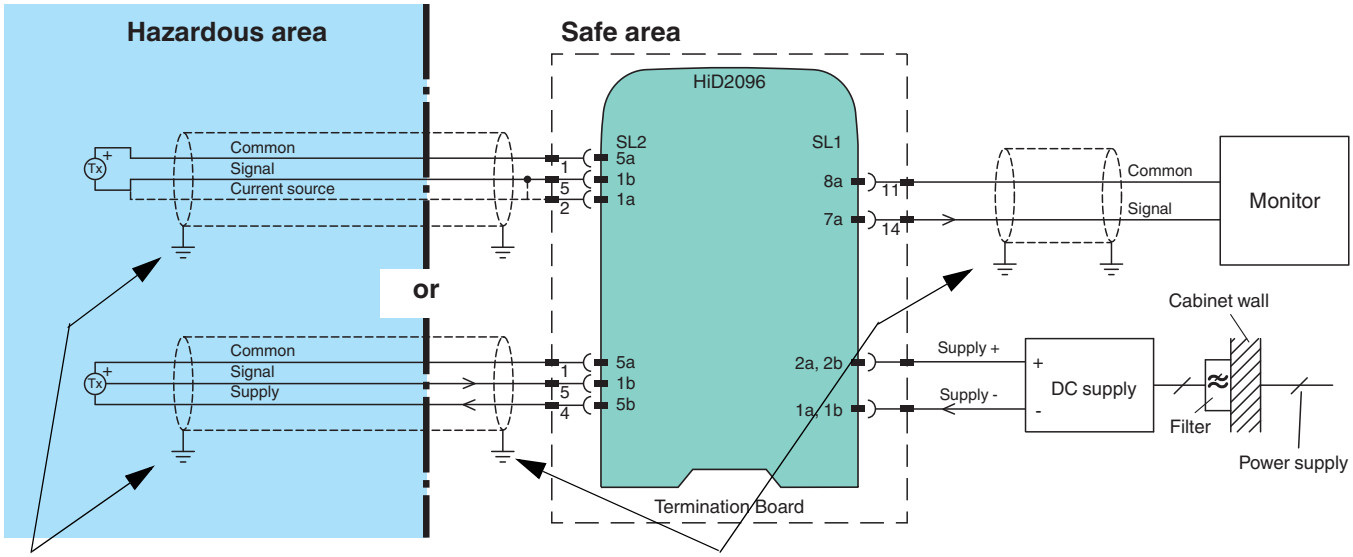

If the transducer and probe are isolated from ground, the cable screen may be left unconnected at this end but must be securely insulated. If the transducer circuitry is connected or decoupled to ground the screen must be securely grounded.

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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