SMART Universal Barrier

HiC2441

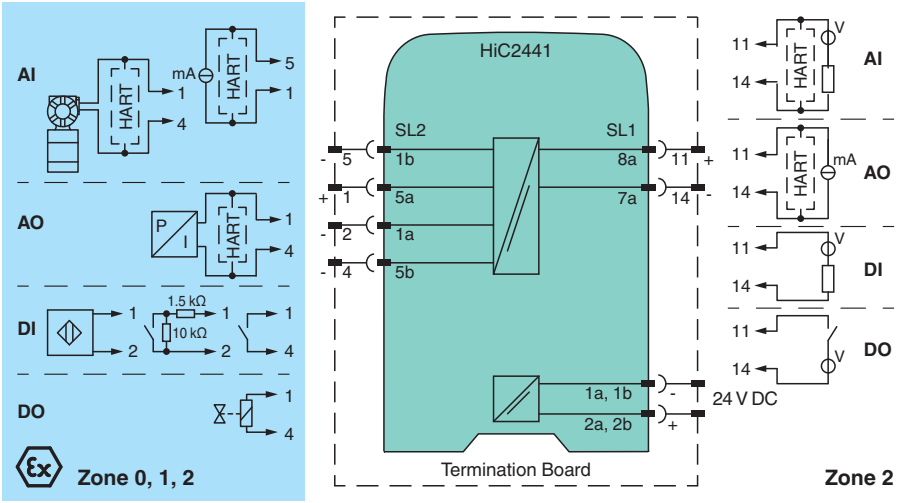
- 1-channel isolated barrier
- 24 V DC supply (bus powered)
- Analog input, digital input, analog output, digital output
- No configuration required, device is self-adapting
- HART transparency
- Low power dissipation
- 3-way isolation
- Up to SIL 2 acc. to IEC/EN 61508

Function

This isolated barrier is used for intrinsic safety applications.
The device can transfer the following signals:
- as an analog input: 0/4 mA ... 20 mA
- as an analog output: 0/4 mA ... 20 mA
- as a digital input: signals from NAMUR sensors or dry contacts
- as a digital output: max. 45 mA

The device requires no configuration and adapts itself automatically to the function of the active input/output of the connected process control system.
The device permits the bi-directional pass-through of the HART communication.
The device is designed primarily for use with universal I/O cards (e. g. Honeywell Universal Process IO).
This device mounts on a HiC Termination Board.

Connection



Technical Data

General specifications	
Signal type	Universal
Functional safety related parameters	
Safety Integrity Level (SIL)	SIL 2

Release date: 2022-09-15 Date of issue: 2022-09-15 Filename: 315318_eng.pdf

Technical Data

Supply		
Connection		SL1: 1a(-), 1b(-); 2a(+), 2b(+)
Rated voltage	U_r	19 ... 30 V DC via Termination Board
Ripple		≤ 10 %
Rated current	I_r	≤ 30 mA
Power consumption		≤ 700 mW
Analog input		
Suitable field devices		2-wire SMART transmitters, current sources
Signal		0/4 ... 20 mA , limited to approx. 40 mA (depends on control system) , reverse polarity protected
Field circuit		SL2: 5a(+), 5b(-) (2-wire SMART transmitter) SL2: 5a(+), 1b(-) (2-wire SMART transmitter with current source)
Voltage drop		approx. 4 V (current source)
Control circuit		SL1: 8a(+), 7a(-)
Supply voltage		min. 16 V at 20 mA (2-wire SMART transmitter)
Voltage		15 ... 30 V
Signal		0/4 ... 20 mA , sink mode , working voltage 15 ... 30 V
Ripple		20 mV $_{rms}$
Analog output		
Suitable field devices		I/P converters (positioner), on-site-displays
Signal		0/4 ... 20 mA
Field circuit		SL2: 5a(+), 5b(-)
Load		0 ... 650 Ω
Voltage		≥ 13 V at 20 mA
Ripple		20 mV $_{rms}$
Control circuit		SL1: 8a(+), 7a(-)
Voltage		12 ... 30 V
Signal		0/4 ... 20 mA
Line fault detection		> 100 kΩ at max. 30 V, with field wiring open
Digital input		
Field circuit		SL2: 5a(+), 1a(-) (NAMUR sensor) SL2: 5a(+), 5b(-) (dry contact)
Suitable field devices		NAMUR sensors according to IEC/EN 60947-5-6, dry contacts
Signal		0.1 ... 9 mA , sink mode
Open loop voltage		approx. 10 V DC , 1 kΩ series resistance
Signal		0.1 ... 9 mA
Control circuit		SL1: 8a(+), 7a(-)
Voltage		13 ... 30 V
Digital output		
Field circuit		SL2: 5a(+), 5b(-)
Suitable field devices		Solenoid Valve , audible alarm , visual alarm
Drive capability		12 V / 40 mA at 300 Ω load
Internal resistor	R_i	min. 240 Ω
Current	I_e	40 mA
Voltage	U_e	12 V
Current limit	I_{max}	45 mA
Open loop voltage	U_s	approx. 22 V
Control circuit		SL1: 8a(+), 7a(-)
Voltage		1-signal: 19 ... 30 V DC 0-signal: 0 ... 5 V DC
Current		1-signal: 0 ... 45 mA, depending on the output load 0-signal: < 0.1 mA, independent of the output load
Power dissipation		1.1 W at 24 V, 300 Ω load (digital output)
Transfer characteristics		

Release date: 2022-09-15 Date of issue: 2022-09-15 Filename: 315318_eng.pdf

Technical Data

Deviation		at 20 °C (68 °F) ≤ ±20 µA incl. linearity, hysteresis and supply fluctuations at 4 ... 20 mA (analog input, analog output) ≤ ±60 µA incl. linearity, hysteresis and supply fluctuations at 0 ... 45 mA (digital output)
Influence of ambient temperature		< 2 µA/K (0 ... 70 °C (32 ... 158 °F)) < 3 µA/K (-40 ... 0 °C (-40 ... 32 °F))
Switching frequency		≤ 500 Hz with 50 % duty cycle (digital input, NAMUR sensor) ≤ 5 Hz (digital input, dry contact) ≤ 20 Hz (digital output)
Frequency range		HART: bandwidth by 0.5 V_{pp} signal and/or 1 mA_{pp} signal 950 ... 2500 Hz (analog input, analog output)
Settling time		≤ 20 ms (analog input, analog output) ≤ 1 ms (digital input, NAMUR sensor)
Reaction time		≤ 5 ms , turn-on/turn-off time (digital output)
Galvanic isolation		
Control/power supply		basic insulation according to IEC/EN 61010-1, rated insulation voltage 60 V_{eff}
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 60529:2001
Protection against electrical shock		IEC 61010-1:2010
Input		EN 60947-5-6:2000
Ambient conditions		
Ambient temperature		-40 ... 70 °C (-40 ... 158 °F) Observe the temperature range limited by derating, see section derating.
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Relative humidity		95 % non-condensing
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 1 and 4 trimmed For further information see system description.
Data for application in connection with hazardous areas		
EU-type examination certificate		TÜV 14 ATEX 153522 X
Marking		⟨Ex⟩ II (1)G [Ex ia Ga] IIC ⟨Ex⟩ II (1)D [Ex ia Da] IIIC ⟨Ex⟩ I (M1) [Ex ia Ma] I
Supply		
Maximum safe voltage	U_m	250 V (Attention! The rated voltage can be lower.)
Equipment		SL2: 5a(+), 5b(-)
Voltage	U_o	25.2 V
Current	I_o	110 mA
Power	P_o	693 mW
Internal capacitance	C_i	5.7 nF
Internal inductance	L_i	0 mH
Equipment		SL2: 5a(+), 1b(-)
Voltage	U_i	< 28 V
Current	I_i	< 115 mA
Voltage	U_o	7.2 V
Current	I_o	0 mA
Power	P_o	0 mW
Internal capacitance	C_i	5.7 nF
Internal inductance	L_i	0 mH

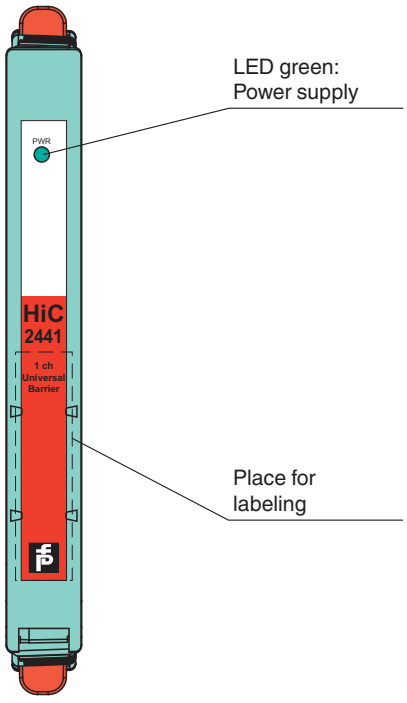
Release date: 2022-09-15 Date of issue: 2022-09-15 Filename: 315318_eng.pdf

Technical Data

Equipment		SL2: 5a(+), 1a(-)
Voltage	U_o	12.6 V
Current	I_o	13 mA
Power	P_o	41 mW
Internal capacitance	C_i	5.7 nF
Internal inductance	L_i	0 mH
Certificate		TÜV 14 ATEX 153523 X
Marking		Ⓔx II 3G Ex ec IIC T4 Gc
Galvanic isolation		
Input/Other circuits		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		E106378
Control drawing		116-0408 (cULus)
IECEx approval		
IECEx certificate		IECEx TUN 15.0004X
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



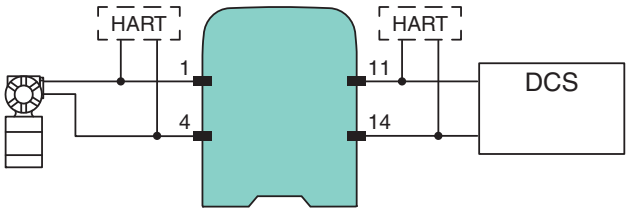
Release date: 2022-09-15 Date of issue: 2022-09-15 Filename: 315318_eng.pdf

Application

Examples

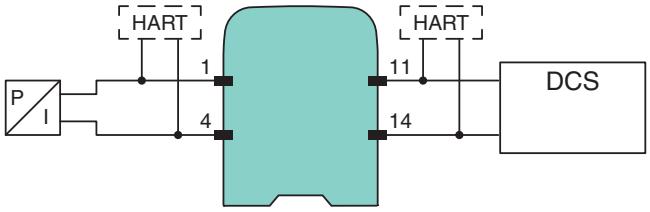
Analog input

The control system must be parameterized to an active current input.



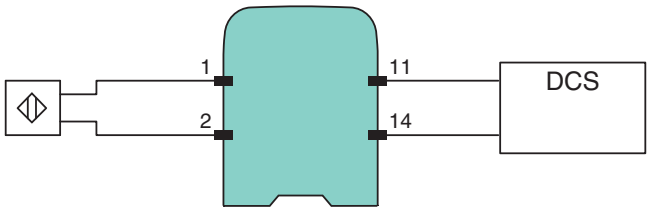
Analog output

The control system must be parameterized to a current output.



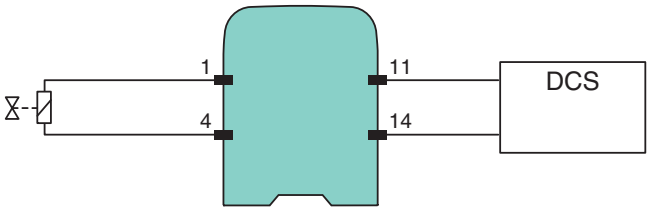
Digital input

The digital input of the control system must evaluate the level of a current signal.



Digital output

The digital output of the control system must be parameterized in a way that the digital output powers actively a valve. The current which is provided by the control system is transferred directly to the valve.

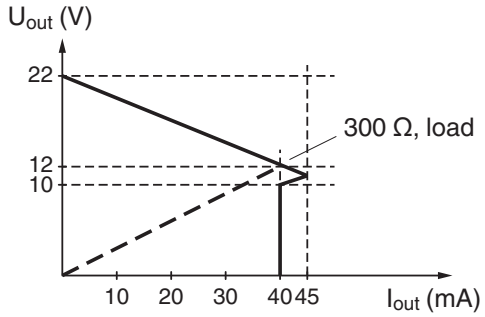


This section does not show all connection options. For further connection options see "Connection" section.

Characteristic Curve

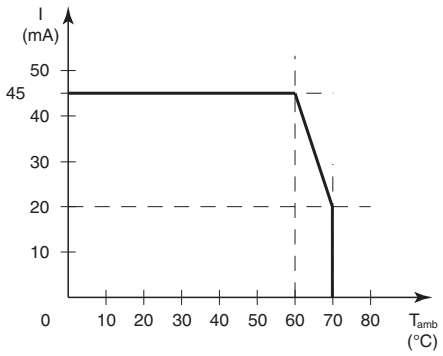
Fallback characteristic for digital output

Release date: 2022-09-15 Date of issue: 2022-09-15 Filename: 315318_eng.pdf



Characteristic Curve

Derating



Application

The device is designed as intrinsically safe interface for Universal Process IO (or Universal Safety IO) by Honeywell.

Release date: 2022-09-15 Date of issue: 2022-09-15 Filename: 315318_eng.pdf