



# 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.

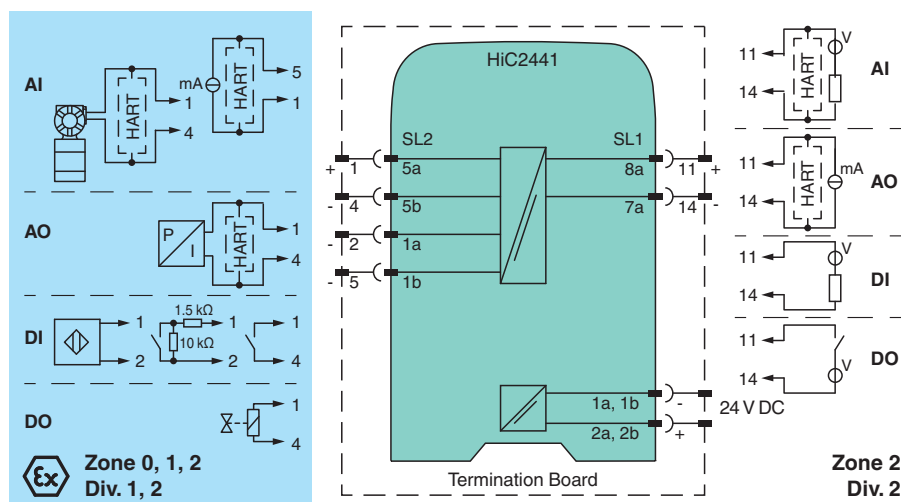
The device is designed primarily for use with universal I/O cards (e. g. Honeywell Universal Process IO).

This device mounts on a HiC Termination Board.

## Application

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

## Connection



## Technical Data

### General specifications

|             |           |
|-------------|-----------|
| Signal type | Universal |
|-------------|-----------|

### Functional safety related parameters

|                              |       |
|------------------------------|-------|
| Safety Integrity Level (SIL) | SIL 2 |
|------------------------------|-------|

## Technical Data

|                                 |           |                                                                                                                      |
|---------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------|
| Systematic capability (SC)      |           | SC 2                                                                                                                 |
| <b>Supply</b>                   |           |                                                                                                                      |
| Connection                      |           | SL1: 1a, 1b(-); 2a, 2b(+)                                                                                            |
| Rated voltage                   | $U_r$     | 19 ... 30 V DC bus powered via Termination Board                                                                     |
| Ripple                          |           | $\leq 10 \%$                                                                                                         |
| Rated current                   | $I_r$     | $\leq 30 \text{ mA}$                                                                                                 |
| Power consumption               |           | $\leq 700 \text{ mW}$                                                                                                |
| <b>Analog input</b>             |           |                                                                                                                      |
| 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                    |
| <b>Field circuit</b>            |           | SL2: 5a(+), 5b(-) (2-wire SMART transmitter)<br>SL2: 5a(+), 1b(-) (2-wire SMART transmitter with current source)     |
| Voltage drop                    |           | approx. 4 V (current source)                                                                                         |
| <b>Control circuit</b>          |           | 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 <sub>rms</sub>                                                                                                 |
| <b>Analog output</b>            |           |                                                                                                                      |
| Suitable field devices          |           | I/P converters (positioner), on-site-displays                                                                        |
| Signal                          |           | 0/4 ... 20 mA                                                                                                        |
| <b>Field circuit</b>            |           | SL2: 5a(+), 5b(-)                                                                                                    |
| Load                            |           | 0 ... 650 $\Omega$                                                                                                   |
| Voltage                         |           | $\geq 13 \text{ V}$ at 20 mA                                                                                         |
| Ripple                          |           | 20 mV <sub>rms</sub>                                                                                                 |
| <b>Control circuit</b>          |           | SL1: 8a(+), 7a(-)                                                                                                    |
| Voltage                         |           | 12 ... 30 V                                                                                                          |
| Signal                          |           | 0/4 ... 20 mA                                                                                                        |
| Line fault detection            |           | $> 100 \text{ k}\Omega$ at max. 30 V, with field wiring open                                                         |
| <b>Digital input</b>            |           |                                                                                                                      |
| <b>Field circuit</b>            |           | SL2: 5a(+), 1a(-) (NAMUR sensor)<br>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 k $\Omega$ series resistance                                                                     |
| Signal                          |           | 0.1 ... 9 mA                                                                                                         |
| <b>Control circuit</b>          |           | SL1: 8a(+), 7a(-)                                                                                                    |
| Voltage                         |           | 13 ... 30 V                                                                                                          |
| <b>Digital output</b>           |           |                                                                                                                      |
| <b>Field circuit</b>            |           | SL2: 5a(+), 5b(-)                                                                                                    |
| Suitable field devices          |           | Solenoid Valve , audible alarm , visual alarm                                                                        |
| Drive capability                |           | 12 V / 40 mA at 300 $\Omega$ load                                                                                    |
| Internal resistor               | $R_i$     | min. 240 $\Omega$                                                                                                    |
| Current                         | $I_e$     | 40 mA                                                                                                                |
| Voltage                         | $U_e$     | 12 V                                                                                                                 |
| Current limit                   | $I_{max}$ | 45 mA                                                                                                                |
| Open loop voltage               | $U_s$     | approx. 22 V                                                                                                         |
| <b>Control circuit</b>          |           | SL1: 8a(+), 7a(-)                                                                                                    |
| Voltage                         |           | 1-signal: 19 ... 30 V DC<br>0-signal: 0 ... 5 V DC                                                                   |
| Current                         |           | 1-signal: 0 ... 45 mA, depending on the output load<br>0-signal: $< 0.1 \text{ mA}$ , independent of the output load |
| Power dissipation               |           | 1.1 W at 24 V, 300 $\Omega$ load (digital output)                                                                    |
| <b>Transfer characteristics</b> |           |                                                                                                                      |

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## Technical Data

|                                                                |                |                                                                                                                                                                                                                               |
|----------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Deviation                                                      |                | at 20 °C (68 °F)<br>≤ ±20 µA incl. linearity, hysteresis and supply fluctuations at 4 ... 20 mA (analog input, analog output)<br>≤ ±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))<br>< 3 µA/K (-40 ... 0 °C (-40 ... 32 °F))                                                                                                                                             |
| Switching frequency                                            |                | ≤ 500 Hz with 50 % duty cycle (digital input, NAMUR sensor)<br>≤ 5 Hz (digital input, dry contact)<br>≤ 20 Hz (digital output)                                                                                                |
| Frequency range                                                |                | HART: bandwidth by 0.5 V <sub>pp</sub> signal and/or 1 mA <sub>pp</sub> signal 950 ... 2500 Hz (analog input, analog output)                                                                                                  |
| Settling time                                                  |                | ≤ 20 ms (analog input, analog output)<br>≤ 1 ms (digital input, NAMUR sensor)                                                                                                                                                 |
| Reaction time                                                  |                | ≤ 5 ms, turn-on/turn-off time (digital output)                                                                                                                                                                                |
| <b>Galvanic isolation</b>                                      |                |                                                                                                                                                                                                                               |
| Control/power supply                                           |                | basic insulation according to IEC/EN 61010-1, rated insulation voltage 60 V <sub>eff</sub>                                                                                                                                    |
| <b>Indicators/settings</b>                                     |                |                                                                                                                                                                                                                               |
| Display elements                                               |                | LED                                                                                                                                                                                                                           |
| Labeling                                                       |                | space for labeling at the front                                                                                                                                                                                               |
| <b>Directive conformity</b>                                    |                |                                                                                                                                                                                                                               |
| Electromagnetic compatibility                                  |                |                                                                                                                                                                                                                               |
| Directive 2014/30/EU                                           |                | EN 61326-1:2013 (industrial locations)                                                                                                                                                                                        |
| <b>Conformity</b>                                              |                |                                                                                                                                                                                                                               |
| Electromagnetic compatibility                                  |                | NE 21:2012<br>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                                                                                                                                                                                                             |
| <b>Ambient conditions</b>                                      |                |                                                                                                                                                                                                                               |
| Ambient temperature                                            |                | -40 ... 70 °C (-40 ... 158 °F)<br>Observe the temperature range limited by derating, see section derating.                                                                                                                    |
| Storage temperature                                            |                | -40 ... 85 °C (-40 ... 185 °F)                                                                                                                                                                                                |
| Relative humidity                                              |                | 95 % non-condensing                                                                                                                                                                                                           |
| <b>Mechanical specifications</b>                               |                |                                                                                                                                                                                                                               |
| Degree of protection                                           |                | IP20                                                                                                                                                                                                                          |
| Mass                                                           |                | approx. 105 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<br>For further information see system description.                                                                                                                                                        |
| <b>Data for application in connection with hazardous areas</b> |                |                                                                                                                                                                                                                               |
| EU-type examination certificate                                |                | TÜV 14 ATEX 153522 X                                                                                                                                                                                                          |
| Marking                                                        |                | ⊕ II (1)G [Ex ia Ga] IIC<br>⊕ II (1)D [Ex ia Da] IIIC<br>⊕ I (M1) [Ex ia Ma] I                                                                                                                                                |
| Supply                                                         |                |                                                                                                                                                                                                                               |
| Maximum safe voltage                                           | U <sub>m</sub> | 250 V (Attention! The rated voltage can be lower.)                                                                                                                                                                            |
| Equipment                                                      |                | SL2: 5a(+), 5b(-)                                                                                                                                                                                                             |
| Voltage                                                        | U <sub>o</sub> | 25.2 V                                                                                                                                                                                                                        |
| Current                                                        | I <sub>o</sub> | 110 mA                                                                                                                                                                                                                        |
| Power                                                          | P <sub>o</sub> | 693 mW                                                                                                                                                                                                                        |
| Internal capacitance                                           | C <sub>i</sub> | 5.7 nF                                                                                                                                                                                                                        |
| Internal inductance                                            | L <sub>i</sub> | 0 mH                                                                                                                                                                                                                          |
| Equipment                                                      |                | SL2: 5a(+), 1b(-)                                                                                                                                                                                                             |
| Voltage                                                        | U <sub>i</sub> | < 28 V                                                                                                                                                                                                                        |
| Current                                                        | I <sub>i</sub> | < 115 mA                                                                                                                                                                                                                      |
| Voltage                                                        | U <sub>o</sub> | 7.2 V                                                                                                                                                                                                                         |
| Current                                                        | I <sub>o</sub> | 0 mA                                                                                                                                                                                                                          |

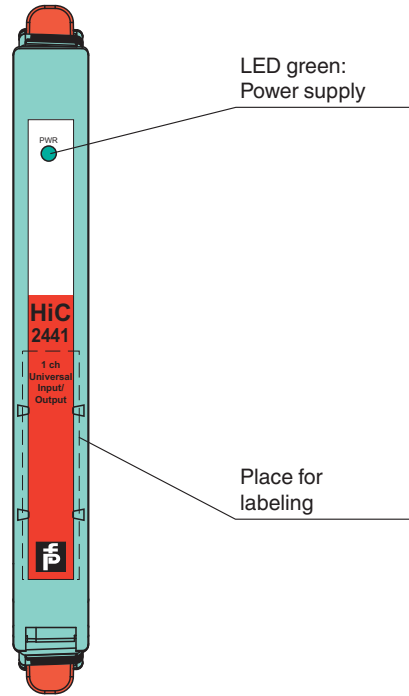
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|                                |                |                                                                                                                                                                                                 |
|--------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power                          | P <sub>o</sub> | 0 mW                                                                                                                                                                                            |
| Internal capacitance           | C <sub>i</sub> | 5.7 nF                                                                                                                                                                                          |
| Internal inductance            | L <sub>i</sub> | 0 mH                                                                                                                                                                                            |
| Equipment                      |                | SL2: 5a(+), 1a(-)                                                                                                                                                                               |
| Voltage                        | U <sub>o</sub> | 12.6 V                                                                                                                                                                                          |
| Current                        | I <sub>o</sub> | 13 mA                                                                                                                                                                                           |
| Power                          | P <sub>o</sub> | 41 mW                                                                                                                                                                                           |
| Internal capacitance           | C <sub>i</sub> | 5.7 nF                                                                                                                                                                                          |
| Internal inductance            | L <sub>i</sub> | 0 mH                                                                                                                                                                                            |
| Certificate                    |                | TÜV 14 ATEX 153523 X                                                                                                                                                                            |
| Marking                        |                | 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 IEC 60079-0:2018+AC:2020 , EN 60079-11:2012 , EN 60079-7:2015+A1:2018                                                                                                                        |
| <b>International approvals</b> |                |                                                                                                                                                                                                 |
| 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<br>Ex ec IIC T4 Gc                                                                                                                              |
| <b>General information</b>     |                |                                                                                                                                                                                                 |
| Supplementary information      |                | Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a> . |

Assembly

Front view



Safety Information

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

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Configuration

No user configuration available for this device.

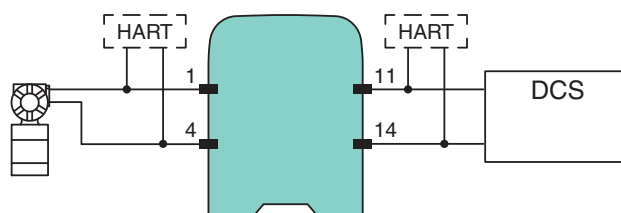
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## Application

### Examples

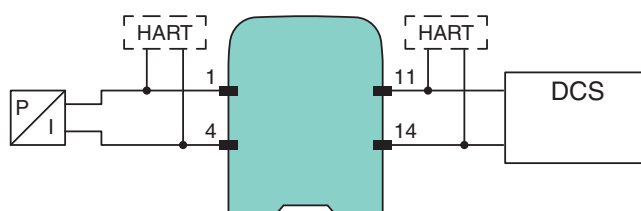
#### Analog input

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



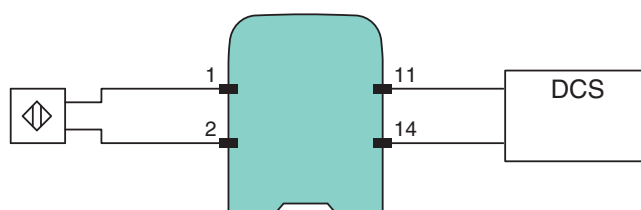
#### Analog output

The control system must be parameterized to a current output.



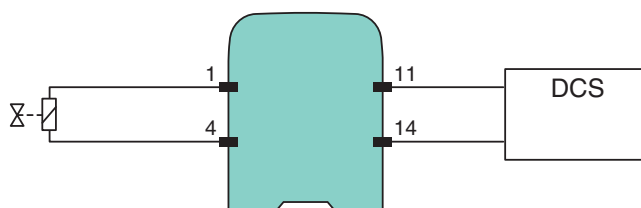
#### Digital input

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



#### Digital output

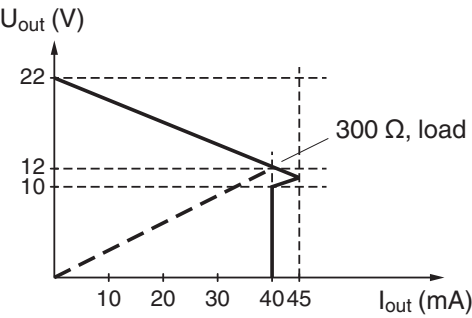
The digital output of the control system must be parameterized in a way that the digital output powers actively a valve. The current which is provided by the control system is transferred directly to the valve.



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

## Characteristic Curve

### Fallback characteristic for digital output



Characteristic Curve

Derating

