

# MACX MCR-EX-SL-RPSSI-I - Repeater power supply



2865340

<https://www.phoenixcontact.com/us/products/2865340>

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Ex i repeater power supply and input signal conditioner, HART-transparent. Transmits supplied or active 0/4 ... 20 mA signals from the Ex area to a load (active or passive) in the safe area. 3-way electrical isolation, SIL 2 in accordance with IEC 61508, with screw connection

## Your advantages

- 0/4 mA ... 20 mA input, intrinsically safe, [Ex ia], powered and not powered
- Measuring transducer supply voltage > 16 V
- Output: 0/4 mA ... 20 mA, active up to 1000  $\Omega$  load or passive
- Bidirectional HART signal transmission
- Error indication according to NAMUR NE 43
- SIL 2 according to IEC/EN 61508
- Installation in zone 2, protection type "ec" (EN 60079-7) permitted
- 3-way electrical isolation
- Power supply possible via DIN rail connector
- Plug-in connection terminal blocks, screw connection technology, with integrated sockets for HART communicators
- Housing width: 12.5 mm
- Minimal power dissipation
- High transmission accuracy

## Commercial data

|                                      |               |
|--------------------------------------|---------------|
| Item number                          | 2865340       |
| Packing unit                         | 1 pc          |
| Minimum order quantity               | 1 pc          |
| Sales key                            | C430          |
| Product key                          | DK1211        |
| GTIN                                 | 4046356160353 |
| Weight per piece (including packing) | 182.5 g       |
| Weight per piece (excluding packing) | 160 g         |
| Customs tariff number                | 85437090      |
| Country of origin                    | DE            |

## Technical data

### Product properties

|                 |                       |
|-----------------|-----------------------|
| Product type    | Repeater power supply |
| Product family  | MACX Analog           |
| Application     | Analog IN             |
| No. of channels | 1                     |

### Electrical properties

|                                                 |                                                                                                  |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Electrical isolation                            | 3-way isolation                                                                                  |
| Electrical isolation between input and output   | yes                                                                                              |
| Maximum power dissipation for nominal condition | 0.95 W (20 mA, 250 Ω)                                                                            |
| Signal transmission behavior                    | In = Out                                                                                         |
| Step response (10-90%)                          | < 200 μs (for jump 4 mA ... 20 mA, load 600 Ω)<br>< 600 μs (for jump 0 mA ... 20 mA, load 600 Ω) |
| Maximum temperature coefficient                 | < 0.01 %/K                                                                                       |
| Temperature coefficient, typical                | < 0.004 %/K                                                                                      |
| Maximum transmission error                      | < 0.1 % (of final value 20 mA)                                                                   |
| Transmission error, typical                     | < 0.05 % (of final value 20 mA)                                                                  |
| Reverse polarity protection                     | yes                                                                                              |

#### Electrical isolation

|                      |                         |
|----------------------|-------------------------|
| Test voltage         | 2.5 kV AC (50 Hz, 60 s) |
| Overvoltage category | II                      |
| Pollution degree     | 2                       |

#### Electrical isolation Input/output/power supply IEC/EN 61010-1

|                          |                      |
|--------------------------|----------------------|
| Standards/regulations    | IEC/EN 61010-1       |
| Rated insulation voltage | 300 V <sub>rms</sub> |
| Insulation               | Safe isolation       |

#### Electrical isolation Input/output IEC/EN 60079-11

|                          |                      |
|--------------------------|----------------------|
| Standards/regulations    | IEC/EN 60079-11      |
| Rated insulation voltage | 265 V <sub>rms</sub> |

#### Electrical isolation Input/power supply IEC/EN 60079-11

|                          |                      |
|--------------------------|----------------------|
| Standards/regulations    | IEC/EN 60079-11      |
| Rated insulation voltage | 265 V <sub>rms</sub> |

#### Electrical isolation Output/supply IEC/EN 60079-7

|                          |                      |
|--------------------------|----------------------|
| Standards/regulations    | IEC/EN 60079-7       |
| Rated insulation voltage | 265 V <sub>rms</sub> |

### Supply

|                        |                                 |
|------------------------|---------------------------------|
| Designation            | Repeater power supply operation |
| Nominal supply voltage | 24 V DC -20 % ... +25 %         |

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|                                   |                                                                                                             |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------|
| Supply voltage range              | 19.2 V DC ... 30 V DC                                                                                       |
| Max. current consumption          | < 76 mA (24 V DC / 20 mA / 1000 Ω)<br>< 55 mA (24 V DC / 20 mA / 250 Ω)                                     |
| Power dissipation                 | < 1.1 W (24 V DC / 20 mA / 1000 Ω)<br>< 0.95 W (24 V DC / 20 mA / 250 Ω)<br>< 1.2 W (24 V DC / 20 mA / 0 Ω) |
| Power consumption (Output active) | < 1.8 W (20 mA / 1000 Ω)<br>< 1.3 W (20 mA / 250 Ω)                                                         |

## Supply

|                          |                                                                                                               |
|--------------------------|---------------------------------------------------------------------------------------------------------------|
| Designation              | Signal conditioner operation                                                                                  |
| Nominal supply voltage   | 24 V DC -20 % ... +25 %                                                                                       |
| Supply voltage range     | 19.2 V DC ... 30 V DC                                                                                         |
| Max. current consumption | < 44 mA (24 V DC / 20 mA / 1000 Ω)<br>< 27 mA (24 V DC / 20 mA / 250 Ω)                                       |
| Power dissipation        | < 0.75 W (24 V DC / 20 mA / 1000 Ω)<br>< 0.65 W (24 V DC / 20 mA / 250 Ω)<br>< 0.95 W (24 V DC / 20 mA / 0 Ω) |

## Input data

### Signal: Repeater power supply operation

|                                   |                                                              |
|-----------------------------------|--------------------------------------------------------------|
| Description of the input          | Active current input, intrinsically safe                     |
| Number of inputs                  | 1                                                            |
| Input signal                      | Current                                                      |
| Current input signal              | 4 mA ... 20 mA                                               |
| Current limitation                | 25 mA                                                        |
| Transmitter supply voltage        | > 16 V (20 mA)<br>> 15.3 V (22.5 mA)                         |
| Polarization and surge protection | Yes                                                          |
| Underload/overload signal range   | 0 mA ... 24 mA (Extended transmission range for diagnostics) |

### Signal: Signal conditioner operation

|                                 |                                                              |
|---------------------------------|--------------------------------------------------------------|
| Description of the input        | Passive current input, intrinsically safe                    |
| Current input signal            | 0 mA ... 20 mA<br>4 mA ... 20 mA                             |
| Voltage drop                    | < 3.5 V (in input isolating amplifier operation)             |
| Underload/overload signal range | 0 mA ... 24 mA (Extended transmission range for diagnostics) |

## Output data

### Signal: Repeater power supply operation

|                       |                                                                             |
|-----------------------|-----------------------------------------------------------------------------|
| Output description    | Current output (active and passive)                                         |
| Number of outputs     | 1                                                                           |
| Current output signal | 4 mA ... 20 mA (active)<br>4 mA ... 20 mA (14 ... 26 V ext. source voltage) |

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|                                          |                                                              |
|------------------------------------------|--------------------------------------------------------------|
| Load/output load current output          | < 1000 $\Omega$ (20 mA)                                      |
|                                          | < 825 $\Omega$ (24 mA)                                       |
| Output ripple                            | < 20 mV <sub>rms</sub>                                       |
| Output behavior in the event of an error | 0 mA (Cable break in the input)                              |
|                                          | $\geq$ 22.5 mA (Cable short-circuit in the input)            |
| Underload/overload signal range          | 0 mA ... 24 mA (Extended transmission range for diagnostics) |

## Signal: Signal conditioner operation

|                                          |                                                              |
|------------------------------------------|--------------------------------------------------------------|
| Output description                       | Current output (active and passive)                          |
| Current output signal                    | 0 mA ... 20 mA (active)                                      |
|                                          | 4 mA ... 20 mA (active)                                      |
|                                          | 0 mA ... 20 mA (14 ... 26 V ext. source voltage)             |
|                                          | 4 mA ... 20 mA (14 ... 26 V ext. source voltage)             |
| Load/output load current output          | < 1000 $\Omega$ (20 mA)                                      |
|                                          | < 825 $\Omega$ (24 mA)                                       |
| Output ripple                            | < 20 mV <sub>rms</sub>                                       |
| Output behavior in the event of an error | 0 mA (Cable break in the input)                              |
|                                          | 0 mA (Cable short-circuit in the input)                      |
| Underload/overload signal range          | 0 mA ... 24 mA (Extended transmission range for diagnostics) |

## Connection data

|                                  |                                             |
|----------------------------------|---------------------------------------------|
| Connection method                | Screw connection                            |
| Stripping length                 | 7 mm                                        |
| Screw thread                     | M3                                          |
| Conductor cross-section rigid    | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> |
| Conductor cross-section flexible | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> |
| Conductor cross-section AWG      | 24 ... 14                                   |
| Tightening torque                | 0.5 Nm ... 0.6 Nm                           |

## Test socket

|               |      |
|---------------|------|
| Max. diameter | 2 mm |
|---------------|------|

## Ex data

|                       |        |
|-----------------------|--------|
| Ex installation (EPL) | Gc     |
|                       | Div. 2 |
| Ex i circuits (EPL)   | Ga     |
|                       | Da     |
|                       | Ma     |
|                       | Div. 1 |

## Safety data: Repeater power supply operation

|                                      |          |
|--------------------------------------|----------|
| Max. output voltage $U_o$            | 25.2 V   |
| Max. output current $I_o$            | 93 mA    |
| Max. output power $P_o$              | 587 mW   |
| Safety-related maximum voltage $U_m$ | 253 V AC |

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|                                                                                            |                                                                                                              |
|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|                                                                                            | 125 V DC                                                                                                     |
| I (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$      | 40 mH / 4.8 $\mu$ F                                                                                          |
| IIA (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$    | 26 mH / 2.9 $\mu$ F                                                                                          |
| IIB (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$    | 14 mH / 820 nF                                                                                               |
| IIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$    | 3 mH / 107 nF                                                                                                |
| IIA (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$     | 26 mH / 470 nF, 20 mH / 570 nF, 1 mH / 630 nF, 0.5 mH / 720 nF, 0.1 mH / 1.1 $\mu$ F, 0.005 mH / 2.9 $\mu$ F |
| IIB/III (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$ | 16 mH / 370 nF, 500 $\mu$ H / 510 nF, 200 $\mu$ H / 660 nF, 100 $\mu$ H / 820 nF                             |
| IIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$     | 2.2 mH / 47 nF, 2 mH / 49 nF, 1 mH / 63 nF, 500 $\mu$ H / 80 nF, 200 $\mu$ H / 107 nF                        |
| I (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$       | 37 mH / 0.54 $\mu$ F, 0.35 mH / 1 $\mu$ F, 0.009 mH / 2.9 $\mu$ F, 0.001 mH / 4.15 $\mu$ F                   |

Safety data: Signal conditioner operation

|                                      |               |
|--------------------------------------|---------------|
| Input voltage $U_i$                  | $\leq 30$ V   |
| Input current $I_i$                  | $\leq 150$ mA |
| Max. internal inductance $L_i$       | negligible    |
| Max. internal capacitance $C_i$      | negligible    |
| Safety-related maximum voltage $U_m$ | 253 V AC      |
|                                      | 125 V DC      |

## Interfaces

Data communication (bypass)

|                     |                  |
|---------------------|------------------|
| HART function       | Yes              |
| Protocols supported | HART-transparent |

## Signaling

|                |                            |
|----------------|----------------------------|
| Status display | Green LED (supply voltage) |
|----------------|----------------------------|

## Dimensions

|                     |                                                                        |
|---------------------|------------------------------------------------------------------------|
| Dimensional drawing |                                                                        |
| Width               | 12.5 mm                                                                |
| Height              | 112.5 mm                                                               |
| Depth               | 113.7 mm                                                               |
| Depth NS 35/7,5     | 114.5 mm (Snapped onto DIN rail NS 35/7,5 in accordance with EN 60715) |

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## Material specifications

|                                                  |                 |
|--------------------------------------------------|-----------------|
| Color                                            | gray (RAL 7042) |
| Flammability rating according to UL 94 (Housing) | V0 (Housing)    |
| Housing material                                 | PA 6.6-FR       |

## Environmental and real-life conditions

### Ambient conditions

|                                         |                                                                         |
|-----------------------------------------|-------------------------------------------------------------------------|
| Degree of protection                    | IP20 (not assessed by UL)                                               |
| Ambient temperature (operation)         | -40 °C ... 60 °C (Any mounting position)<br>-40 °C ... 70 °C (Derating) |
| Ambient temperature (storage/transport) | -40 °C ... 80 °C                                                        |
| Permissible humidity (operation)        | 10 % ... 95 % (non-condensing)                                          |

### Altitude range ( $\leq 2000$ m)

|                                 |                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Altitude                        | $\leq 2000$ m (The technical data refers to altitudes $\leq 2000$ m above mean sea level. For altitudes $> 2000$ m above mean sea level, refer to the data sheet.) |
| Ambient temperature (operation) | -40 °C ... 60 °C<br>-40 °C ... 70 °C (Derating)                                                                                                                    |
| Rated insulation voltage        | 375 V <sub>PP</sub> (Power supply, input / output)                                                                                                                 |

### Altitude range ( $\leq 3000$ m)

|                                 |                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------|
| Height range                    | $> 2000$ m ... 3000 m                                                              |
| Ambient temperature (operation) | -40 °C ... 54 °C<br>-40 °C ... 63 °C (Derating)                                    |
| Rated insulation voltage        | 190 V AC (Power supply, input / output)<br>110 V DC (Power supply, input / output) |

### Altitude range ( $\leq 4000$ m)

|                                 |                                                 |
|---------------------------------|-------------------------------------------------|
| Height range                    | $> 3000$ m ... 4000 m                           |
| Ambient temperature (operation) | -40 °C ... 48 °C<br>-40 °C ... 56 °C (Derating) |
| Rated insulation voltage        | 60 V AC/DC (Power supply, input / output)       |

### Altitude range ( $\leq 5000$ m)

|                                 |                                                 |
|---------------------------------|-------------------------------------------------|
| Height range                    | $> 4000$ m ... 5000 m                           |
| Ambient temperature (operation) | -40 °C ... 42 °C<br>-40 °C ... 49 °C (Derating) |
| Rated insulation voltage        | 60 V AC/DC (Power supply, input / output)       |

## Approvals

### CE

|             |              |
|-------------|--------------|
| Certificate | CE-compliant |
| Note        | and EN 61326 |

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## ATEX

|                |                                     |
|----------------|-------------------------------------|
| Identification | ⚡ II (1) G [Ex ia Ga] IIC           |
|                | ⚡ II (1) D [Ex ia Da] IIIC          |
|                | ⚡ II 3(1) G Ex ec [ia Ga] IIC T4 Gc |
|                | ⚡ I (M1) [Ex ia Ma] I               |
| Certificate    | BVS 08 ATEX E 054X                  |

## IECEX

|                |                         |
|----------------|-------------------------|
| Identification | [Ex ia Ga] IIC          |
|                | [Ex ia Da] IIIC         |
|                | Ex ec [ia Ga] IIC T4 Gc |
|                | [Ex ia Ma] I            |
| Certificate    | IECEX BVS 08.0016X      |

## CCC / China-Ex

|                |                         |
|----------------|-------------------------|
| Identification | [Ex ia Ga] IIC          |
|                | [Ex ia Da] IIIC         |
|                | Ex ec [ia Ga] IIC T4 Gc |
| Certificate    | 2022122316115973        |

## UL, USA/Canada

|                |                                                                         |
|----------------|-------------------------------------------------------------------------|
| Identification | UL 61010 Listed                                                         |
|                | Class I, Div. 2, Groups A, B, C, D T4                                   |
|                | Class I, Div. 2, Groups IIC, IIB, IIA T4                                |
|                | Associated apparatus for use in Class I, Division 1, Groups A,B,C,D     |
|                | Associated apparatus for use in Class II, Div.1 Groups E,F,G            |
|                | Associated apparatus for use in Class III, Division 1                   |
|                | Associated apparatus for use in Class I, Zone 0,1,2, Groups IIC,IIB,IIA |
| Certificate    | ⓈⓂⓂ C.D.-No 83104549                                                    |

## Shipbuilding approval

|             |                   |
|-------------|-------------------|
| Certificate | DNV GL TAA000020C |
|-------------|-------------------|

## Safety Integrity Level (SIL, IEC 61508)

|                |                      |
|----------------|----------------------|
| Identification | 2                    |
| Certificate    | IN-AT-AS-MRL-2300149 |

## Systematic Capability

|                |   |
|----------------|---|
| Identification | 3 |
|----------------|---|

## KC-s

|                |                 |
|----------------|-----------------|
| Identification | [Ex ia] IIC/IIB |
| Certificate    | 17-KA4BO-0400X  |

## INMETRO

|  |                |
|--|----------------|
|  | [Ex ia Ga] IIC |
|--|----------------|

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|                |                         |
|----------------|-------------------------|
| Identification | [Ex ia Da] IIC          |
|                | Ex ec [ia Ga] IIC T4 Gc |
|                | [Ex ia Ma] I            |
| Certificate    | DNV 18.0136 X           |

## Shipbuilding data

|             |                                                                                         |
|-------------|-----------------------------------------------------------------------------------------|
| Temperature | B                                                                                       |
| Humidity    | B                                                                                       |
| Vibration   | A                                                                                       |
| EMC         | A                                                                                       |
| Enclosure   | Required protection according to the Rules shall be provided upon installation on board |

## EMC data

|                               |                                                                      |
|-------------------------------|----------------------------------------------------------------------|
| Electromagnetic compatibility | Conformance with EMC directive                                       |
| Noise immunity                | EN 61000-6-2                                                         |
| Note                          | When being exposed to interference, there may be minimal deviations. |

## Noise emission

|                       |              |
|-----------------------|--------------|
| Standards/regulations | EN 61000-6-4 |
|-----------------------|--------------|

## Electromagnetic HF field

|                                                        |                          |
|--------------------------------------------------------|--------------------------|
| Designation                                            | Electromagnetic RF field |
| Standards/regulations                                  | EN 61000-4-3             |
| Typical deviation from the measuring range final value | 1 %                      |

## Fast transients (burst)

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| Designation                                            | Fast transients (burst) |
| Standards/regulations                                  | EN 61000-4-4            |
| Typical deviation from the measuring range final value | 1 %                     |

## Conducted interference

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| Designation                                            | Conducted interferences |
| Standards/regulations                                  | EN 61000-4-6            |
| Typical deviation from the measuring range final value | 1 %                     |

## Standards and regulations

|                      |                 |
|----------------------|-----------------|
| Electrical isolation | 3-way isolation |
|----------------------|-----------------|

## GB Standard

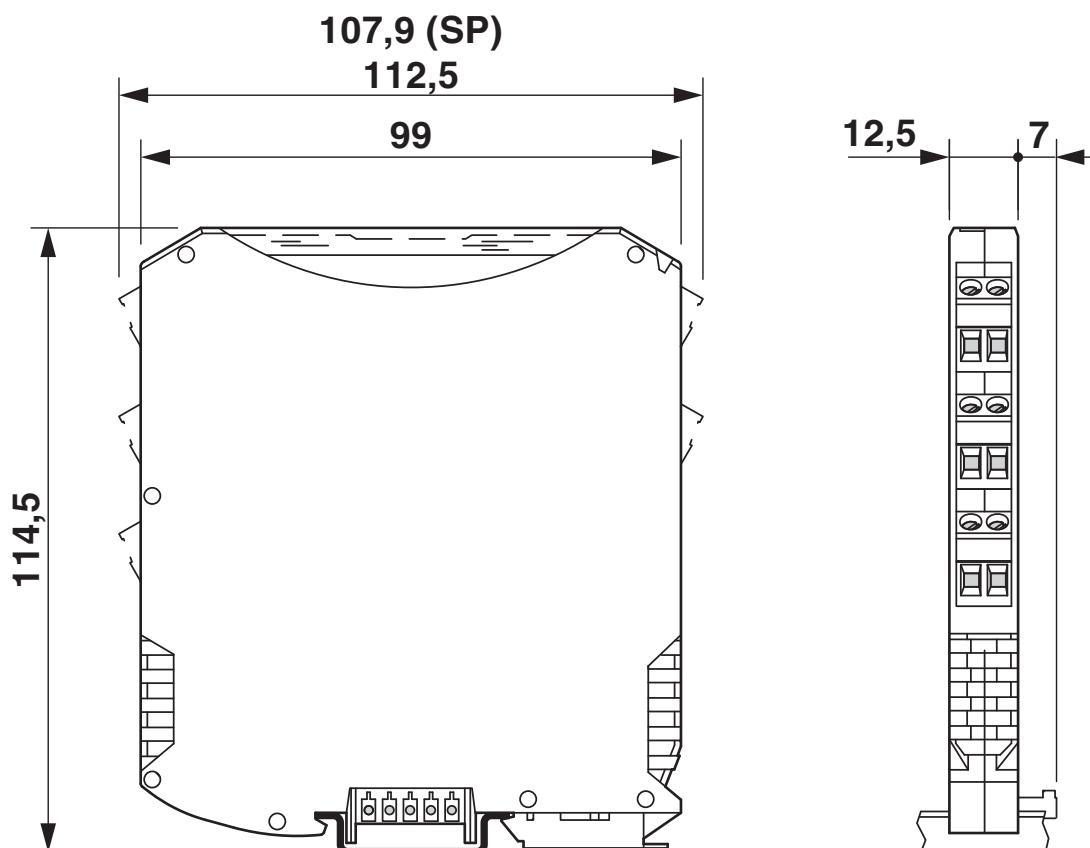
|                       |             |
|-----------------------|-------------|
| Standards/regulations | GB/T 3836.1 |
|                       | GB/T 3836.3 |
|                       | GB/T 3836.4 |

## Mounting

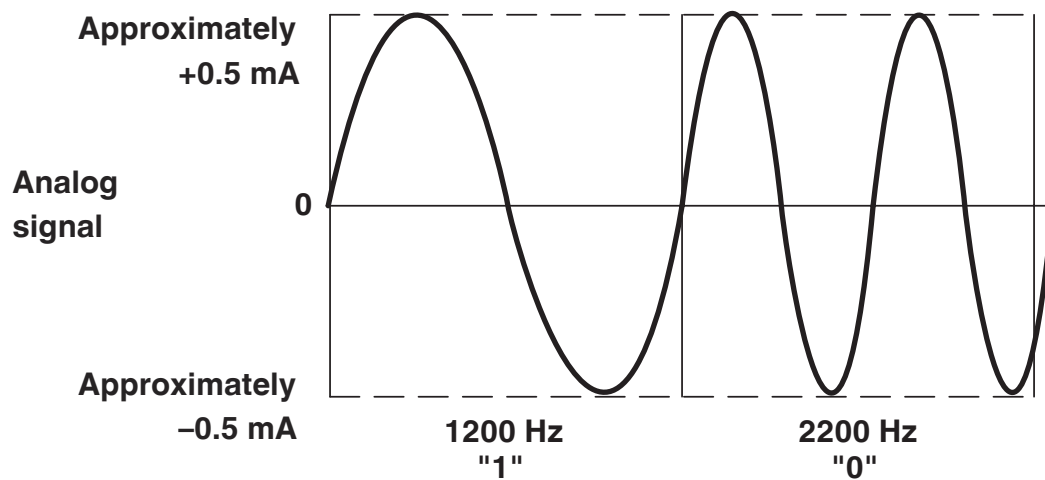
|               |                   |
|---------------|-------------------|
| Mounting type | DIN rail mounting |
|---------------|-------------------|

## Drawings

Dimensional drawing



Diagram



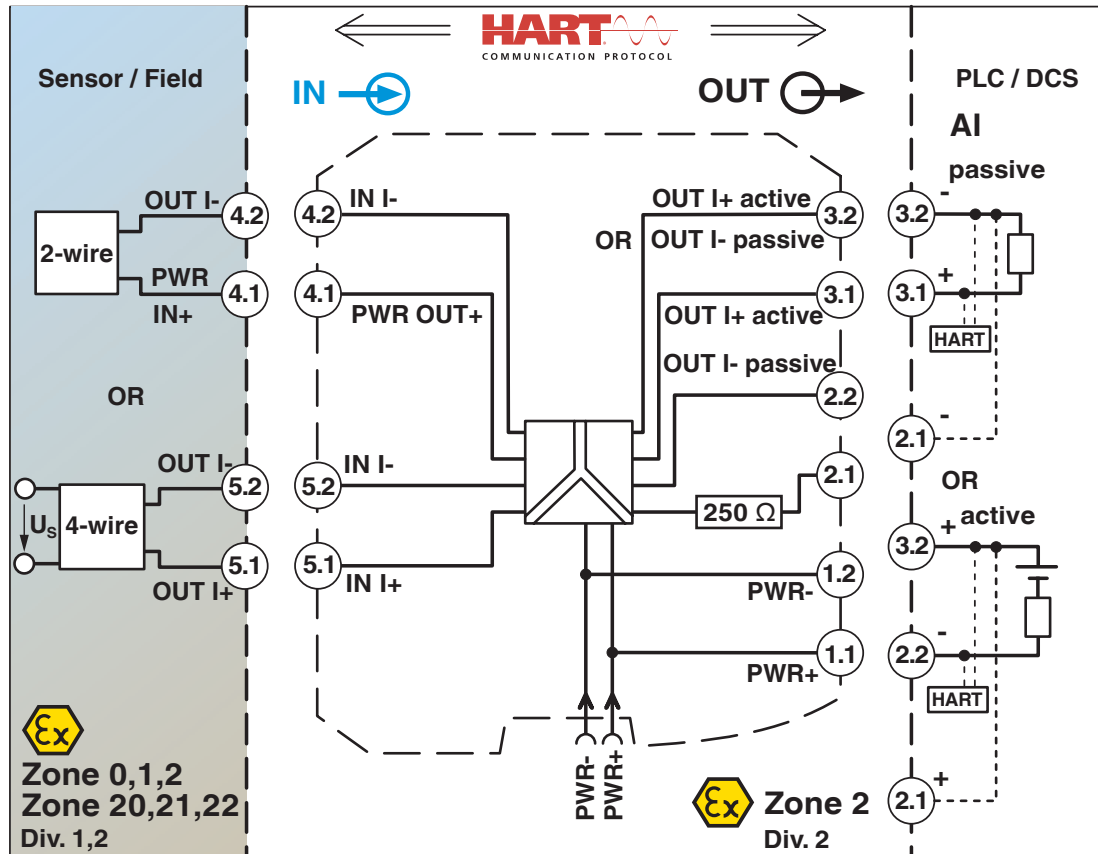
Signal transmission analog and digital at the same time

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Block diagram



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## Approvals

🔗 To download certificates, visit the product detail page: <https://www.phoenixcontact.com/us/products/2865340>

### DNV

Approval ID: TAA000020C



### UL Listed

Approval ID: E330267



### cUL Listed

Approval ID: E330267

### TUEV Austria FS

Approval ID: IN-AT-AS-MRL-23-0149



### IECEx

Approval ID: IECEx BVS 08.0016X



### CCC

Approval ID: 2022122316115973



### cUL Listed

Approval ID: E199827



### UL Listed

Approval ID: E199827



### ATEX

Approval ID: BVS 08 ATEX E 054X

### INMETRO

Approval ID: DNV 18.0136 X



### KC-s

Approval ID: 17-KA4BO-0400X

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## Classifications

### ECLASS

|                   |          |
|-------------------|----------|
| ECLASS-13.0       | 27210120 |
| ECLASS-14.0 ASSET | 27250101 |
| ECLASS-15.0       | 27210120 |
| ECLASS-15.0 ASSET | 27250101 |

### ETIM

|          |          |
|----------|----------|
| ETIM 9.0 | EC002653 |
|----------|----------|

### UNSPSC

|             |          |
|-------------|----------|
| UNSPSC 21.0 | 39121000 |
|-------------|----------|

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## Environmental product compliance

### EU RoHS

|                                         |                    |
|-----------------------------------------|--------------------|
| Fulfills EU RoHS substance requirements | Yes                |
| Exemption                               | 6(c), 7(a), 7(c)-I |

### China RoHS

|                                        |                                                                                                                                                                                                                                   |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment friendly use period (EFUP) | EFUP-50                                                                                                                                                                                                                           |
|                                        | An article-related China RoHS declaration table can be found in the download area for the respective article under "Manufacturer declaration". For all articles with EFUP-E, no China RoHS declaration table issued and required. |

### EU REACH SVHC

|                                     |                                      |
|-------------------------------------|--------------------------------------|
| REACH candidate substance (CAS No.) | Lead(CAS: 7439-92-1)                 |
| SCIP                                | 3b111f6c-b897-4a2c-b6d8-b819c21a1ebd |

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