

# Isolator Barriers

Isolating repeater

Ex i field circuit ISpac

9165/16-11-11s Art. No. 201270



- Compact one- and two-channel Ex i output isolating repeater
- Variants with wire-breakage and short-circuit monitoring system, which can be disconnected and features a signalling contact
- Can be used up to SIL 2 (IEC/EN 61508)

MY R. STAHL 9165A



9165 series Ex i isolating repeaters can be used for the intrinsically safe operation of control valves, I/P transducers or indicators. They transmit superimposed HART communication signals in both directions. The input, output and auxiliary power are galvanically separated from one another. The two channels in the two-channel variants are galvanically separated from one another.

## Technical Data

### Explosion Protection

|                                 |                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Application range (zones)       | 2                                                                                                                                                                                                                       |
| Ex interface zone               | 0, 1, 2, 20, 21, 22                                                                                                                                                                                                     |
| IECEx gas certificate           | IECEx BVS 10.0011 X                                                                                                                                                                                                     |
| IECEx gas explosion protection  | Ex nA nC [ia Ga] IIC T4 Gc                                                                                                                                                                                              |
| IECEx dust certificate          | IECEx BVS 10.0011 X                                                                                                                                                                                                     |
| IECEx dust explosion protection | [Ex ia Da] IIIC                                                                                                                                                                                                         |
| ATEX gas certificate            | DMT 03 ATEX E 012 X                                                                                                                                                                                                     |
| ATEX gas explosion protection   | II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc                                                                                                                                                                                   |
| ATEX dust certificate           | DMT 03 ATEX E 012 X                                                                                                                                                                                                     |
| ATEX dust explosion protection  | II (1) D [Ex ia Da] IIIC                                                                                                                                                                                                |
| FMus certificate                | FM16US0122X                                                                                                                                                                                                             |
| cFM certificate                 | FM16CA0067X                                                                                                                                                                                                             |
| Marking cFMus                   | Class I, Div. 2, Groups A,B,C,D;<br>Class I, Zone 2, AEx/Ex nA nC Group IIC<br>AIS Class I,II,III, Div. 1, Groups A,B,C,D,E,F,G;<br>Class I, Zone 0, [AEx ia]/[Ex ia] IIC<br>T4 at Ta = 70°C<br>See Doc. 91 656 01 31 1 |
| Certificates                    | ATEX (BVS), Canada (FM), China (NEPSI), IECEx (BVS), Korea (KTL), SIL (exida), USA (FM)                                                                                                                                 |
| Ship approval                   | CCS, EU RO MR (DNV)                                                                                                                                                                                                     |
| Declaration of conformity       | ATEX (EUK), China (CCC)                                                                                                                                                                                                 |
| Installation                    | In Zone 2, Division 2 and safe areas                                                                                                                                                                                    |
| Further information             | See relevant certificate and operating instructions                                                                                                                                                                     |

### Safety Data

|                           |        |
|---------------------------|--------|
| Max. voltage $U_o/V_{oc}$ | 25.6 V |
| Max. current $I_o/I_{sc}$ | 96 mA  |

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|                                                         |               |
|---------------------------------------------------------|---------------|
| Max. power $P_o$                                        | 605 mW        |
| Max. permissible external capacitance $C_o/C_s$ for IIC | 0.103 $\mu$ F |
| Max. permissible external inductance $L_o/L_a$ for IIC  | 1.9 mH        |
| Max. permissible external capacitance $C_o/C_s$ for IIB | 0.8 $\mu$ F   |
| Max. permissible external inductance $L_o/L_a$ for IIB  | 11 mH         |
| Max. permissible external capacity $C_o$ for IIIC       | 0.8 $\mu$ F   |
| Max. permissible external inductance $L_o$ for IIIC     | 11 mH         |
| Internal capacitance                                    | Negligible    |
| Internal inductance                                     | Negligible    |
| Safety-related max. voltage                             | 253 V         |

## Functional Safety

|                                                   |                 |
|---------------------------------------------------|-----------------|
| SIL                                               | 2               |
| HFT                                               | 0               |
| SFF                                               | 72%             |
| Lambda SD                                         | 0 FIT           |
| Lambda SU                                         | 0 FIT           |
| Lambda DD                                         | 150 FIT         |
| Lambda DU                                         | 58 FIT          |
| PFD <sub>avg</sub> at T <sub>proof</sub> 1 year   | 3,63E-04        |
| PFD <sub>avg</sub> at T <sub>proof</sub> 3 years  | 8,40E-04        |
| PFD <sub>avg</sub> at T <sub>proof</sub> 5 years  | 1,32E-03        |
| PFD <sub>avg</sub> at T <sub>proof</sub> 10 years | 2,51E-03        |
| Further information                               | See test report |

## Electrical Data

|                      |      |
|----------------------|------|
| Number of channels   | 1    |
| LFD relay            | Yes  |
| Communication signal | HART |

## Auxiliary Power

|                               |                   |
|-------------------------------|-------------------|
| Auxiliary power               | 24 V DC           |
| Nominal voltage $V_{nom}$     | 24 V DC           |
| Auxiliary power voltage range | 18 ... 31.2 V     |
| Voltage range residual ripple | $\leq 3,6 V_{SS}$ |
| Nominal current               | 55 mA             |
| Power consumption             | 1.3 W             |
| Max. power dissipation        | 1.1 W             |
| Polarity reversal protection  | Yes               |
| Undervoltage monitoring       | Yes               |
| Operation indication          | Green "PWR" LED   |

## Galvanic Isolation

|                              |                 |
|------------------------------|-----------------|
| Test voltage as per standard | EN IEC 60079-11 |
|------------------------------|-----------------|

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## Galvanic Isolation

|                                          |           |
|------------------------------------------|-----------|
| Ex i output to fault message contact     | 1.5 kV AC |
| Ex i output to auxiliary power           | 1.5 kV AC |
| Ex i output to input                     | 1.5 kV AC |
| Test voltage as per standard             | EN 50178  |
| Fault message contact to auxiliary power | 350 V AC  |
| Input to auxiliary power                 | 350 V AC  |
| Fault message contact to input           | 350 V AC  |

## Input

|                                        |                          |
|----------------------------------------|--------------------------|
| Input                                  | 0/4 ... 20 mA with HART  |
| Input signal                           | 0/4 to 20 mA with HART   |
| Function range input                   | 0 – 24 mA                |
| Maximum input current                  | 50 mA                    |
| Input resistance                       | 175/400 $\Omega$         |
| Behaviour of the input with line fault | RE $\geq$ 100 k $\Omega$ |

## Output

|                                            |                                                                                                        |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Output                                     | 0/4 to 20 mA with HART                                                                                 |
| Output signal                              | 0/4 to 20 mA with HART                                                                                 |
| Function range output                      | 0 – 24 mA                                                                                              |
| Open-circuit voltage $U_a$                 | 22,5 V                                                                                                 |
| Output residual ripple                     | $\leq$ 50 mV                                                                                           |
| Load resistance $R_L$                      | 0 ... 800 $\Omega$                                                                                     |
| Settling time 10-90%                       | $\leq$ 100 $\mu$ s                                                                                     |
| LF switch user adjustment                  | Activated/deactivated                                                                                  |
| Line fault response threshold              | $I_E > 3.6$ mA                                                                                         |
| Min. RL for KS detection                   | 150 $\Omega$                                                                                           |
| Wire break. err detection OFF              | UA > 16 V                                                                                              |
| Short circuit error detection output       | RL < 50 ohm                                                                                            |
| Line fault indication                      | Red "LF" LED                                                                                           |
| Line fault and loss of power signalization | Contact (30 V / 100 mA) closed to ground in case of fault<br>pac-Bus, floating contact (30 V / 100 mA) |
| Deviations / error note                    | Information in % of the measuring range (20 mA) at $U_N$ , 23 $^{\circ}$ C                             |
| Average measurement fault                  | 0,10%                                                                                                  |
| Temperature influence error limits         | $\leq$ 0.05%/10 K                                                                                      |

## Ambient Conditions

|                                  |                                                                                                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Ambient temperature $^{\circ}$ C | -20 $^{\circ}$ C ... +70 $^{\circ}$ C (Single device)<br>-20 $^{\circ}$ C ... +60 $^{\circ}$ C (Group assembly) |
| Ambient temperature $^{\circ}$ F | -4 $^{\circ}$ F ... +158 $^{\circ}$ F (Single device)<br>-4 $^{\circ}$ F ... +140 $^{\circ}$ F (Group assembly) |
| Note                             | The installation conditions affect the ambient temperature.<br>Observe the "Cabinet installation guide".        |
| Storage temperature $^{\circ}$ C | -40 $^{\circ}$ C ... +80 $^{\circ}$ C                                                                           |
| Storage temperature $^{\circ}$ F | -40 $^{\circ}$ F ... +176 $^{\circ}$ F                                                                          |
| Max. relative humidity           | 95%                                                                                                             |
| Use at the height of             | < 2000 m                                                                                                        |
| Electromagnetic compatibility    | Tested to the following standards and regulations: EN 61326-1 For use in industrial areas;<br>NAMUR NE 21       |

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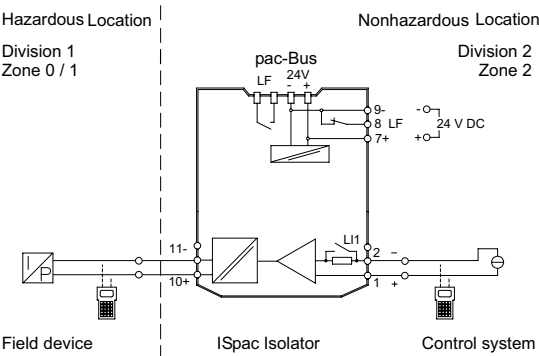
Mechanical Data

|                                     |           |
|-------------------------------------|-----------|
| Degree of protection (IP)           | IP30      |
| Degree of protection (IP) terminals | IP20      |
| Fire resistance (UL 94)             | V0        |
| Enclosure material                  | Polyamide |
| Grid dimension                      | 17.6 mm   |
| Width                               | 17.6 mm   |
| Width, inches                       | 0.69 in   |
| Height                              | 114.5 mm  |
| Height in inches                    | 4.51 in   |
| Length                              | 108 mm    |
| Length in inches                    | 4.25 in   |
| Weight                              | 180 g     |
| Weight                              | 0.4 lb    |

Mounting / Installation

|                                    |                            |
|------------------------------------|----------------------------|
| Mounting type                      | DIN rail NS35/15, NS35/7.5 |
| Mounting orientation               | Horizontal<br>Vertical     |
| Connection type                    | Screw terminal             |
| Min. rigid conductor cross section | 0.2 mm²                    |
| Max. rigid conductor cross section | 2.5 mm²                    |
| Min. flex conductor cross section  | 0.2 mm²                    |
| Max. flex conductor cross section  | 2.5 mm²                    |
| Connection cross-section AWG       | 24 ... 14                  |

Technical Drawings – Subject to Alterations

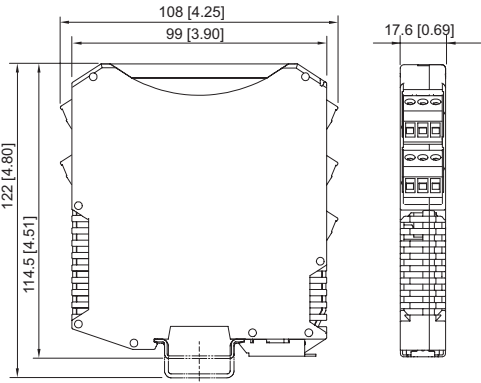


Connection diagram 9165/16-11-11

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Dimensional Drawings (All Dimensions in mm [inches]) – Subject to Alterations



ISpac Series 9143, 9146, 9147, 9160, 9162, 9163, 9165, 9167, 9170, 9172, 9175, 9176, 9180, 9182, 9193, ISbus Series 9412 with screw terminal

Accessories

| Transparent cover                                                                 |                                                                                                                                          | Art. No. |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------|
|  | For 91xx ISpac modules<br>Yellow, transparent<br>Clear identification of the device for SIL applications.<br>(Packaging unit: 10 pieces) | 200914   |

We reserve the right to make alterations to the technical data, dimensions, weights, designs and products available without notice. The illustrations cannot be considered binding.