

# Isolators

Vibration transducer Supply device

Ex i field circuit ISpac

9147/10-99-10k Art. No. 213112



- Space-saving two-channel variant reduces installation costs
- Simple to adjust using easy-to-access rotary switches
- For use up to SIL 2 (IEC 61508)

MY R. STAHL 9147A



Series 9147 vibration transducer power supply units connect vibration, acceleration and speed sensors to analysis systems. The measuring signals are galvanically separated when they are transmitted. They are transmitted at frequencies of up to 50 Hz. These devices have already been tested with numerous sensors from well-known manufacturers such as Bently Nevada and are in use in systems across the globe.

## Technical Data

### Explosion Protection

|                                 |  |
|---------------------------------|--|
| Application range (zones)       | 2  |
| Ex interface zone               | 0, 1, 2, 20, 21, 22  |
| IECEX gas certificate           | IECEX BVS 12.0001 X  |
| IECEX gas explosion protection  | Ex ec [ia Ga] IIC T4 Gc  |
| IECEX dust certificate          | IECEX BVS 12.0001 X  |
| IECEX dust explosion protection | [Ex ia Da] IIIC  |
| IECEX firedamp certificate      | IECEX BVS 12.0001 X  |
| IECEX firedamp protection       | [Ex ia Ma] I   |
| ATEX gas certificate            | BVS 12 ATEX E 007 X  |
| ATEX gas explosion protection   | ⊕ II 3 (1) G Ex ec [ia Ga] IIC T4 Gc   |
| ATEX dust certificate           | BVS 12 ATEX E 007 X  |
| ATEX dust explosion protection  | ⊕ II (1) D [Ex ia Da] IIIC   |
| ATEX firedamp certificate       | BVS 12 ATEX E 007 X  |
| ATEX firedamp protection        | ⊕ I (M1) [Ex ia Ma] I  |
| 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 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. 9147 6 031 001 1 |
| Certificates                    | ATEX (BVS), Canada (FM), China (NEPSI), IECEX (BVS), India (PESO), Korea (KTL), SIL (exida), USA (FM)  |
| Ship approval                   | CCS, EU RO MR (DNV)  |
| Declaration of Conformity       | ATEX (EUK), China (CCC)  |
| Installation                    | In Zone 2  |

#### Explosion Protection

|                     |   |
|---------------------|---|
| Further information | See relevant certificate and operating instructions |
|---------------------|---|

#### Safety Data

|  |   |               |               |               |               |               |
|--|---|---------------|---------------|---------------|---------------|---------------|
| Max. voltage $U_o$   | 26.3 V  |               |               |               |               |               |
| Max. current $I_o$   | 88.3 mA   |               |               |               |               |               |
| Max. power $P_o$   | 579 mW  |               |               |               |               |               |
| Max. permissible external capacity $C_o$ for IIC                       | 0.097 $\mu$ F   |               |               |               |               |               |
| Max. permissible external inductance $L_o$ for IIC                     | 4.4 mH  |               |               |               |               |               |
| Max. permissible external capacity $C_o$ for IIB                       | 0.74 $\mu$ F  |               |               |               |               |               |
| Max. permissible external inductance $L_o$ for IIB                     | 18 mH   |               |               |               |               |               |
| Max. permissible external capa.IIA                                     | 2.51 $\mu$ F  |               |               |               |               |               |
| Max. permissible external inductance $L_o$ for IIA                     | 36 mH   |               |               |               |               |               |
| Max. permissible external capacity $C_o$ for IIIC                      | 0.74 $\mu$ F  |               |               |               |               |               |
| Max. permissible external inductance $L_o$ for IIIC                    | 18 mH   |               |               |               |               |               |
| Max. permissible external capacity $C_o$ for I                         | 3.95 $\mu$ F  |               |               |               |               |               |
| Max. permissible external inductance $L_o$ for I                       | 58 mH   |               |               |               |               |               |
| Internal capacitance   | 2.4 nF  |               |               |               |               |               |
| Internal inductance  | Negligible  |               |               |               |               |               |
| Safety-related max. voltage  | 253 V   |               |               |               |               |               |
| Intrinsically safe limiting values inductance $L_o$ /capacitance $C_o$ | Jointly connectable inductance $L_o$ /capacitance $C_o$ |               |               |               |               |               |
| IIC  | $L_o$ [mH]  | 2.200 mH      | 1 mH          | 0.500 mH      | 0.200 mH      |               |
|  | $C_o$ [ $\mu$ F]  | 0.043 $\mu$ F | 0.059 $\mu$ F | 0.075 $\mu$ F | 0.097 $\mu$ F |               |
| IIB  | $L_o$ [mH]  | 17 mH         | 2 mH          | 0.500 mH      | 0.200 mH      | 0.10 mH       |
|  | $C_o$ [ $\mu$ F]  | 0.320 $\mu$ F | 0.340 $\mu$ F | 0.480 $\mu$ F | 0.620 $\mu$ F | 0.740 $\mu$ F |
| IIA  | $L_o$ [mH]  | 28 mH         | 1 mH          | 0.500 mH      | 0.100 mH      | 0.005 mH      |
|  | $C_o$ [ $\mu$ F]  | 0.430 $\mu$ F | 0.570 $\mu$ F | 0.670 $\mu$ F | 1 $\mu$ F     | 2.510 $\mu$ F |
| IIIC   | $L_o$ [mH]  | 17 mH         | 2 mH          | 0.500 mH      | 0.200 mH      | 0.10 mH       |
|  | $C_o$ [ $\mu$ F]  | 0.320 $\mu$ F | 0.340 $\mu$ F | 0.480 $\mu$ F | 0.620 $\mu$ F | 0.740 $\mu$ F |
| I  | $L_o$ [mH]  | 40 mH         | 20 mH         | 1 mH          | 0.200 mH      | 0.002 mH      |
|  | $C_o$ [ $\mu$ F]  | 0.490 $\mu$ F | 0.720 $\mu$ F | 0.750 $\mu$ F | 1.100 $\mu$ F | 3.950 $\mu$ F |

#### Functional Safety

|           |         |
|-----------|---------|
| SIL       | 2       |
| HFT       | 0       |
| SFF       | 66%     |
| Lambda SD | 0 FIT   |
| Lambda SU | 0 FIT   |
| Lambda DD | 188 FIT |
| Lambda DU | 95 FIT  |

#### Functional Safety

|  |          |
|--|----------|
| PFD <sub>avg</sub> at T <sub>proof</sub> 1 year  | 7,95E-04 |
| PFD <sub>avg</sub> at T <sub>proof</sub> 2 years | 1,17E-03 |
| PFD <sub>avg</sub> at T <sub>proof</sub> 5 years | 2,29E-03 |

#### Electrical Data

|                                    |                 |
|------------------------------------|-----------------|
| Number of channels                 | 1               |
| LFD relay                          | No              |
| Operation indication               | Green "PWR" LED |
| Internal resistance R <sub>i</sub> | 30 Ω            |

#### Auxiliary Power

|                               |                       |
|-------------------------------|-----------------------|
| Auxiliary power               | 24 V DC               |
| Nominal voltage               | 24 V DC               |
| Auxiliary power voltage range | 18 to 31.2 V          |
| Voltage range residual ripple | ≤ 3,6 V <sub>SS</sub> |
| Nominal current               | 75 mA                 |
| Power consumption             | 1.8 VA                |
| Max. power dissipation        | 1.4 W                 |
| Polarity reversal protection  | Yes                   |
| Undervoltage monitoring       | Yes                   |
| Operation indication          | Green "PWR" LED       |

#### Galvanic Isolation

|                               |                 |
|-------------------------------|-----------------|
| Test voltage as per standard  | EN IEC 60079-11 |
| Ex i input to output          | 1.5 kV AC       |
| Ex i input to auxiliary power | 1.5 kV AC       |
| Test voltage as per standard  | EN 50178        |
| Output to auxiliary power     | 350 V AC        |

#### Input

|                                     |                                |
|-------------------------------------|--------------------------------|
| Input                               | -20 to -0.5 V                  |
| Input signal                        | -20 to -0.5 V                  |
| Function range input                | -24 – 0 V                      |
| Input resistance                    | 10 kΩ                          |
| Output current for 2-wire operation | 2.6/4.3/7.9 mA at -10 V        |
| Output current for 3-wire operation | 10 mA at -20 V; 20 mA at -17 V |

#### Output

|   |   |
|---|---|
| Output                                    | -20 to -0.5 V   |
| Output signal                             | -20 to -0.5 V   |
| Output internal resistance R <sub>i</sub> | 30 Ω  |
| Load resistance R <sub>L</sub>            | > 2 kΩ  |
| Signal transmission delay                 | < 7 μs  |
| Signal transmission frequency range       | 0 – 50 kHz  |
| Signal transmission phase fluctuation     | < 0.6%/period   |
| Deviations / error note                   | Information in % of the measuring range (20 mA) at U <sub>N</sub> , 23 °C |
| Temperature influence error limits        | < 0.05% / 10 K  |
| Auxiliary power influence error limits    | < 0,05 %  |

| AC transmission error<br>at $U_N$ and 20 °C and an offset of 10 V | Frequency   | Phase error      | Amplitude error |
|---|-------------|------------------|-----------------|
|   | 0 to 200 Hz | $\leq 0.5^\circ$ | $\pm 1\%$       |
|   | < 400 Hz    | $\leq 1.0^\circ$ | $\pm 1\%$       |
|   | < 600 Hz    | $\leq 1.5^\circ$ | $\pm 1\%$       |
|   | < 1 Hz      | $\leq 2.5^\circ$ | $\pm 1\%$       |
|   | < 10 kHz    | $\leq 25^\circ$  | +1/-5%          |
|   | < 20 kHz    | $\leq 50^\circ$  | 1/5%            |
|   | < 50 kHz    | $\leq 125^\circ$ | -1%             |

#### Ambient Conditions

|                               |  |
|-------------------------------|--|
| Ambient temperature           | -20 °C ... +70 °C (Single device)<br>-20 °C ... +60 °C (Group assembly)  |
| Ambient temperature           | -4°F ... +158°F (Single device)<br>-4°F ... +140°F (Group assembly)  |
| Note                          | Installation conditions influence the ambient temperature.<br>Please observe the "Cabinet installation guide". |
| Storage temperature           | -40 °C ... +80 °C  |
| Storage temperature           | -40°F ... +176°F   |
| Maximum 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      |

#### 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                              | 128 mm    |
| Length in inches                    | 5.04 in   |
| Mounting depth in inches            | 4.51 in   |
| Weight                              | 150 g     |
| Weight                              | 0.33 lb   |

#### Mounting / Installation

|                                    |                            |
|------------------------------------|----------------------------|
| Mounting type                      | DIN rail NS35/15, NS35/7.5 |
| Mounting orientation               | Horizontal<br>Vertical     |
| Connection type                    | Spring clamp terminal      |
| Min. rigid conductor cross section | 0.2 mm <sup>2</sup>        |
| Max. rigid conductor cross section | 2.5 mm <sup>2</sup>        |
| Min. flex conductor cross section  | 0.2 mm <sup>2</sup>        |
| Max. flex conductor cross section  | 2.5 mm <sup>2</sup>        |
| Connection cross-section AWG       | 24 ... 14                  |

# Isolators

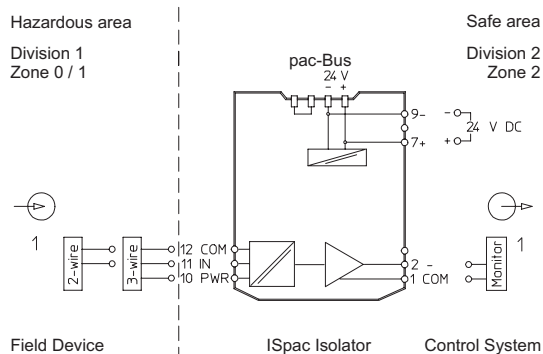
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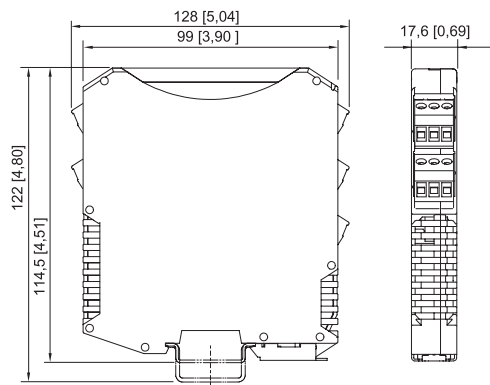


## Technical Drawings – Subject to Alterations



9147/10-99-10 connection diagram

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



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

## Accessories

### Transparent cover



For 91xx ISpac modules  
Yellow, transparent  
Clear identification of the device for SIL applications.  
(Packaging unit: 10 pieces)

Art. No.

200914

## Spare Parts

### Screw terminal



3-pole plug, screw connector  
thread: M3  
stripping length: 7 mm  
colour: green

Art. No.

112817



3-pole plug, screw connector  
thread: M3  
stripping length: 7 mm  
colour: black

Art. No.

112816







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|  |   |                 |
|--|---|-----------------|
|    | 3-pole plug, screw connector<br>thread: M3<br>stripping length: 7 mm<br>colour: blue                | 112818          |
| <b>Screw terminal with test tap</b>  |   | <b>Art. No.</b> |
|    | 3-pole plug with test tap, screw connector<br>thread: M3<br>stripping length: 7 mm<br>colour: black | 113005          |
|    | 3-pole plug with test tap, screw connector<br>thread: M3<br>stripping length: 7 mm<br>colour: blue  | 113004          |
| <b>Spring clamp terminal</b>   |   | <b>Art. No.</b> |
|    | 3-pole plug with test tap, spring clamp connection<br>stripping length: 10 mm<br>colour: green      | 112825          |
|  | 3-pole plug with test tap, spring clamp connection<br>stripping length: 10 mm<br>colour: black      | 112824          |
|  | 3-pole plug with test tap, spring clamp connection<br>stripping length: 10 mm<br>colour: blue       | 112826          |

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.