11024E00

- Most compact device in its class, two versions available:
  - Limit value evaluation, frequency/ current conversion, impulse divider function within 17.6 mm width
  - Dual channel frequency/ current conversion within 17.6 mm width
- Line fault monitoring indicated by LED and fault-contact contact enables easy monitoring and prompt troubleshooting
- Broad input frequency range 0.001 ... 20 kHz

The frequency transmitters are used for speed control of rotating parts, e.g. fans, centrifuges, blade and stirring devices in hazardous areas.The frequency detected at the intrinsically safe input is processed in different ways.

- Proportional to the frequency 0/4 mA ... 20 mA output signal
- Configurable limits evaluation in case of exceeding or lower deviation of the value with adjustable hysteresis
- Impulse output with a frequency divider function

Optional start-up delay enables the start of the system without any fault messages from the frequency transmitter. The frequency transmitter can be easily parameterised by the software ISpac Wizard.

| | ATEX/ IECEx | | | | | |
|---|---|---|---|---|---|---|
| Zone | 0 | 1 | 2 | 20 | 21 | 22 |
| Ex i interface | x | x | x | x | x | x |
| Installation in | | | x*) | | | x*) |

| | NEC 505 Class I | | | NEC 506 | | |
|---|---|---|---|---|---|---|
| Zone | 0 | 1 | 2 | 20 | 21 | 22 |
| Ex i interface | x | x | x | | | |
| Installation in | | | x*) | | | x*) |

| | NEC 500 | | | | | |
|---|---|---|---|---|---|---|
| | Class I | | Class II | | Class III | |
| Division | 1 | 2 | 1 | 2 | 1 | 2 |
| Ex i interface | x | x | x | x | x | x |
| Installation in | | x*) | | x*) | | x*) |

*) Restrictions see table explosion protection

WebCode 9146A

## Selection Table

| Version | Channels | Output | Limit value contact | Impulse output | Connection type | Order number |
|---|---|---|---|---|---|---|
| Frequency Transmitter Field Circuit Ex i Series 9146 | 1 | 0/4 ... 20 mA | 2 NO / NC | one NO selectable | Screw terminals | **9146/10-11-12s** |
| | | | | | Spring clamp terminals | **9146/10-11-12k** |
| | 2 | 0/4 ... 20 mA | without | one NO selectable | Screw terminals | **9146/20-11-11s** |
| | | | | | Spring clamp terminals | **9146/20-11-11k** |

## Explosion Protection

| | |
|---|---|
| **Global (IECEx)** | |
| Gas, dust and mining | IECEx BVS 13.0095X<br>Ex nA nC [ia Ga] IIC T4 Gc<br>[Ex ia Da] IIIC<br>[Ex ia Ma] I |
| **Europe (ATEX)** | |
| Gas and dust | BVS 05 ATEX E 0171 X<br>Ⓔx II 3 (1) G Ex nAc nCc [ia] IIC T4<br>Ⓔx II (1) D [Ex ia] IIIC |
| **Certifications and certificates** | |
| Certificates | IECEx, ATEX, Brazil (INMETRO), India (PESO), Canada (cFM), Kazakhstan (TR), Russia (TR), Serbia (SRPS), USA (FM), Belarus (TR) |
| Ship approval | DNV |
| **Safety data** | |
| Max. voltage $U_o$ | 10.5 V |
| Max. current $I_o$ | 23.4 mA |
| Max. power $P_o$ | 61.4 mW |
| Max. connectable capacitance $C_o$ | |
| IIC | 2.41 µF |
| IIB | 16.8 µF |
| Max. connectable inductance $L_o$ | |
| IIC | 63 mH |
| IIB | 230 mH |
| Internal capacitance $C_i$ | negligible |
| Internal inductance $L_i$ | negligible |
| Insulation voltage $U_m$ | 253 V |
| **Further parameters** | |
| Installation | in Zone 2 and in the safe area |
| Further information | see respective certificate and operating instructions |

## Technical Data

| | |
|---|---|
| **Electrical data** | |
| Auxiliary power | |
| Nominal voltage $U_N$ | 24 V DC |
| Voltage range | 18 ... 31.2 V |
| Residual ripple within voltage range | ≤ 3.6 $V_{SS}$ |
| Nominal current at $U_N$ | |
| 1 channel | 55 mA |
| 2 channels | 75 mA |
| Power consumption at $U_N$ | |
| 1 channel | 1.32 W |
| 2 channels | 1.8 W |
| Polarity reversal protection | yes |
| Ex i input | |
| Input signal | acc. to EN 60947-5-6 (NAMUR) |
| Current for ON / OFF | |
| ON | 2.1 mA |
| OFF | 1.2 mA |
| Hysteresis | 0.2 mA |
| Open-circuit voltage | 8.5 V |
| Short-circuit current | ≤ 8.5 mA |
| Input frequency | 0.001 ... 20000 Hz |
| Impulse width / break | 25 µs |
| Resolution | < 0.1 % of measurement range |
| Output | |
| Output signal (configurable) | 0/4 ... 20 mA |
| Functional range | 0 ... 20.5 mA |
| Connectable load resistance | 0 ... 600 Ω |
| Operating mode | counter, frequency by period, gate time |

## Technical Data

### Electrical data

| | |
|---|---|
| Limiting values | |
| Message | 2 NO (electronic) |
| Switching voltage | ≤ ± 30 V |
| Switching current (resistive load) | ≤ 50 mA |
| Switch on resistance | ≤ 12.5 Ω (typique < 9.5 Ω ) |
| Reclosing lockout | Reset using the DIP-switch or „Power-Off“ (configurable) |
| Start override | off / 1 ... 999 sec. |
| Parameterisation | via Software ISpac Wizard |
| Pulse output | |
| Frequency range | 0 ... 5 kHz |
| Dividing ratio Input / Output | 1:1 ... 1:20000 |
| Switching voltage | ≤ ± 30 V |
| Switching current | ≤ 50 mA |
| Parameterisation | via Software ISpac Wizard<br>Activated impulse output allocates contact “B“ (see connection diagram) |
| Error limits | |
| | Accuracy, typical data expressed in % of basic measuring range at $U_N$, 23 °C |
| Middle measurement error | ≤ 0.1 % |
| Temperature effect | ≤ 0.05 |
| Error detection Ex i input | |
| Open circuit | $I_{in}$ < 0.05 ... 0.35 mA<br>according to EN 60947-5-6 |
| Short circuit | $R_{in}$ < 100 ... 360 Ω<br>according to EN 60947-5-6 |
| Behaviour of output | configurable, default:<br>short circuit: 3.8 mA<br>open circuit: 20.5 mA |
| Settings (switch LF) | activated / deactivated |
| Error detection | LED red "LF" each channel |
| Message of line fault and auxiliary power failure | - contact (30 V / 100 mA) closed to earth in case of error<br>- pac-Bus, potential-free contact (30 V / 100 mA) |
| Galvanic separation | |
| Test voltages | |
| acc. to standard | EN 60079-11 |
| Ex i input to output | 1.5 kV AC |
| Ex i input to auxiliary power | 1.5 kV AC |
| Ex i input to configuration interface | 1.5 kV AC |
| Ex i input to error message contact | 1.5 kV AC |
| Ex i inputs interconnected | – – |
| acc. to standard | EN 50178 |
| Output to auxiliary power | 350 V AC |
| Output to configuration interface | 350 V AC |
| Outputs interconnected | 350 V AC |
| Error message contact to auxiliary power and outputs | 350 V AC |
| Electromagnetic compatibility | Tested under the following standards and regulations:<br>EN 61326-1 Use in industrial environment;<br>NAMUR NE 21 |

### Ambient conditions

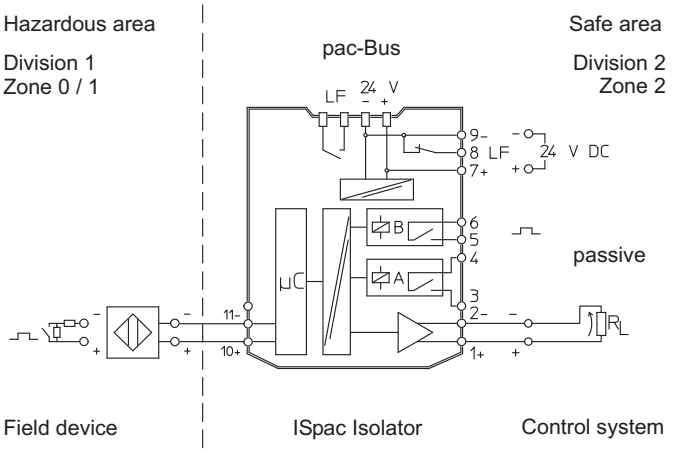
| | |
|---|---|
| Ambient temperature | |
| Single device | -40 ... +70 °C<br>For temperatures below -20 °C use suitable cables and cable connections. |
| Group assembly | -20 ... +60 °C<br>The installation conditions affect the ambient temperature.<br>Observe the "Cabinet installation guide". |
| Storage temperature | -40 ... +80 °C |
| Relative humidity (no condensation) | ≤ 95 % |
| Use at the height of | < 2000 m |

## Technical Data

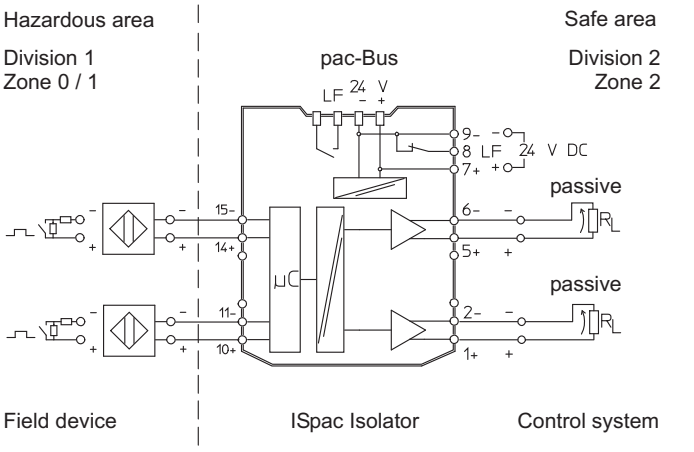
### Electrical connection

Connection diagram

**1 channel, with limit value contact**
**9146/10-11-12**




**2 channels**
**9146/20-11-11**




## Technical Data

### Mechanical data

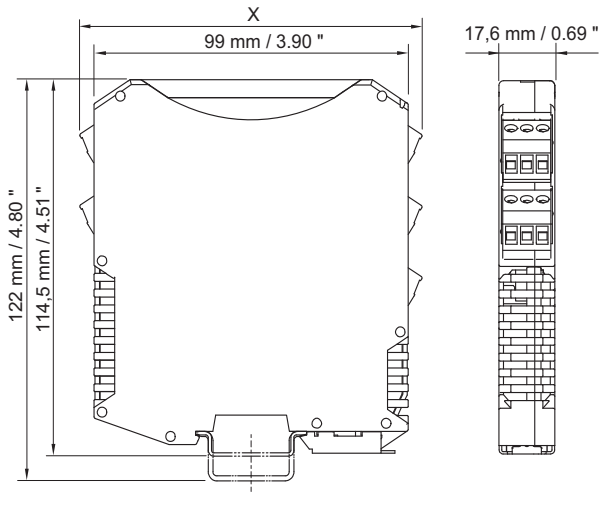
| | | Screw-type terminals | Spring-type terminals |
|---|---|---|---|
| Connection | | | |
| | Single-wire connection | | |
| | - rigid | 0.2 ... 2.5 mm² | 0.2 ... 2.5 mm² |
| | - flexible | 0.2 ... 2.5 mm² | 0.2 ... 2.5 mm² |
| | - flexible with core end sleeves (without / with plastic sleeve) | 0.25 ... 2.5 mm² | 0.25 ... 2.5 mm² |
| | Two-wire connection | | |
| | - rigid | 0.2 ... 1 mm² | - - |
| | - flexible | 0.2 ... 1.5 mm² | - - |
| | - flexible with core end sleeves | 0.25 ... 1 mm² | 0.5 ... 1 mm² |
| Weight | approx. 160 g | | |
| Mounting type | on top hat rail (NS35/15, NS35/7.5) or in pac-Carrier | | |
| Mounting orientation | horizontal or vertical | | |
| Enclosure | IP30 | | |
| Terminals | IP20 | | |
| Enclosure material | PA 6.6 | | |
| Fire resistance (UL-94) | V0 | | |

## Accessories and Spare Parts

| Designation | Description | Order number |
|---|---|---|
| Parameterising set ISpac - Wizard | The software serves for commissioning, configuring and diagnosing the ISpac isolators Series 9146, 9162 and 9182.<br>For further information, see operating instructions.<br>Form of delivery: CD-ROM; parameterising software incl. parameterising cable / adaptor<br><br>System requirements:<br>• IBM compatible PC with MS Windows 98, NT, 2000, XP, Vista, Windows 7<br>• CD-ROM drive<br>• RS 232 C interface<br>• RS 232 / USB adaptor | **9199/20-02** |
| Resistance coupling element | Connection of additional contacts in the Ex area as well, in order to enable short circuit and open circuit detection. | **105944** |

A3

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




| | Dimension X |
|---|---|
| Screw-type terminals | 108 mm / 4.25″ |
| Spring-cage terminals | 128 mm / 5.04″ |

## Customer-specific parameterisation

R. STAHL offers the service to configure ISpac isolators according to your requirements.
There are two options:

1. The form can be downloaded on the product page ISpac, section "Data sheet". Please edit the form directly on your PC.
2. Download the software at ISpac Wizard free: "http://www.r-stahl.com/downloads/software/ex-i-isolators.html". Create them using the software configuration. Forward the .prj file to your R. STAHL sales office.

**Order-No.:** **-Pos.:** **Pieces:**

| | Type | Channels | Output | Limit value |
|---|---|---|---|---|
| ☐ | 9146/10-11-12. | 1 | 0/4 mA ... 20 mA | 2 NC / NO |
| ☐ | 9146/20-11-11. | 2 | 0/4 mA ... 20 mA | none |

**with:**

☐ Screw terminal s ☐ Spring cage terminal k

Please read the operating instructions before you fill in the following form.
Please select only one item parameter and channel.

| | Default | Channel 1 | Channel 2 |
|---|---|---|---|
| **Signal-Tag** | ID-Nr. | | |
| **I.S. input** | | | |
| Working mode | Frequency via period | ☐ Counter<br>☐ Frequency via period<br>☐ Frequency via event (50 ms)<br>☐ Frequency via event (200 ms)<br>☐ Frequency via event (1000 ms) | ☐ Counter<br>☐ Frequency via period<br>☐ Frequency via event (50 ms)<br>☐ Frequency via event (200 ms)<br>☐ Frequency via event (1000 ms) |
| Impulse type | Positive pulse rise time | ☐ Positive pulse rise time<br>☐ Negative pulse rise time | ☐ Positive pulse rise time<br>☐ Negative pulse rise time |
| Measurement range | 0 Hz ... 1000 Hz | from to<br>(max. 20 000 Hz) | from to<br>(max. 20 000 Hz) |
| **Output** | | | |
| Signal | 4 mA ... 20 mA | ☐ 0 mA ... 20 mA ☐ 4 mA ... 20 mA | ☐ 0 mA ... 20 mA ☐ 4 mA ... 20 mA |
| Fault behaviour | Output Fault value (2.4 mA) | ☐ Hold last value (start with fault value)<br>☐ Fault control off<br>☐ Output Fault value: | ☐ Hold last value (start with fault value)<br>☐ Fault control off<br>☐ Output Fault value: |
| **Limiting value for Relay A** (only 9146/10-11-12) | | | |
| Signalling | inactive | ☐ active ☐ inactive | --- |
| Value | 25 % | % (0 %... 100 %) | --- |
| Behaviour contact | inactive | ☐ inactive<br>☐ closes, if value > limit value<br>☐ closes, if value < limit value<br>☐ opens, if value > limit value<br>☐ opens, if value < limit value | --- |
| Hysteresis | 7,5 % | % (0.1 % ... 10 %) | --- |
| Startup delay | 0 s | s (0 s ... 999 s)<br>valid for both channels | --- |
| Relay Lockout | inactive | ☐ active ☐ inactive | --- |
| **Limiting value for Relay B** (only 9146/10-11-12) | | | |
| Signalling | inactive | ☐ active ☐ inactive | --- |
| Value | 25 % | % (0 % ... 100 %) | --- |
| Behaviour contact | inactive | ☐ inactive<br>☐ closes, if value > limit value<br>☐ closes, if value < limit value<br>☐ opens, if value > limit value<br>☐ opens, if value < limit value | --- |
| Hysteresis | 7,5 % | % (0.1 % ... 10 %) | --- |
| Startup delay | 0 s | s (0 s ... 999 s)<br>valid for both channels | --- |
| Relay Lockout | inactive | ☐ active ☐ inactive | --- |
| Impulse output | inactive | ☐ active ☐ inactive | --- |
| Divider | 4 | (1 ... 20 000) | --- |

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