

# Isolator Barriers

Frequency transmitter

Ex i field circuit

9146/20-11-11s Art. No. 159886



- Compact Ex i frequency transmitter for monitoring rotational speed in hazardous areas
- Limit value analysis + frequency-current conversion + pulse divider function over a width of just 17.6 mm
- Parameterization made easy by "ISpac Wizard" software

MY R. STAHL 9146A



9146 series Ex i- frequency transmitters monitor the speed of rotating parts on one or two channels, e.g. the speed of fans or centrifuges. The frequency measured at the intrinsically safe input (between 0.001 Hz and 20 kHz) is issued as a unit signal (0/4 mA to 20 mA) or processed by a frequency divider. In single-channel devices, these frequency transmitters check whether speeds have exceeded or fallen below the limit values.

## Technical Data

### Explosion Protection

Application range (Zones)	2
Ex interface zone	0 1 2 20 21 22
IECEX gas certificate	IECEX BVS 13.0095 X
IECEX gas explosion protection	Ex ec nC [ia Ga] IIC T4 Gc
IECEX dust certificate	IECEX BVS 13.0095 X
IECEX dust explosion protection	[Ex ia Da] IIIC
IECEX firedamp certificate	IECEX BVS 13.0095 X
IECEX firedamp protection	[Ex ia Ma] I
ATEX gas certificate	BVS 05 ATEX E 0171 X
ATEX gas explosion protection	⊕ II 3 (1) G Ex ec nC [ia Ga] IIC T4 Gc
ATEX dust certificate	BVS 05 ATEX E 0171 X
ATEX dust explosion protection	⊕ II (1) D [Ex ia Da] IIIC
ATEX firedamp certificate	BVS 05 ATEX E 0171 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; Class I, Zone 2, AEx/Ex nA nC Group IIC AIS Class I,II,III, Div. 1, Groups A,B,C,D,E,F,G; Class I, Zone 0, [AEx ia]/[Ex ia] IIC T4 at Ta = 70°C See Doc. 9146 6 031 001 1
Certificates	ATEX (BVS), Canada (FM), IECEX (BVS), India (PESO), USA (FM)

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## Explosion Protection

Ship approval	CCS, EU RO MR (DNV)
Declaration of Conformity	ATEX (EUK)

## Safety Data

Max. voltage $U_o/V_{oc}$	10.5 V
Max. current $I_o/I_{sc}$	23.4 mA
Max. power $P_o$	61.4 mW
Max. permissible external capacity $C_o$ for I	95 $\mu$ F
Max. permissible external inductance $L_o$ for I	600 mH
Max. permissible external capacitance $C_o/C_a$ for IIC	2.41 $\mu$ F
Max. permissible external capacitance $C_o/C_a$ for IIB	16.8 $\mu$ F
Max. permissible external capa.IIA	75 $\mu$ F
Max. permissible external inductance $L_o/L_a$ for IIC	63 mH
Max. permissible external inductance $L_o/L_a$ for IIB	230 mH
Max. permissible external inductance $L_o$ for IIA	450 mH
Internal capacitance	Negligible
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 $C_o$ .

	$L_o$ [mH]	$C_o$ [ $\mu$ F]			
IIC	$L_o$ [mH]	$C_o$ [ $\mu$ F]			
IIB	$L_o$ [mH]	$C_o$ [ $\mu$ F]			
IIA	$L_o$ [mH]	$C_o$ [ $\mu$ F]			
IIIC	$L_o$ [mH]	$C_o$ [ $\mu$ F]			
I	$L_o$ [mH]	$C_o$ [ $\mu$ F]			

## Electrical Data

Number of channels	2
LFD relay	Yes
Parameterisation	With parameterising set 9199/20-02

## Auxiliary Power

Auxiliary power	24 V DC
Auxiliary power voltage range	18 to 31.2 V
Voltage range residual ripple	$\leq 3,6 V_{SS}$
Nominal current	75 mA
Power consumption	1.8 W

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### Auxiliary Power

Max. power dissipation	1.5 W
Polarity reversal protection	Yes
Undervoltage monitoring	Yes
Operation indication	Green "PWR" LED

### Galvanic Isolation

Test voltage as per standard	IEC 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 fault message contact	1.5 kV AC
Test voltage as per standard	EN 50178
Output to auxiliary power	350 V AC
Output to output	350 V AC
Fault message contact to auxiliary power	350 V AC
Fault message contact to output	350 V AC

### Input

Input signal	As per EN 60947-5-6 (NAMUR)
Input current for ON	$\geq 2.1$ mA
Input current for OFF	$\leq 1.2$ mA
Hysteresis	Approx. 0.2 mA
Input internal resistance $R_i$	1000 $\Omega$
Input for open-circuit voltage $U_a$	8,5 V
Short-circuit current	$\leq 8.5$ mA
Input frequency	0.0010 – 20000 Hz
Input for centre resolution note	$< 0.1$ % of measuring range
Line fault and loss of power signalization	Contact (30 V / 100 mA) closed to ground in case of fault pac-Bus, floating contact (30 V / 100 mA)

### Output

Output per channel	0/4 to 20 mA
Output signal	0/4 to 20 mA
Function range output	0 – 20.5 mA
Min. output current	0 mA
Max. output current	20.5 mA
Max. load resistance $R_L$	600 $\Omega$
Average measurement fault	$\leq 0,1\%$
Temperature influence	$\leq 0,05\%$ / 10 K
Operating modes	Counter, period measurement, variable gate time
Limit contact (per channel)	without
Pulse output	without
Fault message contact switching capacity	30 V / 100 mA
LF switch user adjustment	Activated/deactivated
Indication of line fault	Red "LF" LED
Wire breakage error detection	$I_E < 0.05$ to 0.35 mA
Short circuit error detection	$R_E < 100$ to 360 ohm
Behaviour of the output	Configurable, factory setting
Behaviour of the output note	Short circuit: 3.8 mA, line breakage: 20.5 mA

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## Ambient Conditions

Ambient temperature °C	-40 °C ... +70 °C (Single device) -40 °C ... +60 °C (Group assembly)
Ambient temperature °F	-40 °F ... +158 °F (Single device) -40 °F ... +140 °F (Group assembly)
Storage temperature °C	-40 °C ... +80 °C
Storage temperature °F	-40 °F ... +176 °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; 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, inches	4.51 in
Length	108 mm
Length, inches	4.25 in
Weight	135 g
Weight	0.3 lb

## Mounting / Installation

Mounting type	DIN rail NS35/15, NS35/7.5
Mounting orientation	Vertical Horizontal
Connection type	Screw 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

# Isolator Barriers

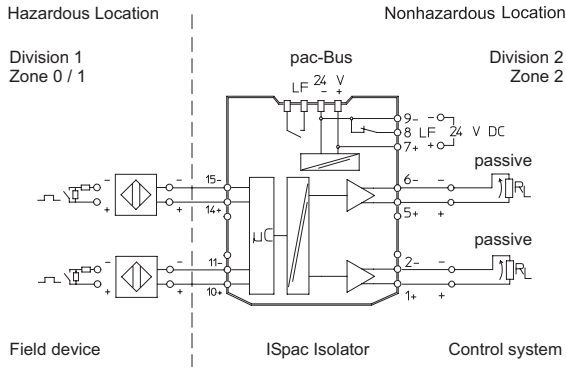
## Frequency transmitter



Ex i field circuit

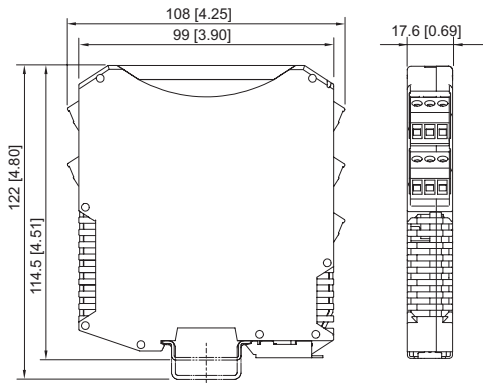
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### Technical Drawings – Subject to Alterations






Connection diagram 9146/20-11-11

### 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

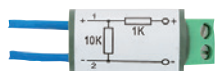
9146 Parameterisation		Art. No.
	Parameterisation ex works optionally available for all variants.	270534
Parameterization set ISpac - Wizard		Art. No.
	The software serves for commissioning, configuring and diagnosing the ISpac isolators Series 9146, 9162, 9182 and 9282. For further information, see operating instructions. Form of delivery: USB stick; parameterization software incl. parameterization cable / adaptor System requirements: IBM compatible PC with MS XP, Vista, Windows 7, 10 RS 232 C interface RS 232 / USB adaptor	202595
Resistive coupling element		Art. No.
	The 0/4 to 20 mA signal of channel 1 is converted to a 0/2 to 10 V signal. The resistive coupling element replaces the existing connection terminal. (Set with 5 pieces)	273968

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Additional connection of contacts also in hazardous areas to enable short-circuit and wire breakage detection

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