



- 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

WebCode **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
IECEEx gas certificate	IECEEx BVS 13.0095 X
IECEEx gas explosion protection	Ex nA nC [ia Ga] IIC T4 Gc
IECEEx dust certificate	IECEEx BVS 13.0095 X
IECEEx dust explosion protection	[Ex ia Da] IIIC
IECEEx firedamp certificate	IECEEx BVS 13.0095 X
IECEEx firedamp protection	[Ex ia Ma] I
ATEX gas certificate	BVS 05 ATEX E 0171 X
ATEX gas explosion protection	Ex II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc
ATEX dust certificate	BVS 05 ATEX E 0171 X
ATEX dust explosion protection	Ex II (1) D [Ex ia Da] IIIC
ATEX firedamp certificate	BVS 05 ATEX E 0171 X
ATEX firedamp protection	Ex I (M1) [Ex ia Ma] I
ATEX firedamp protection 2	Ex I (M1) 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

Explosion Protection

Certificates	ATEX (BVS), Canada (FM), IECEx (BVS), India (PESO), USA (FM)
Ship approval	CCS, EU RO MR (DNVGL)

Safety Data

Max. voltage U_o	10.5 V
Max. current I_o	23.4 mA
Max. power P_o	61.4 mW
Max. permissible external capacity C_o for IIC	2.41 μ F
Max. permissible external capacity C_o for IIB	16.8 μ F
Max. permissible external capa.IIA	75 μ F
Max. permissible external capacity C_o for I	95 μ F
Max. permissible external inductance L_o for IIC	63 mH
Max. permissible external inductance L_o for IIB	230 mH
Max. permissible external inductance L_o for IIA	450 mH
Max. permissible external inductance L_o for I	600 mH
Internal capacitance	Negligible
Internal inductance	Negligible
Safety-related max. voltage	253 V

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
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

Galvanic Isolation

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	$\geq 2.1 \text{ mA}$
Input current for OFF	$\leq 1.2 \text{ mA}$
Hysteresis	Approx. 0.2 mA
Input internal resistance R_i	1000Ω
Input for open-circuit voltage U_a	8.5 V
Short-circuit current	$\leq 8.5 \text{ mA}$
Input frequency	$0.0010 - 20000 \text{ Hz}$
Min. pulse duration (ON/OFF)	$25 \mu\text{s}$
Input for centre resolution note	$< 0.1 \%$ of measuring range
Line fault and loss of power signalisation	- Contact ($30 \text{ V} / 100 \text{ mA}$) closed to ground in case of fault - pac-Bus, floating contact ($30 \text{ V} / 100 \text{ mA}$)

Output

Output per channel	$0/4 \text{ to } 20 \text{ mA}$
Output signal	$0/4 \text{ to } 20 \text{ mA}$
Min. output current	0 mA
Max. output current	20.5 mA
Max. load resistance R_L	600Ω
Average measurement fault	$\leq 0.1\%$
Temperature influence	$\leq 0.05\% / 10 \text{ K}$
Limit contact (per channel)	without
Pulse output	without
Fault message contact switching capacity	$30 \text{ V} / 100 \text{ mA}$
LF switch user adjustment	Activated/deactivated
Indication of line fault	Red "LF" LED
Wire breakage error detection	$I_E < 0.05 \text{ to } 0.35 \text{ mA}$
Short circuit error detection	$R_E < 100 \text{ to } 360 \text{ ohm}$
Behaviour of the output	Configurable, factory setting
Behaviour of the output note	Short circuit: 3.8 mA , line breakage: 20.5 mA

Ambient Conditions

Ambient temperature	$-40 \text{ }^\circ\text{C} \dots +70 \text{ }^\circ\text{C}$ (Single device) $-40 \text{ }^\circ\text{C} \dots +60 \text{ }^\circ\text{C}$ (Group assembly)
Ambient temperature	$-40 \text{ }^\circ\text{F} \dots +158 \text{ }^\circ\text{F}$ (Single device) $-40 \text{ }^\circ\text{F} \dots +140 \text{ }^\circ\text{F}$ (Group assembly)
Storage temperature	$-40 \text{ }^\circ\text{C} \dots +80 \text{ }^\circ\text{C}$
Storage temperature	$-40 \text{ }^\circ\text{F} \dots +176 \text{ }^\circ\text{F}$
Maximum relative humidity	95%
Use at the height of	$< 2000 \text{ m}$
Electromagnetic compatibility	Tested to the following standards and regulations: EN 61326-1 Use in industrial environment; NAMUR NE 21

Mechanical Data

Degree of protection (IP)	IP30
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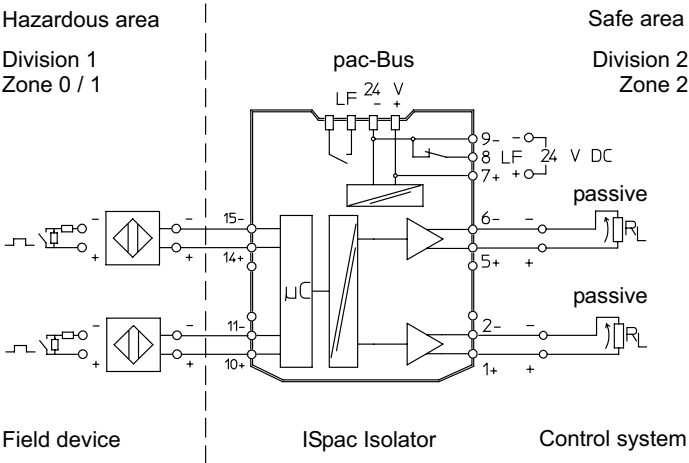
Mechanical Data

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	0.135 kg
Weight	0.3 lb

Mounting / Installation

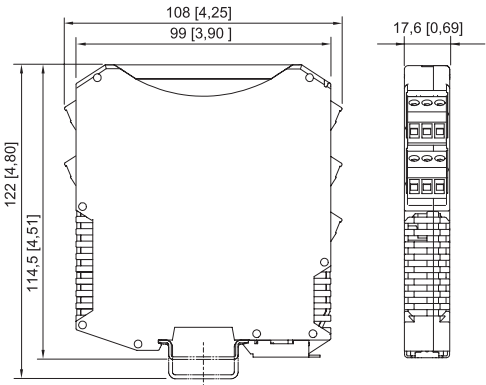
Mounting type	DIN rail NS35/15, NS35/7.5
Mounting orientation	Vertical Horizontal
Connection type	Screw terminal
Min. rigid conductor cross section	0.2 mm²
Max. rigid conductor cross section	2.5 mm²
Min. flex conductor cross section	0.2 mm²
Max. flex conductor cross section	2.5 mm²
Connection cross-section AWG	24 – 13

Technical Drawings – Subject to Alterations



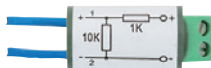
Connection diagram 9146/20-11-12

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 screw terminal

Accessories

Parameterising set ISpac - Wizard		Art. No.
	The software serves for commissioning, configuring and diagnosing the ISpac isolators Series 9146, 9162 and 9182. For further information, see operating instructions. Form of delivery: USB stick; parameterising software incl. parameterising cable / adaptor System requirements: IBM compatible PC with MS XP, Vista, Windows 7, 10 RS 232 C interface RS 232 / USB adaptor	202595
Resistance 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 available connection terminal. (Set with 5 pieces)	273968
	Connection of additional contacts in the Ex area as well, in order to enable short circuit and open circuit detection.	105944

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.