

Isolator Barriers

Frequency transmitter

Ex i field circuit

9146/10-11-12s Art. No. 159883



- 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
IECEX gas certificate	IECEX BVS 13.0095 X
IECEX gas explosion protection	Ex nA nC [ja 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 nA nC [ja 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
ATEX firedamp protection 2	⊕ 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

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Explosion Protection

EAC certificate	EAEU RU S-DE.HA91.B.00100/20
EAC gas explosion protection	Ex 2 Ex nA nC [ia Ga] IIC T4 Gc X
EAC dust explosion protection	Ex [Ex ia Da] IIIC X
Certificates	ATEX (BVS), Canada (FM), EAC (ENDCE), IECEx (BVS), India (PESO), USA (FM)
Ship approval	CCS, EU RO MR (DNV GL)

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 capacitance C_o/C_a for IIC	2.41 μ F
Max. permissible external capacitance C_o/C_a for IIB	16.8 μ F
Max. permissible external capa.IIA	75 μ F
Max. permissible external cap.I	95 μ 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
Max. permissible external induc.I	600 mH
Internal capacitance	Negligible
Internal inductance	Negligible
Safety-related max. voltage	253 V

Electrical Data

Number of channels	1
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	55 mA
Power consumption	1.32 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	IEC EN 60079-11
Ex i input to output	1.5 kV AC
Ex i input to auxiliary power	1.5 kV AC
Galv.sep. Ex i input to FMC	1.5 kV AC
Test voltage as per standard	EN 50178

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Galvanic Isolation

Output to auxiliary power	350 V AC
Output to output	350 V AC
Fault message contact to auxiliary power	350 V AC
Galv. separation FMC to output	350 V AC

Input

Input signal	As per EN 60947-5-6 (NAMUR)
Input current for ON	≥ 2.1 mA
Input current for OFF	≤ 1.2 mA
Hysteresis	Approx. 0.2 mA
Input internal resistance R_i	1000 Ω
Input for open-circuit voltage U_a	8,5 V
Short-circuit current	≤ 8.5 mA
Input frequency	0.0010 – 20000 Hz
Min. pulse duration (ON/OFF)	25 μ s
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
Min. output current	0 mA
Max. output current	20.5 mA
Max. load resistance R_L	600 Ω
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)	2 NO/NC
Switching voltage limiting values	$\leq \pm 30$ V
Switching current limiting values	$\leq \pm 50$ mA
Switch-on resistance	≤ 12.5 ohm (typical < 9.5 ohm)
Anti-pumping device	Reset using the DIP-switch or "Power-Off" (configurable)
Switching state indication	Yellow "OUT" LED disconnection
Start override	OFF/1 to 999 seconds
Pulse output	One configurable NO
Pulse OUT frequency range	0 ... 5 kHz
IN / OUT splitting ratio	1:1 ... 1:20000
Pulse output note	Activated impulse output allocates contact "B" (see connection diagram)
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 Use in industrial environment; NAMUR NE 21

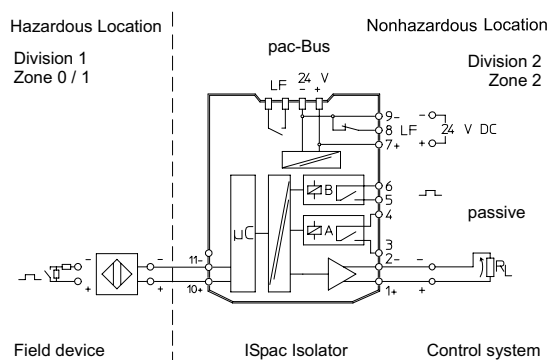
Mechanical Data

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	0.125 kg
Weight	0.28 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 ²
Max. rigid conductor cross section	2.5 mm ²
Min. flex conductor cross section	0.2 mm ²
Max. flex conductor cross section	2.5 mm ²
Connection cross-section AWG	24 – 13

Technical Drawings – Subject to Alterations



Connection diagram 9146/10-11-12

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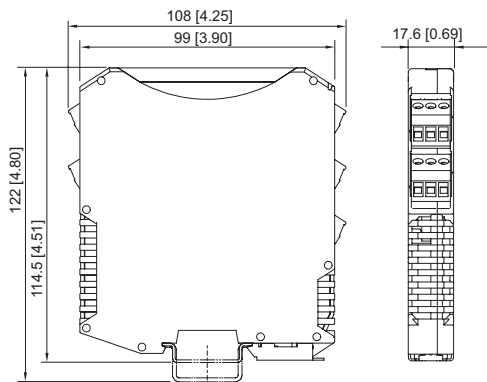
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Dimensional Drawings (All Dimensions in mm [inches]) – Subject to Alterations



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

Accessories

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

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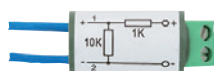
Resistance coupling element

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)

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Connection of additional contacts in the Ex area as well, in order to enable short circuit and open circuit detection.

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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.