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	without	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 Ex nA nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC [Ex ia Ma] I
Europe (ATEX)	
Gas and dust	BVS 05 ATEX E 0171 X ⟨Ex⟩ II 3 (1) G Ex nAc nCc [ia] IIC T4 ⟨Ex⟩ 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 GL, CCS, EU RO MR
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 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 according to EN 60947-5-6
Short circuit	R_{in} < 100 ... 360 Ω according to EN 60947-5-6
Behaviour of output	configurable, default: short circuit: 3.8 mA 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 - 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: EN 61326-1 Use in industrial environment; NAMUR NE 21

Ambient conditions

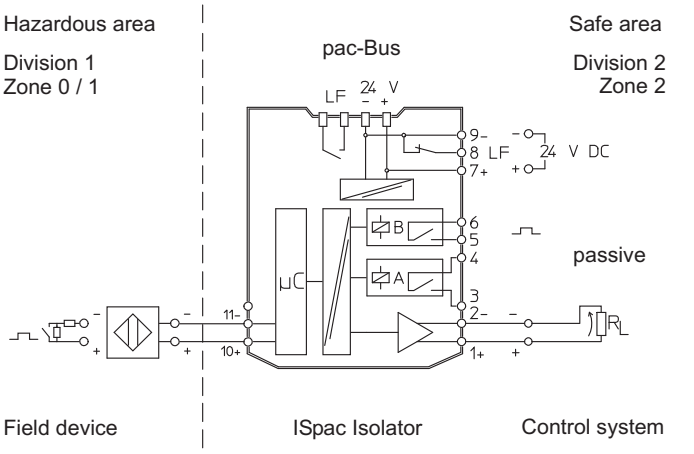
Ambient temperature	
Single device	-40 ... +70 °C For temperatures below -20 °C use suitable cables and cable connections.
Group assembly	-20 ... +60 °C The installation conditions affect the ambient temperature. Observe the "Cabinet installation guide".
Storage temperature	-40 ... +80 °C
Relative humidity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

Technical Data

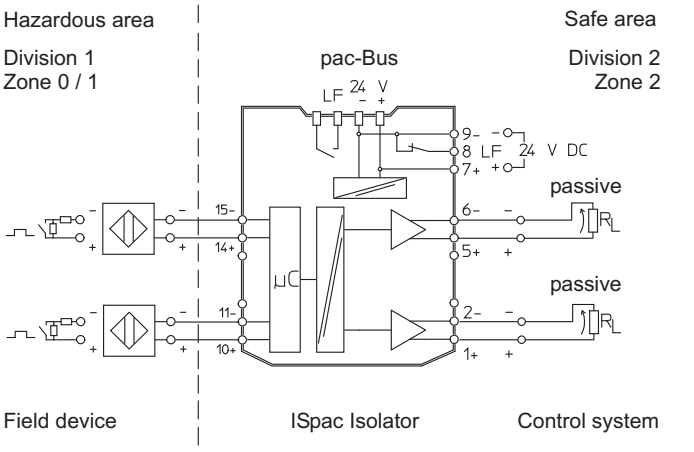
Electrical connection

Connection diagram

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



2 channels
9146/20-11-11



Technical Data

Mechanical data

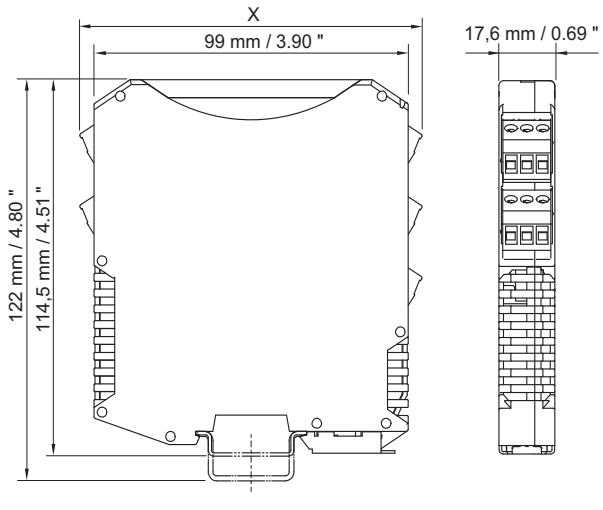
		Screw-type terminals	Spring-type terminals
Connection			
	Single-wire connection		
	- rigid	0.2 ... 2.5 mm²	0.2 ... 2.5 mm²
	- flexible	0.2 ... 2.5 mm²	0.2 ... 2.5 mm²
	- flexible with core end sleeves (without / with plastic sleeve)	0.25 ... 2.5 mm²	0.25 ... 2.5 mm²
	Two-wire connection		
	- rigid	0.2 ... 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. For further information, see operating instructions. Form of delivery: CD-ROM; parameterising software incl. parameterising cable / adaptor System requirements: • IBM compatible PC with MS Windows 98, NT, 2000, XP, Vista, Windows 7 • CD-ROM drive • RS 232 C interface • 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 ☐ Frequency via period ☐ Frequency via event (50 ms) ☐ Frequency via event (200 ms) ☐ Frequency via event (1000 ms)	☐ Counter ☐ Frequency via period ☐ Frequency via event (50 ms) ☐ Frequency via event (200 ms) ☐ Frequency via event (1000 ms)
Impulse type	Positive pulse rise time	☐ Positive pulse rise time ☐ Negative pulse rise time	☐ Positive pulse rise time ☐ Negative pulse rise time
Measurement range	0 Hz ... 1000 Hz	from to (max. 20 000 Hz)	from to (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) ☐ Fault control off ☐ Output Fault value:	☐ Hold last value (start with fault value) ☐ Fault control off ☐ 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 ☐ closes, if value > limit value ☐ closes, if value < limit value ☐ opens, if value > limit value ☐ opens, if value < limit value	---
Hysteresis	7,5 %	% (0.1 % ... 10 %)	---
Startup delay	0 s	s (0 s ... 999 s) 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 ☐ closes, if value > limit value ☐ closes, if value < limit value ☐ opens, if value > limit value ☐ opens, if value < limit value	---
Hysteresis	7,5 %	% (0.1 % ... 10 %)	---
Startup delay	0 s	s (0 s ... 999 s) valid for both channels	---
Relay Lockout	inactive	☐ active ☐ inactive	---
Impulse output	inactive	☐ active ☐ inactive	---
Divider	4	(1 ... 20 000)	---

05205E02