

**Isolating Repeater
 Field Circuit Ex i
 Series 9165**

www.stahl.de



- > For HART output signals
0/4 mA ... 20 mA
- > Intrinsically safe output
[Ex ia] IIC
- > Galvanic isolation between
input, output and power supply
- > Open circuit / short-circuit
monitoring and messaging
(can be switched off)
- > For use up to SIL 2 (IEC 61508)

A3



09734E00

Basic function of the analogue output 0/4 mA ... 20 mA for HART, 1 and 2 channels.

Isolating repeaters are used for intrinsically safe operation of control valves l/p transformers or indicators.

Furthermore, operation of intrinsically safe HART-valves is possible. The devices transmit a superimposed HART communication signal bidirectionally.



	ATEX / IECEx						NEC 505						NEC 506						NEC 500					
	0	1	2	20	21	22	Class I						Class II						Class III					
Zone	x	x	x	x	x	x	Zone	0	1	2	20	21	22	Division	1	2	1	2	1	2				
Ex i interface	x	x	x	x	x	x	Ex i interface	x	x	x				Ex i interface	x	x	x	x	x	x				
Installation in			x			x	Installation in			x			x	Installation in		x		x		x				

WebCode 9165A

Selection Table

Version	Channels	Input	Ex i output signal	LFD relay	Order number	Tech. data see page
Isolating Repeater Series 9165	1	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	no	9165/16-11-10s	A3/3
				yes	9165/16-11-11s	A3/5
	2	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	no	9165/26-11-10s	A3/3
				yes	9165/26-11-11s	A3/5
Note	The order numbers listed in the table are for devices equipped with screw terminals. For devices equipped with springclamp terminals, replace the ending "s" for screw terminals with "k" for spring clamp terminals. * LFD - Line fault diagnostic no - device reports line faults via input resistance >100 kΩ and LED yes - device reports line faults via input resistance >100 kΩ, LED and relay contact					

Explosion Protection

Global (IECEX)

Gas and dust	IECEX BVS 10.0011X Ex nA nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC
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Europe (ATEX)

Gas and dust	DMT 03 ATEX E 012 X ⊕ II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc ⊕ II (1) D [Ex ia Da] IIIC
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Certifications and certificates

Certificates	IECEX, ATEX, Brazil (INMETRO), India (PESO), Canada (cFM), Kazakhstan (TR), Korea (KCs), Russia (TR), Ukraine (TR), USA (FM, UL*), Belarus (TR) * for UL approval - special version on request
Ship approval	DNV GL

Safety data

Max. voltage U_o	25.60 V
Max. current I_o	96 mA
Max. power P_o	605 mW
Max. connectable capacitance C_o	
IIC	103 nF
IIB / IIIC	800 nF
Max. connectable inductance L_o	
IIC	1.9 mH
IIB / IIIC	11 mH
Internal capacitance C_i	negligible
Internal inductance L_i	negligible
Safety-related maximum voltage U_m	253 V

Further parameters

Installation	in Zone 2, Div. 2 and in the safe area
Further information	see respective certificate and operating instructions

Functional safety (IEC 61508)

Test report	Exida STAHL 04/04-03 R004	
Max. SIL	2	
Safe Failure Fraction SFF	72 %	
PFD _{AVG} at T _[Proof]	T _[Proof]	PFD _{AVG}
	1 year	3.63 x 10 ⁻⁴
	5 years	1.32 x 10 ⁻³
	10 years	2.51 x 10 ⁻³
Further information	For further information see safety test report.	

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 , 20 mA	
1 channel	55 mA
2 channels	90 mA
Power consumption at U_N , 20 mA	
1 channel	1.3 W
2 channels	2.2 W
Power dissipation at U_N , $R_L = 500 \Omega$	
1 channel	1.1 W
2 channels	1.8 W
Polarity reversal protection	yes
Operation indication	LED green "PWR"
Undervoltage monitoring	yes (no faulty module / output states)

Galvanic separation

Test voltages

acc. to standard	EN 60079-11
Ex i outputs to inputs	1.5 kV AC
Ex i outputs to power supply	1.5 kV AC
Error contact to Ex i outputs	1.5 kV AC
Ex i outputs to each other	500 V AC
acc. to standard	EN 50178
Inputs to power supply	350 V AC
Inputs to each other	350 V AC
Error contact to power supply and inputs	350 V AC

Version

Input

	9165/x6-11-10 without LFD relay	9165/x6-11-11 with LFD relay
Input signal	4 ... 20 mA with HART	0/4 ... 20 mA with HART
Functional range	4 ... 24 mA	4 ... 24 mA
Max. input current	50 mA	50 mA
Input resistance	400 Ω	175 / 400 Ω
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz	bi-directional HART transmission, 0.5 ... 10 kHz

Ex i output

Output signal	4 ... 20 mA with HART	0/4 ... 20 mA with HART
Connectable load resistance	0 ... 800 Ω	0 ... 800 Ω
Min. load resistance for short-circuit detection	150 Ω	150 Ω
Residual ripple	≤ 50 mV	≤ 50 mV
Open-circuit voltage	≤ 22.5 V	≤ 22.5 V
Response time (10 ... 90 %)	≤ 100 μ s	≤ 100 μ s

Fault detection Ex i output

Open-circuit		
Output voltage	> 16 V	> 16 V
Short circuit		
Output load	< 50 Ω	< 50 Ω
Behavior of input	≥ 100 k Ω	≥ 100 k Ω
Input current for line break detection	≥ 3.6 mA	≥ 3.6 mA
Settings (Switch LF)	-	activated / deactivated
Error detection	LED red "LF" each channel	LED red "LF" each channel
Signalization of faulty line and power supply failure	no	- Contact (30 V / 100 mA) closed to ground in case of fault - pac-Bus, floating contact (30 V / 100 mA)

Technical Data

Error limits	Accuracy, typical data expressed as % of calibrated span (20 mA) at U_N , 23 °C
Deviation	$\leq 0.1 \%$
Temperature effect	$\leq 0.05 \%$ / 10 K
Electromagnetic compatibility	Tested under the following standards and regulations: EN 61326-1 (Use in industrial environment)

Ambient conditions

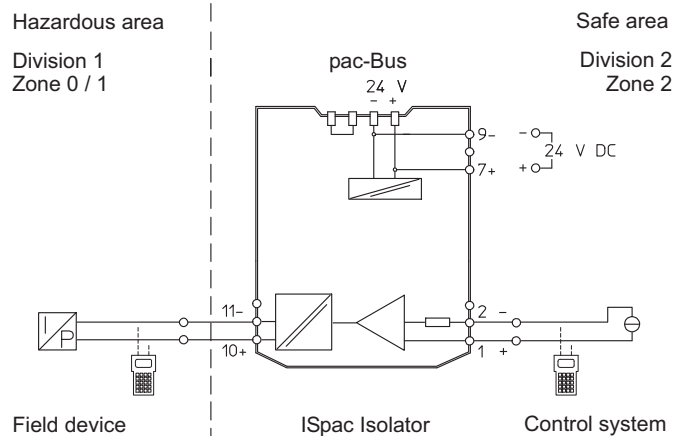
Ambient temperature	
Single device	-20 ... +70 °C
Group assembly	-20 ... +60 °C
	The installation conditions affect the ambient temperature. Observe the "Cabinet installation guide"
Storage temperature	-40 ... +80 °C
Relative humidity (no condensation)	$\leq 95 \%$
Use at the height of	< 2000 m

Technical Data

Electrical connection

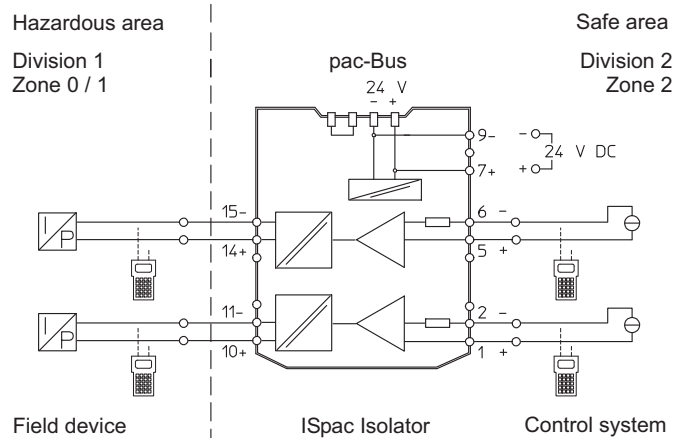
Connection diagram

1 channel
9165/16-11-10



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2 channels
9165/26-11-10



14167E02

Technical Data

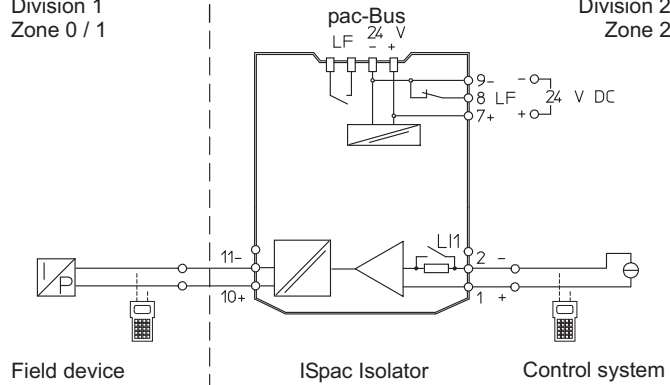
Electrical connection

Connection diagram

1 channel
9165/16-11-11

Hazardous area
Division 1
Zone 0 / 1

Safe area
Division 2
Zone 2

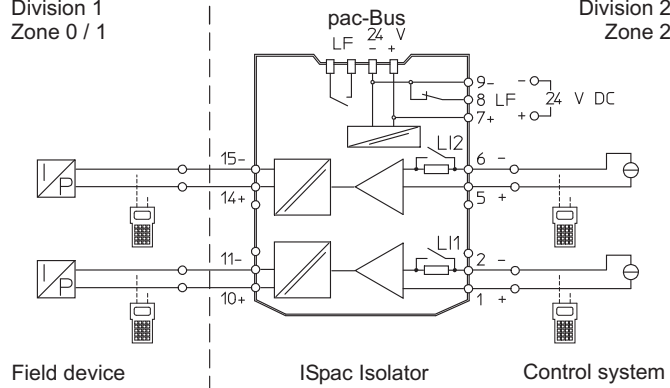


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2 channels
9165/26-11-11

Hazardous area
Division 1
Zone 0 / 1

Safe area
Division 2
Zone 2



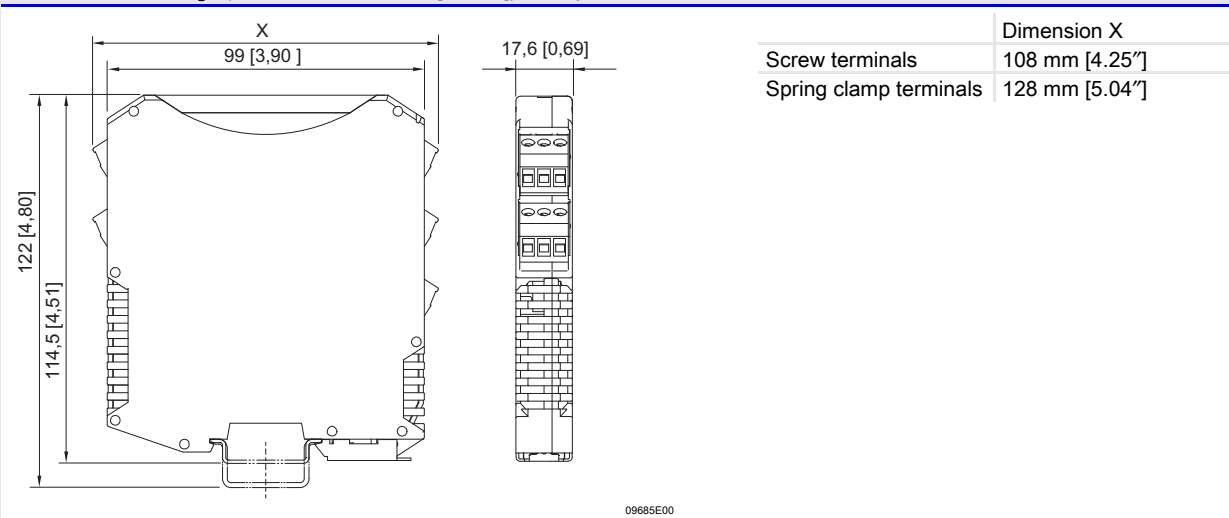
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Technical Data

Mechanical data

Connection	Screw terminals	Spring clamp terminals
Single-wire connection		
- rigid	0.2 ... 2.5 mm ²	0.2 ... 2.5 mm ²
- flexible	0.2 ... 2.5 mm ²	0.2 ... 2.5 mm ²
- flexible with core end sleeves (without / with plastic sleeve)	0.25 ... 2.5 mm ²	0.25 ... 2.5 mm ²
two-wire connection		
- rigid	0.2 ... 1 mm ²	-
- flexible	0.2 ... 1.5 mm ²	-
- flexible with core end sleeves	0.25 ... 1 mm ²	0.5 ... 1 mm ²
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	

Dimensional drawings (all dimensions in mm [inches]) – Subject to alterations



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.