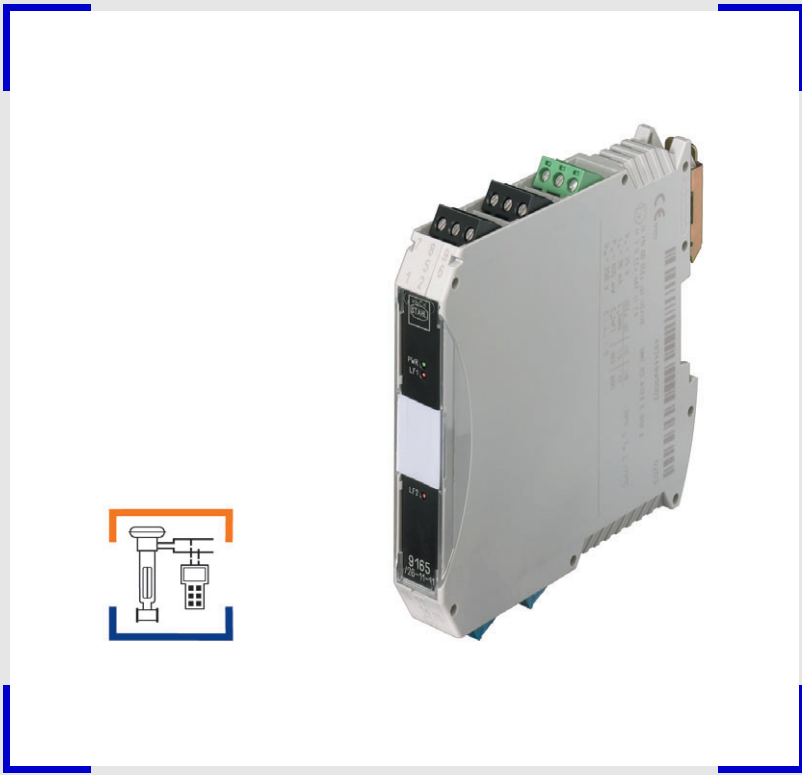


Isolating Repeater Field Circuit Ex i Series 9165



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)

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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					
							Class I						Class II						Class III					
Zone	0	1	2	20	21	22	Zone	0	1	2	20	21	22	Division	1	2	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	x	x		
Installation in			x ¹⁾			x ¹⁾	Installation in			x ¹⁾			x ¹⁾	Installation in		x ¹⁾		x ¹⁾				x ¹⁾		

¹⁾ Restrictions see table explosion protection:

WebCode 9165A

Isolating Repeater Field Circuit Ex i

Series 9165



Selection Table

Version	Channels	Input	Ex i output signal	LFD*	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	3
	2	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	no	9165/26-11-10s	3
	1	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	yes	9165/16-11-11s	6
	2	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	yes	9165/26-11-11s	6
Note	The order code above is with screw type removable terminals. For spring clamp terminals, please substitute the „s“ with „k“.					
	* LFD - Line fault diagnostic no - device transmits field-side line fault via 4 ... 20 mA signal via LED yes - device transmits field-side line fault via 4 ... 20 mA signal via LED and relay contact					

Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-10



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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USA (NEC)

Gas and dust	3017145 (FM) NI/1/2/ABCD/T4 NI/1/2/IIC/T4 AIS/I,II,III/1/ABCDEFG I/O/[AEx ia]/IIC
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Certifications and certificates

Certificates	IECEX, ATEX, Brazil (INMETRO), Canada (CSA), Kazakhstan (GOST K), Russia (GOST R), Serbia (SRPS), Ukraine (TR), USA (FM), Belarus (operating authorisation)
Ship approval	DNV

Safety data

Max. voltage U_o / V_{oc}	25.6V
Max. current I_o / I_{sc}	96mA
Max. power P_o	605mW
Max. connectable capacitance C_o / C_a	
IIC	103 nF
IIB	800 nF
Max. connectable inductance L_o / L_a	
IIC	1.9 mH
IIB	11 mH
internal capacitance C_i	negligible
internal inductance L_i	negligible
Insulation 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	82 %	
MTBF	193 years	
PFD _{AVG} at T _[Proof]	T _[Proof]	PFD _{AVG}
	1 year	3.17 x 10 ⁻⁴
	5 years	1.58 x 10 ⁻³
	10 years	3.16 x 10 ⁻³

Further information For further information see safety test report.

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Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-10



Technical Data

Electrical data

Power supply	
Nominal voltage U_N	24 V DC
Voltage range	18 ... 31.2 V
Residual ripple within voltage range	3.6 VSS
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
Reverse polarity protection	yes
Indication	LED green "PWR"
Undervoltage monitoring	yes (no faulty module / output states)
Galvanic isolation	
Test voltages	
according to regulation	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
according to regulation	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
Input from nonhazardous location	
Input signal	4 ... 20 mA with HART
Input_Function range	4 ... 24 mA
Max. input current	50 mA
Input resistance	400 Ω
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz
Ex i output	
Output signal	4 ... 20 mA with HART
Connectable load resistance	0 ... 800 Ω
Min. load resistance for short-circuit detection	150 Ω
Residual ripple	≤ 50 mV
No-load voltage	≤ 22.5 V
Response time (10 ... 90 %)	≤ 100 μ s
Error detection (LFD)	
Open-circuit	
Output voltage	> 16 V
Short circuit	
Output load	< 50 Ω
Behavior of input	≥ 100 k Ω
Input current for line breake detection	≥ 3.6 mA
Signalization of faulty line and power supply failure	no
Error limits	
Accuracy, typical data expressed as % of calibrated undervoltage monitoring	
Linearity error	≤ 0.05 %
Offset error	≤ 0.05 %
Temperature effect	≤ 0.05 % / 10 K
Power supply effect within voltage range	≤ 0.01 %
effect load resistance	≤ 0.02 %
Cross-talk	≤ 0.01 %
Electromagnetic compatibility	Tested under the following standards and regulations: EN 61326-1 (Use in industrial environment)

Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-10



Technical Data

Ambient Conditions

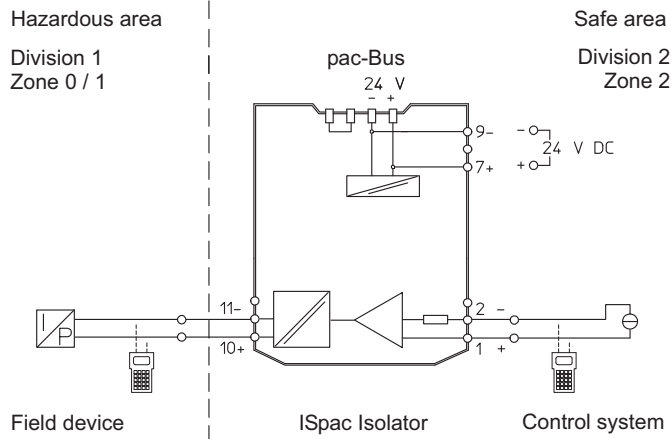
Ambient temperature	-20 ... +70 °C / -4 ... +158 °F
Single device	-20 ... +60 °C / -4 ... +140 °F
Group installation	Installation conditions affect the ambient temperature. Please follow the operating instructions.
Storage temperature	-40 ... +80 °C / -40 ... +176 °F
Relative humidity (no condensation)	≤ 95 %

Technical Data

Electrical connection

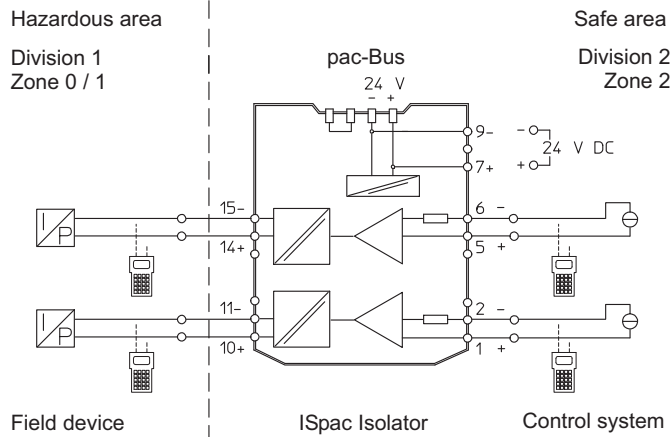
Connection diagram

1 channel 9165/16-11-10.



14166E02

2 channels 9165/26-11-10.



14167E02

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Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-11



Explosion Protection									
Global (IECEX)									
Gas and dust	IECEX BVS 10.0011X Ex nA nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC								
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								
USA (NEC)									
Gas and dust	3017145 (FM) NI/II/2/ABCD/T4 NI/II/2/IIC/T4 AIS/I,II,III/1/ABCDEFG I/O/[AEx ia]/IIC Special version with UL-approval (order number: 160184, 160193): E81680 (UL) Class I, Groups A,B,C and D Class II, Groups E,F and G Class III								
Certifications and certificates									
Certificates	IECEX, ATEX, Brazil (INMETRO), Canada (CSA), Kazakhstan (GOST K), Korea (KCs) only for 9165/16-11-11., Russia (GOST R), Serbia (SRPS), Ukraine (TR), USA (FM, UL), Belarus (operating authorisation)								
Ship approval	DNV								
Safety data									
Max. voltage U_o / V_{oc}	25.6V								
Max. current I_o / I_{sc}	96mA								
Max. power P_o	605mW								
Max. connectable capacitance C_o / C_a									
IIC	103 nF								
IIB	800 nF								
Max. connectable inductance L_o / L_a									
IIC	1.9 mH								
IIB	11 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								
Functional safety (IEC 61508)									
Test report	Exida STAHL 04/04-03 R004								
Max. SIL	2								
Safe Failure Fraction SFF	82 %								
MTBF	193 years								
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1 year	3.17×10^{-4}								
5 years	1.58×10^{-3}								
10 years	3.16×10^{-3}								
Further information	For further information see safety test report.								

Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-11



Technical Data

Electrical data

Power supply	
Nominal voltage U_N	24 V DC
Voltage range	18 ... 31.2 V
Residual ripple within voltage range	3.6 VSS
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
Reverse polarity protection	yes
Indication	LED green "PWR"
Undervoltage monitoring	yes (no faulty module / output states)
Galvanic isolation	
Test voltages	
according to regulation	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
according to regulation	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
Input from nonhazardous location	
Input signal	0/4 ... 20 mA with HART
Input_Function range	0 ... 24 mA
Max. input current	50 mA
Input resistance (changeable switch LI)	175 / 400 Ω
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz
Ex i output	
Output signal	0/4 ... 20 mA with HART
Connectable load resistance	0 ... 800 Ω
Min. load resistance for short-circuit detection	150 Ω
Residual ripple	≤ 50 mV
No-load voltage	≤ 22.5 V
Response time (10 ... 90 %)	≤ 100 μ s
Error detection (LFD)	
Open-circuit	
Output voltage	> 16 V
Short circuit	
Output load	< 50 Ω
Behavior of input	≥ 100 k Ω
Input current for line break detection	≥ 3.6 mA
Settings (Switch LF)	activated / deactivated
Error detection	LED rot "LF" je Kanal
Signalization of faulty line and power supply failure	- Contact (30 V / 100 mA) closed to ground in case of fault - pac-Bus, floating contact (30 V / 100 mA)
Error limits	
Accuracy, typical data expressed as % of calibrated undervoltage monitoring	
Linearity error	≤ 0.05 %
Offset error	≤ 0.05 %
Temperature effect	≤ 0.05 % / 10 K
Power supply effect within voltage range	≤ 0.01 %
effect load resistance	≤ 0.02 %
Cross-talk	≤ 0.01 %
Electromagnetic compatibility	Tested under the following standards and regulations: EN 61326-1 (Use in industrial environment)

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Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-11



Technical Data

Ambient Conditions

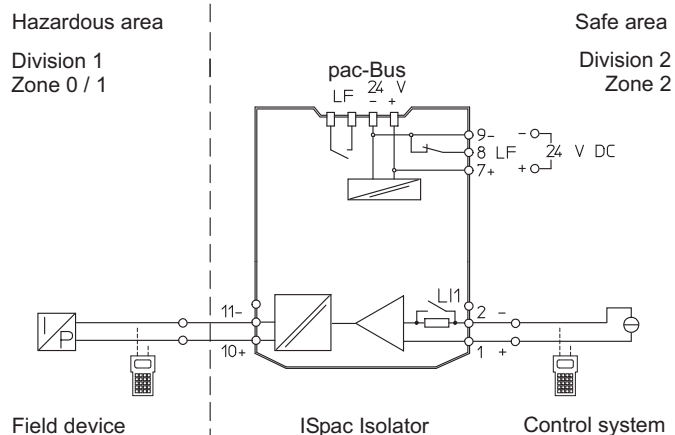
Ambient temperature	-20 ... +70 °C / -4 ... +158 °F -20 ... +60 °C / -4 ... +140 °F Installation conditions affect the ambient temperature. Please follow the operating instructions.
Single device	
Group installation	
Storage temperature	-40 ... +80 °C / -40 ... +176 °F
Relative humidity (no condensation)	≤ 95 %

Technical Data

Electrical connection

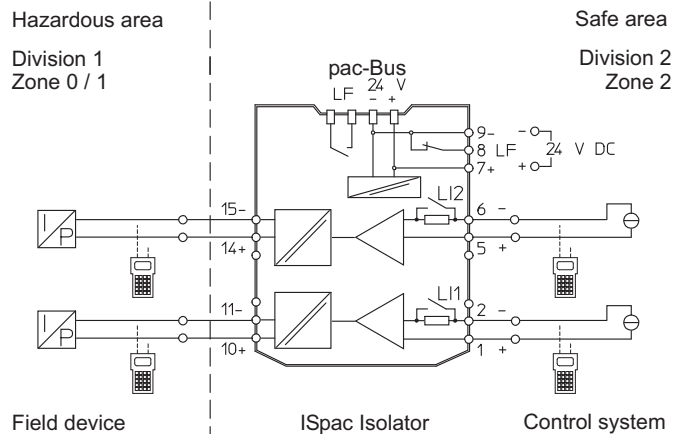
Connection diagram

1 channel 9165/16-11-11.



06689E02

2 channels 9165/26-11-11.



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Isolating Repeater Field Circuit Ex i

Series 9165



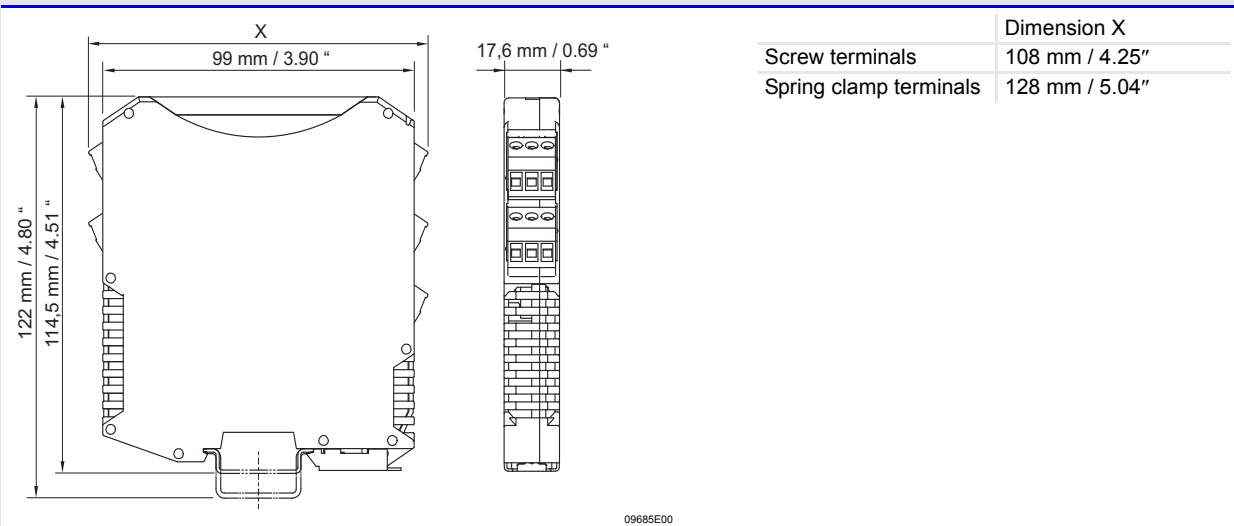
Technical Data

Mechanical data

Connection		Screw terminals	Spring clamp terminals
	Connection single-wire		
	- rigid	0.2 ... 2.5 mm ² / 24 ... 14 AWG	0.2 ... 2.5 mm ² / 24 ... 14 AWG
	- flexible	0.2 ... 2.5 mm ² / 24 ... 14 AWG	0.2 ... 2.5 mm ² / 24 ... 14 AWG
	- flexible, end covering sleeves (without / with plastic sleeving)	0.25 ... 2.5 mm ² / 22 ... 14 AWG	0.25 ... 2.5 mm ² / 22 ... 14 AWG
	Connection two wires		
	- rigid	0.2 ... 1 mm ² / 24 ... 14 AWG	--
	- flexible	0.2 ... 1.5 mm ² / 24 ... 16 AWG	--
	- flexible, end covering sleeves	0.25 ... 1 mm ² / 22 ... 16 AWG	0.5 ... 1 mm ² / 20 ... 16 AWG
Weight	approx. 160		
Assembly	on DIN rail (NS35/15, NS35/7.5) or in pac-Carrier		
Installation position	horizontal or vertical		
Enclosure	IP30		
Terminals	IP20		
Enclosure material	PA 6.6		
Fire protection class (UL-94)	V0		

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Dimensional Drawing (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.