

Isolating Repeater Field Circuit Ex i Series 9165



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- > 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 / GOST							NEC 505						NEC 506						NEC 500					
							Class I						Class I						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				
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			
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 Rev. C	3
	2	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	no	9165/26-11-10s Rev. C	3
	1	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	yes	9165/16-11-11s Rev. C	6
	2	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	yes	9165/26-11-11s Rev. C	6
Note	<p>The order code above is with screw type removable terminals. For spring clamp terminals, please substitute the „s“ with „k“.</p> <p>* LFD - Line fault diagnostic The device transmits a line fault detected in the field circuit via the 4 ... 20 mA signal. Without LED / relay contact.</p>					

Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-10 Rev. C



Explosion Protection

Global (IECEX)	
Gas and dust	IECEX BVS 10.0011X Ex nAc nCc [ia] IIC T4 [Ex ia] IIIC

Europe (ATEX)	
Gas and dust	DMT 03 ATEX E 012 X ⊕ II 3 (1) G Ex nAc nCc [ia] IIC T4 ⊕ II (1) D [Ex ia] IIIC

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

Russia (Gost-R)	
Gas	2ExnAnC[ia]IIC T4X 2ExnAnCIIC T4X

Certificates and Approvals	
Certificates	IECEX, ATEX, Brazil (INMETRO), Canada (CSA), Kazakhstan (GOST-K), Russia (GOST-R), Serbia (SRPS), Ukraine (GOST-U), USA (FM), Belarus (GOST-B)
Other approvals	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	3.17×10^{-4}
	5 years	1.58×10^{-3}
	10 years	3.16×10^{-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 Rev. C



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	0/4 ... 20 mA with HART
Input_Function range	0 ... 24 mA
Max. input current	50 mA
Input resistance (changeable switch LI)	225 / 550 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 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 Rev. C



Technical Data

Ambient Conditions

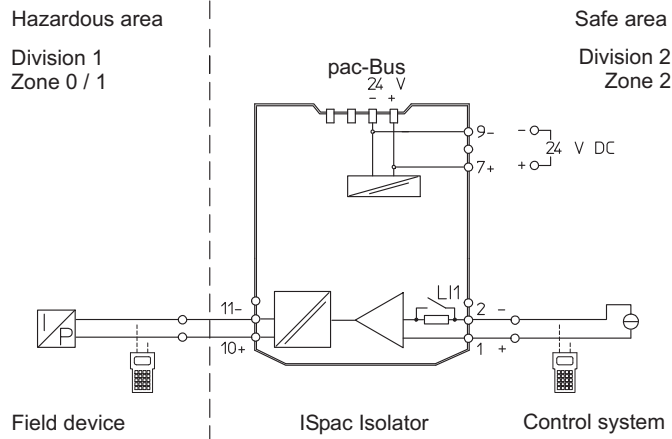
Ambient temperature	-20 ... +70 °C / -4 ... +158 °F
Single device	-20 ... +60 °C / -4 ... +140 °F
Group installation	Installation conditions affect the ambient temperature. Please follow the operating instructions.
Storage temperature	-40 ... +80 °C / -40 ... +176 °F
Relative humidity (no condensation)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

Technical Data

Electrical connection

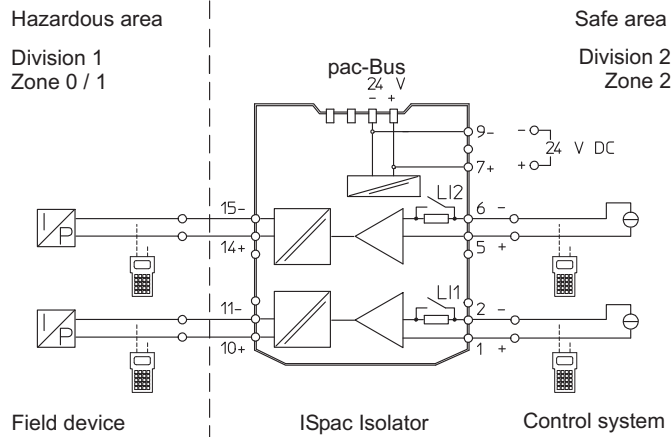
Connection diagram

1 channel 9165/16-11-10.



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2 channels 9165/26-11-10.



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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
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Russia (Gost-R)

Gas	2ExnAnC[ia]IICT4X 2ExnAnCIICT4X
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Certificates and Approvals

Certificates	IECEx, ATEX, Brazil (INMETRO), Canada (CSA), Kazakhstan (GOST-K), Korea (KTL) only for 9165/16-11-11., Russia (GOST-R), Serbia (SRPS), Ukraine (GOST-U), USA (FM, UL), Belarus (GOST-B)
Other approvals	ship approval (DNV)

Safety data

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Max. current I_o / I_{sc}	96mA
Max. power P_o	605mW
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Further parameters

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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	
Linearity error	Accuracy, typical data expressed as % of calibrated undervoltage monitoring
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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Installation conditions affect the ambient temperature.
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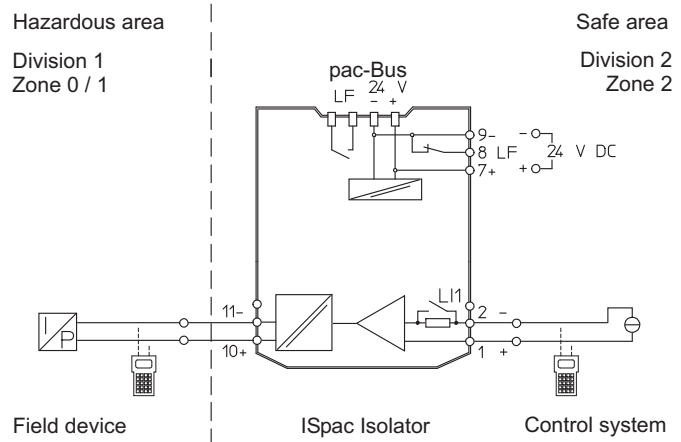
Storage temperature	-40 ... +80 °C / -40 ... +176 °F
Relative humidity (no condensation)	≤ 95 %

Technical Data

Electrical connection

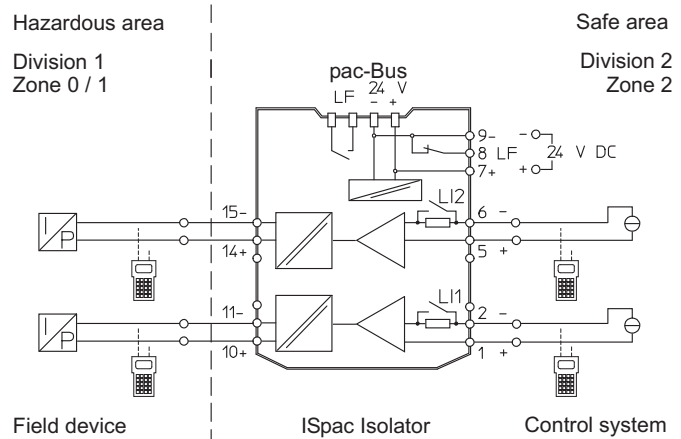
Connection diagram

1 channel 9165/16-11-11.



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2 channels 9165/26-11-11.



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Isolating Repeater Field Circuit Ex i

Series 9165



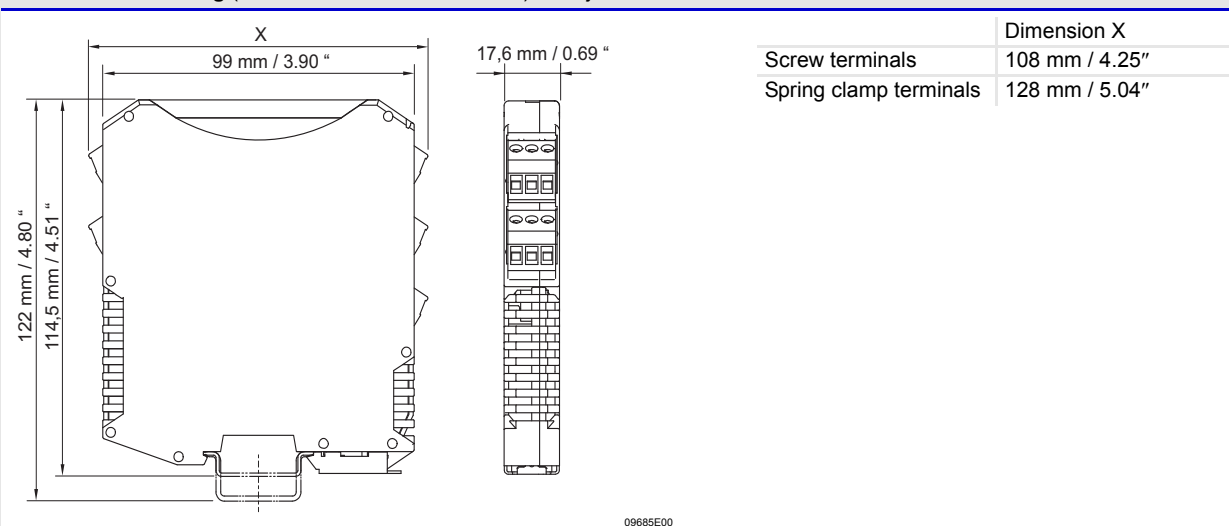
Technical Data

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	

A3

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.

Representante oficial de:



[Argentina – Uruguay – Paraguay – Bolivia – Ecuador.]



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