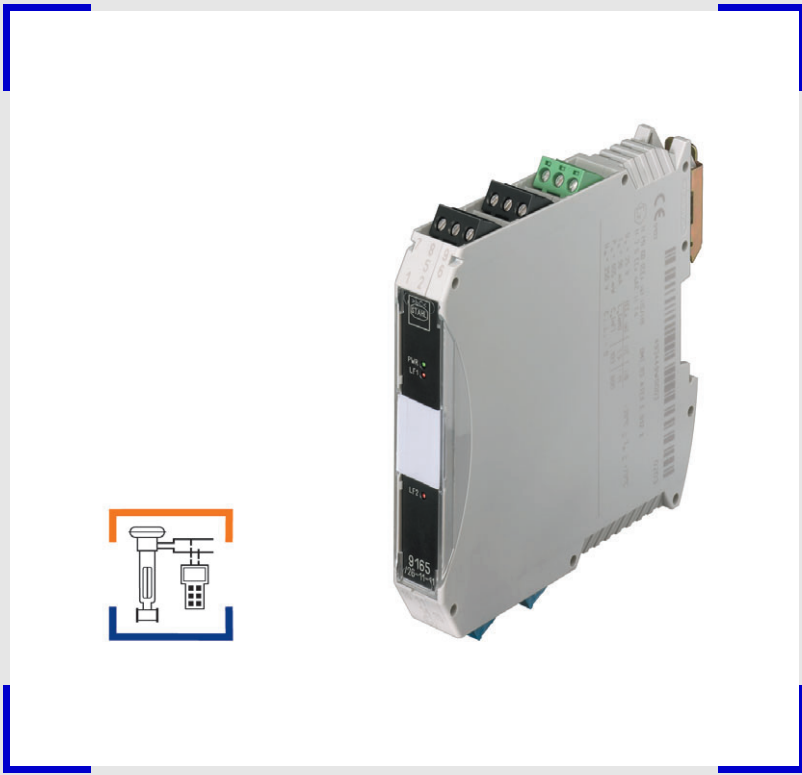


# Isolating Repeater Field Circuit Ex i Series 9165



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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 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 <sup>1)</sup>			x <sup>1)</sup>	Installation in			x <sup>1)</sup>			x <sup>1)</sup>	Installation in		x <sup>1)</sup>		x <sup>1)</sup>				x <sup>1)</sup>		

<sup>1)</sup> 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	<b>9165/16-11-10s Rev. C</b>	3
	2	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	no	<b>9165/26-11-10s Rev. C</b>	3
	1	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	yes	<b>9165/16-11-11s Rev. C</b>	6
	2	0/4 ... 20 mA with HART	0/4 ... 20 mA with HART	yes	<b>9165/26-11-11s Rev. C</b>	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
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### 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
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### 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
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### Russia (Gost-R)

Gas	2ExnAnC[ia]IIC T4X 2ExnAnCIIC T4X
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## 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 <sub>AVG</sub> at $T_{[Proof]}$	$T_{[Proof]}$	PFD <sub>AVG</sub>
	1 year	$3.17 \times 10^{-4}$
	5 years	$1.58 \times 10^{-3}$
	10 years	$3.16 \times 10^{-3}$

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 $\Omega$
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 $\Omega$
Min. load resistance for short-circuit detection	150 $\Omega$
Residual ripple	$\leq 50$ mV
No-load voltage	$\leq 22.5$ V
Response time (10 ... 90 %)	$\leq 100$ $\mu$ s
Error detection (LFD)	
Open-circuit	
Output voltage	$> 16$ V
Short circuit	
Output load	$< 50$ $\Omega$
Behavior of input	$\geq 100$ k $\Omega$
Input current for line breake detection	$\geq 3.6$ mA
Signalization of faulty line and power supply failure	no
Error limits	
Accuracy, typical data expressed as % of calibrated undervoltage monitoring	
Linearity error	$\leq 0.05$ %
Offset error	$\leq 0.05$ %
Temperature effect	$\leq 0.05$ % / 10 K
Power supply effect within voltage range	$\leq 0.01$ %
effect load resistance	$\leq 0.02$ %
Cross-talk	$\leq 0.01$ %
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

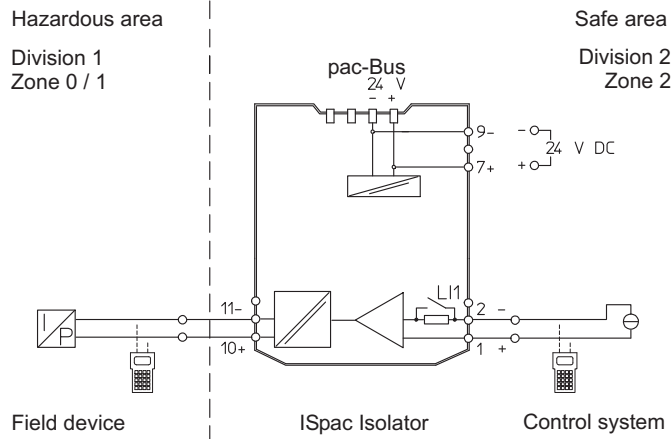
Ambient temperature	-20 ... +70 °C / -4 ... +158 °F
Single device	-20 ... +60 °C / -4 ... +140 °F
Group installation	Installation conditions affect the ambient temperature. Please follow the operating instructions.
Storage temperature	-40 ... +80 °C / -40 ... +176 °F
Relative humidity (no condensation)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

### Technical Data

#### Electrical connection

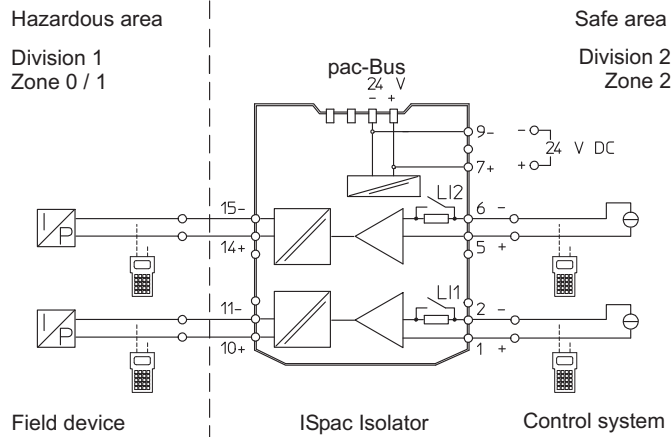
Connection diagram

#### 1 channel 9165/16-11-10.



14166E02

#### 2 channels 9165/26-11-10.



14167E02

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# Isolating Repeater Field Circuit Ex i

## Series 9165/x6-11-11 Rev. C



### Explosion Protection

#### Global (IECEx)

Gas and dust	IECEx BVS 10.0011X Ex nAc nCc [ia] IIC T4 [Ex ia] IIIC
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#### 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
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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

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
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Max. connectable inductance $L_o / L_a$	
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internal capacitance $C_i$	negligible
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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	$3.17 \times 10^{-4}$
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	10 years	$3.16 \times 10^{-3}$

Further information	For further information see safety test report.
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# Isolating Repeater Field Circuit Ex i

Series 9165/x6-11-11 Rev. C



## Technical Data

### Electrical data

Power supply	
Nominal voltage $U_N$	24 V DC
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Residual ripple within voltage range	3.6 VSS
Nominal current at $U_N$ , 20 mA	
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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)	225 / 550 $\Omega$
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 $\Omega$
Min. load resistance for short-circuit detection	150 $\Omega$
Residual ripple	$\leq 50$ mV
No-load voltage	$\leq 22.5$ V
Response time (10 ... 90 %)	$\leq 100$ $\mu$ s
Error detection (LFD)	
Open-circuit	
Output voltage	$> 16$ V
Short circuit	
Output load	$< 50$ $\Omega$
Behavior of input	$\geq 100$ k $\Omega$
Input current for line break detection	$\geq 3.6$ 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 $\leq 0.05$ %
Offset error	$\leq 0.05$ %
Temperature effect	$\leq 0.05$ % / 10 K
Power supply effect within voltage range	$\leq 0.01$ %
effect load resistance	$\leq 0.02$ %
Cross-talk	$\leq 0.01$ %
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 Rev. C



### Technical Data

#### Ambient Conditions

Ambient temperature	-20 ... +70 °C / -4 ... +158 °F
Single device	-20 ... +60 °C / -4 ... +140 °F
Group installation	-20 ... +60 °C / -4 ... +140 °F

Installation conditions affect the ambient temperature.  
Please follow the operating instructions.

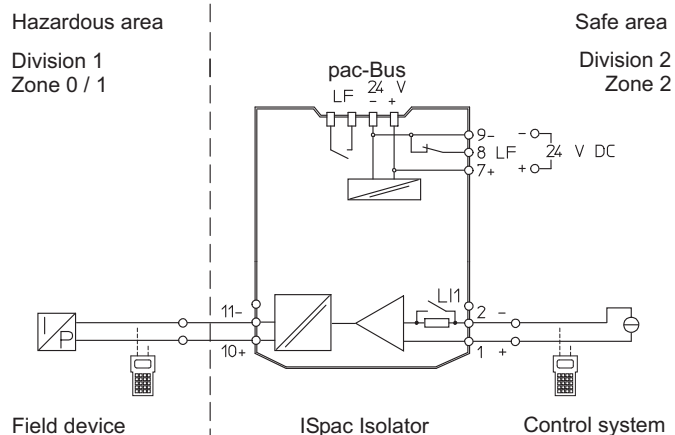
Storage temperature	-40 ... +80 °C / -40 ... +176 °F
Relative humidity (no condensation)	≤ 95 %

### Technical Data

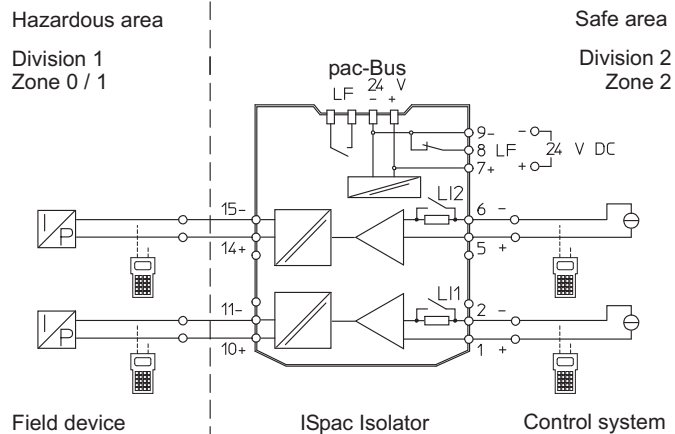
#### Electrical connection

Connection diagram

#### 1 channel 9165/16-11-11.



#### 2 channels 9165/26-11-11.





# Isolating Repeater Field Circuit Ex i

## Series 9165



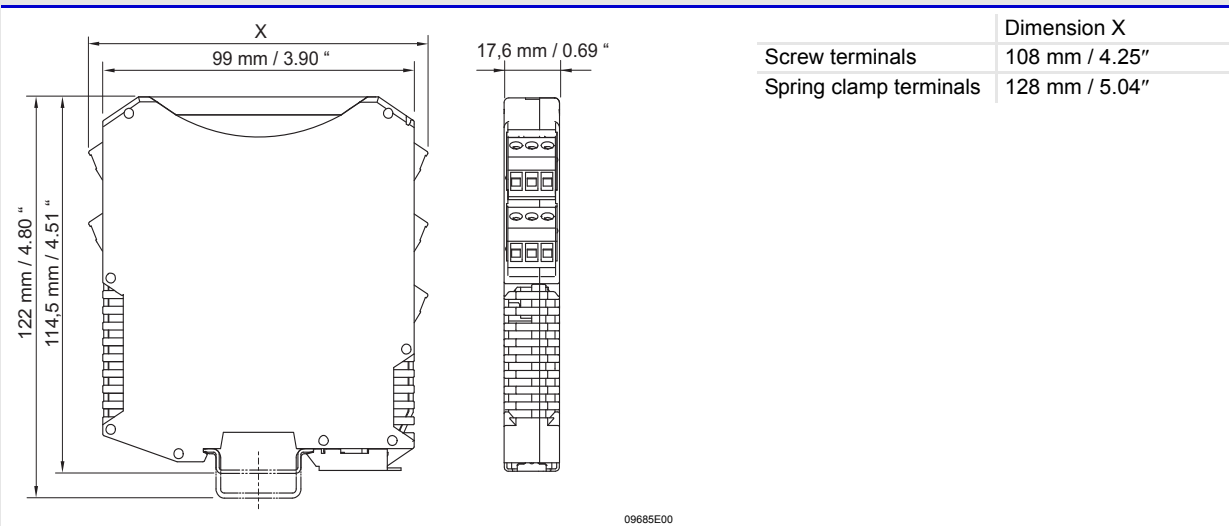
### Technical Data

#### Mechanical data

Connection		Screw terminals	Spring clamp terminals
	Connection single-wire		
	- rigid	0.2 ... 2.5 mm <sup>2</sup> / 24 ... 14 AWG	0.2 ... 2.5 mm <sup>2</sup> / 24 ... 14 AWG
	- flexible	0.2 ... 2.5 mm <sup>2</sup> / 24 ... 14 AWG	0.2 ... 2.5 mm <sup>2</sup> / 24 ... 14 AWG
	- flexible, end covering sleeves (without / with plastic sleeving)	0.25 ... 2.5 mm <sup>2</sup> / 22 ... 14 AWG	0.25 ... 2.5 mm <sup>2</sup> / 22 ... 14 AWG
	Connection two wires		
	- rigid	0.2 ... 1 mm <sup>2</sup> / 24 ... 14 AWG	--
	- flexible	0.2 ... 1.5 mm <sup>2</sup> / 24 ... 16 AWG	--
	- flexible, end covering sleeves	0.25 ... 1 mm <sup>2</sup> / 22 ... 16 AWG	0.5 ... 1 mm <sup>2</sup> / 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.