





**Engineering Guideline** 

## Intrinsically safe isolators ISpac



for Emerson DeltaV SIS







### A unique solution designed for the DeltaV SIS

The complete solution – pac-Carrier and the specified Ex i / I.S. isolators – has been designed in close cooperation with Emerson's DeltaV SIS specialists. The isolators for the discrete input and discrete output have been modified according to the requirements of safety related applications. The results are isolators which offer so-called line fault transparency.

In contrast to usual isolators these new devices are able to detect short circuit or line break in the field and report those failures back to the DeltaV SIS system directly via the signal channel. For the first time the operator of the DeltaV SIS gets full access to the condition of all field circuits no matter if a Ex i / I.S. isolation is required or not.

The pac-Carrier has been customized in several steps to the specific needs of DeltaV SIS system. It allows a maximum flexibility. Each slot of the pac-Carrier can be equipped individually with the isolator fitting to the function of the channel. As a result the pac-Carrier can be fitted to any configuration of the DeltaV SIS system. Non Ex i / I.S. signals can be easily integrated by means of an additional terminal block.

#### Test accomplished

In order to ensure a reliable interworking with the DeltaV SIS system the ISpac solution was thoroughly tested by Emerson. The solution passed the test.

Without doubt the best test is the practice. The ISpac system including the isolators has proved its reliability since many years all over the world. As a partner of Emerson Process Management we provided already in numerous projects around the world our solutions. Get in contact with R. STAHL in order to get the updated reference list.

### Integrated solution pac-Carrier and single channel Ex i / I.S. isolator

#### Your benefits

- The most flexible system for the integration of Ex i / I.S. signals
- Tested by Emerson's DeltaV SIS specialists for maximum compatibility
- Complete line fault transparency no blind spots
- Compact and rugged installation
- Zone 2 / Div 2 installation for DeltaV SIS and Ex i / I.S. isolation made by STAHL



Example of 16 slots pac- Carrier

- 1. Detachable connectors
  - Screw terminals
  - Cage clamp terminals
- 2. Labeling for module, slot and carrier
- 3. Ejector mechanism
- 4. Redundant and fused supply
- 5. Power supply failure and line fault signaling via relay contact
- 6. Additional interface for field signal connection w/o Ex i / I.S. isolator
- 7. DIP switch for selection between AI, AO, DI or DO.
- 8. System cable plug
- 9. Installation on DIN rail or mounting plate
- 10. Integrated pac bus for power supply and line-fault signaling
- 11. Reliable snap-in mechanism, without tool
- 12. Single slot, any signal mixture

STAH



### Stand-alone Isolators on DIN rail

R.STAHL's compact ISpac Ex i / I.S. isolator system provides the entire, sophisticated functionality required for process automation in hazardous areas subject to the risk of gas and dust explosion. It offers solutions for all conceivable requirements made of point-to-point transmission of process signals. There is a device with one or two channels for all processes and standard applications. Standalone application on single DIN rails, group installation of 20, 30 or more devices, transmission of HART signals or use in SIL applications: always the same design with consistent installation procedures. This drastically simplifies your planning procedures and wiring. The consequence of this flexibility is an unrivalled level of economy and efficiency.





The ISpac modules are available for all functions, both as single-channel devices and as two-channel devices. Most of the components of R.STAHL's ISpac Ex i isolator system can be used in applications necessitating SIL 2 or SIL 3.



### **Customized solutions for Emerson**

R. STAHL offers a wide range of customized solutions which allow the user to integrate field signals into Emerson's DeltaV and DeltaV SIS in an easy and cost effective manner. The solutions designed for Emerson cover the different ways of connecting field devices to process control and safety systems nowadays.

In addition to the products the R. STAHL Competence Centre provides the full range of services: consulting, engineering, commissioning and maintenance in order to contribute to Emerson's overall project business. We do not only regard ourselves as a manufacturer and supplier of components and systems, but also as a provider of comprehensive services.

Our engineers have many years of experience, from the engineering to the handling of smallest details, which is beneficial for you and your customer.

R. STAHL is able to manufacture completely equipped I.S. system cabinets for control room or field installation. In addition to our approved R. STAHL standard components additional components from certified suppliers are used.



Example of a customer specific field station for an Emerson system mode by STAHL

#### Cooperation with STAHL provides the following benefits:

- Complete solutions for any kind of hazardous location world-wide
- Selection of the explosion protection method which fits best your needs technically and economically
- Competent consulting and engineering
- In-house manufacturing ensures maximum flexibility and short delivery times
- Complete range of interface solutions barriers, isolators, remote I/O, fieldbus, HMI and camera





## Content

## Integrated solution pac-Carrier and single channel Ex i / I.S. isolator

	DeltaV SIS			STAHL pac-Carrier						
Signal type	Card type	Channels	Slots	Cable type	pac-Carrier type	ISpac	page			
DI, DO, AI AO	SLS 1508	16	16	9195/C-006	9195/16A–EP1–04A4	DI: 9170/10-14-12 DO: 9175/10-1x-12 AI: 9160/13-10-11 AO: 9165/16-11-11 Rev C	7-12			

## Stand-alone Isolators on DIN rail (without pac-Carrier)

Signal type	Channels	Description	ISpac	page	
וח	1	Switching repeater with electrical output (NAMUR EN 60947-5-	9170/10-14-12	12 15	
ы	2	6, 35 V / 50 mA) with line fault transparency (LFT)	9170/20-14-12	12-15	
	1	Binary output with line fault transparency (LFT) for $I_{max} = 60 \text{ mA}$	9175/10-12-12		
DO	1	Binary output with line fault transparency (LFT) for $I_{max} = 45 \text{ mA}$	9175/10-14-12	16-27	
	1	Binary output with line fault transparency (LFT) for $I_{max}$ = 35 mA	9175/10-16-12		
	1	Transmitter supply unit $0/4 \text{ m} = 20 \text{ m} \text{ with } H \text{A} \text{P} \text{T}$	9160/13-10-11	28-32	
AI	2		9160/23-10-11		
	1/2	Transmitter supply unit with Single input 0/4 mA20 mA and dual output with HART	9160/19-10-11	20 02	
40	1	isolating repeater $0/4 \text{ m} \Lambda = 20 \text{ m} \Lambda$ with HAPT	9165/16-11-11 Rev C		
AU	2	Isolating repeater 0/4 mA20 mA with MART	9165/26-11-11 Rev C	34-36	

**Please note**: Only single channel isolators can be mounted on pac-Carrier 9195. All types (single / dual channel / signal duplicator) can be used for DIN rail installation without pac-Carrier.

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## Spac

pac-Carrier Type 9195 / 16A – EP1 – 04A4

• For Emerson DeltaV SIS

TR Pac

- Signal types: 16 x DI, DO, AI, AO
- pac-Carrier for 16 modules, up to 16 signals
- ISpac isolators DI 9170/10-14-12, DO 9175/10-1x-12, AI 9160/13-10-11, AO 9165/16-11-11 Rev C can be used
- Customized system cables type 9195/C-006 with Sub-D for connection on pac-Carrier and wires to the DeltaV SIS
- Redundant power supply with fault signalisation contact and exchangeable fuses
- Horizontal or vertical installation
- Simple installation on DIN rail or mounting plate
- Various labeling possibilities
- Fast and reliable installation of the isolators without tools
- Comfortable exchange of the isolators with secured ejector mechanism
- Installation possible in Zone 2 and Div. 2

Comfortable and simple integration of the Ex I / I.S. isolators ISpac into Emerson / DeltaV SIS automation systems via system specific connection boards and system cables.

### System overview





05179E00



Technical data	
Certificates Explosion protection	BVS 03 ATEX E213 X
Installation	In Zone 2, Div. 2 and in the safe area
Power supply Nominal voltage U <sub>N</sub> Redundant supply Indication Fuse Polarity reversal protection	(X31) 24 V DC (19 V 31,2 V) yes, decoupled with diodes 2 LED green "PWR1"; "PWR2" 2 x TR5; T 2,0 A; exchangeable, for primary and redundant supply yes
Connection to automation system Connection Number of channels	(X01) 1 x socket Sub-D 50 pole for customized cable type 9195/C-006 16
Connection field devices – None Ex i / I.S. Connection Number of channels	(X02) Screw terminal 16 (3 PINs per channel)
Connection field devices – Ex i / I.S. Connection Number of channels	at the terminals of the Ex i / I.S. isolators (see "signal loops") 16
Error messaging Power supply failure PF Line fault LF (of IS pac modules) Setting switch "SP" Setting switch "LFS"	(X31) Contact (35 V / 100 mA), closed in good conditions Contact (35 V / 100 mA), closed in good conditions Power failure message suppressed for redundant supply (single supply) Line fault message suppressed
Ambient conditions Ambient temperature Storage temperature Relative humidity (no condensation)	max 20 °C + 70 °C (see specification of Ex I/ I.S. isolators) - 40 °C + 80 °C ≤95 %
Mechanical data Weight Mounting type Mounting position Casing / Terminal protection class Casing material Fire protecting class (UL-94)	approx. 320 g on DIN rail (NS35 / 15, NS35 / 7.5) or mounting plate (4 x screw M6) horizontal or vertical IP 00 / IP 20 PA 6.6 V0





### Signal loops

The diagrams below show typical applications. Please refer to the connection list to get the entire connection scheme. Basic technical parameters of the ISpac isolating repeaters can be found at the end of this document. The detailed specifications

can be downloaded at: www.ispac.info.

#### Switching repeater (DI)

with Line Fault Transparency for NAMUR proximity switches and contacts - electronic output

## 9170/10-14-12



#### Digital output (DO)

with Line Fault Transparency for solenoid valves and LED's

Please note, that the current of the line fault detection may cause problems with specific types of solenoid valves. Valves may not switch off even if the output of the digital output is in the operating mode OFF. In this case the line fault detection must be deactivated. See 7.2.

Please check the holding current of the solenoid valve by means of the individual spec sheet.

Line fault detection circuit ISpac 9175: Current: 0,5...1,1 mA





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#### Transmitter supply unit (AI)

for 2-, 3-wire transmitter and mA sources for 2-wire transmitter with HART

for control valves, i/p-converters or indicators bi-directional HART communication.

For safety applications only 4...20 mA signals are permitted

Isolating repeater (AO)



#### **SIL specification**

ISpac type	Function	SIL	Tested by	Test report Number	SFF	PFD	Tproof
9170/10-14-12	DI	2	EXIDA	Stahl 05/08-34 R009 (V2, Rev. R1)	89%	6,25E-04	5
9175/10-1x-12	DO	2	EXIDA	Stahl 07/10-01R012 (V1, Rev. R0)	97%	3,85E-04	5
9160/13-10-11	AI	2	EXIDA	Stahl 05/08-34 R008 (V2, Rev. R3)	73%	4,46E-04	1
9165/16-11-11RevC	AO	2	EXIDA	Stahl 04/04-03 R004 (V3, Rev. R0)	82%	9,51E-04	3
9195/16 A-EP1-04A4		3	EXIDA	Stahl 04/04-03 R002 (V1, Rev. R1.0)	91%	2.04E-05	10

Please find further parameters in the SIL reports. Download at www.ispac.info.

Accessories and Spa	ccessories and Spare Parts								
Designation	Illustration	Description	Order number						
Cover yellow transparent (10 pieces)	01955E00	The yellow covers mark the isolators used for SIL applications. Delivered in packages of 10 pieces.	200914						
System cable	Customized s Carrier and w	system cables type 9195/C-006 with Sub-D for connection on pac- ires to the DeltaV SIS. Please specify the required length.	9195/C-006						

## Dimension drawings (all dimensions in mm) - subject to alterations

12472E00



Please note: In order to snap in the ISpac modules an extra space of approx. 50 mm is required.

186 mm

Please read the "ISpac engineering guideline" carefully before you start to engineer the enclosures with incorporated ISpac modules with or without pac-Carriers. The "ISpac engineering guideline" can be downloaded from: www.ispac.info.

Cage clamp terminals



### **Connection list**

## Connection to field devices (Ex i / I.S.)

<b>termin</b> ISpac	<b>al Ex</b> c Mo	dules	nel	slot	t/ : no.	swi n	itch o	X01 X02			Cable 0105/C-006	SLS 1508
DI: 9170 DO: 9175 AO: 9165	polarity	AI: 9160	chanı	carrier	inpu output	B102	B103	pin no (Sub-D 50)	polarity	no (screw)	color code	terminal no
10	+	12						1	+	1	White	A1
11	-	10	1	1	1	1		18	-	17	Brown	B1
		10						34			Green	C1
10	+	12						2	+	2	Yellow	A2
11	-	10	2	2	2	2		19	-	18	Gray	B2
10		12						30		2	PINK	02
10	т	12	з	3	3	3		20	т	5	Bod	R3
11	-	10	5	5	5	5		36	-	19	Black	C3
10	+	12						4	+	4	Purple	A4
		12	4	4	4	4		21			gray-pink	B4
11	-	10						37	-	20	red-blue	C4
10	+	12						5	+	5	white-green	A5
11	-	10	5	5	5	5		22	-	21	brown-green	B5
		10						38		21	white-yellow	C5
10	+	12		_		_		6	+	6	yellow-brown	A6
11	-	10	6	6	6	6		23	-	22	white-gray	B6
40		10						39		7	gray-brown	C6
10	+	12	7	7	7	7		7	+	/	white-pink	A7 87
11	-	10	'	'	'	'		24 40	-	23	white-blue	Б7 С7
10	+	12						8	+	8	brown-blue	A8
			8	8	8	8		25			white-red	B8
11	-	10						41	-	24	brown-red	C8
10	+	12						9	+	9	white-black	A9
11	-	10	9	9	9		1	26	_	25	brown-black	B9
		10						42		25	gray-green	C9
10	+	12			10			10	+	10	yellow-gray	A10
11	-	10	10	10	10		2	27	-	26	pink-green	B10
10		12						43		11	groop blue	010 011
10	т	12	11	11	11		З	28	т		vellow-blue	B11
11	-	10	•••				Ŭ	44	-	27	areen-red	C11
10	+	12						12	+	12	yellow-red	A12
11		10	12	12	12		4	29		20	green-black	B12
11	-	10						45	-	20	yellow-black	C12
10	+	12						13	+	13	gray-blue	A13
11	-	10	13	13	13		5	30	-	29	pink-blue	B13
10		10						46		14	gray-red	013
10	+	12	14	14	14		6	31	+	14	grav-black	R14
11	-	10	.4	1.4	.4		5	47	-	30	pink-black	C14
10	+	12						15	+	15	blue-black	A15
14		10	15	15	15		7	32		24	red-black	B15
11	-	10						48	-	31	white-brown-black	C15
10	+	12						16	+	16	yellow-green-black	A16
11		10	16	16	16		8	33		32	gray-pink-black	B16
11		10						49		52	blue-red-black	C16
								17 *)			white-green-black	(GND)
								50 *)			green-brown-black	(GND)

\*) connector body

We reserve the right to make alterations to the technical data, weights, dimensions, designs and products available without notice. The illustration cannot be considered binding.

# **Ex i Isolators**





Switching Repeater with Electronic Output (35 V / 50 mA) with Line Fault Transparency Type 9170/.0-14-12 LFT

- Intrinsically safe input [Ex ia] IIC
- Galvanic isolation between input, output and power supply
- Open-circuit / short-circuit monitoring and messaging (can be switched off)
- Line fault transparency (LFT): line fault signalling directly via output on PLC / DCS
- Inversion of output signal can be set
- Transmission frequency up to 10 kHz
- Installation possible in Zone 2
- Can be used up to SIL 2 (IEC 61508)

	Zones					
	0	1	2	20	21	22
Ex i interfaces	х	х	х	Х	Х	Х
Installation in			Х			Х

STAHL

Basic function: binary / digital input, 1 and 2 channels. The switching repeaters are suitable typically for intrinsically safe operation of contacts, proximity switches to EN 60947-5-6 (NAMUR), optocoupler outputs etc.

The version 9175/.0-14-12 LFT is characterised by line fault transparency. This function makes it possible to signal cable faults directly to the control level via the signal channel. The Output of the switching repeater acc. to EN 90947-5-6 (NAMUR).





Selection Table										
Version	Chan	inels	Power Supply	Output / cl	hannel	Connection type	Order	number		
Switching repeater	1		24 V DC	1 electron	ic output	Screw terminals	9170/	10-14-12s		
with electrical output with line fault transparency (35 V / 50 mA)	1		NAMUR (EN 609 (35 V / 5		7-5-6) mA)	Spring cage terminals	9170/	10-14-12k		
Type 9170/.0-14-12 LFT	2		24 V DC 1 elect		ic output	Screw terminals	9170/	20-14-12s		
				NAMUR (EN 60947 (35 V / 50	7-5-6) mA)	Spring cage terminals	9170/	20-14-12k		
				(00 1 / 00			_			
Accessories and Spare	Parts									
Designation	Descript	ion						Order number		
Resistance coupling element	Allows to	o detect s	short circuit or open	circuit if sim	ple conta	ct is applied.		105944		
Technical Data										
Certificates	[	DMT 02 A	ATEX E 195 X							
Other certificates	ţ	pending								
Explosion protection		<ul> <li></li></ul>								
Installation	i	in Zone 2								
Safe maximum values (CENELEC)		Inputs Max. voltage $U_o$ Max. current $I_o$ Max. power $P_o$ Max. connectable capacitance IIC/IIB Max. connectable inductance IIC/IIB Intern. capacitance $C_i$ and inductance $L_i$ Insulation voltage $U_m$ Further information and combinations of			$\begin{array}{c} \mbox{channels single} & 2 \mbox{channels single} & 2 \mbox{channels single} & 10.6 \ V & 128 \ m & $			nels parallel V - / 16.2 μF / 61 mH - / negligible		
Power supply		Nominal voltage $U_N$ Voltage range Residual ripple Nominal current at $U_N$ 1 / 2 channels Power consumption at $U_N$ 1 / 2 channel Max. power losses 1 / 2 channels Polarity reversal protection Indication Undervoltage monitoring			24 V DC 18 V3 < 3.26 V 26 mA / 0.6 W / 1 9es LED gre yes (no 1	31.2 V ss 36 mA I.9 W I.9 W en "PWR" faulty module / outp	5)			
Ex i Input		Input signal current for ON / OFF Hysteresis No-load voltage Short-circuit current Input resistance R <sub>i</sub>			on regulations EN 60947-5-6 (NAM ≥ 2.1 mA / ≤ 1.2 mA approx. 0.2 mA 8.2 V 8.2 mA 1000 Ω			JR)		
Output		maximum maximum Overload Voltage d electrical Switching Switching Electronic Electronic Electronic n case of open) Settings ( Indication	n load DC n load AC n switching power protected rop life time resistive loan switching frequence delay ON / OFF delay OFF / ON c output closed c output closed c output opened f error (signalisation	ad >y contact	35 V / 50 	) mA DC cles Ω κΩ κΩ ο of operating mode	e nel			



Technical Data							
Error detection Ex i Input	Open-circuit (EN 60947-5-6) Short-circuit (EN 60947-5-6) Behaviour of output Settings (Switch LF) Error detection Error messaging and power supp	l <sub>E</sub> R⊧ ⊳ly failure	< E <	0.05 mA 0.35 mA 100 Ω 360 Ω OFF activated / deactivated LED red "LF" each channel - Contact in the output circuit (35 V /50 mA) opens in case of error - Contact (30 V / 100 mA) close to ground in case of error - pac-Bus, floating contact (30 V / 100 mA)			
Galvanic isolation	Test voltage under regulations El	N 60079-11					
	Ex i input to output Ex i input to power supply Ex i Inputs to each other Ex i input to error-contact			1.5 kV AC 1.5 kV AC 500 V AC 1.5 kV AC			
	Test voltage under regulations El	N 50178					
	Output to power supply Outputs to each other Error-contact to power supply Error-contact to outputs			1.1 kV AC 1.1 kV AC 350 V AC 1.1 kV AC			
Electromagnetic compatibility	<ul> <li>Tested under the following standards and regulations: EN 61326-1 (Use in industrial environment) NAMUR NE 21</li> </ul>						
Ambient conditions	Ambient temperature			- 20 °C + 60 °C / + 70 °C			
	Storage temperature Relative humidity (no condensati	on)	≤	- 40 °C + 80 95 %	°C		
Mechanical data		Screw terminals	s S te	Spring cage erminals	Insulation displacement connectors		
	Connection one wire - rigid - flexible - flexible, end covering sleeves (without / with plastic sleeving)	0.2 2.5 mm <sup>2</sup> 0.2 2.5 mm <sup>2</sup> 0.25 2.5 mm <sup>2</sup>	0 0 2 0	).2 2.5 mm <sup>2</sup> ).2 2.5 mm <sup>2</sup> ).25 2.5 mm <sup>2</sup>	0.5 1 mm <sup>2</sup>		
	Connection two wires - rigid - flexible - flexible, end covering sleeves	0.2 1 mm <sup>2</sup> 0.2 1.5 mm <sup>2</sup> 0.25 1 mm <sup>2</sup>	- - 0	- - ).5 1 mm²			
	Weight Mounting type Mounting position Casing protection class Terminal protection class Casing material Fire protecting class (UL-94)		a o (  h II F V	approx. 160 g on DIN rail acc. to NS35/15; NS35/7 norizontal or vertio P 30 P 20 PA 6.6 /0	EN 50022 7.5) or in pac-Carrier cal		





#### Dimension drawings (all dimensions in mm) - subject to alterations



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## **Ex i Isolators**





### Binary Output with Line Fault Transparency for Imax = 60 mA Type 9175/10-12-12 LFT

- Intrinsically safe output [Ex ia] IIC
- 1 channel

06256E02

- Galvanic isolation between input and output
- Open-circuit and short-circuit monitoring (can be switched off)
- Line fault transparent (LFT): line fault signalling directly via output on PLC / DCS
- Installation possible in Zone 2
- For use up to SIL 2 (IEC 61508)

	Zones					
	0	1	2	20	21	22
Ex i interfaces	х	Х	х	Х	Х	Х
Installation in			Х			Х

Basic function: binary output, 1 channel.

The binary output is used for the intrinsically safe operation of Ex i solenoid valves or indicators.

The version 9175/10-12-12 LFT is characterised by line fault transparency. This function makes it possible to signal cable faults directly to the control level via the signal channel. The input for the binary output is high impedance in case of fault.





Selection Table										
Version	Cha	annels	No-load voltage U <sub>A</sub>	Max. output current I <sub>A max</sub>	Internal resistance R <sub>i</sub>	( t	Connection type	Order number		
Binary Output with	1		10 V	60 mA	150 Ω	(	Screw terminals	9175/10-12-12s		
Line Fault Transparency for I <sub>max</sub> = 60 mA Type 9175/10-12-12 LFT						t	Spring cage terminals	9175/10-12-12k		
Technical Data										
Certificates		DMT 03	3 ATEX E 043 X							
Explosion protection		⑤ II 3 (1) G Ex nA nC [ia] IIC T4 and ⑥ II (1) D [Ex iaD]								
Installation		In Zone	2 and in the sa	fe area						
Safe maximum values (CENELEC)		Max. vc Max. cu Max. co Max. co Max. co Internal Internal Insulatio	oltage U <sub>0</sub> urrent I <sub>0</sub> ower P <sub>0</sub> onnectable capa onnectable induc capacitance C <sub>i</sub> inductance L <sub>i</sub> on voltage U <sub>m</sub>	citance IIC / III stance IIC/ IIB	11.3 V 75 mA 210 mW C / IIB 1.79 μF / / IIB 6.3 mH / 1.1 nF negligible 253 V			12.1 μF 25 mH e		
Power supply		Nominal voltage U <sub>N</sub> Voltage range Residual ripple within voltage ra Indication Polarity reversal protection Undervoltage monitoring			192 24 V DC 18 V 3 3.6 V <sub>pp</sub> LED gree yes yes (no f			31.2 V en "PWR" faulty module / output states)		
Current consumption		Device	draws its power	from auxiliary	power or sign	nal cat	ble as a function	of its switching state.		
		Switchin Input =	ng state Output	Auxi Rate	Auxiliary power Rated current I <sub>N</sub>			Signal input Rated current I <sub>N</sub>		
		OFF		30 n	30 mA					
		ON		14 n	14 mA 50 m			Ą		
		Power of Power I	consumption: 1. oss: 1.4 W	5 W						
Galvanic isolation		Test voltage under regulations EN 60079-11 Ex i output to input Ex i output to power supply Ex i output to error-contact			079-11	1	1.5 kV AC 1.5 kV AC 1.5 kV AC			
		Test vol Error-	tage under regu contact to powe	llations EN 50 r supply and in	178 nputs	3	350 V AC			
Input	nput Sw \ C			Switching voltage according to EN 61131-2 Voltage for ON / OFF Control current < Input resistance R <sub>i</sub> switching state OFF				18 V 31.2 V / 0 V 15 V see current consumption table 3.5 $k\Omega$		



Ex i output		
	Output characteristic curves (at $U_N$ ; - 20 °C (more information see instructions)	:+60 °C)
	15 10 5 0 0 5 10 15 20 25 30 35 40 45 50 55 60	
		07757E00
Maximum values each output	No-load voltage U <sub>A</sub> Max. output current I <sub>A max</sub> Internal resistance R <sub>i</sub>	10 V 60 mA 150 Ω
	Residual ripple output Switching delay OFF ←→ ON Operating frequency	≤ 50 mV ≤ 1 ms ≤ 50 Hz
	Indication	LED yellow "OUT" each channel
Note	You may find a list of compatible Ex i soler	noid valves on our homepage www.ispac.info.
Error detection Ex i output	Open-circuit Short-circuit, at 23 °C	> 7 kΩ < 50 Ω ± 3 Ω / 10 K
	Settings (switch LF) Error detection Error messaging and power supply	activated / deactivated LED red "LF" each channel - contact on the signal input open in ca of fault - pac-Bus, floating contact (30 V / 100 mA)
Electromagnetic compatibility	Tested under the following standards and EN 61326-1 (Use in industrial environmen NAMUR NE 21	regulations: t)
Ambient conditions	Ambient temperature	- 20 °C + 60 °C / + 70 °C
	Storage temperature Relative humidity (no condensation)	(see instructions) - 40 °C + 80 °C ≤ 95 %
Connection diagram	Hazardous area	Safe area
	Division 1 pac-Bus Zone 0 / 1 LF 24 V	Division 2 Zone 2
		9
		active
	Field Device ISpac Isolat	or Control System
		07758E02



Technical Data				
Mechanical data		Screw terminals	Spring cage terminals	Insulation displacement connectors
	Connection one wire - rigid - flexible - flexible, end covering sleeves (without / with plastic sleeving)	0.2 2.5 mm <sup>2</sup> 0.2 2.5 mm <sup>2</sup> 0.25 2.5 mm <sup>2</sup>	$\begin{array}{c} 0.2 \ \ 2.5 \ mm^2 \\ 0.2 \ \ 2.5 \ mm^2 \\ 0.25 \ \ 2.5 \ mm^2 \end{array}$	0.5 1 mm <sup>2</sup>
	Connection two wires - rigid - flexible - flexible, end covering sleeves	0.2 1 mm² 0.2 1.5 mm² 0.25 1 mm²	 0.5 1 mm²	
	Weight Mounting type Mounting position Casing protection class Terminal protection class Casing material Fire protecting class (UL-94)		approx. 160 g on DIN rail acc. to (NS35/15; NS35/1 horizontal or verti IP 30 IP 20 PA 6.6 V0	) EN 50022 7.5) or in pac-Carrier cal

Dimension drawings (all dimensions in mm) - subject to alterations



Dimension XScrew terminals108 mmSpring cage terminals128 mmInsulation displacement connectors131 mm

STAHL

We reserve the right to make alterations to the technical data, weights, dimensions, designs and products available without notice. The illustrations cannot be considered binding.

## **Ex i Isolators**





### Binary Output with Line Fault Transparency for Imax = 45 mA Type 9175/10-14-12 LFT

- Intrinsically safe output [Ex ia] IIC
- 1 channel

06256E02

- Galvanic isolation between input and output
- Open-circuit and short-circuit monitoring (can be switched off)
- Line fault transparent (LFT): line fault signalling directly via output on PLC / DCS
- Installation possible in Zone 2
- For use up to SIL 2 (IEC 61508)

	Zones							
	0	1	2	20	21	22		
Ex i interfaces	х	х	х	х	Х	Х		
Installation in			Х			Х		

Basic function: binary output, 1 channel.

The binary output is used for the intrinsically safe operation of Ex i solenoid valves or indicators.

The version 9175/10-14-12 LFT is characterised by line fault transparency. This function makes it possible to signal cable faults directly to the control level via the signal channel. The input for the binary output is high impedance in case of fault.





Selection Table									
Version	Chan	nels	No-load voltage U <sub>A</sub>	Max. outpu current I <sub>A m</sub>	it Ir <sub>nax</sub> re	nternal esistance R <sub>i</sub>	Connection type	Order number	
Binary Output with Line Fault Transparency	1	17.5 V 45 mA 130 Ω		30 Ω	Screw terminals	9175/10-14-12s			
for I <sub>max</sub> = 45 mA Type 9175/10-14-12 LFT							Spring cage terminals	9175/10-14-12k	
Technical Data									
Certificates	0	OMT 03	3 ATEX E 043 X	(					
Explosion protection	4	ଇ II 3	(1) G Ex nA nC	[ia] IIC T4 a	nd 🐼	II (1) D [Ex ia	iD]		
Installation	h	n Zone	e 2 and in the sa	afe area					
Safe maximum values (CENELEC)		Max. voltage $U_0$ Max. current $I_0$ Max. power $P_0$ Max. connectable capacitance IIC / IIB Max. connectable inductance IIC/ IIB Internal capacitance $C_i$ Internal inductance $L_i$ Insulation voltage $U_m$					19.6 V 150 mA 732 mW 235 nF / 1470 nF 1.5 mH / 6 mH 1.1 nF negligible 253 V		
Power supply	N F I U	Nomina Voltage Residua ndicati Polarity Jnderv	al voltage U <sub>N</sub> e range al ripple within v on v reversal protec oltage monitorir	voltage range ction ng	е	5	24 V DC 18 V 31.2 V 3.6 V <sub>pp</sub> LED green "PWR" yes yes (no faulty module / output states)		
Current consumption	۵	Device	draws its powe	r from auxilia	ary pov	wer or signal o	cable as a fund	tion of its switching state.	
	S	Switchi nput =	ng state Output	A R	uxiliary ated c	y power surrent I <sub>N</sub>	Sig Ra	ınal input ted current I <sub>N</sub>	
	C	OFF		35	5 mA				
	C	NC		14	4 mA		80 mA		
	F	Power Power	consumption: 2 loss: 1.73 W	.26 W					
Galvanic isolation	T	Test vo Exio Exio Exio	Itage under reg output to input output to power output to error-c	ulations EN ( supply ontact	60079	-11	1.5 kV AC 1.5 kV AC 1.5 kV AC		
	٦	Test vo Error-	Itage under reg -contact to powe	ulations EN ser supply and	50178 d input	ts	350 V AC		
Input	S	Switching voltage according to EN 61131-2 Voltage for ON / OFF Control current < Input resistance R <sub>i</sub> switching state OFF				-2 <	18 V 31.2 see current c 3.5 kΩ	V / 0 V 15 V onsumption table	



Ex i output		
	Output characteristic curves (at $U_N$ ; -20 °C (more information see instructions)	. +60 °C)
	$\sum_{n=1}^{2} 25_{n}^{2}$	
		07759E00
Maximum values each output	No-load voltage U <sub>A</sub> Max. output current I <sub>A max</sub> Internal resistance R <sub>i</sub>	17.5 V 45 mA 130 Ω
	Residual ripple output Switching delay OFF ←→ ON Operating frequency	≤ 50 mV ≤ 1 ms ≤ 50 Hz
	Indication	LED yellow "OUT" each channel
Note	You may find a list of compatible Ex i solenoid	d valves on our homepage www.ispac.info.
Error detection Ex i output	Open-circuit Short-circuit (each output), at 23 °C	> 10 kΩ 40 Ω 80 Ω ± 6 Ω / 10 K
	Settings (switch LF) Error detection Error messaging and power supply	activated / deactivated LED red "LF" each channel - contact on the signal input open in ca of fault - pac-Bus, floating contact (30 V / 100 mA)
Electromagnetic compatibility	Tested under the following standards and reg EN 61326-1 (Use in industrial environment) NAMUR NE 21	gulations:
Ambient conditions	Ambient temperature	- 20 °C + 60 °C / + 70 °C
	Storage temperature Relative humidity (no condensation)	(see instructions) - 40 °C + 80 °C ≤ 95 %
Connection diagram	Hazardous area	Safe area
	Division 1 pac-Bus Zone 0 / 1 LF 24 V	Division 2 Zone 2
		→ 9 9 24 V DC 7+ + 0-1
		2
	Field Device ISpac Isolator	Control System
		07758E02



Technical Data				
Mechanical data		Screw terminals	Spring cage terminals	Insulation displacement connectors
	Connection one wire - rigid - flexible - flexible, end covering sleeves (without / with plastic sleeving)	$\begin{array}{c} 0.2 \ \ 2.5 \ mm^2 \\ 0.2 \ \ 2.5 \ mm^2 \\ 0.25 \ \ 2.5 \ mm^2 \end{array}$	$\begin{array}{c} 0.2 \ \ 2.5 \ mm^2 \\ 0.2 \ \ 2.5 \ mm^2 \\ 0.25 \ \ 2.5 \ mm^2 \end{array}$	0.5 1 mm²
	Connection two wires - rigid - flexible - flexible, end covering sleeves	0.2 1 mm² 0.2 1.5 mm² 0.25 1 mm²	 0.5 1 mm <sup>2</sup>	
	Weight Mounting type Mounting position Casing protection class Terminal protection class Casing material Fire protecting class (UL-94)		approx. 160 g on DIN rail acc. tr (NS35/15; NS35/ horizontal or verti IP 30 IP 20 PA 6.6 V0	o EN 50022 7.5) or in pac-Carrier cal

Dimension drawings (all dimensions in mm) - subject to alterations



Dimension XScrew terminals108 mmSpring cage terminals128 mmInsulation displacement connectors131 mm

We reserve the right to make alterations to the technical data, weights, dimensions, designs and products available without notice. The illustrations cannot be considered binding.

## **Ex i Isolators**





### Binary Output with Line Fault Transparency for Imax = 35 mA Type 9175/10-16-12 LFT

- Intrinsically safe output [Ex ia] IIC
- 1 channel

06256E02

- Galvanic isolation between input and output
- Open-circuit and short-circuit monitoring (can be switched off)
- Line fault transparent (LFT): line fault signalling directly via output on PLC / DCS
- Installation possible in Zone 2
- For use up to SIL 2 (IEC 61508)

	Zones							
	0	1	2	20	21	22		
Ex i interfaces	х	х	х	х	Х	Х		
Installation in			Х			Х		

Basic function: binary output, 1 channel.

The binary output is used for the intrinsically safe operation of Ex i solenoid valves or indicators.

The version 9175/10-16-12 LFT is characterised by line fault transparency. This function makes it possible to signal cable faults directly to the control level via the signal channel. The input for the binary output is high impedance in case of fault.



24



Selection Table									
Version	Chanr	nels M	No-load voltage U <sub>A</sub>	Max. output current I <sub>A ma</sub>	t Int ax res	ternal sistance R <sub>i</sub>	Connection type	C	Drder number
Binary Output with Line Fault Transparency	1	2	25 V	35 mA	25	50 Ω	Screw terminals	9	0175/10-16-12s
for I <sub>max</sub> = 35 mA Type 9175/10-16-12 LFT							Spring cage terminals	ə 9	0175/10-16-12k
Technical Data									
Certificates	D	MT 03	ATEX E 043 X	[					
Explosion protection	Æ		1) G Ex nA nC	[ia] IIC T4 ar	nd 🐼 l	II (1) D [Ex ia	aD]		
Installation	Ir	n Zone 2	2 and in the sa	ife area					
Safe maximum values (CENELEC)	N N N Ir Ir Ir	Max. voltage $U_0$ Max. current $I_0$ Max. power $P_0$ Max. connectable capacitance IIC / IIB Max. connectable inductance IIC/ IIB Internal capacitance $C_i$ Internal inductance $L_i$ Insulation voltage $U_m$					27.6 V 110 mA 760 mW 85 nF / 667 nF 1.2 mH / 9 mH 1.1 nF negligible 253 V		
Power supply	N V R Ir U	lominal oltage r desidual dication olarity r Indervo	voltage U <sub>N</sub> range I ripple within v n reversal protec ltage monitorir	voltage range stion	9	×	24 V DC 18 V 31.2 V 3.6 V <sub>pp</sub> LED green "PWR" yes yes (no faulty module / output states)		
Current consumption	D	evice d	draws its power	r from auxilia	ry pow	ver or signal o	cable as a fu	nction	of its switching state.
	S Ir	witching put = C	ig state Dutput	Au Ra	Auxiliary power Rated current I <sub>N</sub>			Signal Rated	l input current I <sub>N</sub>
	С	)FF		40	mA				
	С	N		14	mA		90 mA		
	P P	ower co ower lo	onsumption: 2. oss: 1.92 W	5 W					
Galvanic isolation	Т	est volta Ex i ou Ex i ou Ex i ou Ex i ou	age under regu utput to input utput to power s utput to error-co	ulations EN 6 supply ontact	60079- <sup>-</sup>	11	1.5 kV AC 1.5 kV AC 1.5 kV AC		
	Т	est volta Error-c	age under regi contact to powe	ulations EN 5 er supply and	50178 I inputs	6	350 V AC		
Input	S	Switching voltage according to EN ( Voltage for ON / OFF Control current Input resistance R <sub>i</sub> switching state			61131- e OFF	2 <	18 V 31. see curren 3.5 kΩ	.2 V / t cons	0 V 15 V sumption table



c curves (at U <sub>N</sub> ; -20 °C ee instructions)	+60 °C)
	07761E00
20 25 30 35 40 45	07761E00
	07761E00
IA max Ri	25 V 35 mA 250 Ω
out F ←→ ON y	≤ 50 mV ≤ 1 ms ≤ 50 Hz
	LED yellow "OUT" each channel
of compatible Ex i solenoid	l valves on our homepage www.ispac.info.
output) output), at 23 °C	> 15 kΩ 50 Ω 90 Ω ± 8 Ω / 10 K
) Id power supply	activated / deactivated LED red "LF" each channel - contact on the signal input open in ca of fault - pac-Bus, floating contact (30 V / 100 mA)
llowing standards and regunition industrial environment)	ulations:
re	- 20 °C + 60 °C / + 70 °C
e lo condensation)	(see instructions) - 40 °C + 80 °C ≤ 95 %
	Safe area
pac-Bus	Division 2 Zone 2
	<u>9-</u> 24 V DC 7+ +
	active
ISpac Isolator	Control Sustam
	$F \leftrightarrow ON$ y of compatible Ex i solenoid putput) putput), at 23 °C ind power supply llowing standards and regulation industrial environment) re e to condensation) $\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$ $\downarrow$



Technical Data				
Mechanical data		Screw terminals	Spring cage terminals	Insulation displacement connectors
	Connection one wire - rigid - flexible - flexible, end covering sleeves (without / with plastic sleeving)	$\begin{array}{c} 0.2 \ \ 2.5 \ mm^2 \\ 0.2 \ \ 2.5 \ mm^2 \\ 0.25 \ \ 2.5 \ mm^2 \end{array}$	0.2 2.5 mm <sup>2</sup> 0.2 2.5 mm <sup>2</sup> 0.25 2.5 mm <sup>2</sup>	0.5 1 mm²
	Connection two wires - rigid - flexible - flexible, end covering sleeves	0.2 1 mm² 0.2 1.5 mm² 0.25 1 mm²	 0.5 1 mm <sup>2</sup>	
	Weight Mounting type Mounting position Casing protection class Terminal protection class Casing material Fire protecting class (UL-94)		approx. 160 g on DIN rail acc. tr (NS35/15; NS35/ horizontal or verti IP 30 IP 20 PA 6.6 V0	o EN 50022 7.5) or in pac-Carrier cal

Dimension drawings (all dimensions in mm) - subject to alterations



Dimension XScrew terminals108 mmSpring cage terminals128 mmInsulation displacement connectors131 mm

STAHL

We reserve the right to make alterations to the technical data, weights, dimensions, designs and products available without notice. The illustrations cannot be considered binding.

# **Ex i Isolators**





STAHL

Basic function: analog input 0/4 mA ... 20 mA, 1 and 2 channels. The transmitter supply units are used for intrinsically safe operation of 2- and 3- wire transmitters or for connection to intrinsically safe mA-sources.

The 2- and 3-wire transmitters are supplied with power from the transmitter supply unit.

For 2-wire transmitters the isolators transfer the HART communication signal bidirectionally.



Transmitter Supply Unit with Output 0/4 mA ... 20 mA Passive with HART (Field Circuit Ex i) Type 9160/..-10-11

- Passive output
- Suitable for
   2-, 3-wire transmitter,
   2-wire HART transmitter and mA-sources
- Intrinsically safe input [Ex ia] IIC
- 1 and 2 channels
- Galvanic isolation between input, output and power supply
- Open-circuit and short-circuit monitoring and messaging for input and output (can be switched off)
- Installation possible in Zone 2 and Div. 2
- Can be used up to SIL 2 (IEC 61508)

	Zones					
	0	1	2	20	21	22
Ex i interfaces	х	х	х	Х	Х	Х
Installation in			Х			Х



Selection Table							
Version	Chann	els	Input	Output A	Output B	Connection type	Order number
Transmitter supply unit	1		0/4 mA 20 mA with HART	passive with HART		Screw terminals	9160/13-10-11s
Type 9160, field circuit Ex i Passive output						Spring cage terminals	9160/13-10-11k
					passive	Screw terminals	9160/19-10-11s
						Spring cage terminals	9160/19-10-11k
	2		0/4 mA 20 mA with HART	passive with HART	passive with HART	Screw terminals	9160/23-10-11s
						Spring cage terminals	9160/23-10-11k
Tochnical Data							
Certificates		DM	T 03 ATEX E 010 X	(	_		
Other certificates		US/ Ukr	A (FM, UL), Canada aine (ISCVE), Ship	` a (CSA), Russia ( ping (DNV)	CTB), Belarus (I	Promatomnadzor	), Brazil (UL do Brasil),
Explosion protection		E E	II 3 (1) G Ex nA nC II (1) D [Ex iaD]	[ia] IIC T4			
Installation		In Zone 2, Div. 2 and in the safe area					
Safe maximum values (CENELEC)			x. voltage U₀ x. current I₀ x. power P₀ x. connectable capa x. connectable indu rnal capacitance C ulation voltage Um	acitance $C_0$ for IIC to the constance $L_0$ for IIC to the constance to	27 V 88 mA 576 mW 90 nF / 705 nF 2.3 mH / 14 mH negligible 250 V		
			en connecting mA s x. output voltage U x. connectable volta x. connectable curr rnal capacitance C	sources: age Ui ent Ii i and inductance	4.1 V 30 V 100 mA negligible		
		Fur	ther information and	d combinations o	f values, see cer	tification.	
Power supply		$ \begin{array}{llllllllllllllllllllllllllllllllllll$					α" bdule / output states)
Galvanic isolation		Tes Ei Ei Ei	t voltage under reg x i input to output x i input to power s x i input to Error-co x i inputs to each o	ulations EN 6007 upply ntact ther	9-11	1.5 kV AC 1.5 kV AC 1.5 kV AC 500 V AC	
Test voltage under regulations EN 50178 Output to power supply Outputs to each other Error-contact to power supply and outputs					8 puts	350 V AC 350 V AC 350 V AC	



Technical Data			
Ex i Input	Input signal Function area Max. input current for mA sources Transmitter supply voltage Supply voltage residual ripple No-load voltage Short-circuit current Input resistance (AC-Impedance HART) Input resistance for mA sources Communication signal (at 2-wire transmitter)	8 IA IA IA 1	0/4 mA 20 mA with HART 0 mA 24 mA 50 mA 16 V at 20 mA (for 2-, 3-wire) 25 mV <sub>eff</sub> 26 V 35 mA 500 $\Omega$ 30 $\Omega$ HART transmission bi-directional, 0.5 kHz 30 kHz
Output	Output signal		
	- Type variant 9160/.3-10-11.		Current sink up, max. 30 Vwith HART
	- Type variant 9160/19-10-11. out out	put A: put B:	Current sink up, max. 30 V with HART Current sink up, max. 30 V without HART
	Load resistance R <sub>L</sub> at 9160/10-11.		0 Ω bei 5 V 15 V 500 Ω bei 24 V 800 Ω bei 30 V
	Residual ripple No-load voltage Communication signal (at 9160/19 only output A) Response time (10 % 90 %)	≤ ≤	40 μA <sub>eff</sub> 15.5 V HART transmission bi-directionale 0.5 kHz 30 kHz 25 ms
Error detection Ex i Input	Open-circuit Short-circuit Behaviour of output Output current at I <sub>E</sub> = 0	< > I <sub>A</sub> =	2 mA 22 mA Input signal 0 mA
Error detection output	Open-circuit	<	2 mA
Error messaging Ex i Input / Output	Settings (switch LF) Error detection Error messaging and power supply failure	2	activated / deactivated LED red "LF" each channel - Contact (30 V, 100 mA), closed to ground in case of error - pac-Bus, floating contact (30 V, 100 mA)
Error limits	Accuracy, typical data expressed as % of	calibrated sp	an at U <sub>N</sub> , 23 °C
	Linearity error Offset error Temperature influence Power supply effect within voltage range Load resistance effect Cross-talk channel 1 / channel 2	N N N N N	0.1 % 0.1 % 0.1 % / 10 K 0.01 % 0.02 % 0.01 %
Electromagnetic compatibility	Tested under the following standards and EN 61326-1 Use in industrial environment	regulations: t	
Ambient conditions	Ambient temperature		- 20 °C + 60 °C / + 70 °C
	Storage temperature Relative humidity (no condensation)	≤	- 40 °C + 80 °C 95 %



Technical Data					
Mechanical data			Screw terminals	Spring cage terminals	Insulation displacement connectors
	Connection one wire - rigid - flexible - flexible, end covering (without / with plastic	sleeves sleeving)	0.2 2.5 mm <sup>2</sup> 0.2 2.5 mm <sup>2</sup> 0.25 2.5 mm <sup>2</sup>	0.2 2.5 mm <sup>2</sup> 0.2 2.5 mm <sup>2</sup> 0.25 2.5 mm <sup>2</sup>	0.5 1 mm²
	Connection two wires - rigid - flexible - flexible, end covering	sleeves	0.2 1 mm <sup>2</sup> 0.2 1.5 mm <sup>2</sup> 0.25 1 mm <sup>2</sup>	 0.5 1 mm²	
	Weight Mounting type Mounting position Casing protection class Terminal protection cla Casing material Fire protecting class (L	s iss JL-94)		approx. 160 g on DIN rail acc. to (NS35/15; NS35/ horizontal or verti IP 30 IP 20 PA 6.6 V0	o EN 50022 7.5) or in pac-Carrier cal
Connection diagram	1 channel output: passive with HART 9160/13-10-11.	Hazardo Division Zone 0 /	us area   1   1   1   	pac-Bus	Safe area Division 2 Zone 2
		දේ OF 00 Field dev	/ 12+ 12+ 11- 10 10 10 10 10 10	ISpac Isolator	$ \begin{array}{ccc}  & & & & \\ $
	d shares l				07652E02
	output A: passive with	Hazardo	us area		Safe area
	output B: passive 9160/19-10-11.	Division Zone 0 /	1   1	pac-Bus	Division 2 Zone 2
					9
					24 <sub>3+</sub> →2- A
		Field dev	vice	ISpac Isolator	Control system

## Transmitter Supply Unit with Output 0/4 mA ... 20 mA Passive with HART (Field Circuit Ex i) Type 9160/..-10-11









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## **Ex i Isolators**





### Isolating Repeater (Field Circuit Ex i) Type 9165 Rev. C

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

	Zones						
	0	1	2	20	21	22	
Ex i interfaces	Х	Х	Х	Х	Х	Х	
Installation in			Х			Х	

STAHL

Basic function: analog output 0/4 mA  $\dots$  20 mA with HART, 1 and 2 channels.

These isolating repeaters are used in the intrinsically safe operation of control valves, i/p-converters or indicators. Operation of intrinsically safe HART-valves is possible, too. The isolators transmit the HART communication signal bidirectionally.





**Selection Table** 

Isolating repeater

Type 9165 Rev. C

**Technical Data** Certificates

Installation

Power supply

Galvanic isolation

Input

Ex i output

Explosion protection

Safety Data (CENELEC)

Channels

1

2

Max. input current

No-load voltage

Behavior of input

Settings (Switch LF)

Open-circuit Short-circuit

Response time (10 % ... 90 %)

Communication signal

Input resistance (changeable switch LI)

Output signal Connectable load resistance Min. load resistance for short-circuit detection Residual ripple

Line breake detection only with input current

Error detection Error messaging and power supply failure

Version

ls	Input	Ex i output signal	Connection type		Order number	
0/4 mA 20 mA 0/4 mA 20 mA with HART *) with HART		0/4 mA 20 mA	Screw terminals		9165/16-11-11s	Rev.C
		with HART	Spring cage terminals		9165/16-11-11k	Rev.C
0/4 mA 20 mA		0/4 mA 20 mA	Screw terminals		9165/26-11-11s	Rev.C
	with HARI	with HAR I	Spring cag	ge terminals	9165/26-11-11k	Rev.C
						_
< <u>(</u> <u></u>	II 3 (T) G EX NAC NC		II (1) D [EX	laD]		
in Z	one 2 and in the sa	te area		05.01/		
Max. voltage $U_0$ Max. current $I_0$ Max. power $P_0$ Max. connectable capacitance $C_0$ for IIC/IIB Max. connectable inductance $L_0$ for IIC/IIB Inner capacitance $C_i$ and Inductance $L_i$ Isolation voltage $U_m$		25.6 V 96 mA 605 mW 103 nF / 800 1.9 mH / 11 r negligible 253 V		nF nH		
See	e certification for furt	ther information and	value comb	pinations.		
Nor Volt Res Nor Pov nels Pov Indi Rev Und	ninal voltage $U_N$ tage range sidual ripple within v minal current ( $U_N$ , 2( ver consumption (( $U_S$ ver dissipation (at U ication verse polarity protec dervoltage monitorin	oltage range 0 mA) 1 / 2 channels J <sub>N</sub> , 20 mA) 1 / 2 char <sub>N</sub> , R <sub>L</sub> = 500 Ω) tion 9	≤ ]-	24 V DC 18 V 31.2 3.6 V <sub>SS</sub> 60 mA / 90 n 1.5 W / 2.2 V 1.3 W / 1.8 V LED green "I yes yes (no fault	V nA V V PWR" y modules / output :	states)
Tes E Fi E	t voltage according x i outputs to inputs x i outputs to power ault-contact to Ex i c x i outputs interconr	to EN 60079 11 supply putputs nected		1.5 kV AC 1.5 kV AC 1.5 kV AC 500 V AC		
Tes In In Fa	t voltage according puts to power suppl puts interconnected ault-contact to powe	to EN 50178 ly er supply and inputs		350 V AC 350 V AC 350 V AC		
Inpi Fur	ut signal actional range			0/4 mA 20 0 mA 24 n	mA with HART	

50 mA 225 Ω / 550 Ω

50 mV 22.5 V

100 µs

≥ 100 kΩ

≥ 3.6 mA

output voltage > 16 V output load < 50  $\Omega$ 

 $\leq$ 

≤

≤

bidirectional HART transmission, 0.5 kHz ... 10 kHz

activated / deactivated LED red "LF" each channel - Contact (30 V / 100 mA), closed to ground in case of error - pac-Bus, floating contact (30 V / 100 mA)

0/4 mA ... 20 mA with HART 0  $\Omega$  ... 800  $\Omega$  150  $\Omega$ 

Automation 29.07.2009

Fault control Ex i output

## Isolating Repeater (Field Circuit Ex i) Type 9165 Rev. C

Technical Data							
Fault limits	Accuracy, typical data expressed as % of calibrated span at U <sub>N</sub> , 23 $^\circ\text{C}$						
	Linearity fault Offset fault Temperature influence Power supply effect within voltage rang Influence of load resistance Cross-talk channel 1 / channel 2	<pre> </pre> 2   10		0.05 % 0.05 % 0.05 % / 0.01 % 0.02 % 0.01 %	10 K		
Electromagnetic compatibility							
Ambient conditions							
Connection diagram							
Mechanical data		Screw ter	minals	6	Spring cage terminals		
	Connection single-wire - rigid - flexible - flexible, end covering sleeves (without / with plastic sleeving)	0.2 mm <sup>2</sup> . 0.2 mm <sup>2</sup> . 0.25 mm <sup>2</sup>	2.5 2.5 2.5	mm <sup>2</sup> mm <sup>2</sup> 5 mm <sup>2</sup>	$\begin{array}{c} 0.2 \ \text{mm}^2 \ \ 2.5 \ \text{mm}^2 \\ 0.2 \ \text{mm}^2 \ \ 2.5 \ \text{mm}^2 \\ 0.25 \ \text{mm}^2 \ \ 2.5 \ \text{mm}^2 \end{array}$		
	Connection two wires - rigid - flexible - flexible, end covering sleeves	0.2 mm <sup>2</sup> . 0.2 mm <sup>2</sup> . 0.25 mm <sup>2</sup>	1 m 1.5 ² 1 r	m² mm² nm²	  0.5 mm <sup>2</sup> 1 mm <sup>2</sup>		
	Weight Assembly type Installation position Enclosure Ingress Protection Terminal Ingress Protection Enclosure material Fire protection class (UL 94)	approx. 160 g on DIN rail (NS35/15; NS35/7.5) or Vertical or horizontal IP30 IP20 PA 6.6 V0		5/7.5) or i ontal	n pac-Carrier		

Dimensional Drawing (All Dimensions in mm) - Subject to Alterations



We reserve the right to make alterations to the technical data, weights, dimensions, designs and products available without notice. The illustrations cannot be considered binding.



Notes:









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