



- > Intrinsically safe input [Ex ia] IIC
- > Galvanic isolation between input, output and power supply
- > For use up to SIL 2, special version up to SIL 3 (IEC 61508)
- > High accuracy

A3



17852E00

Basic function: analogue input 0/4 mA ... 20 mA, 1 and 2 channels. Transmitter supply units are used for intrinsically safe operation or 2- and 3-wires transmitters or for connection to intrinsically safe mA sources (4-wires transmitter).

2- and 3-wires transmitters are supplied with power via transmitter supply unit.

In 2-wires transmitters the devices transmit HART communication signal bidirectionally.



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

Variants with UL certificate on request

WebCode 9160A

Selection Table

Output version (control)	Channels	Input	Output A	Output B	SIL	LFD*	Order number	Art. no.	Tech. data see page
0/4 ... 20 mA active / source with HART	1	0/4 ... 20 mA	0/4 ... 20 mA	--	2	no	9160/13-11-10s	214893	A3/3
					3	yes	9160/13-11-13s	214897	A3/11
				0/4 ... 20 mA	2	no	9160/19-11-10s	214901	A3/3
					2	yes	9160/14-11-11s	214899	A3/7
	2	0/4 ... 20 mA High Power	0/4 ... 20 mA	0/4 ... 20 mA	2	no	9160/23-11-10s	214905	A3/3
0/4 ... 20 mA passive / sink with HART	1	0/4 ... 20 mA	passive	--	2	no	9160/13-10-10s	214837	A3/14
				passive	2	no	9160/19-10-10s	222093	A3/14
	2	0/4 ... 20 mA	passive	passive	2	no	9160/23-10-10s	214903	A3/14
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 diagnosis no - Device transmits line fault on the field side via the 4 ... 20 mA signal. Without LED / relay contact. yes - Device transmits line fault on the field side via the 4 ... 20 mA signal. With LED / relay contact.							
		Further variants with line fault diagnosis are available on request.							

Explosion Protection									
Design	9160/xx-11-10								
Global (IECEX)									
Gas, dust and mining	IECEX BVS 08.0050X Ex nA [ia Ga] IIC T4 Gc [Ex ia Da] IIIC [Ex ia Ma] I								
Europe (ATEX)									
Gas, dust and mining	DMT 03 ATEX E 010 X Ex II 3 (1) G Ex nA [ia Ga] IIC T4 Gc Ex II (1) D [Ex ia Da] IIIC Ex I (M1) [Ex ia Ma] I								
Certifications and certificates									
Certificates	IECEX, ATEX, Brasil (INMETRO), Canada (cFM), Kazakhstan (TR), Russia (TR), Ukraine (TR), USA (FM), Belarus (TR)								
Ship approval	DNV GL								
Safety data									
Max. voltage U_o	27 V								
Max. current I_o	88 mA								
Max. power P_o	576 mW								
Max. connectable capacitance C_o									
IIC	90 nF								
IIB / IIIC	705 nF								
Max. connectable inductance L_o									
IIC	2.3 mH								
IIB / IIIC	17 mH								
Internal capacitance C_i	negligible								
Internal inductance L_i	negligible								
Safety-related maximum voltage	253 V								
When connecting a current source									
Max. output voltage U_o	4.1 V								
Max. connectable voltage U_i	30 V								
Max. connectable current I_i	100 mA								
Internal capacitance C_i	negligible								
Internal inductance L_i	negligible								
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 10/02-01 R027								
Max. SIL	2								
Safe Failure Fraction SFF	85 %								
PFD _{AVG} at $T_{[Proof]}$	<table> <tr> <th>$T_{[Proof]}$</th><th>PFD_{AVG}</th></tr> <tr> <td>1 year</td><td>2.29×10^{-4}</td></tr> <tr> <td>2 years</td><td>3.38×10^{-4}</td></tr> <tr> <td>5 years</td><td>6.64×10^{-4}</td></tr> </table>	$T_{[Proof]}$	PFD _{AVG}	1 year	2.29×10^{-4}	2 years	3.38×10^{-4}	5 years	6.64×10^{-4}
$T_{[Proof]}$	PFD _{AVG}								
1 year	2.29×10^{-4}								
2 years	3.38×10^{-4}								
5 years	6.64×10^{-4}								
Further information	For further information see safety test report.								

Technical Data

Design	9160/xx-11-10
Electrical data	
Auxiliary power	
Nominal voltage U_N	24 V DC
Voltage range	18 ... 31.2 V
Residual ripple	$\leq 3.6 V_{SS}$
Nominal current at U_N , 20 mA	
1 channel	75 mA
2 channels incl. 9160/19-xx-xx	131 mA
Power consumption at U_N , 20 mA	
1 channel	1.8 W
2 channels incl. 9160/19-xx-xx	3.1 W
Power dissipation at U_N , $R_L = 250 \Omega$	
1 channel	1.4 W
2 channels incl. 9160/19-xx-xx	2.3 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 input to output	1.5 kV AC
Ex i input to auxiliary power	1.5 kV AC
Ex i input to error message contact	1.5 kV AC
Ex i inputs interconnected	500 V AC
acc. to standard	EN 50178
Output to auxiliary power	350 V AC
Outputs interconnected	350 V AC
Error message contact to auxiliary power and outputs	350 V AC
Ex i input	
Input signal	0/4 ... 20 mA with HART
Functional range	0 ... 24 mA
Max. input current for mA sources	50 mA
Supply voltage for transmitter	$\geq 16 V$ at 20 mA (for 2-wire)
Residual ripple of supply voltage	$\leq 25 mV_{eff}$
Open-circuit voltage	≤ 26
Short-circuit current	$\leq 35 mA$
Input resistance for mA sources	$\leq 100 \Omega$
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz
Output	
Output signal	0/4 ... 20 mA with HART
Load resistance R_L	0 ... 600 Ω (terminal 1+ / 2- or 5+ / 6-) 0 ... 379 Ω (terminal 3+ / 2- or 4+ / 6-) (with internal 221 Ω resistor for HART)
Residual ripple	$\leq 40 \mu A_{eff}$
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz (at 9160/19 only output 1)
Response time (10 ... 90 %)	$\leq 100 \mu s$ (at 9160/19 output 2: $\leq 200 ms$, typ. 100 ms)
Error detection Ex i input	
Behaviour of the output	= Input signal

Technical Data

Electrical data

Signal transmission	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; NAMUR NE 21

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)	$\leq 95 \%$

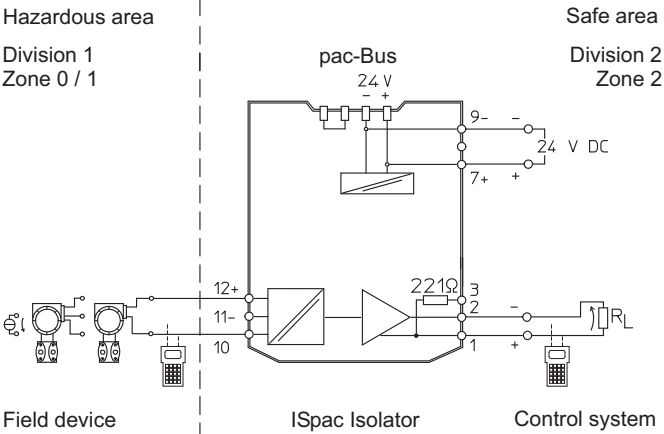
A3

Technical Data

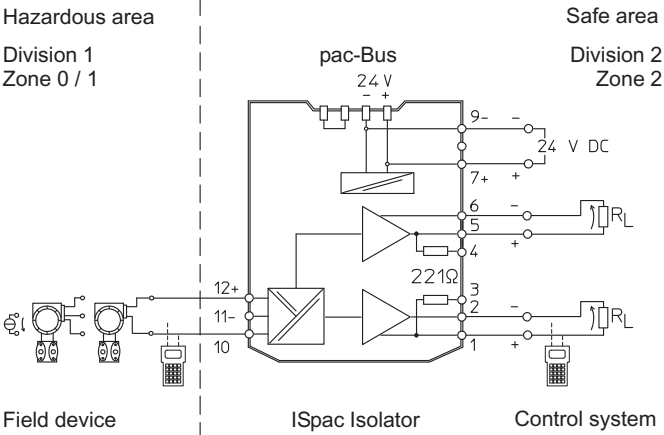
Electrical connection

Connection diagram

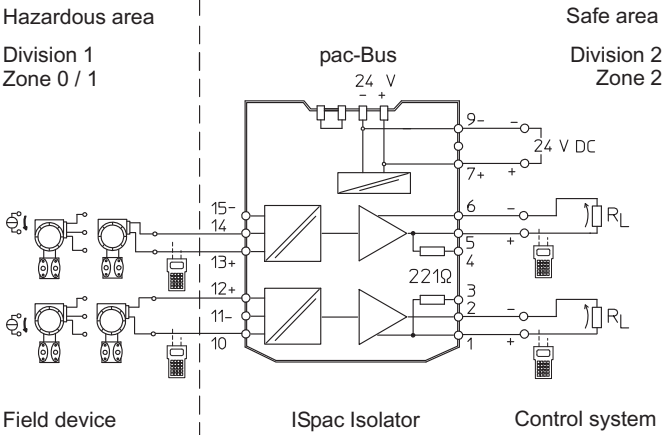
1 channel, output:
active / source
9160/13-11-10.



1 channel, output:
active / source
9160/19-11-10.



2 channels, outputs:
active / source
9160/23-11-10.



Explosion Protection

Global (IECEX)

Gas, dust and mining	IECEX BVS 08.0050X Ex nA nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC [Ex ia Ma] I
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Europe (ATEX)

Gas, dust and mining	DMT 03 ATEX E 010 X II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc II (1) D [Ex ia Da] IIIC I (M1) [Ex ia Ma] I
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Certifications and certificates

Certificates	IECEX, ATEX, Brasil (INMETRO), Canada (cFM), Kazakhstan (TR), Russia (TR), Ukraine (TR), USA (FM), Belarus (TR)
Ship approval	DNV GL

Safety data

Design	9160/..-11-11	9160/14-11-11
Max. voltage U_o	27 V	27 V
Max. current I_o	88 mA	112.5 mA
Max. power P_o	576 mW	731 mW
Max. connectable capacitance C_o		
IIC	90 nF	90 nF
IIB / IIIC	705 nF	705 nF
Max. connectable inductance L_o		
IIC	2.3 mH	0.31 mH
IIB / IIIC	17 mH	9.2 mH
Internal capacitance C_i	negligible	negligible
Internal inductance L_i	negligible	negligible
Safety-related maximum voltage	253 V	253 V
When connecting a current source		
Max. output voltage U_o	4.1 V	4.1 V
Max. connectable voltage U_i	30 V	30 V
Max. connectable current I_i	100 mA	100 mA
Internal capacitance C_i	negligible	negligible
Internal inductance L_i	negligible	negligible

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 10/02-01 R027								
Max. SIL	2								
Safe Failure Fraction SFF	85 %								
PFD _{AVG} at $T_{[Proof]}$	<table> <tr> <th>$T_{[Proof]}$</th><th>PFD_{AVG}</th></tr> <tr> <td>1 year</td><td>2.29×10^{-4}</td></tr> <tr> <td>2 years</td><td>3.38×10^{-4}</td></tr> <tr> <td>5 years</td><td>6.64×10^{-4}</td></tr> </table>	$T_{[Proof]}$	PFD _{AVG}	1 year	2.29×10^{-4}	2 years	3.38×10^{-4}	5 years	6.64×10^{-4}
$T_{[Proof]}$	PFD _{AVG}								
1 year	2.29×10^{-4}								
2 years	3.38×10^{-4}								
5 years	6.64×10^{-4}								
Further information	For further information see safety test report.								

Technical Data

Electrical data

Auxiliary power

Design

Nominal voltage U_N

9160/..-11-11

24 V DC

9160/14-11-11

24 V DC

Voltage range

18 ... 31.2 V

18 ... 31.2 V

Residual ripple

$\leq 3.6 V_{SS}$

$\leq 3.6 V_{SS}$

Nominal current at U_N , 20 mA

1 channel

88 mA

87 mA

2 channels incl. 9160/19-xx-xx

148 mA

Power consumption at U_N , 20 mA

1 channel

2.1 W

1.9 W

2 channels incl. 9160/19-xx-xx

3.4 W

Power dissipation at U_N , $R_L = 250 \Omega$

1 channel

1.7 W

1.6 W

2 channels incl. 9160/19-xx-xx

2.8 W

Polarity reversal protection

yes

yes

Operation indication

LED green "PWR"

LED green "PWR"

Undervoltage monitoring

yes (no faulty module / output states)

Galvanic separation

Test voltages

acc. to standard

EN 60079-11

Ex i input to output

1.5 kV AC

Ex i input to auxiliary power

1.5 kV AC

Ex i input to error message contact

1.5 kV AC

Ex i inputs interconnected

500 V AC

acc. to standard

EN 50178

Output to auxiliary power

350 V AC

Outputs interconnected

350 V AC

Error message contact to auxiliary power and outputs

350 V AC

Ex i input

Design

Input signal

9160/..-11-11

0/4 ... 20 mA with HART

9160/14-11-11

0/4 ... 20 mA with HART

Functional range

0 ... 24 mA

0 ... 24 mA

Max. input current for mA sources

50 mA

50 mA

Supply voltage for transmitter

$\geq 16 V$ at 20 mA (for 2-wire)

$\geq 17.5 V$ at 20 mA (for 2-, 3-wire)

Residual ripple of supply voltage

$\leq 25 mV_{eff}$

$\leq 25 mV_{eff}$

Open-circuit voltage

≤ 26

≤ 26

Short-circuit current

35 mA

70 mA

Input resistance for mA sources

$\leq 100 \Omega$

$\leq 100 \Omega$

Communication signal

bi-directional HART transmission, 0.5 ... 10 kHz

Output

Output signal

0/4 ... 20 mA with HART

Load resistance R_L

0 ... 600 Ω (terminal 1+ / 2- or 5+ / 6-)

0 ... 379 Ω (terminal 3+ / 2- or 4+ / 6-)
(with internal 221 Ω resistor for HART)

Residual ripple

$\leq 40 \mu A_{eff}$

Communication signal

bi-directional HART transmission, 0.5 ... 10 kHz

(at 9160/19 only output 1)

Response time (10 ... 90 %)

$\leq 100 \mu s$

(at 9160/19 output 2: $\leq 200 ms$, typ. 100 ms)

Technical Data

Error detection Ex i input	
Wire breakage	< 3.6 mA
Short circuit	> 20.5 mA
Behaviour of the output	= Input signal
Output current at $I_E = 0$	$I_A = 0$ mA
Fault detection output	
Open-circuit	< 3.6 mA
Fault message Ex i input/output	
Settings (switch LF)	activated / deactivated
Indication of faulty line	LED red "LF" per channel
Message 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)
Signal transmission	
	Accuracy, typical data expressed as % of calibrated span (20 mA) at U_N , 23 °C
Deviation	$\leq 0,1$ %
Temperature effect	≤ 0.05 % / 10 K
Electromagnetic compatibility	Tested under the following standards and regulations: EN 61326-1 Use in industrial environment; NAMUR NE 21
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)	≤ 95 %

A3

Technical Data

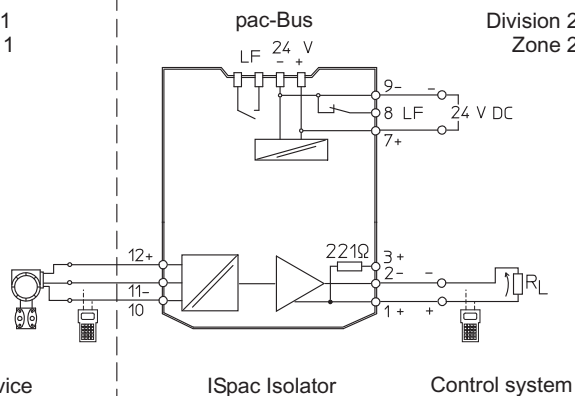
Electrical connection

Connection diagram

1 channel, output:
active / source
9160/14-11-11.

Hazardous area
Division 1
Zone 0 / 1

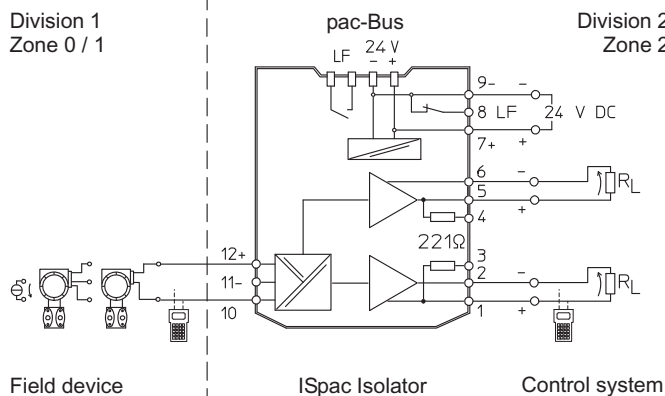
Safe area
Division 2
Zone 2



1 channel, outputs
9160/19-11-11.

Hazardous area
Division 1
Zone 0 / 1

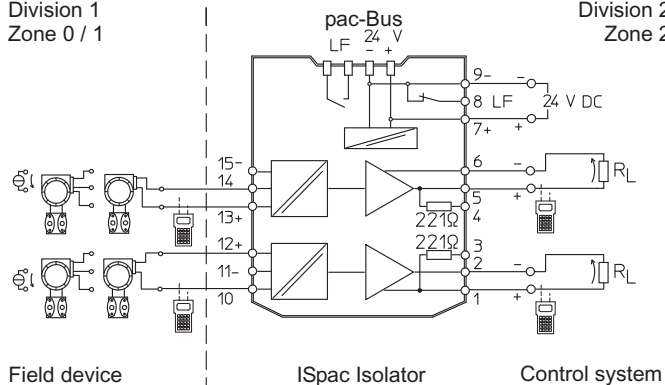
Safe area
Division 2
Zone 2



2 channels, outputs:
active / source
9160/23-11-11.

Hazardous area
Division 1
Zone 0 / 1

Safe area
Division 2
Zone 2



Explosion Protection									
Design	9160/13-11-13								
Global (IECEx)									
Gas, dust and mining	IECEx BVS 08.0050X Ex nA nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC [Ex ia Ma] I								
Europe (ATEX)									
Gas, dust and mining	DMT 03 ATEX E 010 X II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc II (1) D [Ex ia Da] IIIC I (M1) [Ex ia Ma] I								
Certifications and certificates									
Certificates	IECEx, ATEX, Brasil (INMETRO), Canada (cFM), Kazakhstan (TR), Russia (TR), Ukraine (TR), USA (FM), Belarus (TR)								
Ship approval	DNV GL								
Safety data									
Max. voltage U_o	27 V								
Max. current I_o	88 mA								
Max. power P_o	576 mW								
Max. connectable capacitance C_o									
IIC	90 nF								
IIB / IIIC	705 nF								
Max. connectable inductance L_o									
IIC	2.3 mH								
IIB / IIIC	17 mH								
Internal capacitance C_i	negligible								
Internal inductance L_i	negligible								
Safety-related maximum voltage	253 V								
When connecting a current source									
Max. output voltage U_o	4.1 V								
Max. connectable voltage U_i	30 V								
Max. connectable current I_i	100 mA								
Internal capacitance C_i	negligible								
Internal inductance L_i	negligible								
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 10/02-01 R027								
Max. SIL	3								
Safe Failure Fraction SFF	95 %								
PFD _{AVG} at $T_{[Proof]}$	<table> <tr> <th>$T_{[Proof]}$</th><th>PFD_{AVG}</th></tr> <tr> <td>1 year</td><td>5.96×10^{-5}</td></tr> <tr> <td>2 years</td><td>8.76×10^{-5}</td></tr> <tr> <td>5 years</td><td>1.72×10^{-4}</td></tr> </table>	$T_{[Proof]}$	PFD _{AVG}	1 year	5.96×10^{-5}	2 years	8.76×10^{-5}	5 years	1.72×10^{-4}
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1 year	5.96×10^{-5}								
2 years	8.76×10^{-5}								
5 years	1.72×10^{-4}								
Further information	For further information see safety test report.								

Technical Data

Design	9160/13-11-13
Electrical data	
Auxiliary power	
Nominal voltage U_N	24 V DC
Voltage range	18 ... 31.2 V
Residual ripple	$\leq 3.6 V_{SS}$
Nominal current at U_N , 20 mA	113 mA
Power consumption at U_N , 20 mA	2.7 W
Power dissipation at U_N , $R_L = 250 \Omega$	2.2 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 input to output	1.5 kV AC
Ex i input to auxiliary power	1.5 kV AC
Ex i input to error message contact	1.5 kV AC
Ex i inputs interconnected	500 V AC
acc. to standard	EN 50178
Output to auxiliary power	350 V AC
Outputs interconnected	350 V AC
Error message contact to auxiliary power and outputs	350 V AC
Ex i input	
Input signal	0/4 ... 20 mA with HART
Functional range	0 ... 24 mA
Max. input current for mA sources	50 mA
Supply voltage for transmitter	$\geq 16 V$ at 20 mA (for 2-wire)
Residual ripple of supply voltage	$\leq 25 mV_{eff}$
Open-circuit voltage	≤ 26
Short-circuit current	35 mA
Input resistance for mA sources	$\leq 100 \Omega$
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz
Output	
Output signal	0/4 ... 20 mA with HART
Load resistance R_L	0 ... 600 Ω (terminal 1+ / 2-) 0 ... 379 Ω (terminal 3+ / 2-) (with internal 221 Ω resistor for HART)
Residual ripple	$\leq 40 \mu A_{eff}$
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz
Response time (10 ... 90 %)	$\leq 100 \mu s$
Error detection Ex i input	
Wire breakage	$< 3.6 mA$
Short circuit	$> 20.5 mA$
Behaviour of the output	= Input signal
Output current at $I_E = 0$	$I_A = 0 mA$
Fault detection output	
Open-circuit	$< 3.6 mA$

Technical Data

Electrical data

Fault message Ex i input/output	
Settings (switch LF)	activated / deactivated
Indication of faulty line	LED red "LF" per channel
Message 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)
Signal transmission	
	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; NAMUR NE 21

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)	$\leq 95 \%$

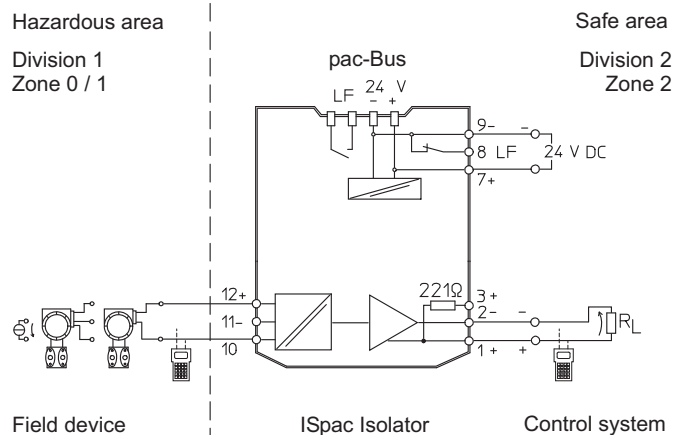
Technical Data

Electrical connection

Connection diagram

1 channel, output:
active / source
9160/13-11-13.

Hazardous area
Division 1
Zone 0 / 1



07652E02

Explosion Protection

Design	9160/xx-10-10	
Global (IECEX)		
Gas, dust and mining	IECEX BVS 08.0050X Ex nA nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC [Ex ia Ma] I	
Europe (ATEX)		
Gas, dust and mining	DMT 03 ATEX E 010 X Ex II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc Ex II (1) D [Ex ia Da] IIIC Ex I (M1) [Ex ia Ma] I	
Certifications and certificates		
Certificates	IECEX, ATEX, Brasil (INMETRO), Canada (cFM), Kazakhstan (TR), Russia (TR), Ukraine (TR), USA (FM), Belarus (TR)	
Ship approval	DNV GL	
Safety data		
Max. voltage U_o	27 V	
Max. current I_o	88 mA	
Max. power P_o	576 mW	
Max. connectable capacitance C_o		
IIC	90 nF	
IIB / IIIC	705 nF	
Max. connectable inductance L_o		
IIC	2.3 mH	
IIB / IIIC	17 mH	
Internal capacitance C_i	negligible	
Internal inductance L_i	negligible	
Safety-related maximum voltage	253 V	
When connecting a current source		
Max. output voltage U_o	4.1 V	
Max. connectable voltage U_i	30 V	
Max. connectable current I_i	100 mA	
Internal capacitance C_i	negligible	
Internal inductance L_i	negligible	
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 10/02-01 R027	
Max. SIL	2	
Safe Failure Fraction SFF	85 %	
PFD _{AVG} at $T_{[Proof]}$	$T_{[Proof]}$	PFD _{AVG}
	1 year	2.29×10^{-4}
	2 years	3.38×10^{-4}
	5 years	6.64×10^{-4}
Further information	For further information see safety test report.	

Technical Data

Design	9160/xx-10-10
Electrical data	
Auxiliary power	
Nominal voltage U_N	24 V DC
Voltage range	18 ... 31.2 V
Residual ripple	$\leq 3.6 V_{SS}$
Nominal current at U_N , 20 mA	
1 channel	57 mA
2 channels	100 mA
Power consumption at U_N , 20 mA	
1 channel	1.4 W
2 channels	2.3 W
Power dissipation at U_N , $R_L = 250 \Omega$	
1 channel	1.1 W
2 channels	1.7 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 input to output	1.5 kV AC
Ex i input to auxiliary power	1.5 kV AC
Ex i input to error message contact	1.5 kV AC
Ex i inputs interconnected	500 V AC
acc. to standard	EN 50178
Output to auxiliary power	350 V AC
Outputs interconnected	350 V AC
Error message contact to auxiliary power and outputs	350 V AC
Ex i input	
Input signal	0/4 ... 20 mA with HART
Functional range	0 ... 24 mA
Max. input current for mA sources	50 mA
Supply voltage for transmitter	$\geq 16 V$ at 20 mA (for 2-wire)
Residual ripple of supply voltage	$\leq 25 mV_{eff}$
Open-circuit voltage	≤ 26
Short-circuit current	35 mA
Input resistance for mA sources	$\leq 100 \Omega$
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz
Output	
Output signal	Current sink, max. 30 V with HART

Technical Data

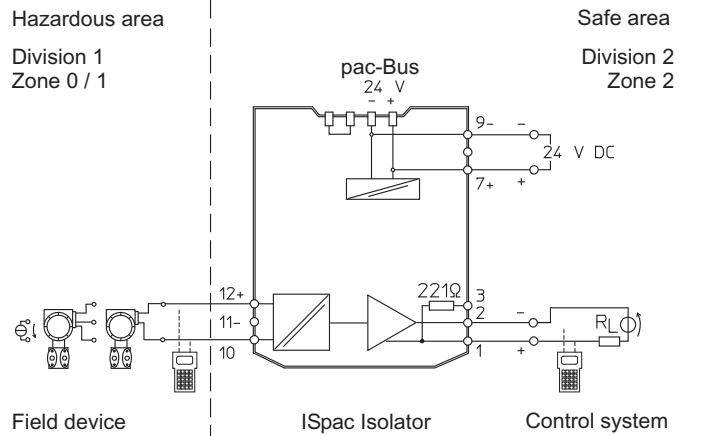
Load resistance R_L	15403E00 U_S: Supply voltage R_L: Load resistance R_{max}: Max. load resistance terminal 1, 2 & 5, 6 R_{min}: Min. load resistance terminal 1, 2 & 5, 6 $R_{max} R$: Max. load resistance terminal 1, 3 & 4, 6 $R_{min} R$: Min. load resistance terminal 1, 3 & 4, 6
Residual ripple	$\leq 40 \mu A_{eff}$
Communication signal	bi-directional HART transmission, 0.5 ... 10 kHz (at 9160/19 only output 1)
Response time (10 ... 90 %)	$\leq 100 \mu s$ (at 9160/19 output 2: ≤ 200 ms, typ. 100 ms)
Error detection Ex i input	= Input signal
Behaviour of the output	$I_A = 0$ mA
Output current at $I_E = 0$	
Signal transmission	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; NAMUR NE 21
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)	$\leq 95 \%$

Technical Data

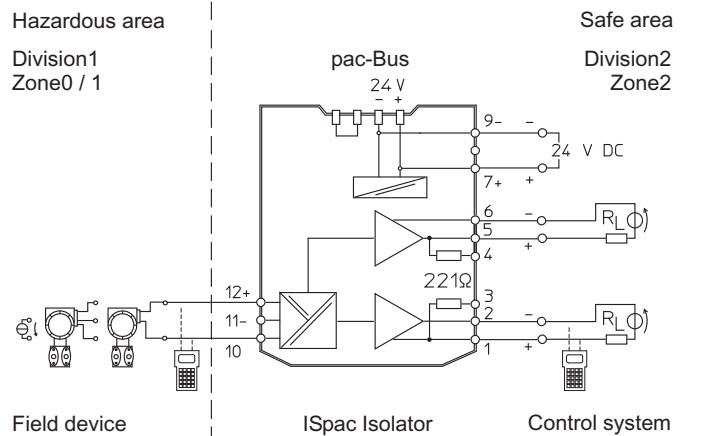
Electrical connection

Connection diagram

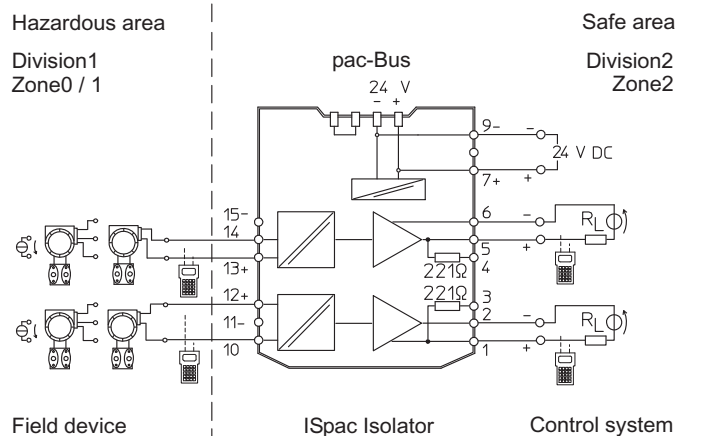
1 channel, output:
passive / sink
9160/13-10-10.



1 channel, outputs:
passive / sink
9160/19-10-10.



2 channels, outputs:
passive / sink
9160/23-10-10.

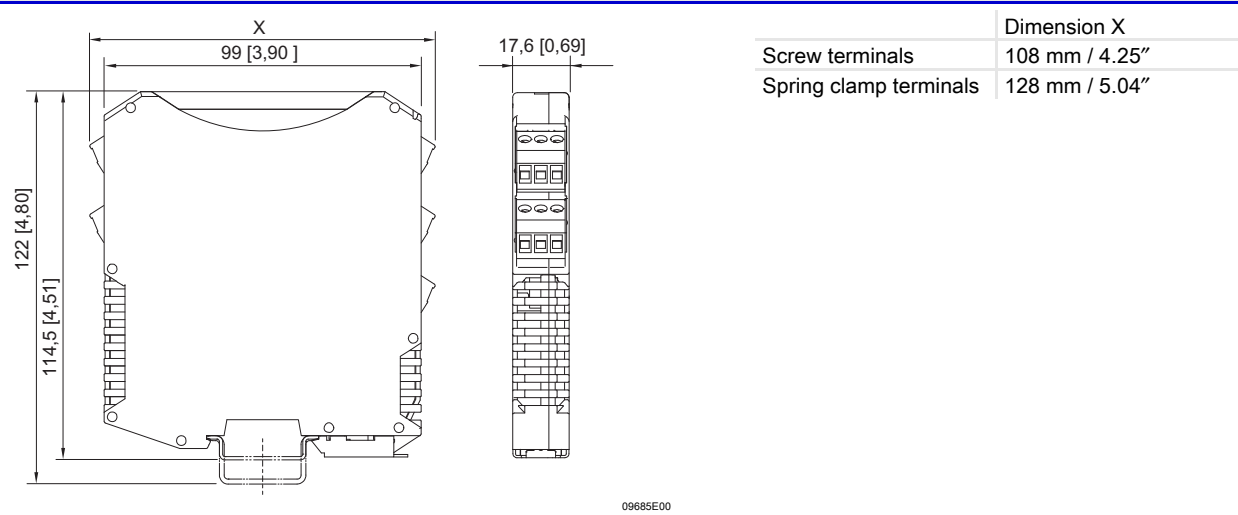


A3

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.