

Isolator Barriers

Transmitter supply unit

Ex i field circuit

9160/23-11-11s Art. No. 220322



- Can be used universally for two- and three-conductor transmitters and mA sources (four-conductor transmitters)
- High degree of accuracy
- Standard variant can be used up to SIL 2, special variant up to SIL 3 (IEC/EN 61508)

WebCode 9160A



9160 series Ex i transmitter power supply units can be used for the intrinsically safe operation of two- and three-conductor transmitters or intrinsically safe mA sources such as four-conductor transmitters. The unit allows HART signals to be transmitted in both directions. The portfolio includes one- and two-channel units and a variant for signal duplication. Special versions are available for higher output voltages and SIL 3.

Technical Data

Explosion Protection

Application range (Zones)	2
Ex interface zone	0 1 2 20 21 22
IECEX certificate Gas	IECEX BVS 08.0050 X
IECEX gas explosion protection	Ex nA nC [ia Ga] IIC T4 Gc
IECEX dust certificate	IECEX BVS 08.0050 X
IECEX dust explosion protection	[Ex ia Da] IIIC
IECEX firedamp certificate	IECEX BVS 08.0050 X
IECEX firedamp protection	[Ex ia Ma] I
ATEX gas certificate	DMT 03 ATEX E 010 X
ATEX gas explosion protection	⊕ II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc
ATEX dust certificate	DMT 03 ATEX E 010 X
ATEX dust explosion protection	⊕ II (1) D [Ex ia Da] IIIC
ATEX firedamp certificate	DMT 03 ATEX E 010 X
ATEX firedamp protection	⊕ I (M1) [Ex ia Ma] I
Certificate FMus	FM16US0122X
Certificate cFM	FM16CA0067X
Marking cFMus	Class I, Div. 2, Groups A,B,C,D; Class I, Zone 2, nA nC Group IIC AIS Class I,II,III, Div. 1, Groups A,B,C,D,E,F,G; Class I, Zone 0, [Ex ia] IIC T4 Mounting vert. at Ta = 70°C , or horizontal Ta = 60°C See Doc. 91 606 01 31 1

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9160/23-11-11s Art. No. 220322



Explosion Protection

EAC certificate	EAEU RU S-DE.HA91.B.00100/20
EAC certificate valid until	2025-01-26
EAC gas explosion protection	Ex 2 Ex nA [ia Ga] IIC T4 Gc X
EAC dust explosion protection	Ex [Ex ia Da] IIIC X
Certificates	ATEX (BVS), Brazil (ULB), Canada (FM), EAC (ENDCE), IECEx (BVS), India (PESO), Korea (KTL), Russia (Meteorological certificate), SIL (exida), USA (FM)
Ship approval	CCS, EU RO MR

Safety Data

Max. voltage U_o/V_{oc}	27 V
Max. current I_o/I_{sc}	88 mA
Max. power P_o	576 mW
Max. permissible external capacitance C_o/C_a for IIC	0.09 μ F
Max. permissible external capacitance C_o/C_a for IIB	0.705 μ F
Max. permissible external capacitance C_o for IIA	2330 nF
Max. permissible external capacitance C_o for I	3750 nF
Max. permissible external inductance L_o/L_a for IIC	2.3 mH
Max. permissible external inductance L_o/L_a for IIB	17 mH
Max. permissible external inductance L_o for IIA	28 mH
Max. permissible external inductance L_o for I	40 mH
Max. voltage U_i	30 V
Max. current I_i	100 mA
Max. voltage U_o isolation amplifier	4.1 V
Max. power P_i note	Internally limited
Internal capacitance C_i	Negligible
Internal capacitance C_i isolating repeater	Negligible
Internal inductance L_i	Negligible
Internal inductance L_i isolating repeater	Negligible
Safety-related maximum voltage	253 V AC

Functional Safety

SIL	2
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Electrical Data

Signal types	Analog input
Number of channels	2
Transmitter supply mode	Yes
Isolating repeater mode	Yes
LFD relay	Yes
Communication signal	HART, 0.5 ... 10 kHz

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Auxiliary Power

Auxiliary power	24 V DC
Auxiliary power nominal voltage	24 V DC
Auxiliary power voltage range	18 ... 31.2 V
Voltage range residual ripple	$\leq 3,6 V_{SS}$
Nominal current	148 mA
Max. power dissipation	2.8 W
Power consumption	3.4 W
Polarity reversal protection	Yes
Undervoltage monitoring	Yes
Operation indication	Green "PWR" LED

Galvanic Isolation

Test voltage according to standard	IEC EN 60079-11
Galvanic isolation Ex i input to output	1.5 kV AC
Galvanic isolation Ex i input to auxiliary power	1.5 kV AC
Galvanic isolation Ex i input to fault message contact	1,5 kV AC
Galvanic isolation Ex i input to Ex i input	500 V
Test voltage according to standard 2	EN 50178
Galvanic isolation output to auxiliary power	350 V AC
Galvanic isolation output to output	350 V AC
Galvanic isolation fault message contact to power supply	350 V AC

Input

Input function	Isolation amplifier Transmitter power unit
Input	0/4 ... 20 mA with HART
Input signal	0/4 ... 20 mA with HART
Input functional range	0 ... 24 mA
Input current max. mA sources	50 mA
Input for open-circuit voltage U_a	$\leq 26 V$
Short-circuit current	$\leq 35 mA$
Ex i input supply voltage for transmitter	$\geq 16 V$ at 20 mA (for 2-wire)
Supply voltage for transmitter	$\geq 16 V$ at 20 mA
Input resistance	$\leq 100 \Omega$

Output

Output	0/4 ... 20 mA with HART
Output A	0/4 ... 20 mA
Output B	0/4 ... 20 mA
Output signal	0/4 ... 20 mA with HART
Output current at $I_e=0$	0 mA
Output residual ripple	$\leq 40 \mu A_{eff}$
Output functional range	0 – 24 mA

Isolator Barriers

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Output

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)
Load resistance R_L max. HART	379 Ω
Load R_L max. with resistor	379 Ω
Load resistance R_L max.	600 Ω
Load resistance R_L max. note	With internal 221 Ω resistor
Settling time 10 ... 90 %	$\leq 100 \mu\text{s}$
Switching capacity fault message contact	30 V / 100 mA
Switch user adjustment line fault	Activated / deactivated
Indication of line fault	Red LED "LF" for each channel
Error detection wire breakage	$< 3.6 \text{ mA}$
Short circuit error detection	$> 20.5 \text{ mA}$
Error detection wire breakage OFF	$< 3,6 \text{ mA}$
Deviation	$\leq 0,1 \%$
Temperature influence error limits	$\leq 0,05 \%$ / 10K
Behaviour of the output	= input signal
Behaviour of the output note	Genauigkeit, typische Angaben in % der Messspanne (20 mA) bei U_N , 23 °C

Ambient Conditions

Ambient temperature °C	-20 °C ... +70 °C (Single device) -20 °C ... +60 °C (Group assembly)
Ambient temperature °F	-4 °F ... +158 °F (Single device) -4 °F ... +140 °F (Group assembly)
Storage temperature °C	-40 °C ... +80 °C
Storage temperature °F	-40 °F ... +176 °F
Max. relative humidity	95%
Use at the height of	$< 2000 \text{ m}$

Mechanical Data

Degree of protection (IP)	IP30
Terminal degree of protection (IP)	IP20
Fire resistance (UL 94)	V0
Connection cross-section	0.2-2.5 mm ² flexible 0.25-2.5 mm ² flexible core end sleeve
Enclosure material	Polyamide
Grid dimension	17.6 mm
Weight	0.2 kg
Weight	0.44 lb

Mounting / Installation

Mounting type	NS35/15, NS35/7.5 DIN rail
Mounting position	Vertical Horizontal
Connection type	Screw terminal
Conductor cross-section solid min.	0.2 mm ²
Conductor cross-section solid max.	2.5 mm ²
Conductor cross-section flexible min.	0.2 mm ²
Conductor cross-section flexible max.	2.5 mm ²

Isolator Barriers

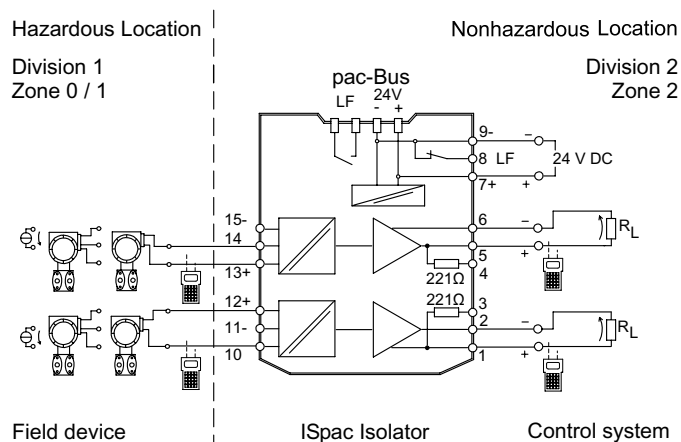
Transmitter supply unit

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9160/23-11-11s Art. No. 220322

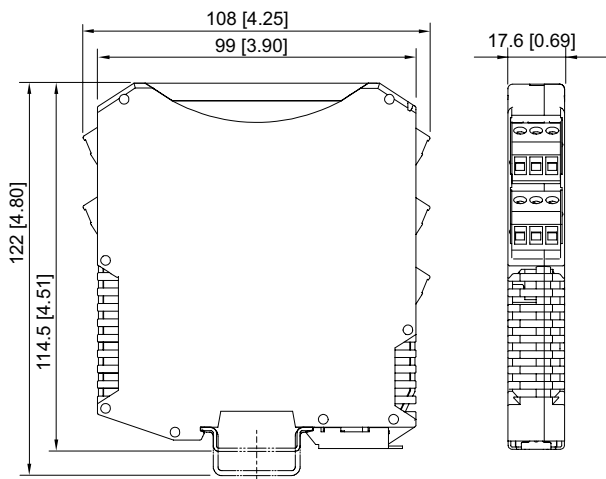


Technical Drawings – Subject to Alterations



Connection diagram 9160/23-11-11


Dimensional Drawings (All Dimensions in mm [inches]) – Subject to Alterations




ISpac Series 9146, 9147, 9160, 9162, 9163, 9165, 9167, 9170, 9172, 9175, 9176, 9180, 9182, 9193, ISbus Series 9412 with screw terminal

Accessories

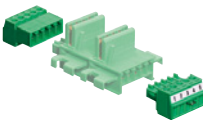
Front cover

	Art. No.
 <p>for ISpac modules 91xx yellow, transparent Clear marking of the device for SIL applications. (Packaging unit: 10 pieces)</p>	200914

pac-Bus

	Art. No.
 <p>Wiring auxiliary power and collective error message</p>	160731

Terminal set for pac-Bus

	Art. No.
 <p>For the supply of 24 V DC auxiliary power via terminals (alternative to using the supply module 9193/21-11-11), with jumper for error message chain for ISpac module 91xx</p>	160730

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9160/23-11-11s Art. No. 220322



Spare Parts

Screw terminal		Art. No.
	3-pole plug, screw connector thread: M3 stripping length: 7 mm color: green	112817
	3-pole plug, screw connector thread: M3 stripping length: 7 mm color: black	112816
	3-pole plug, screw connector thread: M3 stripping length: 7 mm color: blue	112818
Screw terminal with test tap		Art. No.
	3-pole plug with test tap, screw connector thread: M3 stripping length: 7 mm colour: black	113005
	3-pole plug with test tap, screw connector thread: M3 stripping length: 7 mm colour: blue	113004
Spring clamp terminal		Art. No.
	3-pole plug with test tap, spring clamp connection stripping length: 10 mm color: green	112825
	3-pole plug with test tap, spring clamp connection stripping length: 10 mm color: black	112824
	3-pole plug with test tap, spring clamp connection stripping length: 10 mm color: blue	112826

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