

# Isolator Barriers

Transmitter supply unit

Ex i field circuit

9160/23-10-10s Art. No. 214903



- 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 [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 [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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## 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] IIC 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 $\mu$ F
Max. permissible external capacitance $C_o/C_a$ for IIB	0.705 $\mu$ 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	No
Communication signal	HART, 0.5 ... 10 kHz

# Isolator Barriers

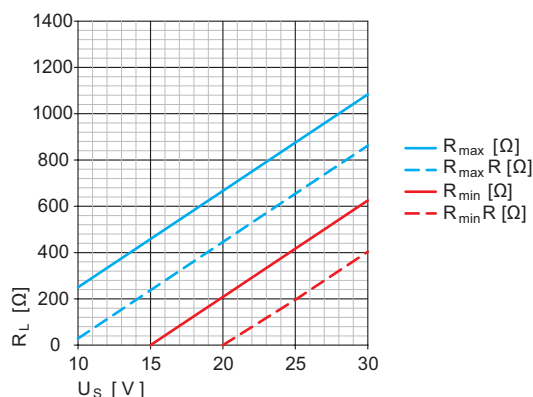
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Load resistance  $R_L$



- $U_s$ : 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
- $R_{maxR}$ : Max. load resistance terminal 1, 3 & 4, 6
- $R_{minR}$ : Max. load resistance terminal 1, 3 & 4, 6

## 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	100 mA
Max. power dissipation	1.7 W
Power consumption	2.3 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 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

## 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	$\leq 100 \Omega$
Line fault and loss of power signalization	Contact (30 V / 100 mA) closed to ground in case of fault pac-Bus, floating contact (30 V / 100 mA)

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Output	
Output	Passive with HART
Output A	Passive
Output B	Passive
Output voltage	≤ 30 V
Output residual ripple	≤ 40 μAeff
Output functional range	0 – 24 mA
Load resistance R <sub>L</sub> max. HART	See characteristic curve
Load resistance R <sub>L</sub> max. note	See characteristic curve
Settling time 10 ... 90 %	≤ 100 μs
Error detection wire breakage	< 3.6 mA
Short circuit error detection	> 20.5 mA
Deviation	≤ 0,1 %
Temperature influence error limits	≤ 0,05 % / 10K
Behaviour of the output	= input signal
Behaviour of the output note	Genauigkeit, typische Angaben in % der Messspanne (20 mA) bei U <sub>N</sub> , 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 m
Electromagnetic compatibility	Tested to the following standards and regulations: EN 61326-1 Use in industrial environment; NAMUR NE 21

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 <sup>2</sup> flexible 0.25-2.5 mm <sup>2</sup> flexible core end sleeve
Enclosure material	Polyamide
Grid dimension	17.6 mm
Weight	0.195 kg
Weight	0.43 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 <sup>2</sup>
Conductor cross-section solid max.	2.5 mm <sup>2</sup>
Conductor cross-section flexible min.	0.2 mm <sup>2</sup>
Conductor cross-section flexible max.	2.5 mm <sup>2</sup>

# Isolator Barriers

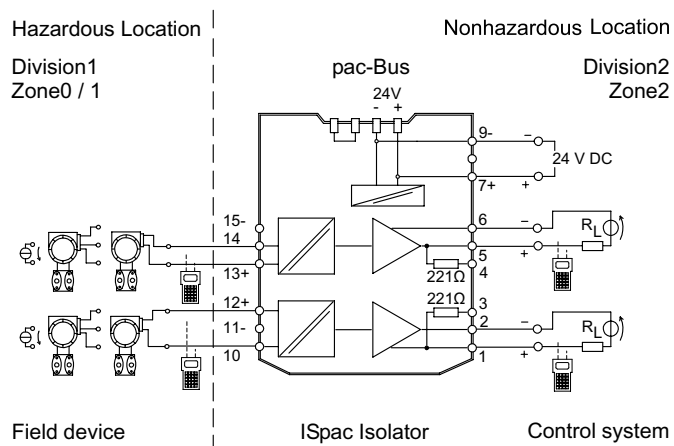
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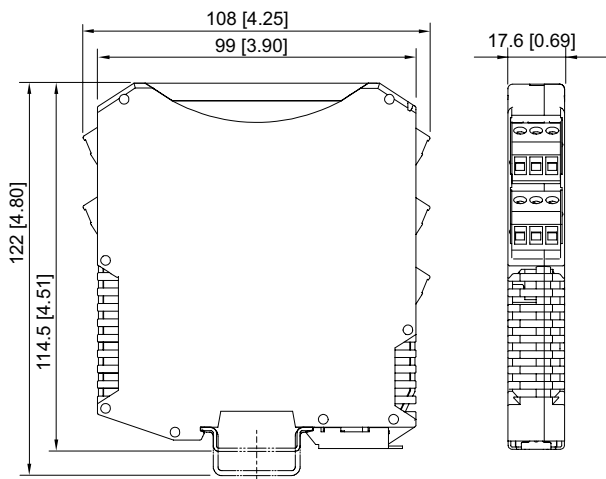


## Technical Drawings – Subject to Alterations



Connection diagram 9160/23-10-10


## 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

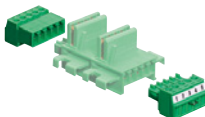
### Front cover

	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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## 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

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.