

Isolator Barriers

Transmitter supply unit

Ex i field circuit

9160/13-11-11s Art. No. 214895

STAHL



- Can be used universally for 2- and 3-wire transmitters and mA sources (4-wire transmitters)
- High degree of accuracy
- Variants with wire breakage and short-circuit monitoring
- Transparent for HART signals

MY R. STAHL 9160A



9160 series transmitter supply units can be used for the intrinsically safe operation of two- and three-wire transmitters or intrinsically safe mA sources such as four-wire transmitters. The unit allows HART signals to be transmitted in both directions. The portfolio includes single- and dual-channel units and a version for signal duplication.

Technical Data

Explosion Protection	
Application range (zones)	2
Ex interface zone	0, 1, 2, 20, 21, 22
IECEEx gas certificate	IECEEx BVS 08.0050 X
IECEEx gas explosion protection	Ex nA nC [ia Ga] IIC T4 Gc
IECEEx dust certificate	IECEEx BVS 08.0050 X
IECEEx dust explosion protection	[Ex ia Da] IIIC
IECEEx firedamp certificate	IECEEx BVS 08.0050 X
IECEEx 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
FMus certificate	FM16US0122X
cFM certificate	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, [AEx/Ex ia] IIC T4 Mounting vert. at Ta = 70°C , or horizontal Ta = 60°C See Doc. 91 606 01 31 1
Certificates	ATEX (BVS), Brazil (ULB), Canada (FM), China (NEPSI), IECEEx (BVS), Korea (KTL), SIL (exida), USA (FM)
Ship approval	CCS, EU RO MR (DNV)
Declaration of conformity	ATEX (EUK)

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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 inductance L_o/L_a for IIC	2.3 mH				
Max. permissible external capacitance C_o/C_a for IIB	0.705 μ F				
Max. permissible external inductance L_o/L_a for IIB	17 mH				
Max. permissible external capa.IIA	2330 nF				
Max. permissible external inductance L_o for IIA	28 mH				
Max. perm. ext. capacit. IIIC	0.705 μ F				
Max. permis. ext. induct. IIIC	17 mH				
Max. permissible ext. capac. I	3750 nF				
Max. permissible external inductance L_o for I	40 mH				
Max. voltage U_o isolation amplifier	4.1 V				
Max. current I_o isolation amplifier	negligible				
Max. power P_o isolation amplifier	negligible				
Max. voltage U_i isolation amplifier	30 V				
Max. current I_i isolation amplifier	100 mA				
Max. power P_i isolation amplifier	internally limited				
Internal capacitance isolation amplifier	Negligible				
Internal inductance L_i isolation amplifier	Negligible				
Max. voltage U_i	30 V				
Max. current I_i note	Internally limited				
Max. power P_i	100 mW				
Internal capacitance	Negligible				
Internal inductance	Negligible				
Safety-related max. voltage	253 V AC				
Intrinsically safe limiting values inductance L_o /capacitance C_o	Jointly connectable inductance L_o /capacitance C_o				
IIC	L_o [mH]	2 mH	1 mH	0.500 mH	0.200 mH
	C_o [μ F]	0.042 μ F	0.056 μ F	0.072 μ F	0.090 μ F
IIB	L_o [mH]	17 mH	2 mH	0.500 mH	0.200 mH
	C_o [μ F]	0.290 μ F	0.320 μ F	0.460 μ F	0.600 μ F
IIA	L_o [mH]	28 mH	2 mH	1 mH	0.200 mH
	C_o [μ F]	0.410 μ F	0.320 μ F	0.540 μ F	0.820 μ F
IIIC	L_o [mH]	17 mH	2 mH	0.500 mH	0.200 mH
	C_o [μ F]	0.290 μ F	0.320 μ F	0.460 μ F	0.600 μ F
I	L_o [mH]	40 mH	20 mH	0.500 mH	0.100 mH
	C_o [μ F]	0.480 μ F	0.660 μ F	0.810 μ F	1.200 μ F

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Functional Safety

SIL	2
HFT	0
SFF	85%
Lambda SD	0 FIT
Lambda SU	0 FIT
Lambda DD	163 FIT
Lambda DU	28 FIT
PFD _{avg} at T _{proof} 1 year	2,29E-04
PFD _{avg} at T _{proof} 2 years	3,38E-04
PFD _{avg} at T _{proof} 5 years	6,64E-04

Electrical Data

Number of channels	1
Transmitter feed operation	Yes
Isolation amplifier operation	Yes
LFD relay	Yes
Communication signal	HART, 0.5 to 10 kHz

Auxiliary Power

Auxiliary power	24 V DC
Auxiliary power nominal voltage	24 V DC
Auxiliary power voltage range	18 ... 31.2 V
Auxiliary pwr nom. voltage DC	24 V
Voltage range residual ripple	≤ 3,6 V _{SS}
Nominal current	88 mA
Max. power dissipation	1.7 W
Power consumption	2.1 W
Polarity reversal protection	Yes
Undervoltage monitoring	Yes
Operation indication	Green "PWR" LED

Galvanic Isolation

Test voltage as per standard	EN IEC 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 fault message contact	1.5 kV AC
Test voltage as per standard	EN 50178
Output to auxiliary power	350 V AC
Galvanic separation FMC to HE and output	350 V AC

Input

Input function	Isolation amplifier Transmitter power unit
Input	0/4 ... 20 mA with HART
Input signal	0/4 to 20 mA with HART
Function range input	0 ... 24 mA
Max. input current, mA sources	50 mA
Input for open-circuit voltage U _a	≤ 26 V

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Input

Short-circuit current	$\leq 35 \text{ mA}$
Supply voltage for transmitter	$\geq 16 \text{ V at } 20 \text{ mA}$
Input resistance	$\leq 100 \text{ ohm}$

Output

Output	0/4 to 20 mA with HART
Output signal	0/4 to 20 mA with HART
Function range output	0 – 24 mA
Output A	0/4 to 20 mA
Behaviour of the output	= input signal
Output current at $I_e=0$	0 mA
Output residual ripple	$\leq 40 \mu\text{A}_{\text{eff}}$
Load resistance R_L	0 ... 600 Ω (terminal 1+/2- resp. 5+/6-) 0 ... 379 Ω (terminal 3+/2- resp. 4+/6-) (With internal 221 ohm resistor for HART)
Settling time 10-90%	$\leq 100 \mu\text{s}$
LF switch user adjustment	Activated/deactivated
Wire breakage error detection input	$< 3.6 \text{ mA}$
Short circuit error detection input	$> 20.5 \text{ mA}$
Wire break. err detection OFF	$< 3,6 \text{ mA}$
Line fault indication	Red "LF" LED
Fault message contact switching capacity	30 V / 100 mA
Line fault and loss of power signalization	- Contact (30 V/100 mA), closed against earth in case of error - pac-Bus, potential-free contact (30 V/100 mA)
Deviations / error note	Information in % of the measuring range (20 mA) at U_N , 23 °C
Deviation	$\leq 0,1 \%$
Temperature influence error limits	$\leq 0.05\% / 10 \text{ K}$

Device Specific Data

LED operating conditions	LED "PWR", green
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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) -40 °F ... +140 °F (Group assembly)
Note	The installation conditions affect the ambient temperature. Observe the "Cabinet installation guide".
Storage temperature °C	-40 °C ... +80 °C
Storage temperature °F	-40 °F ... +176 °F
Max. relative humidity	95 %
Use at the height of	$< 2000 \text{ m}$
Max. operating altitude	2000 m
Electromagnetic compatibility	Tested to the following standards and regulations: EN 61326-1 For use in industrial areas; NAMUR NE 21

Mechanical Data

Degree of protection (IP)	IP30
Degree of protection (IP) terminals	IP20
Fire resistance (UL 94)	V0

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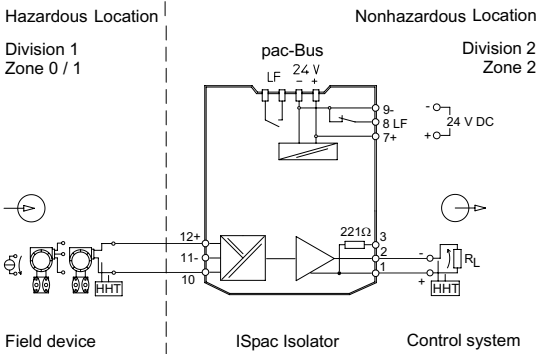
Mechanical Data

Enclosure material	Polyamide
Min. rigid conductor cross section	0.2 mm²
Max. rigid conductor cross section	2.5 mm²
Min. flexible conductor cross section	0.2 mm²
Max. flexible conductor cross section	2.5 mm²
Connection cross-section	0.2 to 2.5 mm² flexible 0.25 to 2.5 mm² flexible with core end sleeve
Width	17.6 mm
Width, inches	0.69 in
Height	114.5 mm
Height in inches	4.51 in
Length	108 mm
Length in inches	4.25 in
Weight	195 g
Weight	0.43 lb

Mounting / Installation

Mounting type	DIN rail NS35/15, NS35/7.5
Grid dimension	17.6 mm
Mounting orientation	Vertical Horizontal
Connection type	Screw terminal
Connection cross-section AWG	24 ... 14

Technical Drawings – Subject to Alterations



Connection diagram 9160/13-11-11

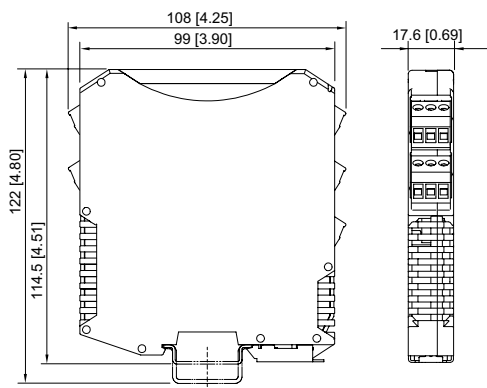
Dimensional Drawings (All Dimensions in mm [inches]) – Subject to Alterations

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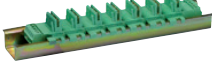
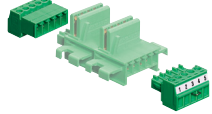
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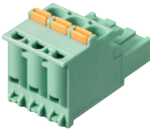


ISpac Series 9143, 9146, 9147, 9160, 9162, 9163, 9165, 9167, 9170, 9172, 9175, 9176, 9180, 9182, 9193, ISbus Series 9412 with screw terminal

Accessories

pac-Bus		Art. No.
	Wiring auxiliary power and collective error message	160731
Terminal set for pac-Bus		Art. No.
	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	160730

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
Spring clamp terminal		Art. No.
	3-pole plug with test tap, spring clamp connection stripping length: 10 mm color: green	112825

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Spring clamp terminal		Art. No.
	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.