

Remote I/O

Remote I/O IS1+ Digital input/output module

for Zone 2 Ex i

9470/33-16-10 Art. No. 210448



- Sixteen channels can be used in pairs as inputs or outputs
- Intrinsically safe Ex ia IIC inputs/outputs with line fault monitoring
- Module in Zone 2, Cl. I, II, Div. 2 can be hot swapped

MY R. STAHL 9470D



The 9470/33 series digital input/output module for Zone 2, Cl. I, II, Div. 2 has 16 channels, which can be used in pairs for Ex i operation as inputs for contacts and NAMUR proximity sensors (EN 60947-5-6) or as outputs for indicator lamps and low-power solenoid valves. Eight inputs can be used for frequencies of up to 20 kHz, and four can be used for detecting the direction of rotation. All inputs/outputs are short-circuit proof and galvanically separated from the system.

Technical Data

Explosion Protection

Application range (zones)	2
Ex interface zone	0, 1, 2, 20, 21, 22
IECEX gas certificate	IECEX DEK 12.0044X
IECEX gas certificate	IECEX DEK 12.0044X
IECEX gas explosion protection	Ex ec ia [ja Ga] IIC T4 Gc
IECEX dust certificate	IECEX DEK 12.0044X
IECEX dust explosion protection	[Ex ia Da] IIIC
ATEX gas certificate	DEKRA 12 ATEX0099 X
ATEX gas certificate	DEKRA 12 ATEX0099 X
ATEX gas explosion protection	⊕ II 3 (1) G Ex ec ia [ja Ga] IIC T4 Gc
ATEX dust certificate	DEKRA 12 ATEX0099 X
ATEX dust explosion protection	⊕ II (1) D [Ex ia Da] IIIC
FMus certificate	FM17US0332X
cFM certificate	FM16CA0134X
Marking cFMus	NI, Class I, Div. 2, Groups A,B,C,D; Class I, Zone 2, AEx/Ex nA ia [ia] IIC AIS Class I,II,III, Div. 1, Groups A,B,C,D,E,F,G; T4 at Ta = 75°C See Doc. 9470 6 031 002 1
Certificates	ATEX (DEK), Brazil (ULB), Canada (FM), China (NEPSI), IECEX (DEK), India (PESO), Korea (KTL), USA (FM)
Ship approval	ABS, BVIS, EU RO MR (DNV), KR, LR
Declaration of conformity	ATEX (EUK), China (CCC)
Installation	in Zone 2, Cl. I, Div. 2 and in safe areas
Further information	For further interconnections (4, 8 or 16 channels), see operating instructions and certificates.

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Safety Data

Max. voltage U_o/V_{oc}	9.8 V													
Max. current I_o (Ex ia)	10.4 mA													
Max. power P_o (Ex ia)	25.5 mW													
Internal capacitance (1 channel)	2.5 nF													
Internal inductance	Negligible													
Max. connectable inductance L_o /capacitance C_o														
1 channel														
IIC	L_o [mH]	280	100	50	20	10	5	2	1	0.5	0.2	0.1	0.02	
	C_o [μ F]	-	0.49	0.56	0.64	0.72	0.81	0.96	1.1	1.3	1.6	2	3.3	
IIB/IIIC	L_o [mH]	1000	100	50	20	10	5	2	1	0.5	0.2	0.1	0.01	
	C_o [μ F]	-	2.6	2.8	3.3	3.7	4.2	5.1	6	7.2	9.3	12	23	
2 parallel channels														
Max. current I_o (Ex ia)	20.8 mA													
Max. power P_o (Ex ia)	51 mW													
Internal capacitance (2 channels)	5 nF													
IIC	L_o [mH]	100	50	20	10	5	2	1	0.5	0.2	0.1	0.02		
	C_o [μ F]	0.3	0.44	0.57	0.67	0.77	0.93	1.1	1.3	1.6	2	3.3		
IIB/IIIC	L_o [mH]	270	100	50	20	10	5	2	1	0.5	0.2	0.1	0.01	
	C_o [μ F]	-	2.3	2.6	3.1	3.6	4.1	5.1	6	7.2	9.3	12	23	

Electrical Data

Number of channels	16 Ex i inputs/outputs (adjustable parameters in pairs)
Current consumption	120 mA
Connection Ex i field signals	Pluggable, blue terminals, 16-pin, 2.5 mm ² , screw or cage clamp version with lock

Auxiliary Power

Power supply connection	BusRail types 9494
Auxiliary power version	Intrinsically safe Ex ia via BusRail
Current consumption	120 mA
Max. power consumption	2.5 W
Max. power dissipation outputs	2.5 W

Galvanic Isolation

Test voltage for galvanic separation	Acc. to standard EN 60079-11
Auxiliary power/system components	≥ 1500 V AC
I/O module / I/O module	≥ 500 V AC
I/O channels/system components	≥ 500 V AC
I/O channels / ground (PA)	≥ 500 V AC
	The inputs of an I/O module have a shared minus conductor.

Input

Number of inputs	16
Min. ON input signal	2.1 mA

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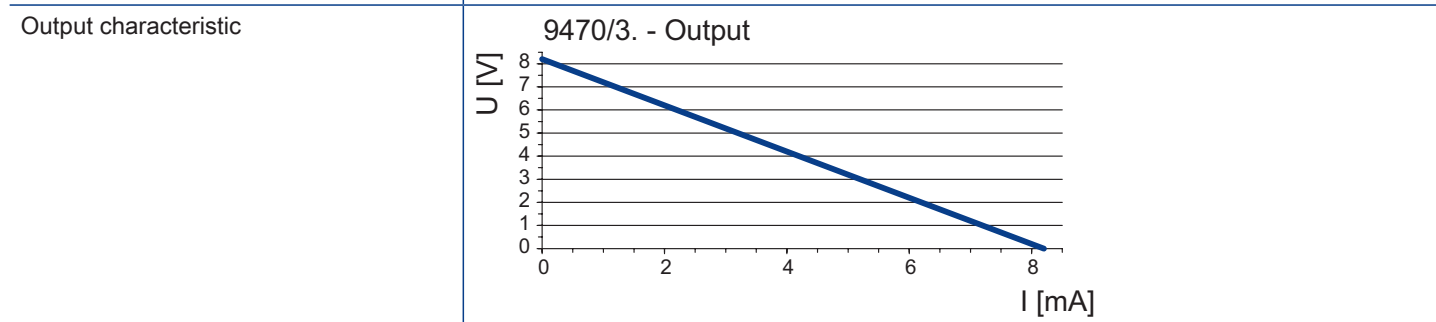


Input

Max. OFF input signal	1.2 mA			
Operating point	1.65 mA			
Supply voltage	8.2 V			
Internal resistance	1 kΩ			
Signal input	EN 60947 input (NAMUR)			
Function	Frequency with direction Up/down counter			
Max. number of counter inputs	8			
Counting range	0 ... 65535 as UINT16			
Max. number of frequency inputs	8			
Min. pulse width	25 μs			
Resolution	16 bit/32 bit			
Max. switching frequency	20 kHz (at frequencies > 1 kHz, the maximum conductor length is reduced, e.g. at 5 kHz to approx. 75 m)			
Frequency band	Measuring range	0.1 to 600 Hz	1 Hz to 3 kHz*	1 Hz to 20 kHz
	Measurement discrimination	0.01 Hz	0.05 Hz	0.5 Hz
	Accuracy	0.1%	0.1%	0.1%
		* Default		
Rotation direction recognition, forward/backward counter	Max. number of channels	4 (each with two inputs switched in parallel)		

Output

Max. number of outputs	16
Max. output current	8.2 mA
Internal resistance of outputs	1 kΩ
Output rated operation	6 V/2 mA
Open-circuit voltage U_o	8.2 V



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Signal transmission	Max. delay from signal/internal bus > 1 ms				
	Max. delay from frequency input/internal bus				
	Filter	None	Small	Medium	Large
	Frequency				
	$0.1 \text{ Hz} \leq f < 1 \text{ Hz}$	$1/f + 1 \text{ ms}$	2/f	3/f	6/f
	$1 \text{ Hz} \leq f < 10 \text{ Hz}$	$1/f + 1 \text{ ms}$	4/f	9/f	18/f
	$10 \text{ Hz} \leq f < 100 \text{ Hz}$	$1/f + 1 \text{ ms}$	8/f	27/f	54/f
	$100 \text{ Hz} \leq f < 1 \text{ kHz}$	$1/f + 1 \text{ ms}$	16/f	81/f	162/f
	$1 \text{ kHz} \leq f < 1960 \text{ Hz}$	1.5 ms	32/f	243/f	486/f
	$1960 \text{ Hz} \leq f < 10 \text{ kHz}$	1.5 ms	16.5 ms	124 ms	248 ms
	$10 \text{ kHz} \leq f < 20 \text{ kHz}$	1.5 ms	33 ms	372 ms	744 ms
$f \geq 20 \text{ kHz}$	1.5 ms	66 ms	372 ms	744 ms	

Device Specific Data

Signal type	Input Output
Diagnostics message module	ON OFF
Pulse extension/frequency filter	2.4 s / large 0.6 s / small 1.2 s / medium 0 s/off
Inverting input/output	Normal inverted
Line fault monitoring	OFF ON
Input behaviour in case of error	Replacement value "0" Replacement value "1" Hold (initial value 0) Hold (initial value 1)
Counter/frequency operating mode	32-bit up/down counter 16-bit up/down counter 16-bit counter 1 Hz to 3 kHz 1 Hz to 20 kHz with direction 1 Hz to 20 kHz 0.1 to 600 Hz
Counter control	Stop Run Reset
Count	Positive slope Negative slope
LED module requires maintenance	"M/S" LED, blue
LED module requires maintenance designation	M/S
LED module requires maintenance colour	blue
LED operating conditions	"RUN" LED, green
Operating status LED designation	RUN
Operating conditions LED colour	green
LED channel error	without
LED channel status	without

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Device Specific Data

Retrievable parameters	Type Software revision Serial number Manufacturer Hardware revision
Signal status bit	"0" = High-impedance output "1" = Output supplied with power
Wire breakage input	< 50 μ A
Short circuit input	< 100 ohm
Wire breakage output	< 50 μ A
Output short circuit	< 100 Ω
Short-circuit detection	Only possible when ON
Note on wire breakage/short-circuit detection	For contacts, a connection with 1 k Ω in series and 10 k Ω in parallel is required for wire breakage/short-circuit detection. For outputs, wire breakage/short-circuit detection is only possible when ON.

Diagnostics

LED group error	"ERR" LED, red
Group error LED designation	ERR
Group error LED colour	red

Ambient Conditions

Ambient temperature °C	-40 °C ... 75 °C
Ambient temperature °F	-40°F ... +167°F
Storage temperature °C	-40 °C ... 80 °C
Storage temperature °F	-40°F ... +176°F
Max. operating altitude	< 2000 m
Max. operating altitude	2000 m
Max. relative humidity	95% (without condensation)
Max. relative humidity	95 %
Shock (semi-sinusoidal)	(IEC EN 60068-2-27) 15 g (3 shocks per axis and direction)
Vibration (sinusoidal)	(IEC EN 60068-2-6) Frequency range 2 ... 13.2 Hz Amplitude 1 mm (peak value) Frequency range 13.2 ... 100 Hz Acceleration amplitude 0.7 g
Electromagnetic compatibility	Tested to the following standards and regulations: EN 61326-1, IEC 61000-4-1 to 61000-4-6 and 61000-4-11, NAMUR NE 21
Note	(observe operating instructions)

Mechanical Data

Degree of protection (IP) (IEC 60529)	IP20
Module enclosure	Polyamide 6GF
Fire resistance (UL 94)	V2
Pollutant class	Corresponds to G3
Width	96.5 mm
Width, inches	3.8 in
Depth	67 mm
Length	128 mm
Length in inches	5.04 in
Mounting depth in inches	2.64 in

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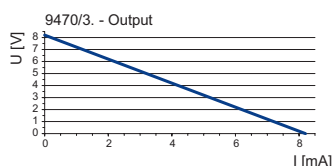
Mechanical Data

Weight	275 g
Weight	0.61 lb

Mounting / Installation

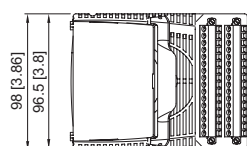
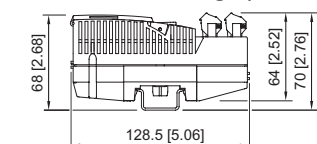
Mounting type	on NS 35/15 DIN rail (DIN EN 60715)
Mounting orientation	Vertical Horizontal

Technical Drawings – Subject to Alterations




Output characteristic

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


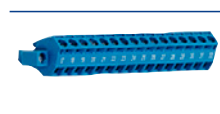
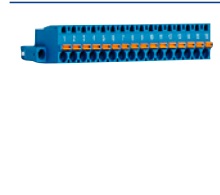


Accessories

Screw terminal with test tap

	Additional connection of contacts also in hazardous areas to enable short-circuit and wire breakage detection. Mounting on DIN rail.	Art. No. 272381
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Pluggable terminal

	2.5 mm ² with lock, 16-pin, screw connector, blue, for connecting the field signals to I/O modules, for intrinsically safe field circuits Labelling: 1 to 16 Note: A second terminal is additionally required for I/O module Series 9470 and 9482 Labelling: 17 to 32	Art. No. 162702
	2.5 mm ² with lock, 16-pin, screw connector, blue, for connecting the field signals to I/O modules, for intrinsically safe field circuits Labelling: 17 to 32	Art. No. 162718
	2.5 mm ² with lock, 16-pin, spring clamp connection, blue, for connecting the field signals to I/O modules, for intrinsically safe field circuits, incl. test jacks Labelling: 1 to 16 Note: A second terminal is additionally required for I/O module Series 9470 and 9482 Labelling: 17 to 32	Art. No. 162695

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	2.5 mm ² with lock, 16-pin, spring clamp connection, blue, for connecting the field signals to I/O modules, for intrinsically safe field circuits, incl. test jacks Labelling: 17 to 32	162716
Partition		Art. No.
	For mounting between intrinsically safe and non-intrinsically safe connections between I/O modules to maintain a tight string length of 50 mm	220101
Resistor error message suppression		Art. No.
	The resistors are used to suppress error messages for unused I/O channels Resistance value: 5K6/0.5 W Suitable for: AIM 9468; UMH 9469; DIOM 9470; DIOM 9471; DIOM 9472; DOM 9475 For intrinsically safe circuits (simple apparatus according to EN 60079-11)	244911
Warning label		Art. No.
	"Clean modules only with a damp cloth."	162796
Indicator lamp		Art. No.
	Simple apparatus for intrinsically safe circuits according to EN 60079-11	228026
DIN A4 sheet		Art. No.
	For label plate on I/O modules; 6 plates per sheet; IS Wizard printout; packaging unit = 20 sheets	162832
Labelling strips		Art. No.
	"FB Addr ... Mod No ..." for pluggable terminal, 26 pieces on the sheet	162788
Vibration bracket set		Art. No.
	When installed in environments with extreme vibration (> 0.7 g and max. 4 g), the 9490 vibration brackets may be used as an additional measure and provide mechanical stability for the individual modules. For mounting: All I/O modules, except 9477/12 and 9478 Number of brackets in a set: 8 Screws (item no. 275516) must be ordered separately.	271920
Set of screws		Art. No.
	Set of M5 x 14 screws (self-tapping) for 9490 vibration brackets Number of screws in a set: 25	275516

Spare Parts

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LED indicator lamp for front installation		Art. No.
	for SA front installation	274899



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