

# Remote I/O

## Remote I/O IS1+ Digital input/output module for Zone 1 Ex i

9470/32-16-10 Art. No. 296152



- 16 channels can be used in pairs as inputs or outputs
- Intrinsically safe Ex ia IIC inputs/outputs with line fault monitoring and an LED fault and status display for each channel
- Module in Zone 1 can be replaced without having to disconnect the power supply (i.e. hot-swapped)

MY R. STAHL 9470C



The 9470/32 digital input/output module for Zone 1 has 16 channels which can be used in pairs for Ex i operation as inputs for contacts and NAMUR proximity switches (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)	1, 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 ia [ia Ga] IIC T4 Gb
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 2 (1) G Ex ia [ia Ga] IIC T4 Gb
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	IS, Class I, Div. 1, Groups A,B,C,D; Class I, Zone 1, AEx/Ex 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 6 031 001 1
Certificates	ATEX (DEK), Brazil (ULB), Canada (FM), China (NEPSI), IECEX (DEK), India (PESO), USA (FM)
Ship approval	ABS, BVIS, EU RO MR (DNV), KR, LR
Declaration of Conformity	ATEX (EUK), China (CCC)
Installation	In Zone 1, Zone 2 and safe areas
Further information	For additional combinations (4, 8 and 16 channels), see the operating instructions and certificate.

#### Safety Data

Max. voltage $U_o$	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	
	$C_o$ [ $\mu$ 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	
	$C_o$ [ $\mu$ 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		
	$C_o$ [ $\mu$ 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	
	$C_o$ [ $\mu$ 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 <sup>2</sup> , screw type 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	$\geq 1500$ V AC
I/O module / I/O module	$\geq 500$ V AC
I/O channels/system components	$\geq 500$ V AC
I/O channels / ground (PA)	$\geq 500$ 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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for Zone 1 Ex i

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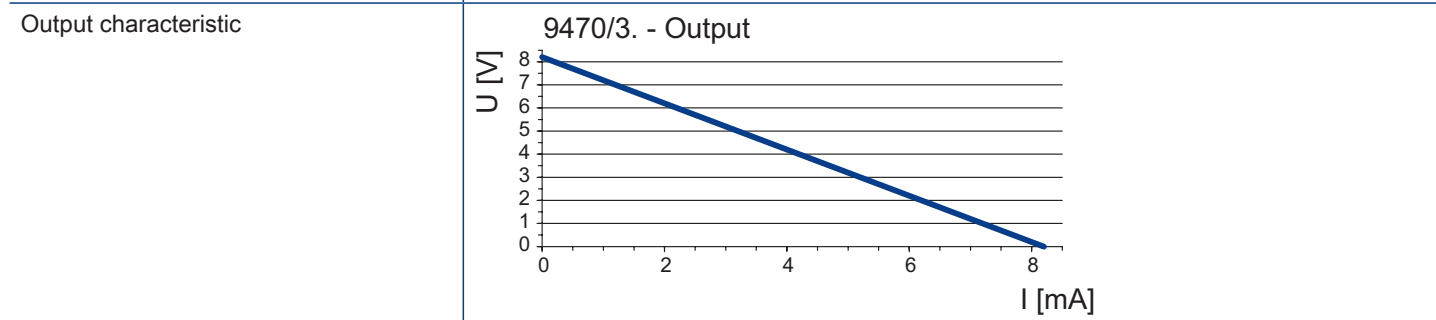


### Input

Max. OFF input signal	1.2 mA			
Operating point	1.65 mA			
Supply voltage	8.2 V			
Internal resistance	1 k $\Omega$			
Signal input	EN 60947 input (NAMUR)			
Function	Up/down counter Frequency with direction			
Max. number of counter inputs	8			
Counting range	0 ... 65535 as UINT16			
Max. number of frequency inputs	8			
Min. pulse width	25 $\mu$ s			
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%
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 k $\Omega$
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	OFF ON
Pulse extension/frequency filter	0 s/off 0.6 s / small 1.2 s / medium 2.4 s / large
Inverting input/output	inverted Normal
Line fault monitoring	OFF ON
Input behaviour in case of error	Replacement value "0" Hold (initial value 0) Hold (initial value 1) Replacement value "1"
Counter/frequency operating mode	0.1 to 600 Hz 1 Hz to 20 kHz 1 Hz to 20 kHz with direction 1 Hz to 3 kHz 16-bit counter 16-bit up/down counter 32-bit up/down counter
Counter control	Reset Run Stop
Count	Negative slope Positive 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 conditions LED designation	RUN
Operating conditions LED colour	green
LED channel error	without
LED channel status	without

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### Device Specific Data

Channel status LEDs	No
Retrievable parameters	Hardware revision Manufacturer Serial number Software revision Type
Signal status bit	"0" = High-impedance output "1" = Output supplied with power
Wire breakage input	< 50 µA
Short circuit input	< 100 ohm
Wire breakage output	< 50 µA
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 kΩ in series and 10 kΩ 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	-40 °C ... 75 °C
Ambient temperature	-40°F ... +167°F
Storage temperature	-40 °C ... 80 °C
Storage temperature	-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 to 13.2 Hz Amplitude 1 mm (peak value) Frequency range 13.2 to 100 Hz Acceleration amplitude 0.7 g
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
Weight	275 g

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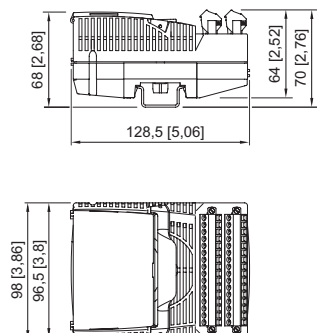
### Mechanical Data

Weight	0.61 lb
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### Mounting / Installation

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

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



### Accessories

Pluggable terminal		Art. No.
	2.5 mm <sup>2</sup> 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	162702
	2.5 mm <sup>2</sup> 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	162718
	2.5 mm <sup>2</sup> 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	162695
	2.5 mm <sup>2</sup> 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

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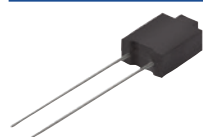
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### Resistor error message suppression

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.

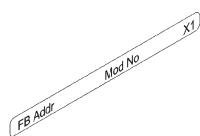


For label plate on I/O modules; 6 plates per sheet;  
IS Wizard printout; packaging unit = 20 sheets

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

### LED indicator lamp for front installation

Art. No.



for SA front installation

274899

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