

Remote I/O

Remote I/O IS1+ Digital input-output module

For Zone 1 Ex i

9470/32-16-11 Art. No. 210447



- Sixteen channels can be used in pairs as inputs or outputs
- Intrinsically safe Ex ia IIC inputs/outputs with line fault monitoring and LED error and status indication for each channel
- Module in Zone 1, Cl. I, II, Div. 1 can be hot swapped

WebCode 9470C



The 9470/32 series digital input/output module for Zone 1, Cl. I, II, Div. 1 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)	1 2
Ex interface zone	0 1 2 20 21 22
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 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
Certificate FMus	FM17US0332X
Certificate cFM	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
EAC certificate	TS RU S-DE.GB04.B.00448
EAC gas explosion protection	⊕ 1 Ex ia [ia Ga] IIC T4 Gb X
EAC dust explosion protection	⊕ [Ex ia Da] IIIC
Certificates	ATEX (DEK), Brazil (ULB), Canada (FM), EAC (ENDCE), IECEX (DEK), India (PESO), Korea (KTL), USA (FM)

Remote I/O

Remote I/O IS1+ Digital input-output module

For Zone 1 Ex i

9470/32-16-11 Art. No. 210447



Explosion Protection

Ship approval	EU RO MR
Notes	CCC certificate available from 2021 onward
Installation	in Zone 1, Zone 2, Cl. I, Div. 1, 2 and in safe areas
Further information	For further interconnections (4, 8 or 16 channels), see operating instructions and certificates.

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 L_i	Negligible													
Max. connectable inductance L_o / capacity 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 channels in parallel														
Max. current I_o (Ex ia)														
Max. power P_o (Ex ia)														
Max. internal capacity (2 channels)														
IIB/IIIC	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		
	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	(adjustable parameters in pairs) 16 Ex i inputs/outputs
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 isolation	According 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

Remote I/O

Remote I/O IS1+ Digital input-output module

For Zone 1 Ex i

9470/32-16-11 Art. No. 210447



Galvanic Isolation

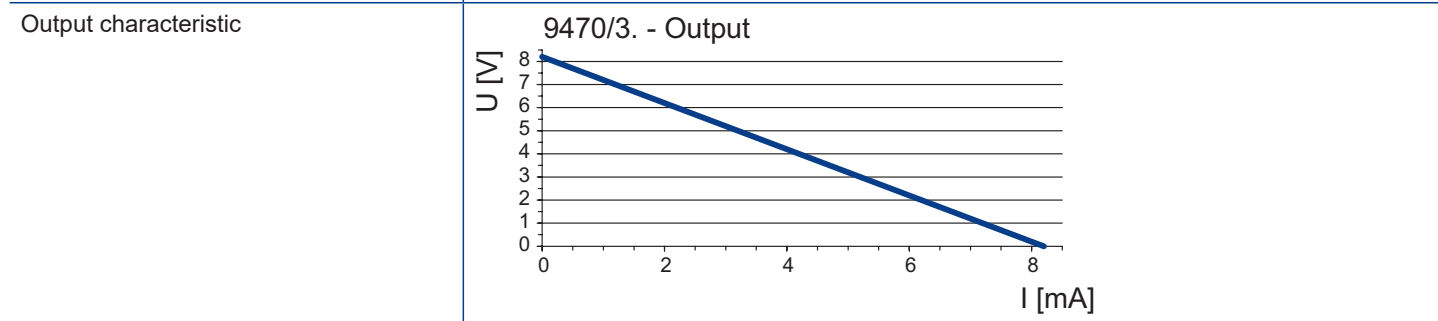
I/O channels / ground (PA)	≥ 500 V AC
	The inputs of an I/O module have a shared minus conductor.

Input

Number of inputs	16			
Min. ON input signal	2.1 mA			
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	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 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 ... 600 Hz	1 Hz ... 3 kHz*	1 Hz ... 20 kHz
	Resolution	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 two inputs switched in parallel)		

Output

Max. number of outputs	16
Application	Ex i low-power solenoid valves
Output current max.	8.2 mA
Internal resistance of outputs	1 kΩ
Output rated operation	6 V / 2 mA
Open-circuit voltage U_a	8.2 V



Remote I/O
 Remote I/O IS1+ Digital input-output module
 For Zone 1 Ex i
 9470/32-16-11 Art. No. 210447



Signal transmission	Max. delay from signal / internal bus				
	Max. delay from frequency input / internal bus				
	Filter	without	small	medium	large
	Frequency				
	$0,1 \text{ Hz} \leq f < 1 \text{ Hz}$	$1/f + 1 \text{ ms}$	$2/f$	$3/f$	$6/f$
	$1 \text{ Hz} \leq f < 10 \text{ Hz}$	$1/f + 1 \text{ ms}$	$4/f$	$9/f$	$18/f$
	$10 \text{ Hz} \leq f < 100 \text{ Hz}$	$1/f + 1 \text{ ms}$	$8/f$	$27/f$	$54/f$
	$100 \text{ Hz} \leq f < 1 \text{ k Hz}$	$1/f + 1 \text{ ms}$	$16/f$	$81/f$	$162/f$
	$1 \text{ kHz} \leq f < 1960 \text{ Hz}$	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	Output Input
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	0.1 ... 600 Hz 1 Hz ... 20 kHz 1 Hz ... 20 kHz with direction 1 Hz ... 3 kHz 16-bit counter 16-bit up/down counter 32-bit up/down counter
Counter control	Stop Run Reset
Count	Negative slope Positive slope
LED module requires maintenance	"M/S" LED, blue
LED operating conditions	"RUN" LED, green
LED group error	"ERR" LED, red
LED channel error	LED for each channel, red
LED channel status	LED per channel, yellow

Remote I/O

Remote I/O IS1+ Digital input-output module

For Zone 1 Ex i

9470/32-16-11 Art. No. 210447



Device Specific Data

Retrievable parameters	Type Software revision Serial number Hardware revision Manufacturer
Signal status bit	"0" = High-impedance output "1" = Output supplied with power
Wire breakage input	< 50 μ A
Short circuit input	< 50 μ A
Wire breakage output	< 100 Ω
Output short circuit	< 100 Ω
Short-circuit detection	Only possible when ON
Short circuit input/output Note	Contacts require circuitry with 1.2 k Ω in series and 15 k Ω in parallel for wire breakage/short-circuit detection. For outputs, wire breakage/short-circuit detection is only possible in the ON state.

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. relative humidity	95% (without condensation)
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, 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 inches	5.04 in
Mounting depth inches	2.64 in
Weight	0.275 kg
Weight	0.61 lb

Mounting / Installation

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

Remote I/O

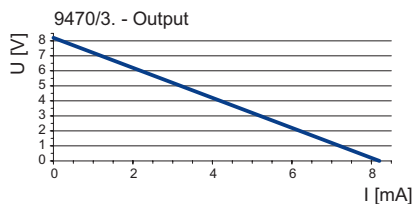
Remote I/O IS1+ Digital input-output module

For Zone 1 Ex i

9470/32-16-11 Art. No. 210447

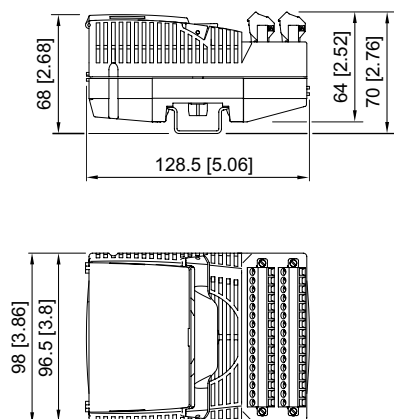


Technical Drawings – Subject to Alterations



Output characteristic

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



Remote I/O





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For Zone 1 Ex i

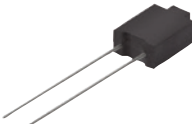
9470/32-16-11 Art. No. 210447




Accessories


Pluggable terminal		Art. No.
	2.5 mm ² with lock, 16-pole, screw connector, blue, for connecting the field signals to I/O modules, for intrinsically safe field circuits Labelling: 1 ... 16 Attention: An additional terminal is necessary for I/O module Series 9470 and 9482. Labelling: 17 ... 32	162702
	2.5 mm ² with lock, 16-pole, screw connector, blue for connecting the field signals to I/O modules, for intrinsically safe field circuits Labelling: 17 ... 32	162718
	2.5 mm ² with lock, 16-pole, spring clamp connection, blue, for connecting the field signals to I/O modules, for intrinsically safe field circuits, incl. test jacks Labelling: 1 ... 16 Attention: An additional terminal is necessary for I/O module Series 9470 and 9482. Labelling: 17 ... 32	162695
	2.5 mm ² with lock, 16-pole, spring clamp connection, blue for connecting the field signals to I/O modules, for intrinsically safe field circuits, incl. test jacks Labelling: 17 ... 32	162716

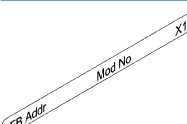
Partition		Art. No.
	For mounting between intrinsically safe and non-intrinsically safe connections of the I/O modules, in order to adhere to the required 50 mm distance	220101

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

Spare Parts

Indicator lamp		Art. No.
	Single electrical equipment for intrinsically safe circuits according to EN 60079-11	228026

Warning sign		Art. No.
	"Clean modules only with a damp cloth."	162796

Labelling strips		Art. No.
	"FB Addr ... Mod No ..." for pluggable terminal, 26 pieces on the sheet	162788

Remote I/O

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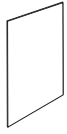
For Zone 1 Ex i

9470/32-16-11 Art. No. 210447



DIN A4 sheet

Art. No.



For the label plate on I/O modules, 6 labels per sheet
Print IS Wizard, packaging unit = 20 sheets

162832

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