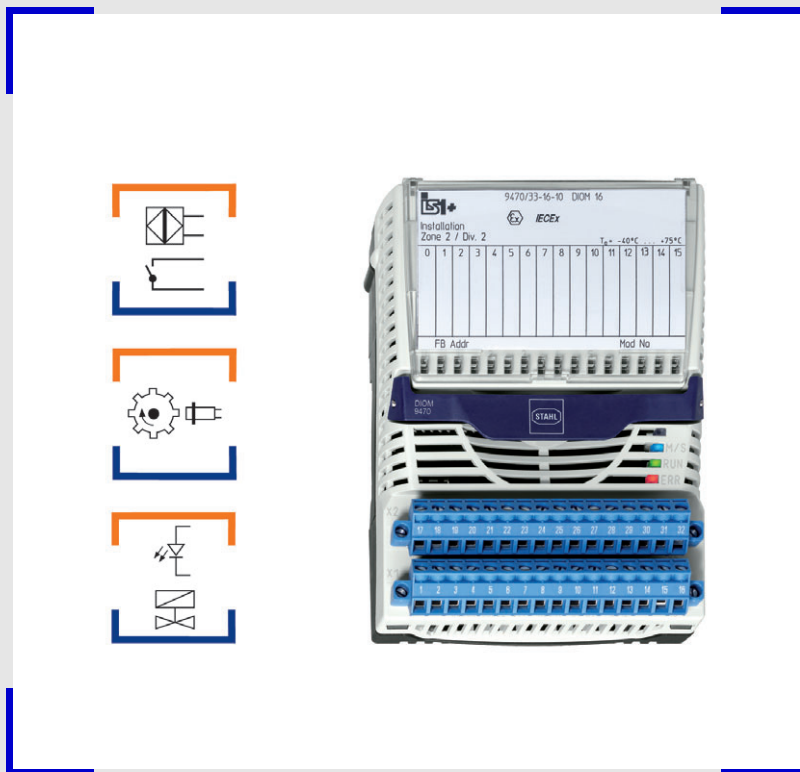


# Digital Input Output Module for Zone 2

## Series 9470/33



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15233E00

- > 16 channels can be adjusted in pairs as digital input or output
- > Intrinsically safe inputs/outputs Ex ia
- > For contacts, NAMUR proximity switches and low-power solenoid valves
- > Up to 8 channels can be used as frequency/counter input; with rotation direction recognition
- > Line fault monitoring per channel
- > Diagnostics based on NE107
- > Module can be replaced in the hazardous area under power (hot swap)



A4

The Digital Input Output Module is used for connecting of up to 16 intrinsically safe digital signals to the IS1 Remote I/O system. All channels can be parameterised in pairs as input for connection of passive contacts or NAMUR proximity switches (EN 60947-5-6) or as output for connection of low power solenoid valves.

Up to 8 inputs can be used as frequency inputs or counters up to 20 kHz, in operating mode "Rotation direction recognition" and "Forward/backward counter" up to 4 inputs. The Ex i inputs or outputs are short-circuit proof and galvanically separated from the system.



Compatible spare for IS1 I/O modules:  
Series 9470/12, 9470/22, 9475/12-08-41

	ATEX / IECEx						NEC 505						NEC 506						NEC 500					
	0	1	2	20	21	22	Zone	0	1	2	20	21	22	Division	1	2	1	2	1	2				
Ex interface	x	x	x	x	x	x	Ex interface	x	x	x	x	x	x	Ex interface	x	x	x	x	x	x				
Installation in			x		x	x	Installation in			x		x	x	Installation in		x		x		x				

WebCode 9470D

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### Explosion Protection

#### Global (IECEX)

Gas and dust	IECEX DEK 12.0044X Ex nA ia [ia Ga] IIC T4 Gc [Ex ia Da] IIIC
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#### Europe (ATEX)

Gas and dust	DEKRA 12ATEX0099X II 3 (1) G Ex nA ia [ia Ga] IIC T4 Gc II (1) D [Ex ia Da] IIIC
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#### USA (FM)

in preparation

### Certifications and certificates

Certificates	ATEX, IECEX, Brazil (INMETRO), Canada (cFM), Rusia (GOST R), USA (FM), Belarus (operating authorisation)
Ship approval	ABS, BV, ClassNK, DNVGL, LR, RS

### Further parameters

Installation	in Zone 2, Zone 21, Zone 22 and in the safe area
Further information	for further interconnections (4, 8 or 16 channels), see operating instructions and certificates

### Safety data

Max. voltage $U_o$	9.8 V												
Max. internal inductance $L_i$	negligible												
1 channel													
Max. current $I_o$	10.4 mA												
Max. power $P_o$	25.5 mW												
Max. internal capacity $C_i$	2.5 nF												
Max. connectable inductance $L_o$ / capacity $C_o$													
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 channels in parallel													
Max. current $I_o$	20.8 mA												
Max. power $P_o$	51 mW												
Max. internal capacity $C_i$	5 nF												
Max. connectable inductance $L_o$ / capacity $C_o$													
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

### Selection Table

Version	Description	Installation	Order number	Weight kg
Digital Input Output Module	16 channels with adjustable parameters for contacts, NAMUR proximity switches or low-power solenoid valves	Zone 2	9470/33-16-10	0.275
Note	Please order 2 terminals separately - see Accessories			

**Technical Data**

**Electrical data**

Ex i inputs/outputs

Number of channels 16 (in pairs with adjustable parameters as input or output)

Inputs

Max. number of channels 16  
Min. input signal ON 2.1 mA  
Max. input signal OFF 1.2 mA  
Operating point 1.65 mA  
Supply voltage 8.2 V  
Internal resistance 1 kΩ  
Signal EN 60947-5-6 (NAMUR)

Frequency input

Max. number of channels 8  
Max. switching frequency 20 kHz (at frequencies > 1 kHz the maximum conductor length is reduced, e.g. at 5 kHz to approx. 75 m)  
Min. pulse width 25 μs

Measuring range	0.1 Hz ... 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 %

Counter

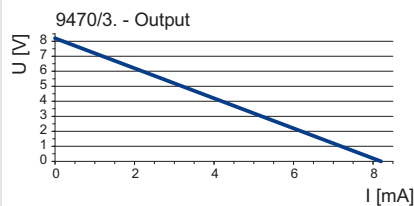
Max. number of channels 8  
Counting range 0 ... 65535 als UINT16

Rotation direction recognition, forward/backward counter

Max. number of channels 4 (each two inputs switched in parallel)  
Function Up/down counter; Frequency with direction  
Resolution 16 bit / 32 bit

Outputs

Max. number of channels 16  
Application Ex i low-power solenoid valves  
Open-circuit voltage 8.2 V  
Max. output current 8.2 mA  
Internal resistance 1 kΩ  
Rated operation 6 V / 2 mA  
Output characteristic



15284E00

Signal transmission

Max. delay from signal / internal bus < 1 ms

Max. delay from frequency input / internal bus

Filter	without	small	medium	large
Frequency				
0.1 Hz ≤ f < 1 Hz	1/f + 1 ms	2/f	3/f	6/f
1 Hz ≤ f < 10 Hz	1/f + 1 ms	4/f	9/f	18/f
10 Hz ≤ f < 100 Hz	1/f + 1 ms	8/f	27/f	54/f
100 Hz ≤ f < 1 kHz	1/f + 1 ms	16/f	81/f	162/f
1 kHz ≤ f < 1960 Hz	1.5 ms	32/f	243/f	486/f
1960 Hz ≤ f < 10 kHz	1.5 ms	16.5 ms	124 ms	248 ms
10 kHz ≤ f < 20 kHz	1.5 ms	33 ms	372 ms	744 ms
f ≥ 20 kHz	1.5 ms	66 ms	372 ms	744 ms

# Digital Input Output Module for Zone 2

## Series 9470/33



### Technical Data

#### Electrical data

Galvanic separation	
Test voltage	
acc. to standard	EN 60079-11
Between auxiliary power/ system components	≥ 1500 V AC
Between two I/O modules	≥ 500 V AC
Between I/O channels/ system components	≥ 500 V AC
Between I/O channels/ ground (PA)	≥ 500 V AC
Electromagnetic compatibility	Tested to the following standards and regulations: EN 61326-1 (2006) IEC 61000-4-1 ... 6, NAMUR NE 21
Electrical connection	
Power supply	BusRail Types 9494
Ex i field signals	Pluggable, blue terminals, 16-pole, 2.5 mm <sup>2</sup> , screw- or spring-type versions with lock
Auxiliary power	
Version	Intrinsically safe Ex ia via BusRail
Max. current consumption	120 mA
Max. power consumption	2.5 W
Max. power dissipation	2.5 W

#### Device-specific data

Settings	
Module	
Diagnostics message	ON / OFF
Signal	
Signal type	Input / output*)
Pulse extension / frequency filter	0 s / off; 0.6 s / small; 1.2 s / medium; 2.4 s / large *)
Inverting input/output	normal / inverted*)
Line fault monitoring	ON / OFF
Behaviour in case of error	Replacement value '0'; replacement value '1'; hold (initial value 0); hold (initial value 1)
Operating mode counter/ frequency	Counter 16 bit; 0.1 ... 600 Hz; 1 Hz ... 3 kHz; 1 Hz ... 20 kHz; 1 Hz ... 20 kHz with direction; up/down counter 16 bit; up/down counter 32 bit*)
Counter control	Run, Stop, Reset
Counting event	positive slope; negative slope*)
	*) setting is made for channel pairs

#### Ambient conditions

Ambient temperature	-40 ... +75 °C (observe operating instructions)
Storage temperature	-40 ... +80 °C
Maximum relative humidity	95 % (without condensation)
Semi-sinusoidal shock (IEC EN 60068-2-27)	15 g (3 shocks per axis and direction)
Sinusoidal vibration (IEC EN 60068-2-6)	1 g in the frequency range 10 ... 500 Hz 2 g in the frequency range 45 ... 100 Hz

#### Mechanical data

Degree of protection (IEC 60529)	IP20
Module enclosure	polyamide 6GF
Fire resistance (UL 94)	V2
Pollutant class	corresponds to G3
Dimensions	L = 128 mm, W = 96.5 mm, H = 67 mm

# Digital Input Output Module for Zone 2

## Series 9470/33



### Technical Data

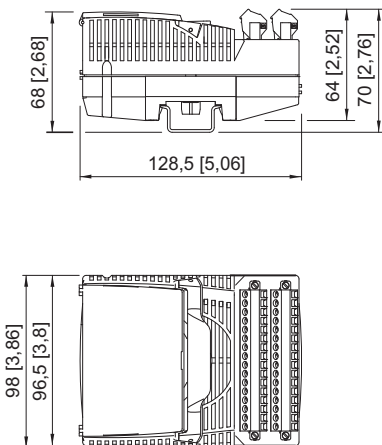
#### Indication

LED indication	
Module requires maintenance	LED "M/S", blue
Operating state	LED "RUN", green
Group error	LED "ERR", red
Function indication	
Retrievable parameters	Manufacturer, Type, hardware revision, software revision, serial number
Error indication	
Module status and alarms	<ul style="list-style-type: none"> <li>• Internal bus error primer / redundant</li> <li>• No response from IOM</li> <li>• Configuration does not correspond to the module</li> <li>• Hardware error</li> <li>• Excess temperature</li> <li>• Slot error</li> <li>• Module requires maintenance</li> </ul>
Signal errors for each channel	
Signal status bit	"0" = signal disturbed; "1" = signal valid
Wire breakage input/output	< 50 $\mu$ A
Short circuit input/output	< 100 $\Omega$ Note: Contacts require circuitry with 1.2 k $\Omega$ in series and 15 k $\Omega$ in parallel for wire breakage/short-circuit detection. For outputs, wire breakage/short-circuit detection is only possible in the ON state.

#### Mounting / Installation

Mounting orientation	horizontal or vertical (observe operating instructions)
Mounting type	on 35 mm DIN rail NS 35/15 (DIN EN 60715)

#### Dimensional drawings (all dimensions in mm / inches) - subject to modifications





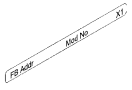
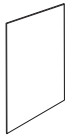


15254E00

## Digital Input Output Module for Zone 2

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#### Accessories and Spare Parts

Designation	Figure	Description	Art. no.
Pluggable terminal	 02079E00	2.5 mm <sup>2</sup> 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 9480. Designation: 17 ... 32	<b>162702</b>
		2.5 mm <sup>2</sup> with lock, 16-pole, screw connector, blue, for connecting the field signals to I/O modules, for intrinsically safe field circuits Labelling: 17 ... 32	<b>162718</b>
	 02077E00	2.5 mm <sup>2</sup> 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 9480. Designation: 17 ... 32	<b>162695</b>
		2.5 mm <sup>2</sup> 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	<b>162716</b>
Labelling strips	 05869E00	"FB Addr ... Mod No ..." for pluggable terminal, sheet with 26 strips	<b>162788</b>
DIN A4 sheet	 09900E00	For label plate on I/O modules; 6 labels on each sheet; print-out using IS Wizard; packaging unit = 20 sheets	<b>162832</b>
Partition	 15196E00	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	<b>220101</b>
Warning sign	 05872E00	"Clean modules only with a damp cloth."	<b>162796</b>

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.