

Remote I/O

IS1+ Remote I/O 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
- Module in Zone 1, Cl. I, II, Div. 1 can be hot swapped

MY R. STAHL 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 [ja 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 [ja 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 [ja] 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), Korea (KTL), 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, Cl. I, Div. 1, 2 and in safe areas |

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Explosion Protection

| | |
|---------------------|--|
| 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 | 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 | (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 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. |

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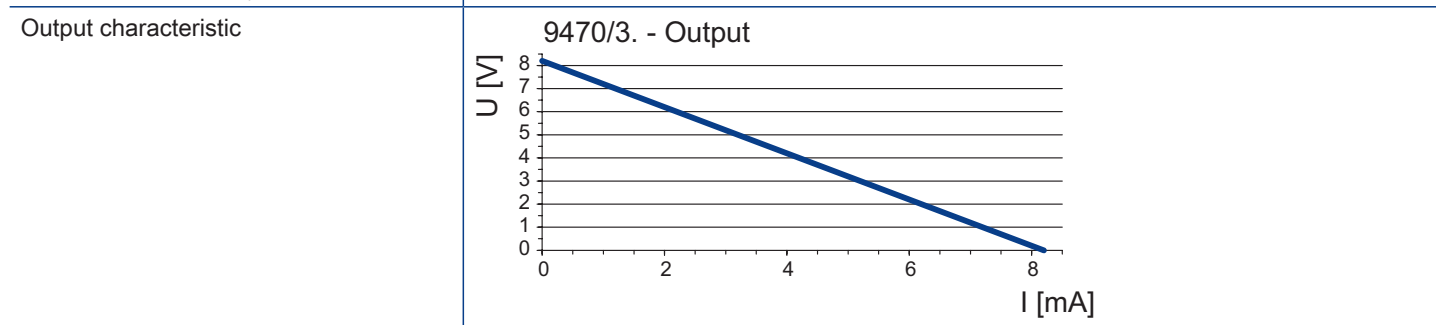


Input

| | | | | |
|--|---|---|-------------------|----------------|
| 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 k Ω | | | |
| 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 μ 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% * Default | 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 Ω |
| 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 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 | |

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 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 | Stop Run Reset |
| Count | Negative slope Positive slope |
| LED module requires maintenance | "M/S" LED, blue |
| LED operating conditions | "RUN" LED, green |
| LED channel error | LED for each channel, red |
| LED channel status | LED per channel, yellow |
| Channel status LEDs | Yes |

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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 | < 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 |
|-----------------|----------------|

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 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, inches | 5.04 in |
| Mounting depth, inches | 2.64 in |
| Weight | 275 g |
| Weight | 0.61 lb |

Mounting / Installation

| | |
|---------------|-------------------------------------|
| Mounting type | on NS 35/15 DIN rail (DIN EN 60715) |
|---------------|-------------------------------------|

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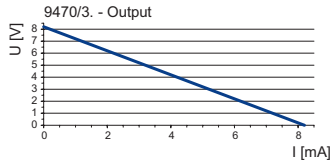
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Mounting / Installation

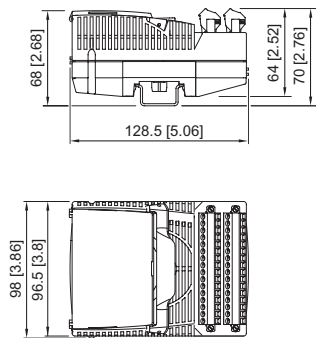
| | |
|----------------------|------------------------|
| Mounting orientation | Horizontal Vertical |
|----------------------|------------------------|

Technical Drawings – Subject to Alterations



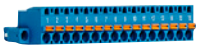
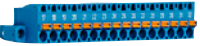



Output characteristic

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



Accessories

| Pluggable terminal | | Art. No. |
|--|---|----------|
|  | 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 | 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 | 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 | 162695 |
|  | 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 |

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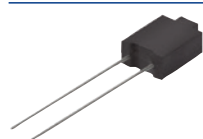
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Resistor error message suppression

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.

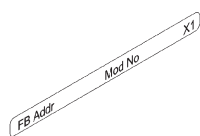


For label plate on I/O modules; 6 plates per sheet;
IS Wizard printout; packaging unit = 20 sheets

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

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.