

# MACX MCR-EX-SL-2NAM-RO-SP - Isolation switch amplifier



2924087

<https://www.phoenixcontact.com/gb/products/2924087>

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Ex i NAMUR isolating amplifier, 2-channel. For operating proximity sensors and switches in Ex areas. The signals are transmitted via relay outputs (N/O contact) to the safe area. Line fault detection (LFD), 3-way isolation, SIL 2.

## Your advantages

- Power supply and error indication possible via DIN rail connector
- Up to SIL 2 in accordance with EN 61508
- Installation in zone 2, protection type "n" (EN 60079-15) permitted
- Line fault detection (LFD), can be activated/deactivated, error indicated by flashing red LED with de-excitation of output relay
- LED indicators for supply voltage, switching state, and malfunction in accordance with NAMUR NE 44
- 3-way electrical isolation
- Direction of operation can be selected (operating or closed circuit current behavior)
- Relay signal output (N/O contact)
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- 2-channel

## Commercial data

|                                      |                                |
|--------------------------------------|--------------------------------|
| Item number                          | 2924087                        |
| Packing unit                         | 1 pc                           |
| Minimum order quantity               | 1 pc                           |
| Note                                 | Made to order (non-returnable) |
| Sales key                            | DK1213                         |
| Product key                          | DK1213                         |
| GTIN                                 | 4046356338042                  |
| Weight per piece (including packing) | 181.9 g                        |
| Weight per piece (excluding packing) | 141.5 g                        |
| Customs tariff number                | 85365019                       |
| Country of origin                    | DE                             |

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## Technical data

### Product properties

|                 |                            |
|-----------------|----------------------------|
| Product type    | Isolating switch amplifier |
| Product family  | MACX Analog                |
| Application     | Digital IN                 |
| No. of channels | 2                          |
| Configuration   | DIP switches               |

### System properties

#### Functionality

|               |              |
|---------------|--------------|
| Configuration | DIP switches |
|---------------|--------------|

### Electrical properties

|   |                 |
|---|-----------------|
| Electrical isolation                            | 3-way isolation |
| Electrical isolation between input and output   | yes             |
| Maximum power dissipation for nominal condition | < 1 W           |

#### Electrical isolation Input/output IEC/EN 60079-11

|                          |                     |
|--------------------------|---------------------|
| Standards/regulations    | IEC/EN 60079-11     |
| Rated insulation voltage | 375 V <sub>PP</sub> |
| Overvoltage category     | III                 |
| Pollution degree         | 2                   |

#### Electrical isolation Input/supply, DIN rail connector IEC/EN 60079-11

|                          |                     |
|--------------------------|---------------------|
| Standards/regulations    | IEC/EN 60079-11     |
| Rated insulation voltage | 375 V <sub>PP</sub> |
| Overvoltage category     | II                  |
| Pollution degree         | 2                   |

#### Electrical isolation Input/supply, DIN rail connector IEC/EN 61010-1

|                          |                      |
|--------------------------|----------------------|
| Standards/regulations    | IEC/EN 61010-1       |
| Rated insulation voltage | 300 V <sub>rms</sub> |
| Overvoltage category     | II                   |
| Pollution degree         | 2                    |
| Insulation               | Safe isolation       |

#### Electrical isolation Output 1/output 2/input, power supply, DIN rail connector IEC/EN 61010-1

|                          |                      |
|--------------------------|----------------------|
| Standards/regulations    | IEC/EN 61010-1       |
| Rated insulation voltage | 300 V <sub>rms</sub> |
| Overvoltage category     | III                  |
| Pollution degree         | 2                    |
| Insulation               | Safe isolation       |

#### Electrical isolation Output 1/output 2/input/power supply, DIN rail connector

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|                      |                         |
|----------------------|-------------------------|
| Test voltage         | 2.5 kV AC (50 Hz, 60 s) |
| Overvoltage category | III                     |
| Pollution degree     | 2                       |

## Supply

|                          |                         |
|--------------------------|-------------------------|
| Nominal supply voltage   | 24 V DC -20 % ... +25 % |
| Supply voltage range     | 19.2 V DC ... 30 V DC   |
| Max. current consumption | 35 mA (24 V DC)         |
| Power dissipation        | < 1 W                   |
| Power consumption        | < 1 W                   |

## Input data

Signal: NAMUR

|   |   |
|---|---|
| Description of the input                | intrinsically safe  |
| Number of inputs                        | 2   |
| Available input sources                 | NAMUR proximity sensors (IEC/EN 60947-5-6)<br>floating switch contacts<br>Switch contacts with resistance circuit |
| Input signal                            | NAMUR   |
| Switching threshold "0" signal current  | < 1.2 mA (blocking)   |
| Switching threshold "1" signal, current | > 2.1 mA (conductive)   |
| Short-circuit current                   | 8 mA  |
| Switching hysteresis                    | < 0.2 mA  |
| Line fault detection                    | < 0.05 mA ... 0.35 mA (Line break)<br>< 100 Ω ... 360 Ω (Short circuit)<br>Activated /deactivated via DIP switch  |
| Open-circuit voltage                    | 8 V DC  |

## Output data

Switching: Relay

|                           |   |
|---------------------------|---|
| Contact switching type    | 1 N/O contact per channel                           |
| Contact material          | AgSnO <sub>2</sub> , hard gold-plated               |
| Maximum switching voltage | 250 V AC (2 A)<br>120 V DC (0.2 A)<br>30 V DC (2 A) |
| Maximum switching power   | 500 VA  |
| Recommended minimum load  | 5 V / 10 mA   |
| Switching frequency       | ≤ 20 Hz (without load)                              |

Signal

|                   |   |
|-------------------|---|
| Number of outputs | 2 |
|-------------------|---|

## Connection data

|                   |                    |
|-------------------|--------------------|
| Connection method | Push-in connection |
|-------------------|--------------------|

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|   |   |
|---|---|
| Stripping length  | 10 mm   |
| Conductor cross-section rigid   | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>   |
| Conductor cross-section flexible  | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>   |
| Conductor cross-section flexible (2 conductors with same cross section) | 0.25 mm <sup>2</sup> ... 0.34 mm <sup>2</sup> (TWIN ferrule without plastic sleeve) |
|   | 0.5 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> (TWIN ferrule with plastic sleeve)      |
| Conductor cross-section AWG   | 24 ... 14   |
|   | 24 ... 22 (TWIN ferrule without plastic sleeve)                                     |
|   | 20 ... 16 (TWIN ferrule with plastic sleeve)  |

## Ex data

|                       |          |
|-----------------------|----------|
| Ex installation (EPL) | Gc       |
|                       | Div. 2   |
| Ex i circuits (EPL)   | [Ga]     |
|                       | [Da]     |
|                       | [Ma]     |
|                       | [Div. 1] |

## Safety data

|  |  |
|--|--|
| Max. internal inductance $L_i$   | negligible                                     |
| Max. internal capacitance $C_i$  | 11 nF  |
| Max. output voltage $U_o$  | 9.6 V  |
| Max. output current $I_o$  | 10 mA  |
| Max. output power $P_o$  | 25 mW  |
| Safety-related maximum voltage $U_m$   | 253 V AC                                       |
|  | 125 V DC                                       |
| I/A/I (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$          | 1000 mH / 210 $\mu$ F                          |
| IIB/IIIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$       | 1000 mH / 26 $\mu$ F                           |
| IIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$            | 300 mH / 3.6 $\mu$ F                           |
| IIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$             | 100 mH / 500 nF, 50 mH / 570 nF, 5 mH / 590 nF |
| I/IIIB/IIA/IIIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$ | 100 mH / 1 $\mu$ F                             |

## Interfaces

### Data

|                 |   |
|-----------------|---|
| No. of channels | 0 |
|-----------------|---|

## Signaling

|                |                              |
|----------------|------------------------------|
| Status display | Green LED (supply voltage)   |
|                | LED yellow (switching state) |
|                | Red LED (line errors)        |

## Dimensions

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|                     |  |
|---------------------|--|
| Dimensional drawing |  |
| Width               | 12.5 mm  |
| Height              | 107.9 mm   |
| Depth               | 113.7 mm   |
| Depth NS 35/7,5     | 114.5 mm (Snapped onto DIN rail NS 35/7,5 in accordance with EN 60715) |

## Material specifications

|  |                 |
|--|-----------------|
| Color  | gray (RAL 7042) |
| Flammability rating according to UL 94 (Housing) | V0 (Housing)    |
| Housing material                                 | PA 6.6-FR       |

## Environmental and real-life conditions

### Ambient conditions

|   |   |
|---|---|
| Degree of protection                    | IP20 (not assessed by UL)   |
| Ambient temperature (operation)         | -40 °C ... 60 °C (Any mounting position)<br>-40 °C ... 70 °C (Derating) |
| Ambient temperature (storage/transport) | -40 °C ... 80 °C  |
| Permissible humidity (operation)        | 10 % ... 95 % (non-condensing)  |

### Altitude range ( $\leq 2000$ m)

|                                 |   |
|---------------------------------|---|
| Altitude                        | $\leq 2000$ m (The technical data refers to altitudes $\leq 2000$ m above mean sea level. For altitudes $>2000$ m above mean sea level, refer to the data sheet.) |
| Ambient temperature (operation) | -40 °C ... 60 °C<br>-40 °C ... 70 °C (Derating)   |
| Rated insulation voltage        | 253 V AC (Power supply, input / output)<br>125 V DC (Power supply, input / output)  |

### Altitude range ( $\leq 3000$ m)

|                                 |  |
|---------------------------------|--|
| Height range                    | $> 2000$ m ... 3000 m  |
| Ambient temperature (operation) | -40 °C ... 54 °C<br>-40 °C ... 63 °C (Derating)                                    |
| Rated insulation voltage        | 190 V AC (Power supply, input / output)<br>110 V DC (Power supply, input / output) |

### Altitude range ( $\leq 4000$ m)

|                                 |   |
|---------------------------------|---|
| Height range                    | $> 3000$ m ... 4000 m                           |
| Ambient temperature (operation) | -40 °C ... 48 °C<br>-40 °C ... 56 °C (Derating) |

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|                                 |   |
|---------------------------------|---|
| Rated insulation voltage        | 60 V AC/DC (Power supply, input / output) |
| Altitude range ( $\leq 5000$ m) |   |
| Height range                    | > 4000 m ... 5000 m                       |
| Ambient temperature (operation) | -40 °C ... 42 °C                          |
|                                 | -40 °C ... 49 °C (Derating)               |
| Rated insulation voltage        | 60 V AC/DC (Power supply, input / output) |

## Approvals

### CE

|             |              |
|-------------|--------------|
| Certificate | CE-compliant |
| Note        | and EN 61326 |

### ATEX

|                |   |
|----------------|---|
| Identification | Ⓜ II (1) G [Ex ia Ga] IIC               |
|                | Ⓜ II (1) D [Ex ia Da] IIIC              |
|                | Ⓜ II 3 (1) G Ex ec [ia Ga] nC IIC T4 Gc |
|                | Ⓜ I (M1) [Ex ia Ma] I                   |
| Certificate    | IBExU 07 ATEX 1069 X                    |

### IECEX

|                |                            |
|----------------|----------------------------|
| Identification | [Ex ia Ga] IIC             |
|                | [Ex ia Da] IIIC            |
|                | Ex ec [ia Ga] nC IIC T4 Gc |
|                | [Ex ia Ma] I               |
| Certificate    | IECEX IBE 08.0001X         |

### CCC / China-Ex

|                |                            |
|----------------|----------------------------|
| Identification | [Ex ia Ga] IIC             |
|                | [Ex ia Da] IIIC            |
|                | Ex ec nC [ia Ga] IIC T4 Gc |
| Certificate    | 2022122316115975           |

### UL, USA/Canada

|                |   |
|----------------|---|
| Identification | UL 61010 Listed   |
|                | Class I, Div. 2, Groups A, B, C, D T4                                   |
|                | Class I, Div. 2, Groups IIC, IIB, IIA T4                                |
|                | Associated apparatus for use in Class I, Division 1, Groups A,B,C,D     |
|                | Associated apparatus for use in Class II, Div.1 Groups E,F,G            |
|                | Associated apparatus for use in Class III, Division 1                   |
|                | Associated apparatus for use in Class I, Zone 0,1,2, Groups IIC,IIB,IIA |
| Certificate    | Ⓜ-Ⓜ C.D.-No 83104549  |

### KC-s

|                |                 |
|----------------|-----------------|
| Identification | [Ex ia] IIC/IIB |
|----------------|-----------------|

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|             |                |
|-------------|----------------|
| Certificate | 17-KA4BO-0410X |
|-------------|----------------|

## Shipbuilding approval

|             |                   |
|-------------|-------------------|
| Certificate | DNV GL TAA00000AG |
|-------------|-------------------|

## Safety Integrity Level (SIL, IEC 61508)

|                |                       |
|----------------|-----------------------|
| Identification | 2                     |
| Certificate    | IN-AT-AS-MRL-24-00163 |

## Systematic Capability

|                |   |
|----------------|---|
| Identification | 3 |
|----------------|---|

## INMETRO

|                |                            |
|----------------|----------------------------|
| Identification | [Ex ia Ga] IIC             |
|                | [Ex ia Da] IIIC            |
|                | Ex ec nC [ia Ga] IIC T4 Gc |
|                | [Ex ia Ma] I               |
| Certificate    | DNV 18.0114 X              |

## Shipbuilding data

|             |   |
|-------------|---|
| Temperature | B   |
| Humidity    | B   |
| Vibration   | A   |
| EMC         | B   |
| Enclosure   | Required protection according to the Rules shall be provided upon installation on board |

## EMC data

|                               |                                |
|-------------------------------|--------------------------------|
| Electromagnetic compatibility | Conformance with EMC directive |
| Noise immunity                | EN 61000-6-2                   |
|                               | EN 61326                       |

## Noise emission

|                       |              |
|-----------------------|--------------|
| Standards/regulations | EN 61000-6-4 |
|-----------------------|--------------|

## Electromagnetic HF field

|                       |                          |
|-----------------------|--------------------------|
| Designation           | Electromagnetic RF field |
| Standards/regulations | EN 61000-4-3             |
| Evaluation criterion  | A                        |

## Fast transients (burst)

|                       |                         |
|-----------------------|-------------------------|
| Designation           | Fast transients (burst) |
| Standards/regulations | EN 61000-4-4            |
| Evaluation criterion  | A                       |

## Conducted interference

|                       |                         |
|-----------------------|-------------------------|
| Designation           | Conducted interferences |
| Standards/regulations | EN 61000-4-6            |

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|                      |   |
|----------------------|---|
| Evaluation criterion | A |
|----------------------|---|

## Standards and regulations

|                      |                 |
|----------------------|-----------------|
| Electrical isolation | 3-way isolation |
|----------------------|-----------------|

### GB Standard

|                       |             |
|-----------------------|-------------|
| Standards/regulations | GB/T 3836.1 |
|                       | GB/T 3836.3 |
|                       | GB/T 3836.4 |
|                       | GB/T 3836.8 |

## Mounting

|               |                   |
|---------------|-------------------|
| Mounting type | DIN rail mounting |
|---------------|-------------------|

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## Drawings

Dimensional drawing



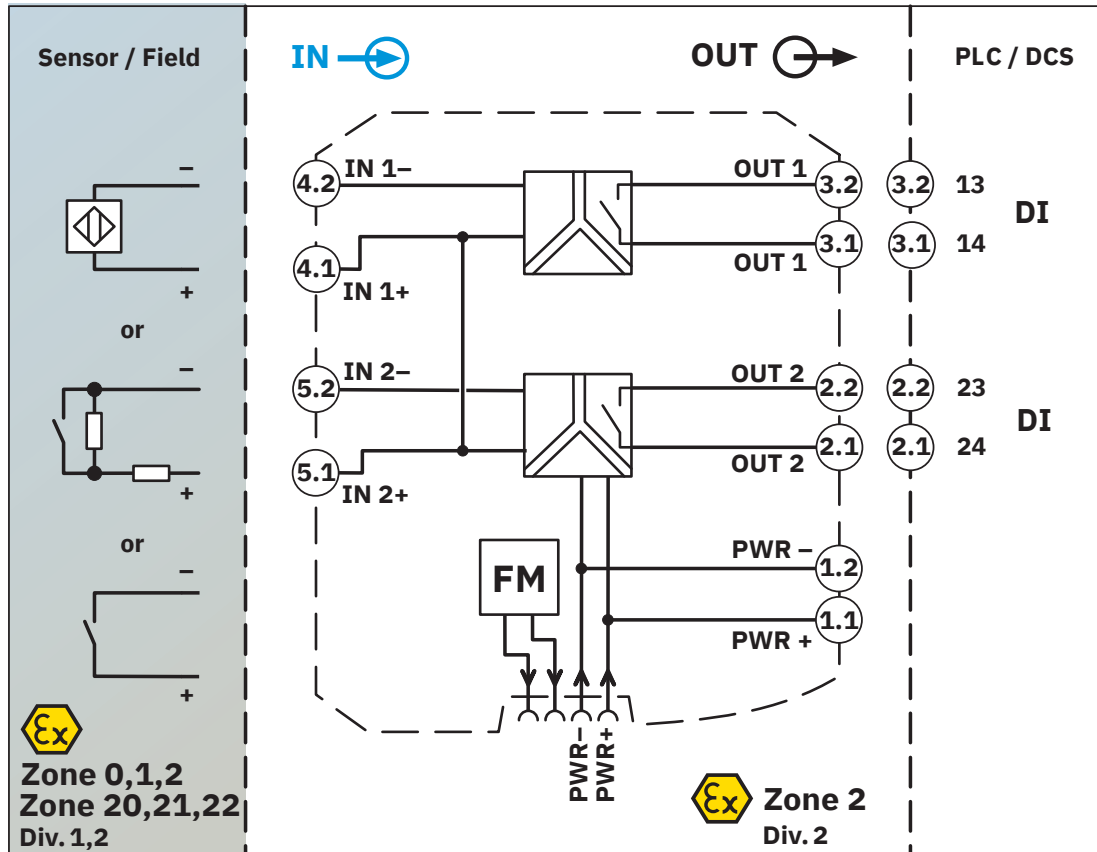
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Block diagram



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## Approvals

To download certificates, visit the product detail page: <https://www.phoenixcontact.com/gb/products/2924087>

 **UL Listed**  
Approval ID: E330267


 **cUL Listed**  
Approval ID: E330267


**Functional Safety**  
Approval ID: 07-06-39 R005 V2R2

**DNV**  
Approval ID: TAA00000AG

**ECAS**  
Approval ID: 163683 E25 08 169506

**TUEV Austria FS**  
Approval ID: IN-AT-AS-24-00163

 **EAC Ex**  
Approval ID: TR TS\_S\_103.01.00078

 **IEC Ex**  
Approval ID: IECEx IBE 08.0001X

 **cUL Listed**  
Approval ID: E199827

 **UL Listed**  
Approval ID: E199827

 **ATEX**  
Approval ID: IBEExU07ATEX1069

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## INMETRO

Approval ID: DNV 18.0114 X



## KC-s

Approval ID: 17-KA4BO-0410X



## CCC

Approval ID: 2022122316115975

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## Classifications

### ECLASS

|             |          |
|-------------|----------|
| ECLASS-13.0 | 27210121 |
| ECLASS-15.0 | 27210121 |

### ETIM

|           |          |
|-----------|----------|
| ETIM 10.0 | EC001485 |
|-----------|----------|

### UNSPSC

|             |          |
|-------------|----------|
| UNSPSC 21.0 | 39121000 |
|-------------|----------|

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## Environmental product compliance

### EU RoHS

|   |              |
|---|--------------|
| Fulfills EU RoHS substance requirements | Yes          |
| Exemption                               | 7(a), 7(c)-I |

### China RoHS

|  |   |
|--|---|
| Environment friendly use period (EFUP) | EFUP-50   |
|  | An article-related China RoHS declaration table can be found in the download area for the respective article under "Manufacturer declaration". For all articles with EFUP-E, no China RoHS declaration table issued and required. |

### EU REACH SVHC

|                                     |  |
|-------------------------------------|--|
| REACH candidate substance (CAS No.) | Lead(CAS: 7439-92-1)   |
|                                     | 2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol(CAS: 79-94-7) |
| SCIP                                | 5a98e3d7-b765-4f18-b9f0-038485ad0904                           |

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