

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



2924061

<https://www.phoenixcontact.com/us/products/2924061>

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Ex i NAMUR isolating amplifier for operating proximity sensors and switches in the Ex area. The signals are transmitted via 2 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
- Installation in zone 2, protection type "n" (EN 60079-15) permitted
- Up to SIL 2 in accordance with EN 61508
- Line fault detection (LFD), can be activated/deactivated, error indicated by flashing red LED with de-excitation of output relay
- 4-way electrical isolation
- Direction of operation can be selected (operating or closed circuit current behavior)
- 2 relay signal outputs (N/O contact); output 2 can also be used as an error signaling output
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- LED indicators for supply voltage, switching state, and malfunction in accordance with NAMUR NE 44

## Commercial data

|                                      |               |
|--------------------------------------|---------------|
| Item number                          | 2924061       |
| Packing unit                         | 1 pc          |
| Minimum order quantity               | 1 pc          |
| Sales key                            | C430          |
| Product key                          | DK1213        |
| GTIN                                 | 4046356337359 |
| Weight per piece (including packing) | 175 g         |
| Weight per piece (excluding packing) | 137.9 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 | 1                          |
| Configuration   | DIP switches               |

### System properties

#### Functionality

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

### Electrical properties

|                                               |                 |
|-----------------------------------------------|-----------------|
| Electrical isolation                          | 3-way isolation |
| Electrical isolation between input and output | yes             |

#### 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

|              |                         |
|--------------|-------------------------|
| Test voltage | 2.5 kV AC (50 Hz, 60 s) |
|--------------|-------------------------|

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|                      |     |
|----------------------|-----|
| 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 | 30 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                        | 1                                               |
| Available input sources                 | NAMUR proximity sensors (IEC/EN 60947-5-6)      |
|                                         | floating switch contacts                        |
|                                         | Switch contacts with resistance circuit         |
| 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)              |
|                                         | < 100 $\Omega$ ... 360 $\Omega$ (Short circuit) |
|                                         | Activated /deactivated via DIP switch           |
| Open-circuit voltage                    | 8 V DC                                          |

## Output data

### Switching: Relay

|                            |                                       |
|----------------------------|---------------------------------------|
| Contact switching type     | 2 N/O contacts                        |
| Contact material           | AgSnO <sub>2</sub> , hard gold-plated |
| Maximum switching voltage  | 250 V AC (2 A)                        |
|                            | 120 V DC (0.2 A)                      |
|                            | 30 V DC (2 A)                         |
| Maximum switching capacity | 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                          |
| Stripping length              | 10 mm                                       |
| Conductor cross-section rigid | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> |

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|                                                                         |                                                             |
|-------------------------------------------------------------------------|-------------------------------------------------------------|
| Conductor cross-section flexible                                        | 0.2 mm² ... 2.5 mm²                                         |
| Conductor cross-section flexible (2 conductors with same cross section) | 0.25 mm² ... 0.34 mm² (TWIN ferrule without plastic sleeve) |
|                                                                         | 0.5 mm² ... 1.5 mm² (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                                       |
| IIA/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/IIB/IIA/IIIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$ | 100 mH / 1 $\mu$ F                             |

## 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) |
|                                          | -40 °C ... 70 °C (Derating)              |
| Ambient temperature (storage/transport)  | -40 °C ... 85 °C                         |
| Permissible humidity (operation)         | 10 % ... 95 % (non-condensing)           |
| Permissible humidity (storage/transport) | 5 % ... 95 % (non-condensing)            |

### Altitude range (≤ 2000 m)

|                                 |                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Altitude                        | ≤ 2000 m (The technical data refers to altitudes ≤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                                                                                                                                     |
|                                 | -40 °C ... 70 °C (Derating)                                                                                                                          |
| Rated insulation voltage        | 253 V AC (Power supply, input / output)                                                                                                              |
|                                 | 125 V DC (Power supply, input / output)                                                                                                              |

### Altitude range (≤ 3000 m)

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

### Altitude range (≤ 4000 m)

|                                 |                     |
|---------------------------------|---------------------|
| Height range                    | > 3000 m ... 4000 m |
| Ambient temperature (operation) | -40 °C ... 48 °C    |

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|                                 |                                           |
|---------------------------------|-------------------------------------------|
|                                 | -40 °C ... 56 °C (Derating)               |
| Rated insulation voltage        | 60 V AC/DC (Power supply, input / output) |
| Altitude range (≤ 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    | UL C.D.-No 83104549                                                     |

### KC-s

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



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|                |                 |
|----------------|-----------------|
| Identification | [Ex ia] IIC/IIB |
| Certificate    | 17-KA4BO-0409X  |

## 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

|                |              |
|----------------|--------------|
| Noise immunity | EN 61000-6-2 |
|                | EN 61326     |

## 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

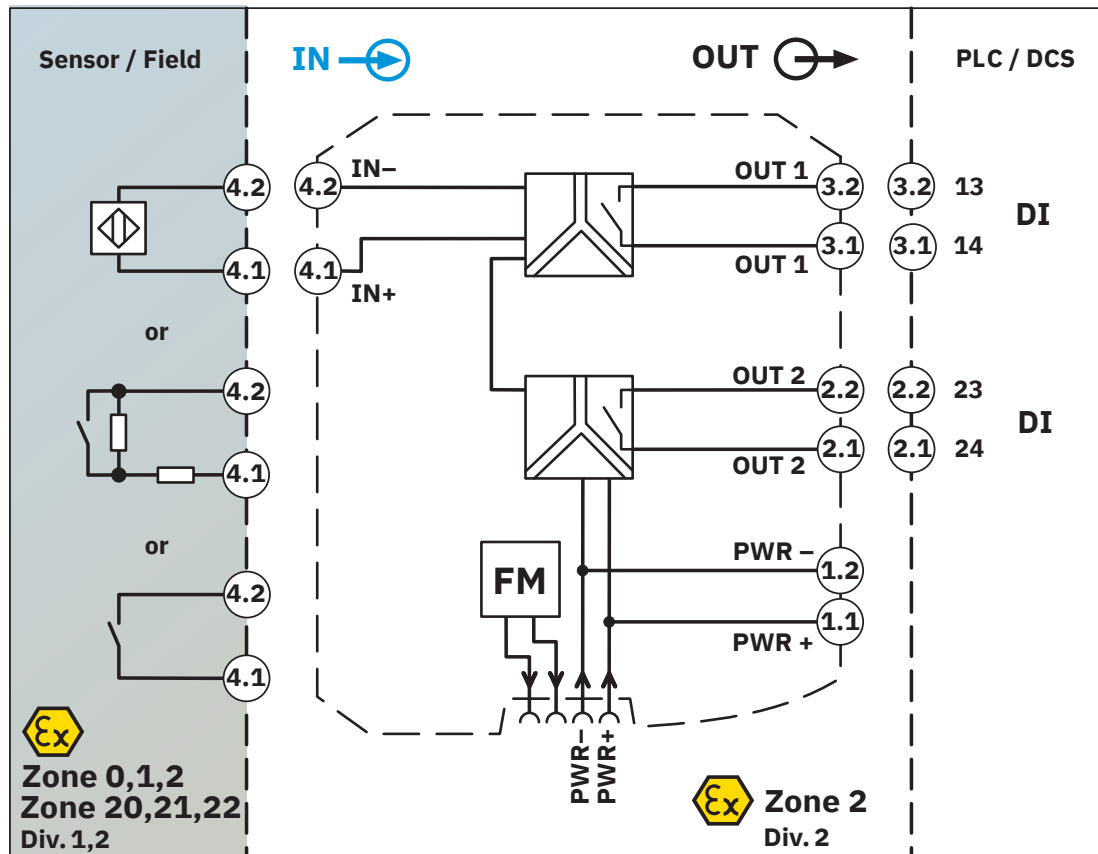


# MACX MCR-EX-SL-NAM-2RO-SP - Isolation switch amplifier

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Block diagram



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



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## Approvals

To download certificates, visit the product detail page: <https://www.phoenixcontact.com/us/products/2924061>



### UL Listed

Approval ID: E330267



### cUL Listed

Approval ID: E330267

### Functional Safety

Approval ID: 07-06-39 R005 V2R2

### DNV

Approval ID: TAA00000AG



### EAC Ex

Approval ID: TR TS\_S\_103.01.00078



### IECEX

Approval ID: IECEX IBE 08.0001X



### cUL Listed

Approval ID: E199827



### UL Listed

Approval ID: E199827



### ATEX

Approval ID: IBExU07ATEX1069

### INMETRO

Approval ID: DNV 18.0114 X



### KC-s

Approval ID: 17-KA4BO-0409X

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CCC

Approval ID: 2022122316115975

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## Classifications

### ECLASS

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

### ETIM

|          |          |
|----------|----------|
| ETIM 9.0 | 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: n/a)                                             |
|                                     | 2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol(CAS: n/a) |
| SCIP                                | ec5dee07-a19b-4d6f-a245-e0828c0c6291                       |

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Phoenix Contact USA  
586 Fulling Mill Road  
Middletown, PA 17057, United States  
(+717) 944-1300  
[info@phoenixcon.com](mailto:info@phoenixcon.com)