

# Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

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NAMUR signal conditioner for operating proximity sensors and switches. The signals are transferred to the control level using 2 isolated relay outputs (N/O contact). Line fault detection (LFD), 3-way electrical isolation, SIL 2, Push-in connection.

## 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 according to EN 61508
- ✔ Line fault detection (LFD), can be activated/deactivated, error indicated by red flashing LED with de-excitation of output relay
- ✔ 4-way electrical isolation
- ✔ Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- ✔ LED indicators for supply voltage, switching state, and malfunction according to NAMUR NE 44
- ✔ 2 relay signal outputs (N/O contact); output 2 can also be used as an error signaling output
- ✔ Direction of operation can be selected (operating or closed circuit current behavior)



## Key Commercial Data

|              |               |
|--------------|---------------|
| Packing unit | 1 pc          |
| GTIN         |               |
| GTIN         | 4046356491679 |

## Technical data

### Note

|                         |   |
|-------------------------|---|
| Utilization restriction | EMC: class A product, see manufacturer's declaration in the download area |
|-------------------------|---|

### Dimensions

|        |          |
|--------|----------|
| Width  | 12.5 mm  |
| Height | 116.9 mm |
| Depth  | 113.7 mm |

### Ambient conditions

# Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

## Technical data

### Ambient conditions

|  |  |
|--|--|
| Ambient temperature (operation)          | -20 °C ... 60 °C (Any mounting position) |
| Ambient temperature (storage/transport)  | -40 °C ... 85 °C                         |
| Maximum altitude                         | ≤ 2000 m                                 |
| Permissible humidity (operation)         | 10 % ... 95 % (non-condensing)           |
| Permissible humidity (storage/transport) | 5 % ... 95 % (non-condensing)            |
| Degree of protection                     | IP20 (not assessed by UL)                |
| Noise immunity                           | EN 61000-6-2 EN 61326                    |

### Input data

|                                 |  |
|---------------------------------|--|
| Non-load voltage                | ~ 8 V DC                               |
| Switching points (attenuated)   | < 1.2 mA (blocking)                    |
| Switching points (unattenuated) | > 2.1 mA (conductive)                  |
| Available input sources         | NAMUR proximity sensors (EN 60947-5-6) |
| Short-circuit current           | ~ 8 mA                                 |
| Switching hysteresis            | < 0.2 mA                               |
| Line fault detection            | Break 0.05 mA < IIN < 0.35 mA          |
|                                 | Short circuit 100 Ω < RSensor < 360 Ω  |

### Output data

|                            |                                       |
|----------------------------|---------------------------------------|
| Switching output           | Relay output                          |
| Contact 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                                |
| Mechanical service life    | 10 <sup>7</sup> cycles                |
| Switching frequency        | ≤ 20 Hz (without load)                |

### Power supply

|                          |   |
|--------------------------|---|
| Nominal supply voltage   | 24 V DC                                     |
| Supply voltage range     | 19.2 V DC ... 30 V DC (24 V DC -20%...+25%) |
| Max. current consumption | 30 mA (24 V DC)                             |
| Power dissipation        | < 950 mW                                    |
| Power consumption        | < 950 mW                                    |

### Connection data

|                                  |   |
|----------------------------------|---|
| Connection method                | Push-in connection                          |
| Stripping length                 | 8 mm  |
| Conductor cross section solid    | 0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> |
| Conductor cross section flexible | 0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> |
| Conductor cross section AWG      | 24 ... 16                                   |

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## Technical data

### General

|                               |   |
|-------------------------------|---|
| No. of channels               | 1   |
| Status display                | Green LED (supply voltage)<br>LED yellow (switching state)<br>Red LED (line errors)                                   |
| Electromagnetic compatibility | Conformance with EMC directive  |
| Interference emission         | EN 61000-6-4  |
| Housing material              | PA 6.6-FR   |
| Color                         | gray  |
| Designation                   | Output 1/output 2/input, power supply, DIN rail connector<br>Output 1/output 2/input/power supply, DIN rail connector |

### Safety characteristic data

|  |  |
|--|--|
| Integrity requirement  | IEC 61508 - Low demand   |
| Designation  | Non-inverted operation   |
| Equipment type   | Type A   |
| Safety Integrity Level (SIL)                                       | 2  |
| Safe Failure Fraction (SFF)  | 78 %   |
| $\lambda_{SU}$   | $2.49 \times 10^{-7}$ (249 FIT)  |
| $\lambda_{SD}$   | $6 \times 10^{-9}$ (6 FIT)   |
| $\lambda_{DU}$   | $6.4 \times 10^{-8}$ (64 FIT)  |
| $\lambda_{DD}$   | $7 \times 10^{-9}$ (7 FIT)   |
| Probability of a hazardous failure on demand (PFD <sub>AVG</sub> ) | $3.09 \times 10^{-4}$ (1 year)<br>$6.17 \times 10^{-4}$ (2 years)<br>$1.54 \times 10^{-3}$ (5 years) |
| Diagnostic coverage (DC)   | DC <sub>S</sub> = 2.4 %, DC <sub>D</sub> = 9 %   |
| Integrity requirement  | IEC 61508 - Low demand   |
| Designation  | Inverted operation   |
| Equipment type   | Type A   |
| Safety Integrity Level (SIL)                                       | 2  |
| Safe Failure Fraction (SFF)  | 78 %   |
| $\lambda_{SU}$   | $2.48 \times 10^{-7}$ (248 FIT)  |
| $\lambda_{SD}$   | $1 \times 10^{-9}$ (1 FIT)   |
| $\lambda_{DU}$   | $6.2 \times 10^{-8}$ (62 FIT)  |
| $\lambda_{DD}$   | $6 \times 10^{-9}$ (6 FIT)   |
| Probability of a hazardous failure on demand (PFD <sub>AVG</sub> ) | $3.01 \times 10^{-4}$ (1 year)<br>$6.02 \times 10^{-4}$ (2 years)<br>$1.5 \times 10^{-3}$ (5 years)  |
| Diagnostic coverage (DC)   | DC <sub>S</sub> = 0.4 %, DC <sub>D</sub> = 8 %   |
| Safety Integrity Level (SIL)                                       | 1  |

# Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

## Technical data

### Standards and Regulations

|                               |   |
|-------------------------------|---|
| Electromagnetic compatibility | Conformance with EMC directive  |
| Noise emission                | EN 61000-6-4  |
| Conformance                   | CE-compliant, additionally EN 61326-1   |
| ATEX                          | # II 3 G Ex nA nC IIC T4 Gc X   |
| UL, USA/Canada                | UL 508 Listed   |
|                               | UL 61010 Listed   |
|                               | Class I, Div. 2, Groups A, B, C, D T4   |
|                               | Class I, Zone 2, Group IIC T4   |
| DNV GL-Temperature            | B   |
| DNV GL-Humidity               | B   |
| DNV GL-Vibration              | A   |
| DNV GL-EMC                    | B   |
| DNV GL-Enclosure              | Required protection according to the Rules shall be provided upon installation on board |

### Conformance/approvals

|                 |   |
|-----------------|---|
| Designation     | CE  |
| Identification  | CE-compliant  |
| Additional text | and EN 61326-1  |
| Designation     | ATEX  |
| Identification  | # II 3 G Ex nA nC IIC T4 Gc X   |
| Designation     | UL, USA/Canada  |
| Identification  | UL 508 Listed   |
|                 | UL 61010 Listed   |
|                 | Class I, Div. 2, Groups A, B, C, D T4   |
|                 | Class I, Zone 2, Groups IIC, IIB, IIA T4  |
| Designation     | UL, USA/Canada  |
| Identification  | UL 508 Listed   |
|                 | UL 61010 Listed   |
|                 | Class I, Div. 2, Groups A, B, C, D T4   |
|                 | Class I, Zone 2, Group IIC T4   |
| Designation     | Shipbuilding approval   |
| Certificate     | DNV GL TAA00000AG   |
| Designation     | Safety Integrity Level (SIL, IEC 61508)   |
| Identification  | 2   |
| Temperature     | B   |
| Humidity        | B   |
| Vibration       | A   |
| EMC             | B   |
| Enclosure       | Required protection according to the Rules shall be provided upon installation on board |

# Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

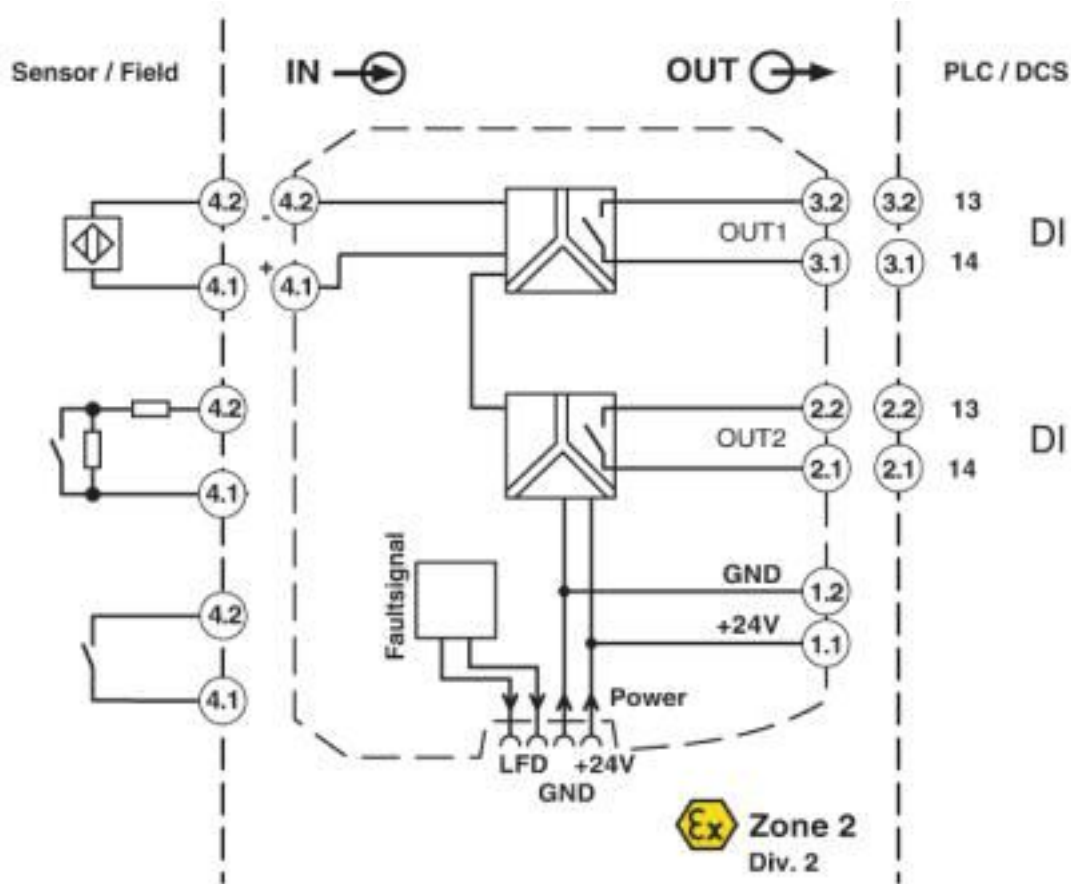
## Technical data

### Environmental Product Compliance

|            |   |
|------------|---|
| REACH SVHC | Lead 7439-92-1  |
| China RoHS | Environmentally Friendly Use Period = 50 years  |
|            | For details about hazardous substances go to tab "Downloads", Category "Manufacturer's declaration" |

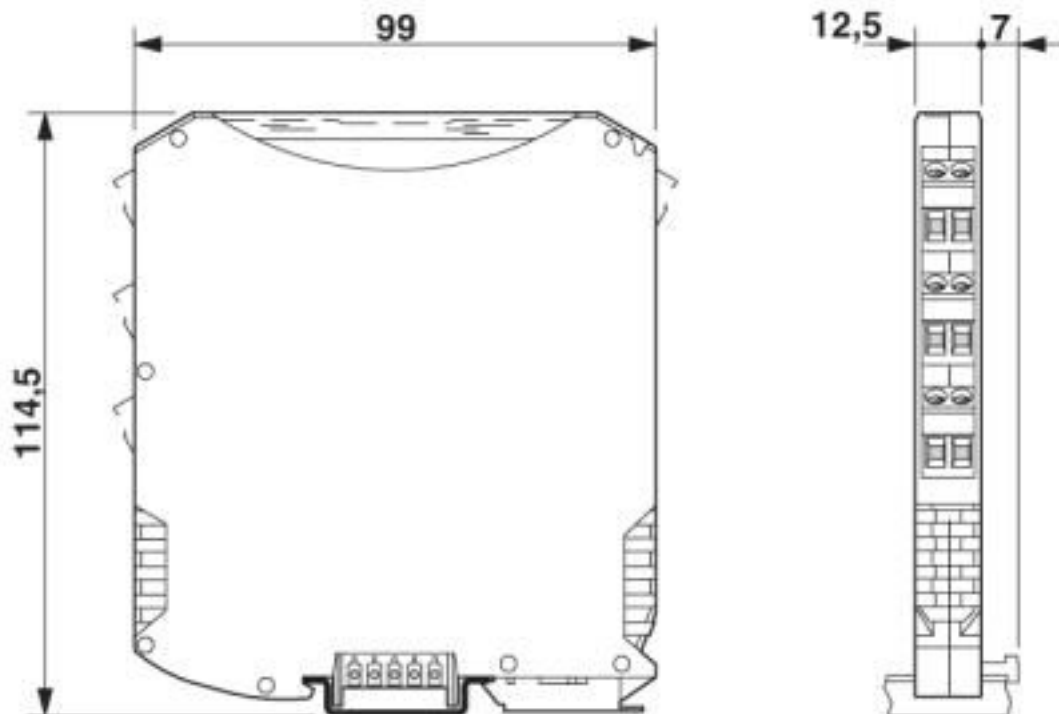
## Drawings

Block diagram

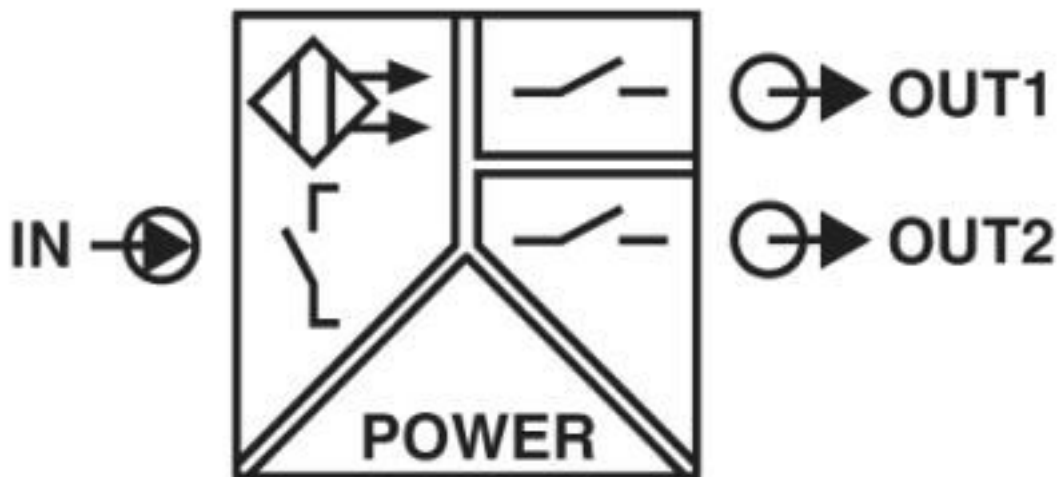


# Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

Dimensional drawing



Pictogram



## Classifications

eCl@ss

|               |          |
|---------------|----------|
| eCl@ss 10.0.1 | 27210121 |
| eCl@ss 4.0    | 27210100 |
| eCl@ss 4.1    | 27210100 |
| eCl@ss 5.0    | 27210100 |

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## Classifications

### eCl@ss

|            |          |
|------------|----------|
| eCl@ss 5.1 | 27210100 |
| eCl@ss 6.0 | 27210100 |
| eCl@ss 7.0 | 27210121 |
| eCl@ss 8.0 | 27210121 |
| eCl@ss 9.0 | 27210121 |

### ETIM

|          |          |
|----------|----------|
| ETIM 2.0 | EC001485 |
| ETIM 3.0 | EC001485 |
| ETIM 4.0 | EC001485 |
| ETIM 5.0 | EC001485 |
| ETIM 6.0 | EC001485 |
| ETIM 7.0 | EC001485 |

### UNSPSC

|               |          |
|---------------|----------|
| UNSPSC 6.01   | 30211506 |
| UNSPSC 7.0901 | 39121008 |
| UNSPSC 11     | 39121008 |
| UNSPSC 12.01  | 39121008 |
| UNSPSC 13.2   | 39121008 |
| UNSPSC 18.0   | 39121008 |
| UNSPSC 19.0   | 39121008 |
| UNSPSC 20.0   | 39121008 |
| UNSPSC 21.0   | 39121008 |

## Approvals

### Approvals

#### Approvals

DNV GL / UL Listed / cUL Listed / Functional Safety / cULus Listed

#### Ex Approvals

ATEX / UL Listed / cUL Listed / EAC Ex / cULus Listed

### Approval details

|        |  |   |            |
|--------|--|---|------------|
| DNV GL |  | <a href="https://approvalfinder.dnvgl.com/">https://approvalfinder.dnvgl.com/</a> | TAA00000AG |
|--------|--|---|------------|

# Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

## Approvals

|           |  |   |               |
|-----------|--|---|---------------|
| UL Listed |  | <a href="http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm">http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm</a> | FILE E 330267 |
|-----------|--|---|---------------|

|            |  |   |               |
|------------|--|---|---------------|
| cUL Listed |  | <a href="http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm">http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm</a> | FILE E 330267 |
|------------|--|---|---------------|

|                   |                    |
|-------------------|--------------------|
| Functional Safety | 07-06-39 R005 V2R2 |
|-------------------|--------------------|

|              |  |
|--------------|--|
| cULus Listed |  |
|--------------|--|

## Accessories

### Accessories

#### Component terminal block

Component terminal block - UKK 5-2R/NAMUR - 2941662



Double-level terminal block, with preassembled resistors

### Device marking

Plastic label - UC-EMLP (11X9) - 0819291



Plastic label, Sheet, white, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 10

Plastic label - UC-EMLP (11X9) YE - 0822602



Plastic label, Sheet, yellow, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 10



## Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

### Accessories

#### Plastic label - UC-EMLP (11X9) SR - 0828094



Plastic label, Sheet, silver, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 10

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#### Plastic label - US-EMLP (11X9) - 0828789



Plastic label, Card, white, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 135

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#### Plastic label - US-EMLP (11X9) YE - 0828871



Plastic label, Card, yellow, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 135

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#### Plastic label - US-EMLP (11X9) SR - 0828872



Plastic label, Card, silver, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 135

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#### Device marker - LS-EMLP (11X9) WH - 0831678



Device marker, Sheet, white, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 255

## Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

### Accessories

Device marker - LS-EMLP (11X9) YE - 0831732

Device marker, Sheet, yellow, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 255



Device marker - LS-EMLP (11X9) SR - 0831705

Device marker, Sheet, silver, unlabeled, can be labeled with: TOPMARK NEO, TOPMARK LASER, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 255



### DIN rail connector

DIN rail bus connectors - ME 6,2 TBUS-2 1,5/5-ST-3,81 GN - 2869728



DIN rail connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos.

### End cover

End cover - D-UKK 3/5 - 2770024



End cover, length: 56 mm, width: 2.5 mm, height: 52 mm, color: gray

End cover - D-UKK 3/5 BU - 2770105



End cover, length: 56 mm, width: 2.5 mm, height: 62 mm, color: blue

### Insulating sleeve

## Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

### Accessories

Insulating sleeve - MPS-IH BK - 0201731

Insulating sleeve, color: black



Insulating sleeve - MPS-IH GY - 0201728

Insulating sleeve, color: gray



Insulating sleeve - MPS-IH GN - 0201702

Insulating sleeve, color: green



Insulating sleeve - MPS-IH YE - 0201692

Insulating sleeve, color: yellow



Insulating sleeve - MPS-IH BU - 0201689

Insulating sleeve, color: blue



## Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

### Accessories

Insulating sleeve - MPS-IH RD - 0201676

Insulating sleeve, color: red



Insulating sleeve - MPS-IH WH - 0201663

Insulating sleeve, color: white



### Labeled device marker

Plastic label - UC-EMLP (11X9) CUS - 0824547

Plastic label, can be ordered: by sheet, white, labeled according to customer specifications, mounting type: adhesive, lettering field size: 11 x 9 mm



Plastic label - UC-EMLP (11X9) YE CUS - 0824548

Plastic label, can be ordered: by sheet, yellow, labeled according to customer specifications, mounting type: adhesive, lettering field size: 11 x 9 mm



Plastic label - UC-EMLP (11X9) SR CUS - 0828098

Plastic label, can be ordered: by sheet, silver, labeled according to customer specifications, mounting type: adhesive, lettering field size: 11 x 9 mm, Number of individual labels: 10



### Module carrier

## Isolation amplifier - MACX MCR-SL-NAM-2RO-SP - 2924265

### Accessories

Module carrier - TC-2D37SUB-ADIO32-2EX-P-UNI - 2904684



Universal Termination Carrier for connecting 16 two-channel MACX Analog Ex i signal conditioners to digital or analog I/O cards, via two D-SUB connectors, 37-pos. (1:1 connection)

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### Power module

Power and error message module - MACX MCR-PTB - 2865625



Power and fault signaling module with screw connection, including corresponding ME 17,5 TBUS 1,5/ 5-ST-3,81 GY DIN rail connector

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Power and error message module - MACX MCR-PTB-SP - 2924184



Power and fault signaling module with Push-in connection, including corresponding ME 17,5 TBUS 1,5/ 5-ST-3,81 GY DIN rail connector

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### Test plug terminal block

Test plugs - MPS-MT - 0201744



Test plugs, with solder connection up to 1 mm<sup>2</sup> conductor cross section, color: gray

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