

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



2924087

<https://www.phoenixcontact.com/de/produkte/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
Sales Key	J1 - MSR-Technik
Product Key	CK3141
Catalog Page	Page 156 (C-5-2019)
GTIN	4046356338042
Weight per Piece (including packing)	192,2 g
Weight per Piece (excluding packing)	141,5 g
Customs tariff number	85365019
Country of origin	DE

## Technical Data

### Notes

#### Utilization restriction

EMC note	EMC: class A product, see manufacturer's declaration in the download area
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### Product properties

Product type	Isolating switch transf.
	MACX Analog
Application	Digital IN
No. of channels	2
Type	Ex i signal conditioners with SIL functional safety
Configuration	DIP switches

### Electrical properties

No. of channels	2
Electrical isolation	3-way isolation
Electrical isolation between input and output	yes
Maximum power dissipation for nominal condition	< 1 W

#### Electrical isolation Input/output

Electrical isolation	375 V (Peak value in accordance with IEC/EN 60079-11)
Overvoltage category	III
Degree of pollution	2

#### Electrical isolation Input/supply, DIN rail connector

Electrical isolation	375 V (Peak value in accordance with IEC/EN 60079-11)
Rated insulation voltage	300 V <sub>rms</sub>
Overvoltage category	II
Degree of pollution	2
Insulation	Safe isolation in accordance with IEC/EN 61010-1

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

Rated insulation voltage	300 V <sub>rms</sub>
Overvoltage category	III
Degree of pollution	2
Insulation	Safe isolation in accordance with IEC/EN 61010-1

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

Test voltage	2.5 kV AC (50 Hz, 60 s)
Overvoltage category	III
Degree of pollution	2

### Supply

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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	0.8 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) 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 Ω ... 360 Ω (Short circuit) Activated /deactivated via DIP switch
Non-load voltage	8 V DC

## Output data

Switching: Relay

Contact type	1 N/O contact per channel
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
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## 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

## Ex data

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	Gc
	Div. 2
	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
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, 1 mH / 590 nF, 10 $\mu$ H / 590 nF
IIB/IIIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	1000 mH / 26 $\mu$ F
I/IIB/IIA/IIIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	100 mH / 1 $\mu$ F, 5 mH / 1 $\mu$ F, 1 mH / 1 $\mu$ F, 10 $\mu$ H / 1 $\mu$ F
IIA/I (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	1000 mH / 210 $\mu$ F

## Interfaces

### Data

No. of channels	0
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## LED signaling

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

## Dimensions

Dimensional drawing	
Width	12.5 mm
Height	116 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)
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### Material specifications

Flammability rating according to UL 94	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)
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 (For use at altitudes ≥2000 m above sea level, see data sheet.)
Ambient temperature (operation)	-40 °C ... 60 °C
Rated insulation voltage	375 V <sub>PP</sub> (Power supply, input / output)

#### Altitude range (≤ 3000 m)

Height range	> 2000 m ... 3000 m
Ambient temperature (operation)	-40 °C ... 54 °C
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
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
Rated insulation voltage	60 V AC/DC (Power supply, input / output)

### Approval data

#### CE

Certificate	CE-compliant
Note	and EN 61326

#### ATEX

Identification	<input type="checkbox"/> II (1) G [Ex ia Ga] IIC
	<input type="checkbox"/> II (1) D [Ex ia Da] IIIC
	<input type="checkbox"/> II 3(1) G Ex ec nC [ia Ga] IIC T4 Gc

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	<input type="checkbox"/> I (M1) [Ex ia Ma] I
Certificate	IBExU 07 ATEX 1069 X

## UKCA Ex (UKEX)

Identification	<input type="checkbox"/> I (M1) [Ex ia Ma] I
	<input type="checkbox"/> II (1) G [Ex ia Ga] IIC
	<input type="checkbox"/> II (1) D [Ex ia Da] IIIC
	<input type="checkbox"/> II 3 (1) G Ex ec [ia Ga] nC IIC T4 Gc
Certificate	CML 22UKEX7421X

## IECEX

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

## CCC / China-Ex

Identification	[Ex ia Ga] IIC
	[Ex iaD]
	Ex nA nC [ia Ga] IIC T4 Gc
Certificate	NEPSI GYJ20.1311X

## 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,D
	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	<input type="checkbox"/> , C.D.-No 83104549

## UL, USA / Canada

Identification	Class I Div 2; IS for Class I, II, III Div 1
	UL 61010 Listed
Certificate	<input type="checkbox"/> , C.D.-No 83104549

## KC-s

Identification	[Ex ia] IIC/IIB
Certificate	17-KA4BO-0410X

## Shipbuilding approval

Certificate	DNV GL TAA00000AG
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Safety Integrity Level (SIL, IEC 61508)

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Identification	2
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## Systematic Capability

Identification	3
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## 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

## EAC Ex

Identification	<input type="checkbox"/> [Ex ia Ga] IIC
	<input type="checkbox"/> [Ex ia Da] IIIC
Certificate	RU C-DE.AB72.B.00093/19

## DNV GL 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 emission	EN 61000-6-4
Noise immunity	EN 61000-6-2
	EN 61326

## 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
Evaluation criterion	A

## Standards and regulations

Electrical isolation	3-way isolation
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## GB Standard

Standards/regulations	GB 3626.20
	GB 3836.1
	GB 3836.4
	GB 3836.8
	GB 12476.1
	GB 12476.4

## Mounting

Mounting type	DIN rail mounting
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# Isolation amplifier - MACX MCR-EX-SL-2NAM-RO-SP

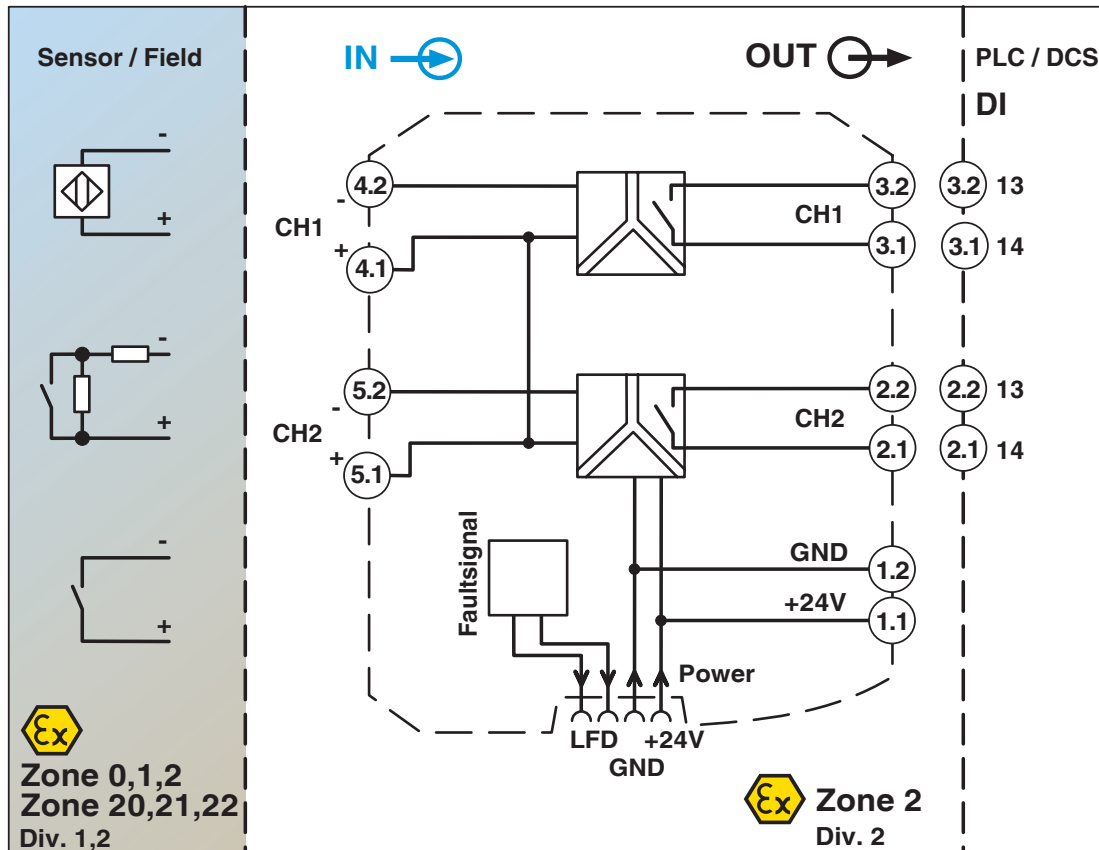


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## Drawings

Block diagram



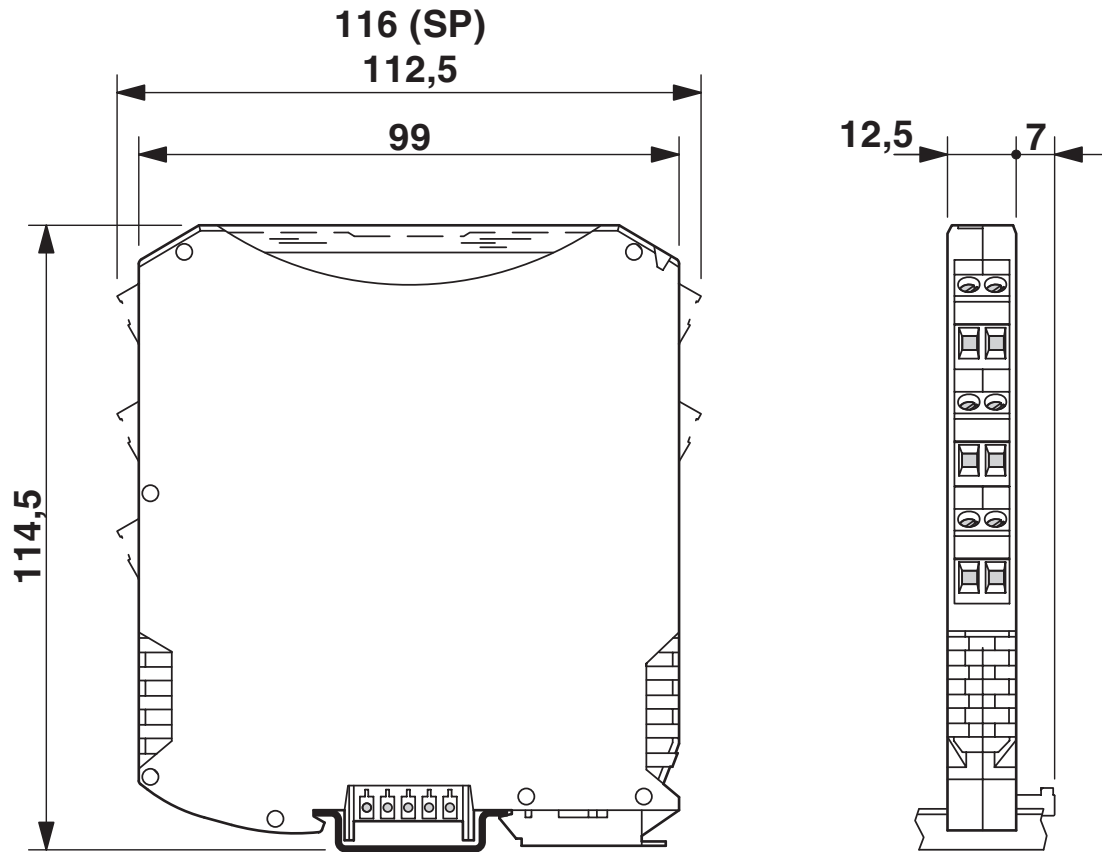
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<https://www.phoenixcontact.com/de/produkte/2924087>

Dimensional drawing



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## Approvals



**DNV GL**

Approval ID: TAA00000AG



**UL Listed**

Approval ID: FILE E 330267



**CCC**

Approval ID: 2020322 316001513



**cUL Listed**

Approval ID: FILE E 330267

### Functional Safety

Approval ID: 07-06-39 R005 V2R2



**EAC Ex**

Approval ID: TR TS\_S\_103.01.00078



**IECEX**

Approval ID: IECEX IBE 08.0001X



**cUL Listed**

Approval ID: FILE E 199827



**UL Listed**

Approval ID: FILE E 199827



**ATEX**

Approval ID: IBEU07ATEX1069

### INMETRO

Approval ID: DNV 18.0114 X

### KC-s

Approval ID: 17-KA4BO-0410X

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cULus Listed

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## Classifications

### ECLASS

ECLASS-9.0	27210121
ECLASS-10.0.1	27210121
ECLASS-11.0	27210121

### ETIM

ETIM 8.0	EC001485
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### UNSPSC

UNSPSC 21.0	39121000
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## Environmental Product Compliance

REACH SVHC	Lead 7439-92-1
China RoHS	Environmentally Friendly Use Period = 50 years
	For information on hazardous substances, refer to the manufacturer's declaration available under "Downloads"

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<https://www.phoenixcontact.com/de/produkte/2924087>

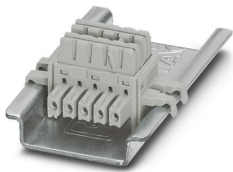
## Accessories

### DIN rail bus connectors

DIN rail bus connectors - ME 6,2 TBUS-2 1,5/5-ST-3,81 GY - 2695439

<https://www.phoenixcontact.com/de/produkte/2695439>

DIN rail connector (TBUS), 5-pos., for bridging the supply voltage, can be snapped onto NS 35/... DIN rail in accordance with EN 60715



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### Module carrier

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

<https://www.phoenixcontact.com/de/produkte/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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<https://www.phoenixcontact.com/de/produkte/2924087>

## Power and error message module

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

<https://www.phoenixcontact.com/de/produkte/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

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

<https://www.phoenixcontact.com/de/produkte/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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<https://www.phoenixcontact.com/de/produkte/2924087>

## End cover

End cover - D-UKK 3/5 - 2770024

<https://www.phoenixcontact.com/de/produkte/2770024>



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

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## End cover

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

<https://www.phoenixcontact.com/de/produkte/2770105>



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

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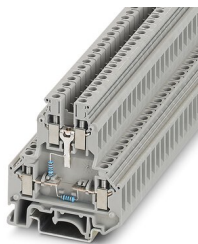
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<https://www.phoenixcontact.com/de/produkte/2924087>

## Component terminal block

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

<https://www.phoenixcontact.com/de/produkte/2941662>



Double-level terminal block, with preassembled resistors

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## Insulating sleeve

Insulating sleeve - MPS-IH WH - 0201663

<https://www.phoenixcontact.com/de/produkte/0201663>



Insulating sleeve, color: white

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<https://www.phoenixcontact.com/de/produkte/2924087>

## Insulating sleeve

Insulating sleeve - MPS-IH RD - 0201676

<https://www.phoenixcontact.com/de/produkte/0201676>

Insulating sleeve, color: red



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## Insulating sleeve

Insulating sleeve - MPS-IH BU - 0201689

<https://www.phoenixcontact.com/de/produkte/0201689>

Insulating sleeve, color: blue



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<https://www.phoenixcontact.com/de/produkte/2924087>

## Insulating sleeve

Insulating sleeve - MPS-IH YE - 0201692

<https://www.phoenixcontact.com/de/produkte/0201692>

Insulating sleeve, color: yellow



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## Insulating sleeve

Insulating sleeve - MPS-IH GN - 0201702

<https://www.phoenixcontact.com/de/produkte/0201702>

Insulating sleeve, color: green



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<https://www.phoenixcontact.com/de/produkte/2924087>

## Insulating sleeve

Insulating sleeve - MPS-IH GY - 0201728

<https://www.phoenixcontact.com/de/produkte/0201728>

Insulating sleeve, color: gray



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## Insulating sleeve

Insulating sleeve - MPS-IH BK - 0201731

<https://www.phoenixcontact.com/de/produkte/0201731>

Insulating sleeve, color: black



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<https://www.phoenixcontact.com/de/produkte/2924087>

## Test plugs

Test plugs - MPS-MT - 0201744

<https://www.phoenixcontact.com/de/produkte/0201744>



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

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## Plastic label

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

<https://www.phoenixcontact.com/de/produkte/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

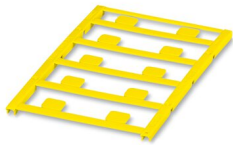
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<https://www.phoenixcontact.com/de/produkte/2924087>

## Plastic label

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

<https://www.phoenixcontact.com/de/produkte/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

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## Plastic label

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

<https://www.phoenixcontact.com/de/produkte/0824547>



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

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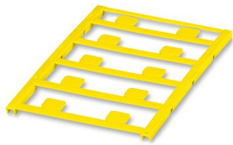
<https://www.phoenixcontact.com/de/produkte/2924087>

## Plastic label

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

<https://www.phoenixcontact.com/de/produkte/0824548>

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



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## Plastic label

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

<https://www.phoenixcontact.com/de/produkte/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

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

<https://www.phoenixcontact.com/de/produkte/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

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## Plastic label

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

<https://www.phoenixcontact.com/de/produkte/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

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

<https://www.phoenixcontact.com/de/produkte/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

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

<https://www.phoenixcontact.com/de/produkte/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

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

<https://www.phoenixcontact.com/de/produkte/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



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## Device marker

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

<https://www.phoenixcontact.com/de/produkte/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



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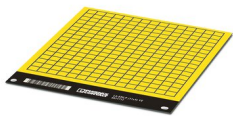
<https://www.phoenixcontact.com/de/produkte/2924087>

## Device marker

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

<https://www.phoenixcontact.com/de/produkte/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



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