

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

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Ex i solenoid driver. For the intrinsically safe control of Ex i solenoid valves, alarm modules or LEDs installed in the Ex area. Current limitation at 25 mA. For gases up to Group IIC, loop-powered, electrical isolation, SIL 3. Push-in connection.

### Your advantages

- ✓ Mechanically compatible with the DIN rail connector
- ✓ Various output characteristic curves compatible with standard solenoid valves
- ✓ Loop-powered: the required power is supplied via the control signal on the input side.
- ✓ Installation in zone 2, protection type "n" (EN 60079-15) permitted
- ✓ Up to SIL 3 according to IEC 61508
- ✓ 2-way electrical isolation
- ✓ Output [Ex ia] IIC/[Ex ia] IIB
- ✓ Input: 19.2 V DC ... 30 V DC



### Key Commercial Data

|              |                                                                                      |
|--------------|--------------------------------------------------------------------------------------|
| Packing unit | 1 pc                                                                                 |
| GTIN         |  |
| GTIN         | 4046356338516                                                                        |

### 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

|                                 |                                          |
|---------------------------------|------------------------------------------|
| Ambient temperature (operation) | -40 °C ... 60 °C (Any mounting position) |
|---------------------------------|------------------------------------------|

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## Technical data

### Ambient conditions

|                                         |                                |
|-----------------------------------------|--------------------------------|
| Ambient temperature (storage/transport) | -40 °C ... 80 °C               |
| Maximum altitude                        | ≤ 2000 m                       |
| Permissible humidity (operation)        | 10 % ... 95 % (non-condensing) |
| Degree of protection                    | IP20 (not assessed by UL)      |
| Noise immunity                          | EN 61000-6-2                   |

### Output data

|                                              |                                               |
|----------------------------------------------|-----------------------------------------------|
| Minimum output voltage                       | 5.5 V DC (At 25 mA)                           |
| Output characteristic curve: Output resistor | 641.1 Ω (Internal resistance R <sub>i</sub> ) |
| Response time                                | 20 ms                                         |

### Compatible valves

|                  |                                                                             |
|------------------|-----------------------------------------------------------------------------|
| Note             | This is an extract of possible combinations of valves and solenoid drivers. |
| Compatible valve | Norgren Herion Coil 2080 / 2082                                             |
|                  | Norgren Herion Coil 2081 / 2083                                             |
|                  | Norgren Herion Coil 2084                                                    |
|                  | Hörbiger Piezo P8 38x RF-Nx-SPN65 30 V type                                 |
|                  | Hörbiger Piezo P20 381RF-NG-CPN61 30 V type                                 |
|                  | Samson Coil 3701-11 (6 V)                                                   |
|                  | Samson Coil 3701-12 (12 V)                                                  |
|                  | Samson Coil 3701-13 (24 V)                                                  |
|                  | Samson Coil 3963-11 (6 V)                                                   |
|                  | Samson Coil 3963-12 (12 V)                                                  |
|                  | Samson Coil 3963-13 (24 V)                                                  |
|                  | Samson Coil 3964-11 (6 V)                                                   |
|                  | Samson Coil 3964-12 (12 V)                                                  |
|                  | Samson Coil 3964-13 (24 V)                                                  |
|                  | Seitz Pilot valve PV 12F73 Ci oH                                            |
|                  | Seitz Pilot valve PV 12F73 Xi oH                                            |
|                  | Seitz Pilot valve PV 12F73 Xi oH-2                                          |

### Power supply

|                   |           |
|-------------------|-----------|
| Power dissipation | < 0.845 W |
|-------------------|-----------|

### 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                                   |

### General

|                 |   |
|-----------------|---|
| No. of channels | 1 |
|-----------------|---|

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## Technical data

### General

|                                 |                                                                                |
|---------------------------------|--------------------------------------------------------------------------------|
| Maximum temperature coefficient | 0.01 %/K                                                                       |
| Status display                  | Yellow LED (switching state / status, lights up when output circuit is active) |
| Degree of pollution             | 2                                                                              |
| Overvoltage category            | II                                                                             |
| Electromagnetic compatibility   | Conformance with EMC directive                                                 |
| Interference emission           | EN 61000-6-4                                                                   |
| Housing material                | PA 6.6-FR                                                                      |
| Color                           | gray                                                                           |
| Designation                     | Output/input                                                                   |
| Electrical isolation            | 375 V (Peak value in accordance with IEC/EN 60079-11)                          |

### Safety characteristic data

|                                                                    |                                            |
|--------------------------------------------------------------------|--------------------------------------------|
| Integrity requirement                                              | IEC 61508 - Low demand                     |
| Equipment type                                                     | Type A                                     |
| Safety Integrity Level (SIL)                                       | 3                                          |
| Safe Failure Fraction (SFF)                                        | 100 %                                      |
| $\lambda_{SU}$                                                     | $2.84 \times 10^{-7}$ (284 FIT)            |
| $\lambda_{SD}$                                                     | 0                                          |
| $\lambda_{DU}$                                                     | 0                                          |
| $\lambda_{DD}$                                                     | 0                                          |
| Probability of a hazardous failure on demand (PFD <sub>AVG</sub> ) | 0 (1 year)                                 |
|                                                                    | 0 (5 years)                                |
|                                                                    | 0 (10 years)                               |
| Diagnostic coverage (DC)                                           | DC <sub>S</sub> =0 %, DC <sub>D</sub> =0 % |

### Safety data

|                                          |                |
|------------------------------------------|----------------|
| Input power P <sub>i</sub>               | negligible     |
| Max. internal inductance L <sub>i</sub>  | negligible     |
| Max. internal capacitance C <sub>i</sub> | negligible     |
| Max. output voltage U <sub>o</sub>       | 25.1 V         |
| Max. output current I <sub>o</sub>       | 39 mA          |
| Max. output power P <sub>o</sub>         | 245 mW         |
| Group                                    | IIC            |
| Max. external inductivity L <sub>o</sub> | 22 mH          |
| Max. external capacitance C <sub>o</sub> | 0.108 µF       |
| Additional text                          | simple circuit |
| Group                                    | IIC            |
| Max. external inductivity L <sub>o</sub> | 20 mH          |
| Max. external capacitance C <sub>o</sub> | 68 nF          |
| Additional text                          | mixed circuit  |

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## Technical data

### Safety data

|                                      |                     |
|--------------------------------------|---------------------|
| Group                                | IIC                 |
| Max. external inductivity $L_o$      | 10 mH               |
| Max. external capacitance $C_o$      | 68 nF               |
| Additional text                      | mixed circuit       |
| Group                                | IIC                 |
| Max. external inductivity $L_o$      | 5 mH                |
| Max. external capacitance $C_o$      | 68 nF               |
| Additional text                      | mixed circuit       |
| Group                                | IIC                 |
| Max. external inductivity $L_o$      | 1 mH                |
| Max. external capacitance $C_o$      | 79 nF               |
| Additional text                      | mixed circuit       |
| Group                                | IIC                 |
| Max. external inductivity $L_o$      | 0.1 mH              |
| Max. external capacitance $C_o$      | 108 nF              |
| Additional text                      | mixed circuit       |
| Group                                | IIB/IIIC            |
| Max. external inductivity $L_o$      | 90 mH               |
| Max. external capacitance $C_o$      | 0.83 $\mu$ F        |
| Additional text                      | simple circuit      |
| Group                                | IIB/IIIC            |
| Max. external inductivity $L_o$      | 100 mH              |
| Max. external capacitance $C_o$      | 270 nF              |
| Additional text                      | mixed circuit       |
| Group                                | IIB/IIIC            |
| Max. external inductivity $L_o$      | 5 mH                |
| Max. external capacitance $C_o$      | 430 nF              |
| Additional text                      | mixed circuit       |
| Group                                | IIB/IIIC            |
| Max. external inductivity $L_o$      | 1 mH                |
| Max. external capacitance $C_o$      | 470 nF              |
| Additional text                      | mixed circuit       |
| Group                                | IIB/IIIC            |
| Max. external inductivity $L_o$      | 0.1 mH              |
| Max. external capacitance $C_o$      | 830 nF              |
| Additional text                      | mixed circuit       |
| Safety-related maximum voltage $U_m$ | 253 V AC (125 V DC) |

### Standards and Regulations

|                               |                                |
|-------------------------------|--------------------------------|
| Electromagnetic compatibility | Conformance with EMC directive |
|-------------------------------|--------------------------------|

# Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

## Technical data

### Standards and Regulations

|                    |                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------|
| Noise emission     | EN 61000-6-4                                                                            |
| Conformance        | CE-compliant, additionally EN 61326                                                     |
| ATEX               | # II (1) G [Ex ia Ga] IIC/IIB/IIA                                                       |
|                    | # II (1) D [Ex ia Da] IIIC                                                              |
|                    | # II 3 (1)G Ex nA [ia IIC Ga] IIC T4 Gc X                                               |
| IECEX              | [Ex ia Ga] IIC/IIB/IIA                                                                  |
|                    | [Ex ia Da] IIIC                                                                         |
|                    | Ex nA [ia IIC Ga] IIC T4 Gc                                                             |
| UL, USA/Canada     | Class I Div 2; IS for Class I, II, III Div 1                                            |
| DNV GL-Temperature | B                                                                                       |
| DNV GL-Humidity    | B                                                                                       |
| DNV GL-Vibration   | A                                                                                       |
| DNV GL-EMC         | A                                                                                       |
| DNV GL-Enclosure   | Required protection according to the Rules shall be provided upon installation on board |
| Group              | IIC                                                                                     |
|                    | IIC                                                                                     |
|                    | IIC                                                                                     |
|                    | IIC                                                                                     |
|                    | IIC                                                                                     |
|                    | IIC                                                                                     |

### Conformance/approvals

|                 |                                                                     |
|-----------------|---------------------------------------------------------------------|
| Designation     | CE                                                                  |
| Identification  | CE-compliant                                                        |
| Additional text | and EN 61326                                                        |
| Designation     | ATEX                                                                |
| Identification  | # II (1) G [Ex ia Ga] IIC/IIB/IIA                                   |
|                 | # II (1) D [Ex ia Da] IIIC                                          |
|                 | # II 3 (1)G Ex nA [ia IIC Ga] IIC T4 Gc X                           |
| Certificate     | IBExU 07 ATEX 1133X                                                 |
| Designation     | IECEX                                                               |
| Identification  | [Ex ia Ga] IIC/IIB/IIA                                              |
|                 | [Ex ia Da] IIIC                                                     |
|                 | Ex nA [ia IIC Ga] IIC T4 Gc                                         |
| Certificate     | IECEX IBE 08.0002X                                                  |
| Designation     | 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 |

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

### Technical data

#### Conformance/approvals

|                |                                                                                         |
|----------------|-----------------------------------------------------------------------------------------|
|                | 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    | #, C.D.-No 83104549                                                                     |
| Designation    | UL, USA/Canada                                                                          |
| Identification | Class I Div 2; IS for Class I, II, III Div 1                                            |
| Certificate    | #, C.D.-No 83104549                                                                     |
| Designation    | Shipbuilding approval                                                                   |
| Certificate    | DNV GL TAA000020C                                                                       |
| Designation    | Safety Integrity Level (SIL, IEC 61508)                                                 |
| Identification | 3                                                                                       |
| Designation    | INMETRO                                                                                 |
| Identification | [Ex ia Ga] IIC/IIB/IIA                                                                  |
|                | [Ex ia Da] IIIC                                                                         |
|                | Ex nA [ia IIC Ga] IIC T4 Gc                                                             |
| Certificate    | DNV 18.0115 X                                                                           |
| Designation    | EAC Ex                                                                                  |
| Identification | # [Ex ia Ga] IIC                                                                        |
|                | # [Ex ia Da] IIIC                                                                       |
| Certificate    | RU C-DE.AB72.B.00093/19                                                                 |
| Temperature    | B                                                                                       |
| Humidity       | B                                                                                       |
| Vibration      | A                                                                                       |
| EMC            | A                                                                                       |
| Enclosure      | Required protection according to the Rules shall be provided upon installation on board |

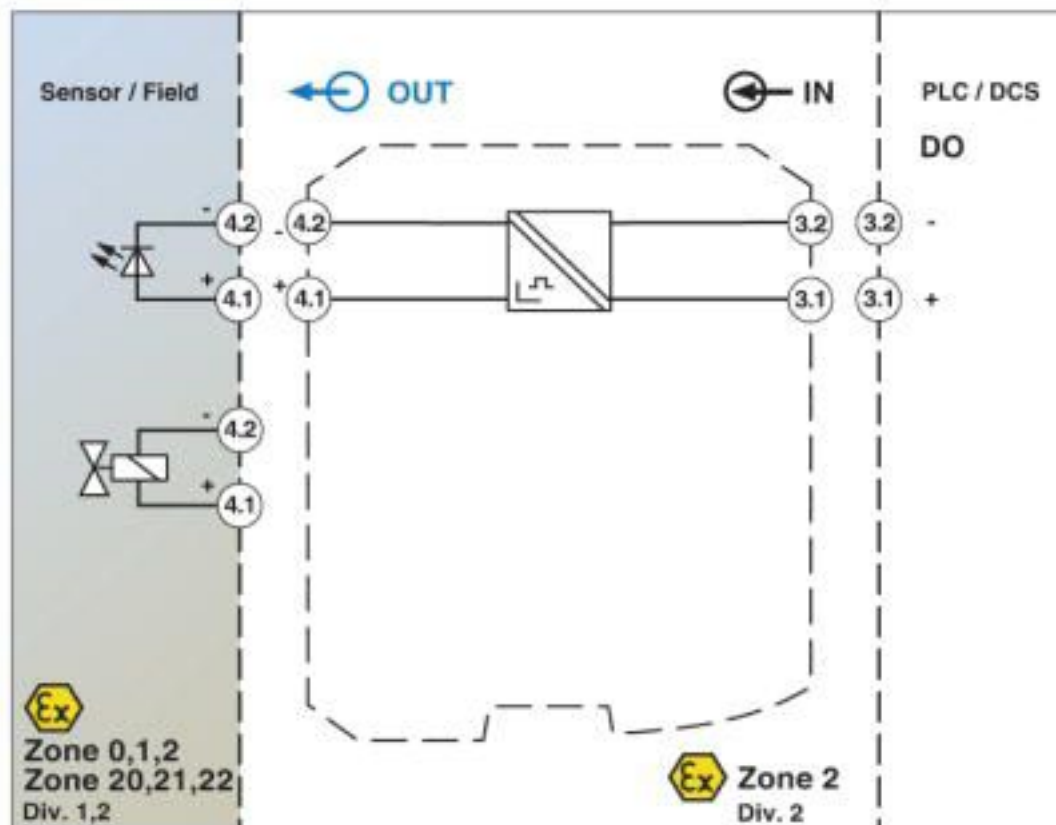
#### Environmental Product Compliance

|            |                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------|
| 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" |

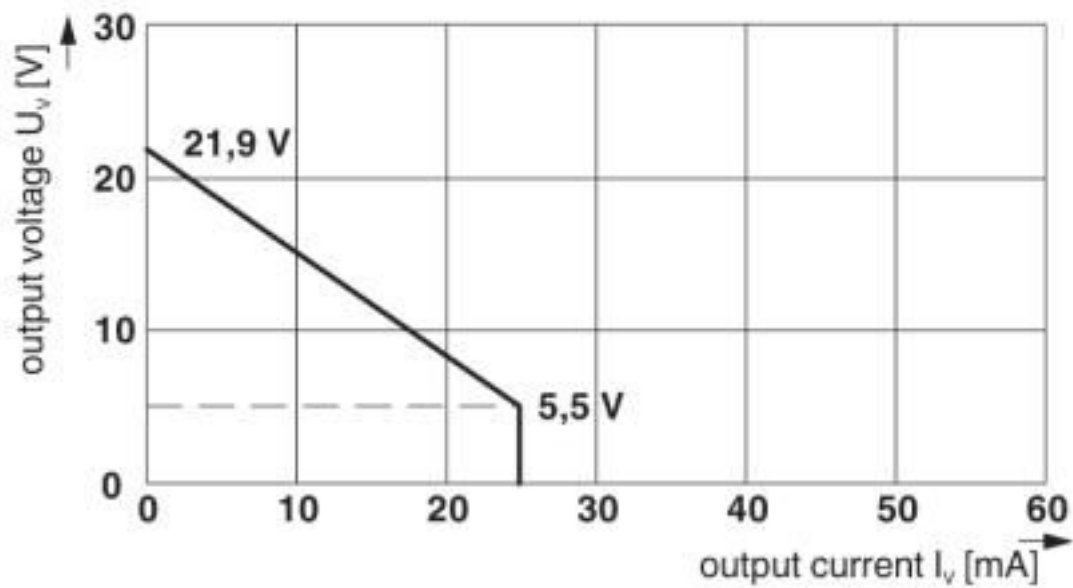
### Drawings

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

Block diagram

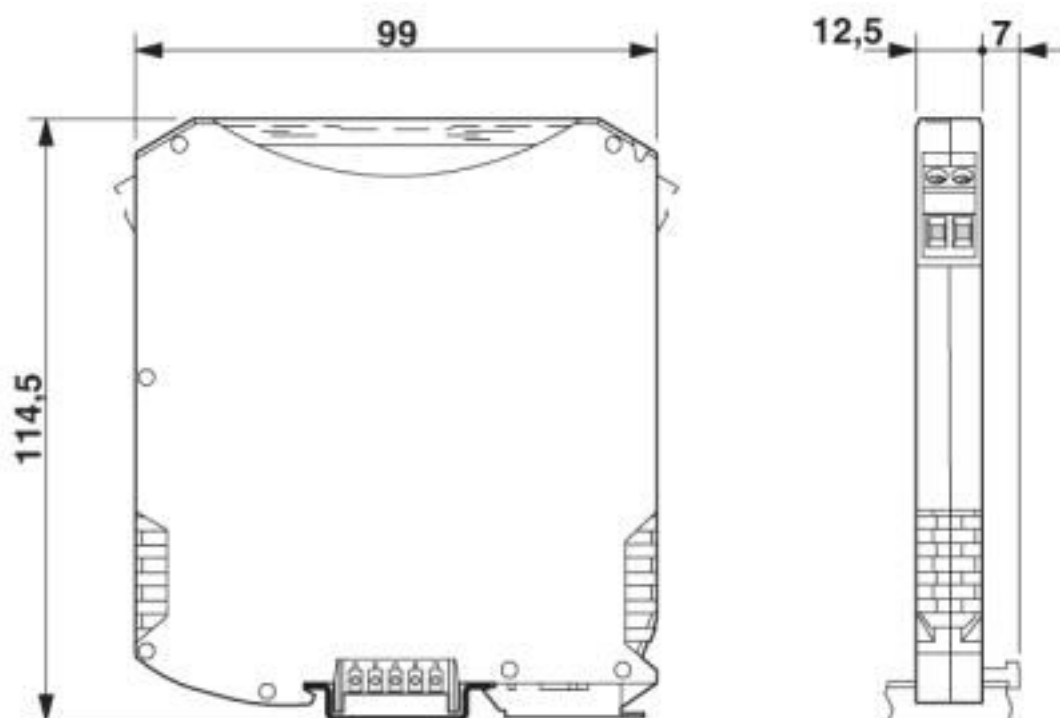


Diagram

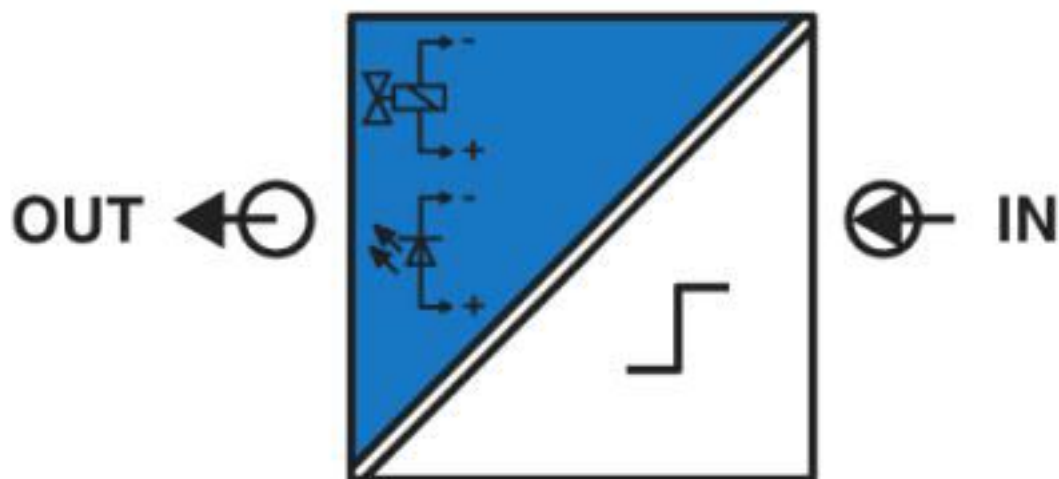


## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

Dimensional drawing



Pictogram



### Classifications

eCl@ss

|               |          |
|---------------|----------|
| eCl@ss 10.0.1 | 27210120 |
| eCl@ss 4.0    | 27210100 |
| eCl@ss 4.1    | 27210100 |
| eCl@ss 5.0    | 27210100 |

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

### Classifications

#### eCl@ss

|            |          |
|------------|----------|
| eCl@ss 5.1 | 27210100 |
| eCl@ss 6.0 | 27210100 |
| eCl@ss 7.0 | 27210120 |
| eCl@ss 8.0 | 27210120 |
| eCl@ss 9.0 | 27210120 |

#### ETIM

|          |          |
|----------|----------|
| ETIM 4.0 | EC002653 |
| ETIM 5.0 | EC002653 |
| ETIM 6.0 | EC002653 |
| ETIM 7.0 | EC002653 |

#### 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

##### Ex Approvals

IECEX / ATEX / EAC Ex / UL Listed / cUL Listed / INMETRO

#### Approval details

|        |                                                                                     |                                                                                   |            |
|--------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------|
| DNV GL |  | <a href="https://approvalfinder.dnvgl.com/">https://approvalfinder.dnvgl.com/</a> | TAA000020C |
|--------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------|

# Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

## 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 | 16/04-017<br>R025 V1R1 |  |  |
|-------------------|------------------------|--|--|

## Accessories

### Accessories

### 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

#### 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

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

### Accessories

#### 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

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#### 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

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

### Accessories

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

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### Insulating sleeve

Insulating sleeve - MPS-IH BK - 0201731

Insulating sleeve, color: black



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Insulating sleeve - MPS-IH GY - 0201728

Insulating sleeve, color: gray



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Insulating sleeve - MPS-IH GN - 0201702

Insulating sleeve, color: green



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Insulating sleeve - MPS-IH YE - 0201692

Insulating sleeve, color: yellow



## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

### Accessories

Insulating sleeve - MPS-IH BU - 0201689

Insulating sleeve, color: blue



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Insulating sleeve - MPS-IH RD - 0201676

Insulating sleeve, color: red



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Insulating sleeve - MPS-IH WH - 0201663

Insulating sleeve, color: white



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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

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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

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

### Accessories

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

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### Module carrier

Module carrier - TC-D37SUB-ADIO16-EX-P-UNI - 2924854



Universal termination carrier for connecting 16 MACX Analog Ex i signal conditioners to digital or analog I/O cards, via D-SUB connector, 37-pos. (1:1 connection)

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Module carrier - TC-D37SUB-AIO16-EX-PS-UNI - 2902932



Universal termination carrier for connecting 16 MACX Analog Ex i signal conditioners to digital or analog I/O cards, via D-SUB connector, 37-pos. (1:1 connection), with HART multiplexer 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

## Solenoid driver - MACX MCR-EX-SL-SD-21-25-LP-SP - 2924113

### Accessories

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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