

# Solenoid driver - MACX MCR-EX-SL-SD-21-60-LP-SP - 2924100

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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 58 mA. For gases up to Group IIB, 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
- ✓ Input: 19.2 V DC ... 30 V DC
- ✓ Output [Ex ia] IIB

RoHS



## Key Commercial Data

Packing unit	1 pc
GTIN	
GTIN	4046356338523

## Technical data

### Note

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

Width	12.5 mm
Height	116.9 mm
Depth	113.7 mm

### Ambient conditions

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## Technical data

### Ambient conditions

Ambient temperature (operation)	-40 °C ... 60 °C (any mounting position, pay attention to the derating curve in the data sheet)
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	12.9 V DC (At 58 mA)
Output characteristic curve: Output resistor	133.4 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	ASCO Coil 302 (12 V)
	ASCO Coil 302 (24 V)
	Bürkert Coil AC 10 standard
	Bürkert Coil AC 10 high resistance
	FESTO Coil MFH-...IA-SA-EX GBXE022AIAD03
	FESTO Coil (J)MFH-...BIA-SA-EX GBXE022AIAD03
	Norgren Herion Coil 2050
	Norgren Herion Coil 2051
	Norgren Herion Coil 2052
	Norgren Herion Coil 2053
	Parker Coil VZ95 482160.01 EEx ia IIB T6

### Power supply

Power dissipation	< 1.325 W
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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

### General

No. of channels	1
Maximum temperature coefficient	0.01 %/K
Status display	Yellow LED (switching state / status, lights up when output circuit is active)
Degree of pollution	2

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## Technical data

### General

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>	188 mA
Max. output power P <sub>o</sub>	1.18 W
Group	IIB/IIIC
Max. external inductivity L <sub>o</sub>	4 mH
Max. external capacitance C <sub>o</sub>	0.83 μF
Additional text	simple circuit
Group	IIB/IIIC
Max. external inductivity L <sub>o</sub>	2 mH
Max. external capacitance C <sub>o</sub>	300 nF
Additional text	mixed circuit
Group	IIB/IIIC
Max. external inductivity L <sub>o</sub>	1 mH
Max. external capacitance C <sub>o</sub>	370 nF
Additional text	mixed circuit

# Solenoid driver - MACX MCR-EX-SL-SD-21-60-LP-SP - 2924100

## Technical data

### Safety data

Group	IIB/IIIC
Max. external inductivity $L_o$	0.5 mH
Max. external capacitance $C_o$	460 nF
Additional text	mixed circuit
Group	IIB/IIIC
Max. external inductivity $L_o$	0.1 mH
Max. external capacitance $C_o$	790 nF
Additional text	mixed circuit
Safety-related maximum voltage $U_m$	253 V (125 V DC)

### Standards and Regulations

Electromagnetic compatibility	Conformance with EMC directive
Noise emission	EN 61000-6-4
Conformance	CE-compliant, additionally EN 61326
ATEX	# II (1) G [Ex ia Ga] IIB/IIA
	# II (1) D [Ex ia Da] IIIC
	# II 3 (1)G Ex nA [ia IIB Ga] IIC T4 Gc X
IECEX	[Ex ia Ga] IIB/IIA
	[Ex ia Da] IIIC
	Ex nA [ia IIB 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	IIB/IIIC
	IIB/IIIC
	IIB/IIIC
	IIB/IIIC
	IIB/IIIC

### Conformance/approvals

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

# Solenoid driver - MACX MCR-EX-SL-SD-21-60-LP-SP - 2924100

## Technical data

### Conformance/approvals

Designation	IECEX
Identification	[Ex ia Ga] IIB/IIA
	[Ex ia Da] IIIC
	Ex nA [ia IIB 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 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 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] IIB/IIA
	[Ex ia Da] IIIC
	Ex nA [ia IIB 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

# Solenoid driver - MACX MCR-EX-SL-SD-21-60-LP-SP - 2924100

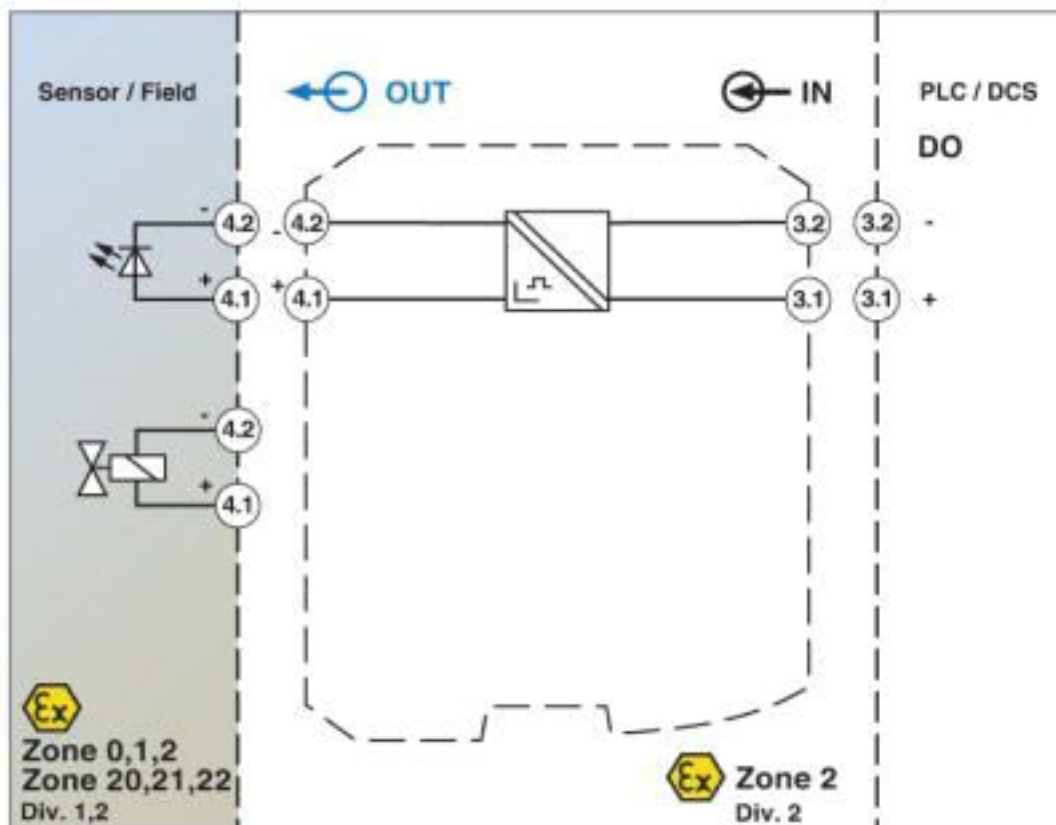
## Technical data

### Environmental Product Compliance

	For details about hazardous substances go to tab "Downloads", Category "Manufacturer's declaration"
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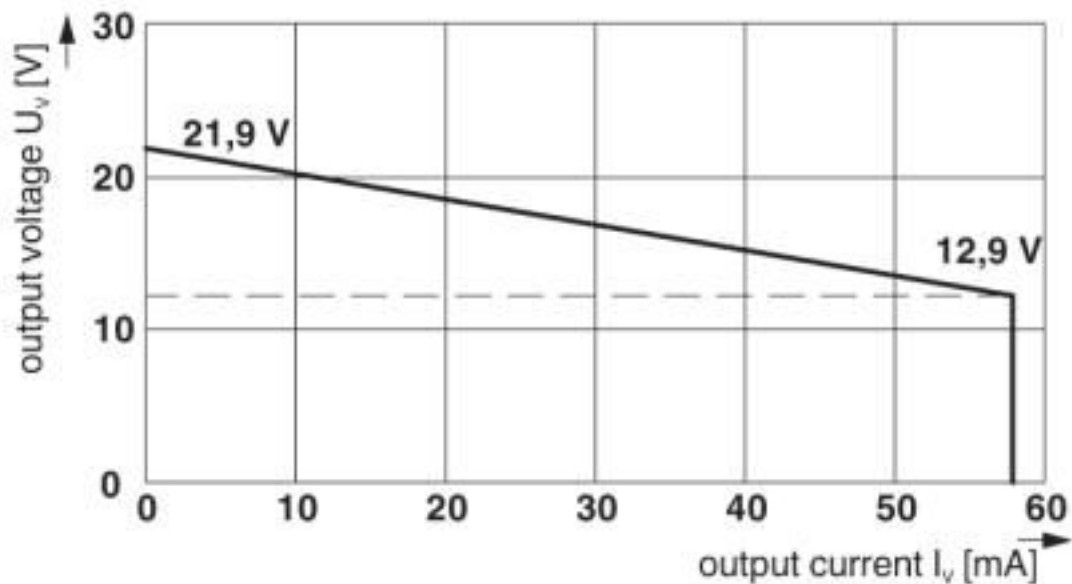
## Drawings

Block diagram

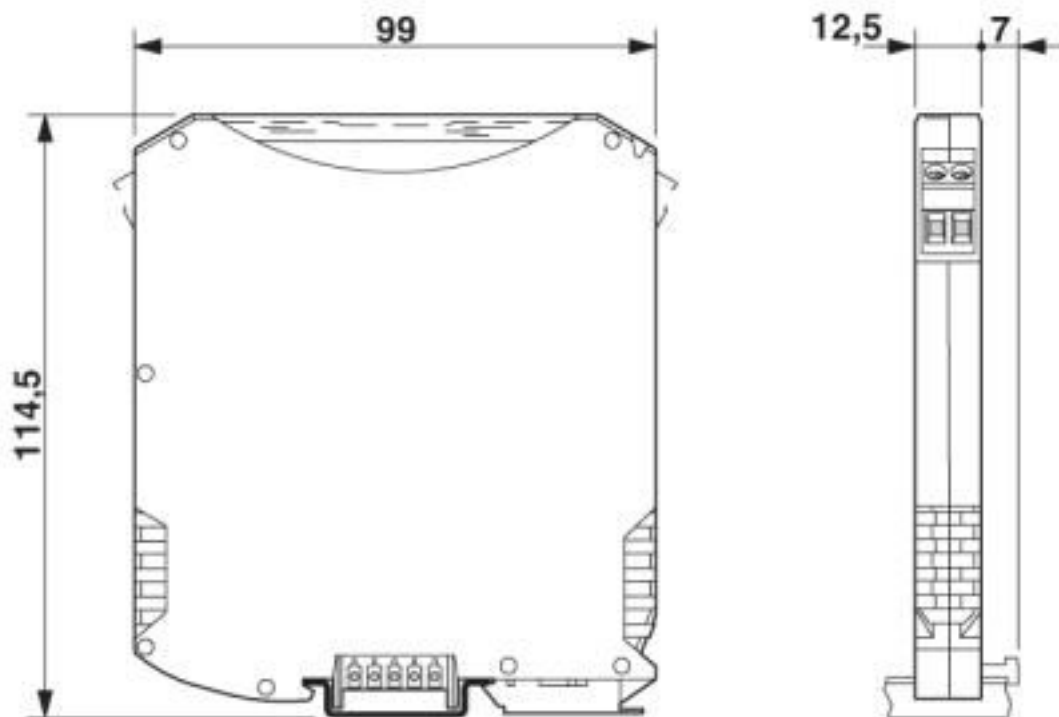


# Solenoid driver - MACX MCR-EX-SL-SD-21-60-LP-SP - 2924100

Diagram



Dimensional drawing



## Classifications

eCl@ss

eCl@ss 10.0.1	27210120
eCl@ss 4.0	27210100

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## Classifications

### eCl@ss

eCl@ss 4.1	27210100
eCl@ss 5.0	27210100
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

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#### Approvals

UL Listed / cUL Listed / Functional Safety / DNV GL

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#### Ex Approvals

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

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### Approval details

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
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## Approvals

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
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Functional Safety			16/04-017 R025 V1R1
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DNV GL		<a href="https://approvalfinder.dnvgl.com/">https://approvalfinder.dnvgl.com/</a>	TAA000020C
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## 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-21-60-LP-SP - 2924100

### 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-21-60-LP-SP - 2924100

## 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-21-60-LP-SP - 2924100

### Accessories

Insulating sleeve - MPS-IH BU - 0201689

Insulating sleeve, color: blue



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



## Solenoid driver - MACX MCR-EX-SL-SD-21-60-LP-SP - 2924100

### 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)

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

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-21-60-LP-SP - 2924100

### 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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