

# Temperature measuring transducer - MACX MCR-EX-SL-RTD-I-SP-NC - 2924168

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Ex-i temperature measuring transducer: Converts signals from resistance thermometers installed in Ex areas and transmits a 0/4-20 mA signal to a load in the safe area. Freely programmable, 3-way isolation, SIL2, spring-cage terminal blocks.

The illustration shows the versions with screw connection

## Product Features

- ✓ Power supply possible via DIN rail connector
- ✓ Programming during operation with Ex measuring circuit connected and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- ✓ Input for resistance thermometers and resistance-type sensors, [Ex ia] IIC
- ✓ Installation in zone 2, protection type "n" (EN 60079-15) permitted
- ✓ Up to SIL 2 according to EN 61508
- ✓ 3-way electrical isolation
- ✓ 0 ... 20 mA or 4 ... 20 mA output
- ✓ Status indicator for supply voltage, cable, sensor, and module errors
- ✓ Configuration via software (FDT/DTM): sensor type, connection technology, measuring range, measuring unit, filter, alarm signal, and output range



## Key commercial data

Packing unit	1 pc
Weight per Piece (excluding packing)	120.0 GRM
Custom tariff number	85437090
Country of origin	Germany

## Technical data

### Note

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

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## Technical data

### Dimensions

Width	12.5 mm
Height	99 mm
Depth	114.5 mm

### Ambient conditions

Ambient temperature (operation)	-20 °C ... 60 °C (Any mounting position)
Ambient temperature (storage/transport)	-40 °C ... 80 °C
Maximum altitude	≤ 2000 m
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Noise immunity	EN 61000-6-2 When being exposed to interference, there may be minimal deviations.
Degree of protection	IP20

### Input data

Sensor types (RTD) that can be used	Sensors (2-, 3-, 4-wire)
Temperature measuring range	-200 °C ... 850 °C (Range depending on the sensor type)
Input signal range	0 Ω ... 2000 Ω
Cable resistance	≤ 50 Ω per cable
Sensor input current	200 μA ... 1 mA
Measuring range span	min. 50 K

### Output data

Signal output	Current output
Current output signal	0 mA ... 20 mA
	4 mA ... 20 mA
Load/output load current output	≤ 500 Ω
Output ripple (current)	< 50 μA <sub>pp</sub>
Behavior in the event of a sensor error	As per NE 43 or can be freely defined

### Power supply

Supply voltage range	19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%))
Power consumption	< 1 W

### Connection data

Conductor cross section solid min.	0.2 mm <sup>2</sup>
Conductor cross section solid max.	1.5 mm <sup>2</sup>
Conductor cross section stranded min.	0.2 mm <sup>2</sup>
Conductor cross section stranded max.	1.5 mm <sup>2</sup>
Conductor cross section AWG/kcmil min.	24

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### Connection data

Conductor cross section AWG/kcmil max	16
Stripping length	8 mm
Connection method	Spring-cage connection

### General

No. of channels	1
Temperature coefficient, typical	0.01 %/K
Step response (0–99%)	typ. 800 ms (With SIL)
	max. 1200 ms (With SIL)
	typ. 700 ms (Without SIL)
	max. 1100 ms (Without SIL)
Alignment zero	± 5 %
Alignment span	± 5 %
Status display	Green LED (supply voltage, PWR)
	Red LED, flashing (line, sensor error, ERR)
	Red LED (module error, ERR)
Inflammability class according to UL 94	V0
Pollution degree	2
Surge voltage category	II
Emitted interference	EN 61000-6-4
Housing material	PA 66-FR
Color	green
Designation	Input/output/power supply
Electrical isolation	300 V <sub>rms</sub> (Rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))
	2.5 kV (50 Hz, 1 min., test voltage)
Designation	Input/output
Electrical isolation	375 V (Peak value in accordance with EN 60079-11)
Designation	Input/power supply
Electrical isolation	375 V (Peak value in accordance with EN 60079-11)
Conformance	CE-compliant, additionally EN 61326
ATEX	# II (1) G [Ex ia Ga] IIC
	# II (1) D [Ex ia Da] IIIC
	# II 3(1) G Ex nA ic [ia Ga] IIC T4 Gc X
IECEX	[Ex ia Ga] IIC
	[Ex ia Da] IIIC
	Ex nA ic [ia Ga] IIC T4 Gc

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## Technical data

### General

UL, USA / Canada	Class I Div 2; IS for Class I, II, III Div 1
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### Safety characteristic data

Integrity requirement	IEC 61508 - Low demand
Architecture	Single-channel, 1oo1
Equipment type	Type B
Safety Integrity Level (SIL)	2
Safe Failure Fraction (SFF)	91.3 %
MTBF	119 Years
$\lambda_{SU}$	$1.5 \times 10^{-7}$ (150 FIT)
$\lambda_{SD}$	$4.61 \times 10^{-7}$ (461 FIT)
$\lambda_{DU}$	$3.23 \times 10^{-7}$ (323 FIT)
$\lambda_{DD}$	$3.18 \times 10^{-8}$ (31.8 FIT)
Probability of a hazardous failure on demand ( $PFD_{AVG}$ )	$1.3 \times 10^{-4}$ (1 year)
	$2.6 \times 10^{-4}$ (2 years)
	$3.91 \times 10^{-4}$ (3 years)
	$6.51 \times 10^{-4}$ (5 years)
	$9.11 \times 10^{-4}$ (7 years)
	$1.04 \times 10^{-3}$ (8 years)
Diagnostic coverage (DC)	90.2 %
Integrity requirement	IEC 61508 - High demand
Architecture	Single-channel, 1oo1
Equipment type	Type B
Safety Integrity Level (SIL)	Up to 2
Safe Failure Fraction (SFF)	91.3 %
MTBF	119 Years
$\lambda_{SU}$	$1.5 \times 10^{-7}$ (150 FIT)
$\lambda_{SD}$	$4.61 \times 10^{-7}$ (461 FIT)
$\lambda_{DU}$	$3.23 \times 10^{-7}$ (323 FIT)
$\lambda_{DD}$	$3.18 \times 10^{-8}$ (31.8 FIT)
Probability of a hazardous failure per hour ( $PFH_D$ )	$3,23 \times 10^{-8}$
Diagnostic coverage (DC)	90.2 %

### Safety data

Max. output voltage $U_o$	6 V
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## Technical data

### Safety data

Max. output current $I_o$	6.3 mA
Max. output power $P_o$	9.4 mW
Group	IIC
Max. external inductivity $L_o$	100 mH
Max. external capacity $C_o$	1.4 $\mu$ F
Group	IIC
Max. external inductivity $L_o$	10 mH
Max. external capacity $C_o$	1.9 $\mu$ F
Group	IIC
Max. external inductivity $L_o$	1 mH
Max. external capacity $C_o$	2.7 $\mu$ F
Group	IIB
Max. external inductivity $L_o$	100 mH
Max. external capacity $C_o$	6.9 $\mu$ F
Group	IIB
Max. external inductivity $L_o$	10 mH
Max. external capacity $C_o$	9.4 $\mu$ F
Group	IIB
Max. external inductivity $L_o$	1 mH
Max. external capacity $C_o$	15 $\mu$ F
Safety-related maximum voltage $U_m$	253 V AC (125 V DC)

### EMC data

Designation	Electromagnetic RF field
Standards/regulations	EN 61000-4-3
Typical deviation from the measuring range final value	4 %
Designation	Fast transients (burst)
Standards/regulations	EN 61000-4-4
Typical deviation from the measuring range final value	4 %
Designation	Conducted interferences
Standards/regulations	EN 61000-4-6
Typical deviation from the measuring range final value	4 %

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## Classifications

### eCl@ss

eCl@ss 4.0	27200206
eCl@ss 4.1	27200206
eCl@ss 5.0	27200206
eCl@ss 5.1	27200206
eCl@ss 6.0	27200206
eCl@ss 7.0	27200206
eCl@ss 8.0	27200206

### ETIM

ETIM 2.0	EC001446
ETIM 3.0	EC001446
ETIM 4.0	EC001446
ETIM 5.0	EC001446

### UNSPSC

UNSPSC 6.01	30211506
UNSPSC 7.0901	39121008
UNSPSC 11	39121008
UNSPSC 12.01	39121008
UNSPSC 13.2	39121008

## Approvals

### Approvals

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#### Approvals

UL Listed / cUL Listed / Functional Safety / cULus Listed

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#### Ex Approvals

ATEX / UL Listed / cUL Listed / IECEx / cULus Listed

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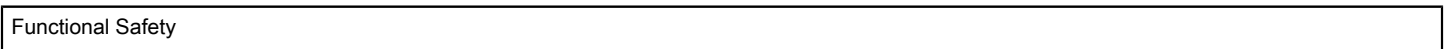
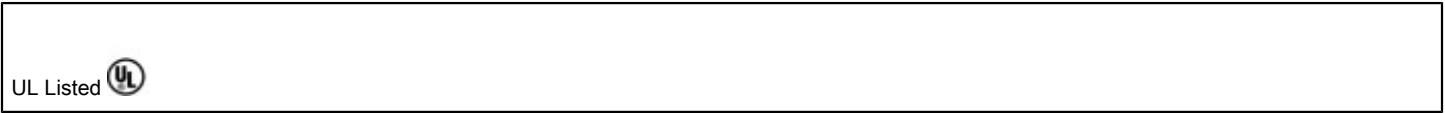
Approvals submitted

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### Approval details

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## Approvals



## Accessories

### Accessories

#### Programming adapter

Programming adapter - IFS-USB-PROG-ADAPTER - 2811271

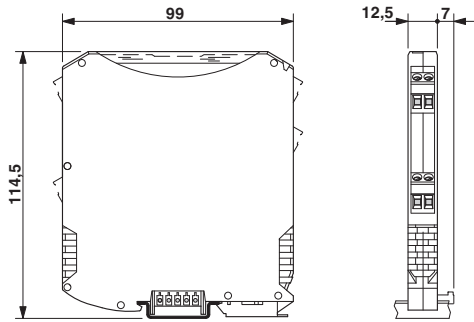


Programming adapter with USB interface, for programming with software. The USB driver is included in the software solutions for the products to be programmed, such as measuring transducers or motor managers.

## Drawings

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Dimensioned drawing



Block diagram

