

# MACX MCR-EX-TC-I - Temperature measuring transducer



1050233

<https://www.phoenixcontact.com/us/products/1050233>

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Ex i temperature transducer: converts signals from thermocouples installed in Ex areas and mV sources and transmits a 0/4...20 mA signal to a load in the safe area. Freely programmable. 3-way isolation, screw connection, SIL.

## Your advantages

- Input for thermocouples and mV sources
- 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
- Installation in zone 2, protection type "ec" (EN 60079-7) permitted
- 3-way electrical isolation
- 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
- Output: 0 mA ... 20 mA or 4 mA ... 20 mA

## Commercial data

Item number	1050233
Packing unit	1 pc
Minimum order quantity	1 pc
Sales key	C430
Product key	DK1215
GTIN	4055626663463
Weight per piece (including packing)	174.1 g
Weight per piece (excluding packing)	150 g
Customs tariff number	85437090
Country of origin	DE

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## 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	Temperature transmitter
Product family	MACX Analog
Application	Temperature
No. of channels	1
Configuration	Software

### System properties

#### Functionality

Configuration	Software
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### Electrical properties

Electrical isolation	3-way isolation
Electrical isolation between input and output	yes
Cold point error, max.	$\pm 2$ K
Step response (0–99%)	$\leq 1.7$ s (with filter factor = 1)
Temperature coefficient, typical	0.01 %/K
Transmission error, typical	0.1 % (For full identification of transmission errors, see the data sheet)

#### Electrical isolation

Test voltage	2.5 kV AC (50 Hz, 60 s)
Overvoltage category	II
Pollution degree	2

#### Electrical isolation Input/output/power supply IEC/EN 61010-1

Standards/regulations	IEC/EN 61010-1
Rated insulation voltage	300 V <sub>rms</sub>
Insulation	Safe isolation

#### Electrical isolation Input/output IEC/EN 60079-11

Standards/regulations	IEC/EN 60079-11
Rated insulation voltage	375 V <sub>PP</sub>

#### Electrical isolation Input/power supply IEC/EN 60079-11

Standards/regulations	IEC/EN 60079-11
Rated insulation voltage	375 V <sub>PP</sub>

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## Supply

Nominal supply voltage	24 V DC -20 % ... +25 %
Supply voltage range	19.2 V DC ... 30 V DC
Max. current consumption	< 40 mA (24 V DC)
Power dissipation	≤ 0.76 W
Power consumption	≤ 1 W

## Input data

### Signal

Number of inputs	1
Input signal	Temperature
	Voltage

### Measurement

Description of the input	intrinsically safe
Sensor types that can be used (TC)	B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, Lr
Temperature measuring range	-250 °C ... 2500 °C (Range depending on the sensor type)
Temperature measuring range: Type B thermocouple	500 °C ... 1820 °C
Temperature measuring range: Type E thermocouple	-230 °C ... 1000 °C
Temperature measuring range: Type J thermocouple	-210 °C ... 1200 °C
Temperature measuring range: Type K thermocouple	-250 °C ... 1372 °C
Temperature measuring range: Type N thermocouple	-200 °C ... 1300 °C
Temperature measuring range: Type R thermocouple	-50 °C ... 1768 °C
Temperature measuring range: Type S thermocouple	-50 °C ... 1768 °C
Temperature measuring range: Type T thermocouple	-200 °C ... 400 °C
Temperature measuring range: Type L thermocouple	-200 °C ... 900 °C
Temperature measuring range: Type U thermocouple	-200 °C ... 600 °C
Temperature measuring range: Type C thermocouple	0 °C ... 2315 °C
Temperature measuring range: Type D thermocouple	0 °C ... 2315 °C
Temperature measuring range: Type A1 GOST thermocouple	0 °C ... 2500 °C
Temperature measuring range: Type A2 GOST thermocouple	0 °C ... 1800 °C
Temperature measuring range: Type A3 GOST thermocouple	0 °C ... 1800 °C
Temperature measuring range: Type M GOST thermocouple	-200 °C ... 100 °C
Temperature measuring range: Type L GOST thermocouple	-200 °C ... 800 °C
Linear mV signal range	-1000 mV ... 1000 mV
Temperature measuring range	Min. 50 K with thermocouple, 10% of the nominal span of the respective range with mV sources

## Output data

### Signal: Current

Number of outputs	1
Configurable/programmable	Yes
Current output signal	0 mA ... 20 mA

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	4 mA ... 20 mA (SIL)
Load/output load current output	$\leq 600 \Omega$
Output ripple (current)	$< 15 \mu A_{pp}$
	$< 10 \mu A_{rms}$
Behavior in the event of a sensor error	Freely definable

## Connection data

Connection method	Screw connection
Stripping length	7 mm
Screw thread	M3
Conductor cross-section rigid	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross-section flexible	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross-section AWG	24 ... 14
Tightening torque	0.5 Nm ... 0.6 Nm

## Test socket

Max. diameter	2 mm
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## Ex data

Ex installation (EPL)	Gc
	Div. 2
Ex i circuits (EPL)	[Ga]
	[Da]
	[Ma]
	[Div. 1]

## Safety data: Terminals: 4.1, 4.2, 5.1, 5.2

Max. internal capacitance $C_i$	44 nF
Max. output voltage $U_o$	6 V
Max. output current $I_o$	4.3 mA (mV)
	7.1 mA (TC with internal cold junction compensation)
	16.8 mA (TC with external cold junction, TC and cold junction connected)
Max. output power $P_o$	25.2 mW (Linear)
Safety-related maximum voltage $U_m$	253 V AC
	125 V DC
	30 V DC (Zone 2: 3.1, 3.2)
IIA/I (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	850 mH / 1000 $\mu$ F
IIB/IIIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	460 mH / 1000 $\mu$ F
IIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	100 mH / 40 $\mu$ F
IIB/IIA (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	100 mH / 950 nF
IIIC/I (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	100 mH / 950 nF

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IIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$	100 mH / 555 nF
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## Signaling

Status display	Green LED (supply voltage)
	Red LED, flashing 2.8 Hz (cable error, sensor error on input or output, ERR)
	Red LED, flashing 1.2 Hz (simulation mode, ERR)
	Red LED, permanently on (module error, ERR)

## Dimensions

Dimensional drawing	
Width	12.5 mm
Height	112.5 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)

## Material specifications

Color	gray (RAL 7042)
Flammability rating according to UL 94 (Housing)	V0 (Housing)
Housing material	PA 6.6-FR

## Environmental and real-life conditions

### Ambient conditions

Degree of protection	IP20
Ambient temperature (operation)	-40 °C ... 70 °C (Any mounting position)
Ambient temperature (storage/transport)	-40 °C ... 80 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)

### Altitude range ( $\leq 2000$ m)

Altitude	$\leq 2000$ m (The technical data refers to altitudes $\leq 2000$ m above mean sea level. For altitudes $>2000$ m above mean sea level, refer to the data sheet.)
Ambient temperature (operation)	-40 °C ... 70 °C
Test voltage	2.5 kV
Rated insulation voltage	300 $V_{rms}$ (IEC/EN 60079-11)
	375 $V_{pp}$ (IEC/EN 60079-11)

### Altitude range ( $\leq 3000$ m)

Height range	$> 2000$ m ... 3000 m
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Ambient temperature (operation)	-40 °C ... 60 °C
Test voltage	2.25 kV
Safety-related maximum voltage $U_m$	190 V AC
	110 V DC
Rated insulation voltage	190 $V_{rms}$ (IEC/EN 60079-11)

## Altitude range ( $\leq 4000$ m)

Height range	> 3000 m ... 4000 m
Ambient temperature (operation)	-40 °C ... 55 °C
Test voltage	2 kV
Safety-related maximum voltage $U_m$	60 V AC/DC
Rated insulation voltage	60 $V_{rms}$ (IEC/EN 60079-11)

## Altitude range ( $\leq 5000$ m)

Height range	> 4000 m ... 5000 m
Ambient temperature (operation)	-40 °C ... 49 °C
Test voltage	1.75 kV
Safety-related maximum voltage $U_m$	60 V AC/DC
Rated insulation voltage	60 $V_{rms}$ (IEC/EN 60079-11)

## Approvals

### CE

Certificate	CE-compliant
Note	and EN 61326

### ATEX

Identification	Ⓢ I (M1) [Ex ia Ma] I
	Ⓢ II (1) G [Ex ia Ga] IIC
	Ⓢ II (1) D [Ex ia Da] IIIC
	Ⓢ II 3(1) G Ex ec ic [ia Ga] IIC T4 Gc
Certificate	IBExU19ATEX1006 X

### IECEX

Identification	[Ex ia Ma] I
	[Ex ia Ga] IIC
	[Ex ia Da] IIIC
	Ex ec ic [ia Ga] IIC T4 Gc
Certificate	IECEX IBE 19.0001 X

### UL, USA/Canada

Identification	UL 61010 Listed
	Class I Div 2; IS for Class I, II, III Div 1
Certificate	Ⓢ C.D.-No 83104549

### Shipbuilding approval

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

Identification	2
Certificate	SEBS-A.150520/17, V2.0

## Systematic Capability

Identification	2
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## INMETRO

Identification	[Ex ia Ma] I
	[Ex ia Ga] IIC
	[Ex ia Da] IIIC
	Ex ec ic [ia Ga] IIC T4 Gc
Certificate	DNV 21.0064 X

## EAC Ex

Identification	Ex ec ic [ia Ga] IIC T4 Gc
Certificate	BY/112 02.01 TP012 103.01 00082

## Shipbuilding 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 immunity	EN 61000-6-2
Note	When being exposed to interference, there may be minimal deviations.

## Noise emission

Standards/regulations	EN 61000-6-4
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## Electromagnetic HF field

Designation	Electromagnetic RF field
Standards/regulations	EN 61000-4-3
Typical deviation from the measuring range final value	1 %

## Fast transients (burst)

Designation	Fast transients (burst)
Standards/regulations	EN 61000-4-4
Typical deviation from the measuring range final value	1 %

## Conducted interference

Designation	Conducted interferences
Standards/regulations	EN 61000-4-6

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Typical deviation from the measuring range final value	1 %
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## Standards and regulations

Electrical isolation	3-way isolation
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## Mounting

Mounting type	DIN rail mounting
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## Drawings

Dimensional drawing



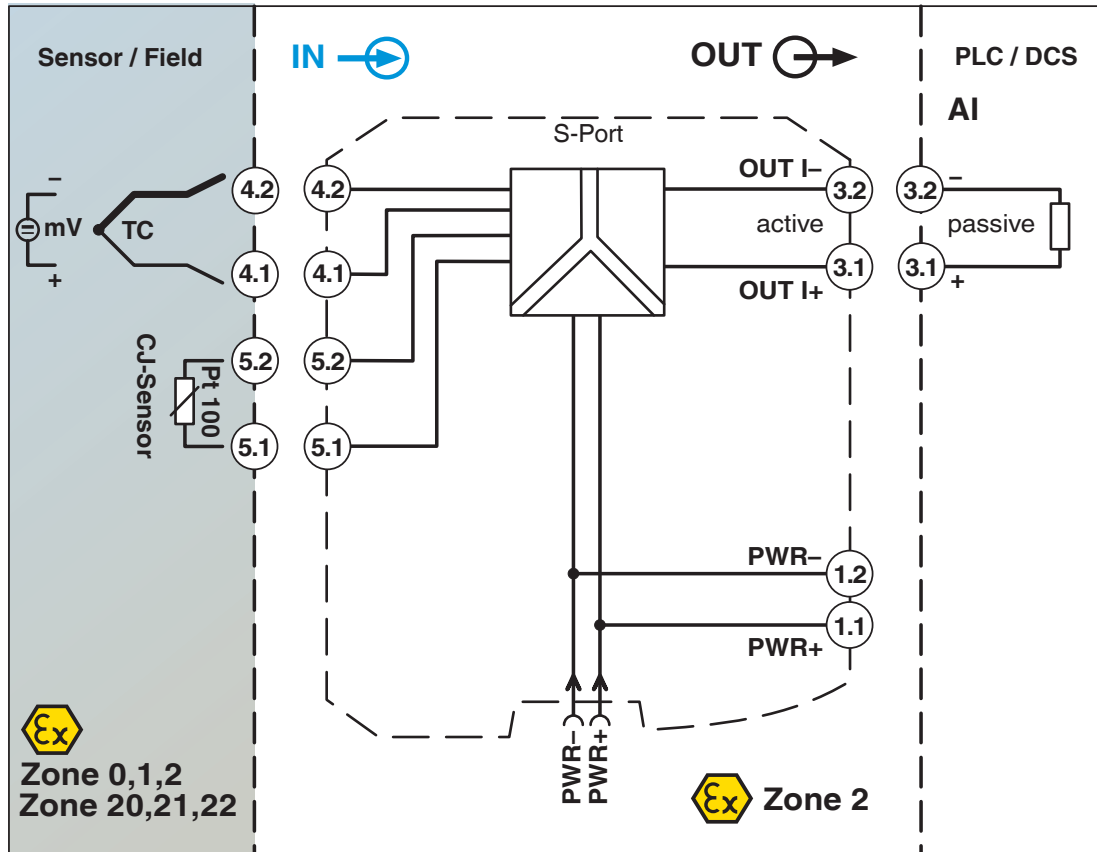
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Block diagram



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## Approvals

To download certificates, visit the product detail page: <https://www.phoenixcontact.com/us/products/1050233>


 **UL Listed**  
Approval ID: E330267


 **cUL Listed**  
Approval ID: FILE E 330267


 **Functional Safety**  
Approval ID: SEBS-A.20170608


**DNV**  
Approval ID: TAA00000AG


**ECAS**  
Approval ID: 163742 E25 08 169509

 **EAC Ex**  
Approval ID: RU C-DE.AB72.B.00093

 **IECEX**  
Approval ID: IECEX IBE 19.0001X

 **cUL Listed**  
Approval ID: FILE E 199827

 **UL Listed**  
Approval ID: E199827

 **ATEX**  
Approval ID: IBExU 19 ATEX 1006 X

**INMETRO**  
Approval ID: DNV 21.0064 X

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## Classifications

### ECLASS

ECLASS-13.0	27210129
ECLASS-15.0	27210129

### ETIM

ETIM 10.0	EC002919
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### UNSPSC

UNSPSC 21.0	41112100
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## Environmental product compliance

### EU RoHS

Fulfills EU RoHS substance requirements	Yes
Exemption	7(a), 7(c)-I

### China RoHS

Environment friendly use period (EFUP)	EFUP-50
	An article-related China RoHS declaration table can be found in the download area for the respective article under "Manufacturer declaration". For all articles with EFUP-E, no China RoHS declaration table issued and required.

### EU REACH SVHC

REACH candidate substance (CAS No.)	Lead(CAS: 7439-92-1)
	2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol(CAS: 79-94-7)
SCIP	e6205f68-5fb9-4366-99e3-d0cfedac9708

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