

# MACX MCR-EX-T-UI-UP-SP - Temperature measuring transducer



2924689

<https://www.phoenixcontact.com/us/products/2924689>

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Freely programmable Ex i temperature measuring transducer with analog output and 1 limit value relay, intrinsically safe signal inputs, resistance thermometer in 2-, 3-, or 4-conductor technology, thermocouples, wide-range supply. Standard configuration, 4-way isolation, Safety Integrity Level (SIL, IEC 61508): 2, Performance Level (ISO 13849): d, Systematic Capability: 2, Push-in connection

## Your advantages

- Input for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, and mV sources, [Ex ia] IIC
- Programming during operation with Ex measuring circuit connected and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Cold junction compensation with separate plug
- Configuration via software (FDT/DTM) or IFS-OP-UNIT operator interface and display unit
- Up to SIL 2 in accordance with EN 61508
- Installation in zone 2, protection type "n" (EN 60079-15) permitted
- Plug-in screw or spring-cage connection technology (Push-in technology)
- Status indicator for supply voltage, cable, sensor, and module errors
- Measure differential temperatures
- Wide-range power supply of 19.2 ... 253 V AC/DC
- Freely programmable input and output
- Inverse output signal ranges as an option
- Relay switching output

## Commercial data

|                                      |               |
|--------------------------------------|---------------|
| Item number                          | 2924689       |
| Packing unit                         | 1 pc          |
| Minimum order quantity               | 1 pc          |
| Sales key                            | C430          |
| Product key                          | DK1215        |
| GTIN                                 | 4046356629102 |
| Weight per piece (including packing) | 251 g         |
| Weight per piece (excluding packing) | 163.7 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 |
|----------|---|

### Product properties

|                |                         |
|----------------|-------------------------|
| Product type   | Temperature transmitter |
| Product family | MACX Analog             |
| Configuration  | DIP switches            |
|                | Software                |

#### Insulation characteristics

|                      |    |
|----------------------|----|
| Overvoltage category | II |
| Pollution degree     | 2  |

### System properties

#### Functionality

|               |              |
|---------------|--------------|
| Configuration | DIP switches |
|               | Software     |

### Electrical properties

|   |  |
|---|--|
| Electrical isolation                          | 4-way isolation                          |
| Electrical isolation between input and output | yes                                      |
| Step response (0–99%)                         | ≤ 1.75 s (SIL on)                        |
|   | 1.3 s (SIL off)                          |
| Maximum temperature coefficient               | 0.01 %/K                                 |
| Maximum transmission error                    | 0.1 % (E.g., at Pt 100, 300 K min. span) |

#### Electrical isolation Input/output/power supply

|              |                         |
|--------------|-------------------------|
| Test voltage | 2.5 kV AC (50 Hz, 60 s) |
|--------------|-------------------------|

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

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

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

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

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

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

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## Electrical isolation Output/supply IEC/EN 61010-1

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

## Supply

|                              |   |
|------------------------------|---|
| Nominal supply voltage range | 24 V AC/DC ... 230 V AC/DC -20 % ... +10 % (50/60 Hz) |
| Supply voltage range         | 19.2 V AC/DC ... 253 V AC/DC (50/60 Hz)               |
| Typical current consumption  | < 50 mA (24 V DC)                                     |
| Power consumption            | < 1.5 W   |

## Input data

### Signal

|                  |             |
|------------------|-------------|
| Number of inputs | 1           |
| Input signal     | Temperature |
|                  | Resistor    |
|                  | Voltage     |

### Measurement

|                                     |   |
|-------------------------------------|---|
| Sensor types (RTD) that can be used | Pt, Ni, Cu sensors: 2, 3, 4-wire                            |
| Sensor types that can be used (TC)  | B, E, J, K, N, R, S, T, L, U, CA, DA, A1G, A2G, A3G, MG, LG |
| Temperature measuring range         | -250 °C ... 2500 °C (Range depending on the sensor type)    |
| Linear resistance measuring range   | 0 Ω ... 50 kΩ   |
| Potentiometer resistance range      | 0 Ω ... 50 kΩ   |
| Linear mV signal range              | -1000 mV ... 1000 mV  |

## Output data

### Switching: Relay

|                           |                                       |
|---------------------------|---------------------------------------|
| Configurable/programmable | Yes                                   |
| Contact switching type    | 1 changeover contact                  |
| Contact material          | AgSnO <sub>2</sub> , hard gold-plated |
| Maximum switching voltage | 30 V AC/DC                            |
| Max. switching current    | 0.5 A (30 V AC)                       |
|                           | 1 A (30 V DC)                         |

### Signal: Voltage/current

|                                 |                          |
|---------------------------------|--------------------------|
| Number of outputs               | 1                        |
| Configurable/programmable       | Yes                      |
| Max. voltage output signal      | ± 11 V                   |
| Current output signal           | 0 mA ... 20 mA (SIL off) |
|                                 | 4 mA ... 20 mA (SIL on)  |
| Max. current output signal      | 22 mA                    |
| Load/output load voltage output | ≥ 10 kΩ                  |

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|   |                     |
|---|---------------------|
| Load/output load current output         | ≤ 600 Ω (20 mA)     |
| Behavior in the event of a sensor error | freely programmable |

## Connection data

|   |   |
|---|---|
| Connection method   | Push-in connection  |
| Stripping length  | 10 mm   |
| 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 flexible (2 conductors with same cross section) | 0.25 mm <sup>2</sup> ... 0.34 mm <sup>2</sup> (TWIN ferrule without plastic sleeve) |
|   | 0.5 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> (TWIN ferrule with plastic sleeve)      |
| Conductor cross-section AWG   | 24 ... 14   |
|   | 24 ... 22 (TWIN ferrule without plastic sleeve)                                     |
|   | 20 ... 16 (TWIN ferrule with plastic sleeve)  |

## Ex data

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

## Safety data

|  |   |
|--|---|
| Max. internal inductance $L_i$   | negligible  |
| Max. internal capacitance $C_i$  | 44 nF   |
| Max. output voltage $U_o$  | 6 V DC  |
| Max. output current $I_o$  | 7 mA (RTD in 2-conductor technology)                |
|  | 13 mA (RTD in 3-conductor technology)               |
|  | 16 mA (RTD in 4-conductor technology)               |
|  | 13 mA (TC with internal cold junction compensation) |
|  | 10 mA (TC with external cold junction compensation) |
|  | 5 mA (mV)   |
|  | 13 mA (Potentiometer)                               |
| Max. output power $P_o$  | 11 mW (RTD in 2-conductor technology)               |
|  | 20 mW (RTD in 3-conductor technology)               |
|  | 24 mW (RTD in 4-conductor technology)               |
|  | 20 mW (TC with internal cold junction compensation) |
|  | 15 mW (TC with external cold junction compensation) |
|  | 7.5 mW (mV)   |
|  | 20 mW (Potentiometer)                               |
| IIA/I (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$    | 100 mH / 150 μF                                     |
| IIB/IIIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$ | 100 mH / 100 μF                                     |

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|   |   |
|---|---|
| IIC (simple circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$           | 100 mH / 10 $\mu$ F                                     |
| IIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$            | 100 mH / 600 nF, 10 mH / 600 nF, 1 mH / 600 nF          |
| I/IIB/IIA/IIIC (mixed circuit): Max. external inductivity $L_o$ / Max. external capacitance $C_o$ | 100 mH / 1 $\mu$ F, 10 mH / 1 $\mu$ F, 1 mH / 1 $\mu$ F |

## Signaling

|                |   |
|----------------|---|
| Status display | LED supply voltage, PWR (green)             |
|                | Red LED, flashing (line, sensor error, ERR) |
|                | Red LED (module error, ERR)                 |
|                | Yellow LED (switching output)               |

## Dimensions

|                     |  |
|---------------------|--|
| Dimensional drawing |  |
| Width               | 17.5 mm  |
| Height              | 107.9 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 (not assessed by UL)          |
| Ambient temperature (operation)         | -20 °C ... 65 °C                   |
| Ambient temperature (storage/transport) | -40 °C ... 85 °C                   |
| Permissible humidity (operation)        | typ. 5 % ... 95 % (non-condensing) |
| Shock (operation)                       | 15g (IEC 60068-2-27)               |
| Vibration (operation)                   | 5g (IEC 60068-2-6)                 |

### 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.) |
|----------|--|

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|                                      |                                    |
|--------------------------------------|------------------------------------|
| Ambient temperature (operation)      | -20 °C ... 65 °C                   |
| Safety-related maximum voltage $U_m$ | 253 V AC/DC (Terminals 1.1, 1.2)   |
|                                      | 250 V AC (Terminals 3.1, 3.2, 3.3) |
|                                      | 120 V DC (Terminals 3.1, 3.2, 3.3) |
|                                      | 30 V (Installation in zone 2)      |

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

|                                      |                                    |
|--------------------------------------|------------------------------------|
| Height range                         | > 2000 m ... 3000 m                |
| Ambient temperature (operation)      | -20 °C ... 55 °C                   |
| Safety-related maximum voltage $U_m$ | 190 V AC (Terminals 1.1, 1.2)      |
|                                      | 110 V DC (Terminals 1.1, 1.2)      |
|                                      | 190 V AC (Terminals 3.1, 3.2, 3.3) |
|                                      | 110 V DC (Terminals 3.1, 3.2, 3.3) |
|                                      | 30 V (Installation in zone 2)      |

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

|                                      |                                      |
|--------------------------------------|--------------------------------------|
| Height range                         | > 3000 m ... 4000 m                  |
| Ambient temperature (operation)      | -20 °C ... 50 °C                     |
| Safety-related maximum voltage $U_m$ | 60 V AC/DC (Terminals 1.1, 1.2)      |
|                                      | 60 V AC/DC (Terminals 3.1, 3.2, 3.3) |
|                                      | 30 V (Installation in zone 2)        |

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

|                                      |                                      |
|--------------------------------------|--------------------------------------|
| Height range                         | > 4000 m ... 5000 m                  |
| Ambient temperature (operation)      | -20 °C ... 45 °C                     |
| Safety-related maximum voltage $U_m$ | 60 V AC/DC (Terminals 1.1, 1.2)      |
|                                      | 60 V AC/DC (Terminals 3.1, 3.2, 3.3) |
|                                      | 30 V (Installation in zone 2)        |

## Approvals

### CE

|             |              |
|-------------|--------------|
| Certificate | CE-compliant |
|-------------|--------------|

### ATEX

|                |  |
|----------------|--|
| Identification | Ⓜ II (1) G [Ex ia Ga] IIC              |
|                | Ⓜ II (1) D [Ex ia Da] IIIC             |
|                | Ⓜ II 3 G Ex ec ic nC [ia Ga] IIC T4 Gc |
|                | Ⓜ I (M1) [Ex ia Ma] I                  |
| Certificate    | IBExU 10 ATEX 1044 X                   |

### IECEX

|                |                               |
|----------------|-------------------------------|
| Identification | [Ex ia Ga] IIC                |
|                | [Ex ia Da] IIIC               |
|                | Ex ec ic nC [ia Ga] IIC T4 Gc |

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|             |                     |
|-------------|---------------------|
|             | [Ex ia Ma] I        |
| Certificate | IECEX IBE 10.0004 X |

## INMETRO

|                |                               |
|----------------|-------------------------------|
| Identification | [Ex ia Ga] IIC                |
|                | [Ex ia Da] IIIC               |
|                | Ex ec ic nC [ia Ga] IIC T4 Gc |
|                | [Ex ia Ma] I                  |
| Certificate    | DNV 18.0143 X                 |

## UL, USA/Canada

|                |                     |
|----------------|---------------------|
| Identification | UL 508 Listed       |
| Certificate    | ®. C.D.-No 83104549 |

## KC-s

|                |                |
|----------------|----------------|
| Identification | [Ex ia] IIC    |
| Certificate    | 17-KA4BO-0411X |

## Shipbuilding approval

|             |                   |
|-------------|-------------------|
| Certificate | DNV GL TAA000020C |
|-------------|-------------------|

## Safety Integrity Level (SIL, IEC 61508)

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

## Systematic Capability

|                |   |
|----------------|---|
| Identification | 2 |
|----------------|---|

## Performance Level (ISO 13849)

|                |   |
|----------------|---|
| Identification | d |
|----------------|---|

## Shipbuilding data

|             |   |
|-------------|---|
| Temperature | B   |
| Humidity    | B   |
| Vibration   | A   |
| EMC         | A   |
| 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 | 2 %                      |

## Fast transients (burst)

|  |                         |
|--|-------------------------|
| Designation  | Fast transients (burst) |
| Standards/regulations                                  | EN 61000-4-4            |
| Typical deviation from the measuring range final value | 2 %                     |

## Conducted interference

|  |                         |
|--|-------------------------|
| Designation  | Conducted interferences |
| Standards/regulations                                  | EN 61000-4-6            |
| Typical deviation from the measuring range final value | 2 %                     |

## Standards and regulations

|                      |                 |
|----------------------|-----------------|
| Electrical isolation | 4-way isolation |
|----------------------|-----------------|

## Mounting

|               |                   |
|---------------|-------------------|
| Mounting type | DIN rail mounting |
|---------------|-------------------|

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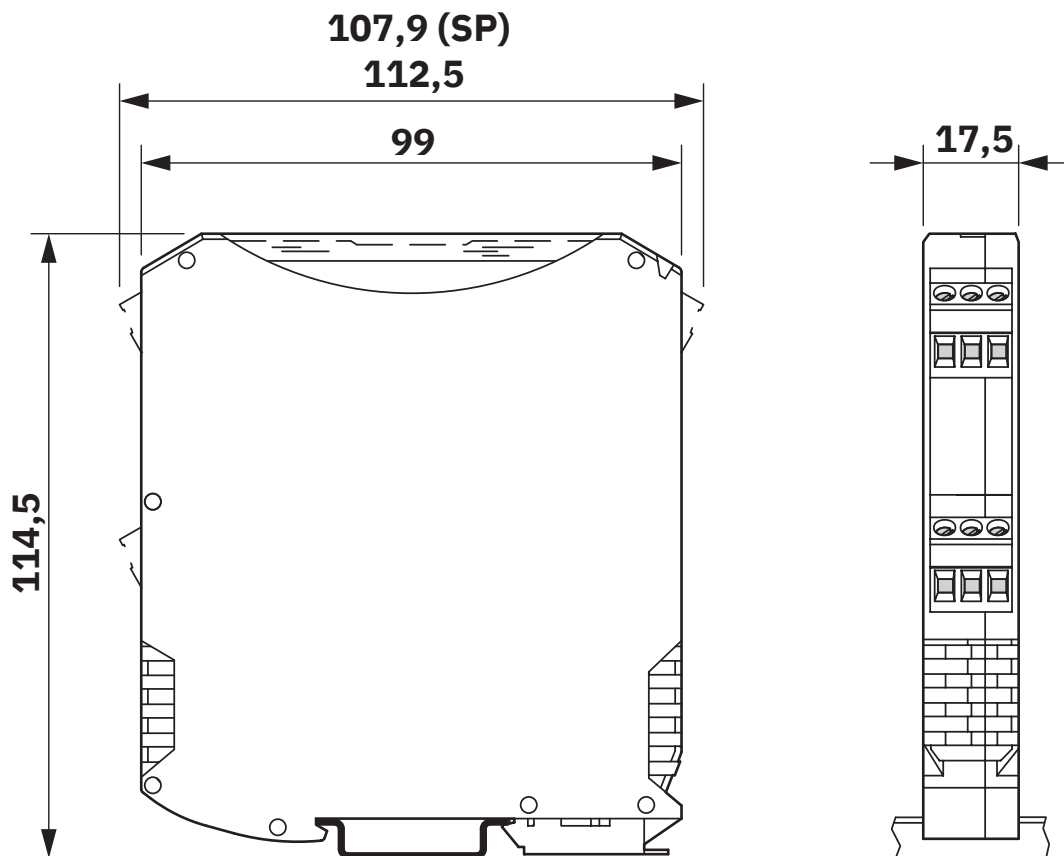


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## Drawings

Dimensional drawing



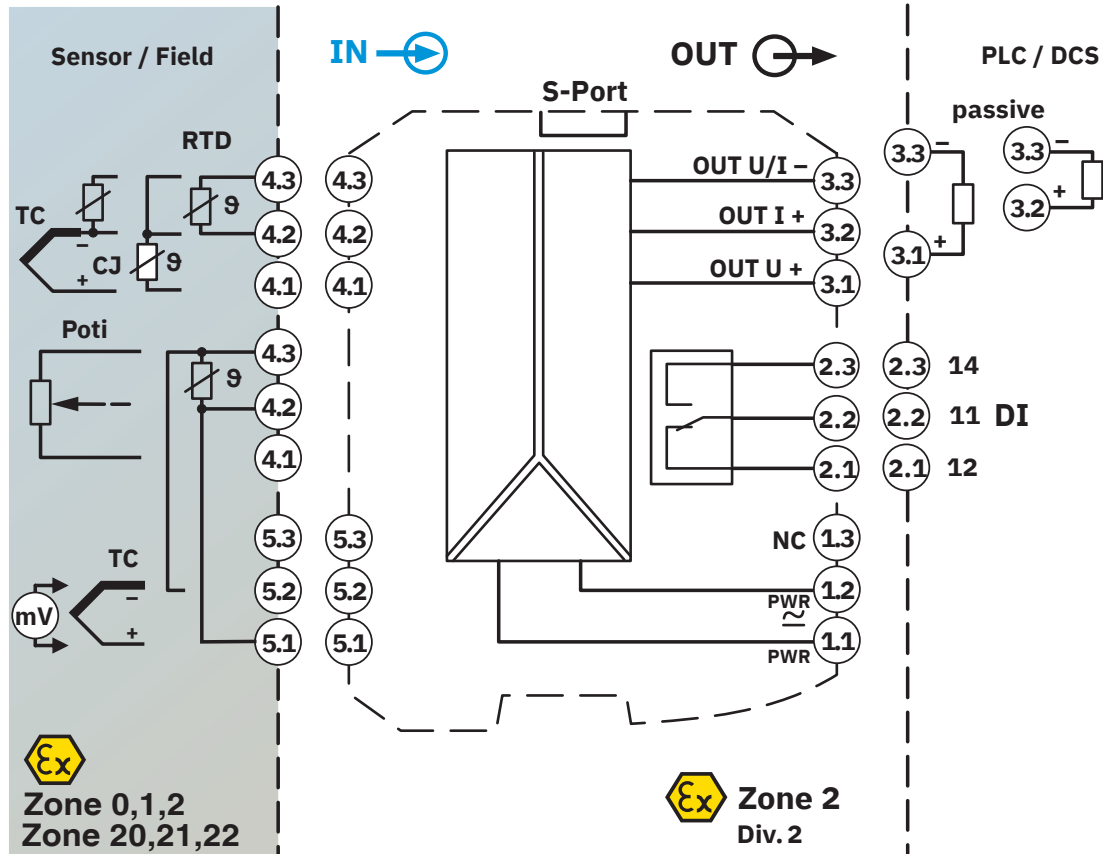
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Block diagram



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## Approvals

To download certificates, visit the product detail page: <https://www.phoenixcontact.com/us/products/2924689>

**DNV**

Approval ID: TAA000020C



**UL Listed**

Approval ID: E238705



**cUL Listed**

Approval ID: E238705



**Functional Safety**

Approval ID: SEBS-A.20170608



**IECEx**

Approval ID: IECEx IBE 10.0004X



**cUL Listed**

Approval ID: E199827



**UL Listed**

Approval ID: E199827



**ATEX**

Approval ID: IBEu 10 ATEX 1044

**INMETRO**

Approval ID: DNV 18.0143 X



**KC-s**

Approval ID: 17-KA4BO-0411X

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## Classifications

### ECLASS

|                   |          |
|-------------------|----------|
| ECLASS-13.0       | 27210129 |
| ECLASS-15.0       | 27210129 |
| ECLASS-15.0 ASSET | 27250101 |

### ETIM

|           |          |
|-----------|----------|
| ETIM 10.0 | EC002919 |
|-----------|----------|

### 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                                | 1f55ef29-2776-44e9-b413-4cfddd56281a                           |

### EF3.1 Climate Change

|         |                |
|---------|----------------|
| CO2e kg | 10.455 kg CO2e |
|---------|----------------|

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