# BT1 / BT2 / BT3 series
# Intrinsically safe temperature transducers for hazardous locations
## Installation and operating instructions

## TEMPERATURE TRANSDUCERS

| | |
|---|---|
| **BTx-CS-5** | **CSA certified, current output** |
| **BTx-CS-3/6** | **CSA certified, voltage output** |
| **BTx-CS-4** | **CSA certified, ratiometric output** |
| **BTx-CH-5** | **CSA + hydrogen use, current output** |
| **BTx-CH-3/6** | **CSA + hydrogen use, voltage output** |
| **BTx-CH-4** | **CSA + hydrogen use, ratiometric output** |


- example -

**CLASS 2258 04**
PROCESS CONTROL EQUIPMENT –
For Hazardous Locations

**CLASS 2258 84**
PROCESS CONTROL EQUIPMENT –
For Hazardous Locations - Certified to US Standards

## APPLICABLE REQUIREMENTS

CAN/CSA - C22.2 No. 0 - 10; CAN/CSA - C22.2 No. 61010-1-12
CAN/CSA - C22.2 No. 60079-0:15; CAN/CSA - C22.2 No. 60089-11:14
ANSI/UL 60079-0-2013 *Sixth Edition;* ANSI/UL 60079-11-2013 *Sixth Edition*
ANSI/UL 61010-1 *Third Edition;* ANSI/UL 913 - 2013 *Eight Edition*

## SUITABLE HAZARDOUS AREAS AND CONDITIONS

**US:** **Class I, Zone 1 AEx ia IIB T3 Gb**
**IS Class I, Division 1, Groups C, D T3**

**CAN:** **Ex ia IIB T3 Gb**
**IS Class I, Division 1, Groups C, D T3**

C US
610337

## SUITABLE TEMPERATURE RANGES

for use in Zone 1 under normal athmospheric conditions:

| | |
|---|---|
| ambient temperature: | -40 °C ... 85 °C (-40 °F ... 185 °F) |
| media temperature | -40 °C ... 200 °C (-40 °F ... 392 °F) |
| ambient pressure: | 0.8 ... 1.2 bar (12 ... 17 psi) |
| oxygen content: | typ. 21 % |

## US / CAN APPROVALS

**CSA Master Contract file:** **610337**
**CSA Report file #:** **80304677**

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## WARNING AND IMPORTANT SAFETY INSTRUCTIONS



**This is the safety alert symbol. It is used to alert you to potential personal injury hazards.**

**Obey all safety messages that follow this symbol to avoid possible injury or death.**

**DANGER** indicates a hazardous situation which, if not avoided, **will result in death or serious injury.**

**WARNING** indicates a hazardous situation which, if not **avoided, could result in death or serious injury.**

**CAUTION** used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor **or moderate injury.**

## ELECTRICAL INSTALLATION raccordement électrique

**⚠WARNING**

To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

**AVERTISSEMENT**
Pour éviter l'inflammation d'atmosphères inflammables ou combustibles, débrancher l'alimentation avant l'entretien.

**⚠WARNING**

Suitable for use in Class I, Division 1, Groups C and D Hazardous Locations, or Non-Hazardous locations only.

**AVERTISSEMENT**
Uniquement adapté à un usage dans les Zones dangereuses de la Classe I, Division 1 des groups C et D ainsi que dans les zones non dangereuses.

**⚠WARNING** **EXPLOSION HAZARD**

Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous. This equipment must be powered by a non-hazardous live source in accordance with CAN/CSA-C22.2 No. 61010-1-14 eg. limited energy source, or a Class 2 Source.

**AVERTISSEMENT** **Risque d'explosion**
Déconnector l'appareil uniquement après avoir coupé l'alimentation électrique ou avoir vérifié qu'il n'est pas installé en zone dangereuse. Cet équipement doit être alimenté par une source directe non dangereuse conformément aux norms CAN/CSA-C22.2 No. 61010-1-14 par exemple en source d'énergie limitée ou en source Classe 2.

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**⚠WARNING** **EXPLOSION HAZARD**

Substitution of components may impair intrinsic safety and suitability for Class I Div. 1.

**AVERTISSEMENT** **Risque d'explosion**
Remplacement d'un composant peut empêcher la conformité de Classe I, Division 1.
La substitution de composants peut compromettre la sécurité intrinséque.

**⚠WARNING**

The enclosure is manufactured from metal. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered during installation.

**AVERTISSEMENT**
Le boîtier est fabriqué en metal. Dans de rares cas, des sources d'inflammation due à des étincelles d'impact et de friction pourraient survenir. Ceci doit être considéré lors de l'installation.

**⚠WARNING**

Potential Electrostatic Discharge Hazard – clean the surface with a damp cloth.

**AVERTISSEMENT**
Décharge potential électrostatique Hazard – nettoyer la surface avec un chiffon humide.

## REQUIREMENTS FOR INSTALLATION

I. All wiring has to be conform to local codes and must be carried out by authorised personal only. High and low voltage wiring has to be separated. For applications in critical industrial environment special cables has to be used.

II. Connection information has to observed without fail. The instructions are laid down into the label of the transmitter and/or the dedicated instruction manual.

III. It is to be ensured that cables are routed without any crushing.

IV. Electricity supply and wirings has to be fill the demands for explosion protection.

V. For the power supply, it must be ensured that the transmitters are powered only by instrinsic safety voltage and current barriers.

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## SPECIAL CONDITIONS FOR SAFE USE

I. Since the temperaturers transducers are not earthed and a charge-generating mechanism may be present when in contact with non-metallic charge generating materials, the device shall be grounded before use.

II. Under certain extreme circumstances, exposed plastic and unearthed metal parts of the enclosure may store an ignition capable level of electrostatic charge. Therefore, the user/installer shall implement precautions to prevent the buildup of electrostatic charge, e.g. locate the equipment where a charge-generating mechanism (such as wind- blown dust) is unlikely to be present and clean with a damp cloth.

III. When the equipment is installed, particular precautions must be taken to ensure, taking into account the effect of the process temperature, that the operating service temperature of the overall transducer assembly is between -40 °C to 85 °C (-40 °F ... 185 °F).

## PROCESS CONNECTION INSTALLATION

For threaded installations, you have to use a suitable wrench depending on the size of the process connection. Fitting sizes has to be 7/8” (SW22) or 1-1/16” (SW27).

Use the hex flats closest to the process connection for installation into the process. For cable connections, hold the product at the hex closest to the conduit connection.

The media connection has to be executed with the protection level of at least IP67. For high pressure fittings, a seal from a crush copper-iron soft seal has to be used.

The maximum torque to be applied for the process connection shall not exceed 25 Nm.

**⚠WARNING** **RISK OF DAMAGING**

It is not allowed to use the body or housing for application of torque during installation or maintenance. It is also not allowed to use the hexagon at cable versions for application of the torque for installation.

**⚠WARNING** **RISK OF INJURY**

It has to be taken care, that for installation and maintenance purposes the process connection is in a de- pressurized state.

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## CONDITIONS FOR USE OF TRANSMITTERS

I. It has to be secured, that the given values like pressure, force, torque and temperature are inside the limits, described in the datasheets or product label.

II. Ambient conditions, like temperature, humidity, athmospheric pressure etc. must not be exceeded.

III. All applicable safety regulations which are laid down by the regulatory bodies in the country of use has to be observed.

IV. Transmitters has to be used only in there original conditions. It is not allowed to carry out un- authorized modifications.

V. All items for providing protection during transit or shipping, like foils, caps or papers, has to be removed before installation.

VI. Type testing of the transmitters are unable to cover all possible ambient conditions. Therefore the user has the responsibility that all electric and plug- socket connection complies with the specified rules and regulations by national requirements.

VII. The values for overpressure safety, given in the datasheets and technical descriptions, are related only to the hydraulic or pneumatic part of the transmitters, not to any kind of electrical connections.

VIII. The implementation of the european regulation EN/IEC 60079-14 has to be followed. Also the standards of EN/IEC 60079-0:2014, EN/IEC 60079-11:2012 and EN/IEC 60079-26:2015 were applied.

IX. There is no garanty for an zonal separation between the media and the transmitter electronic.

## ENTITY PARAMETERS

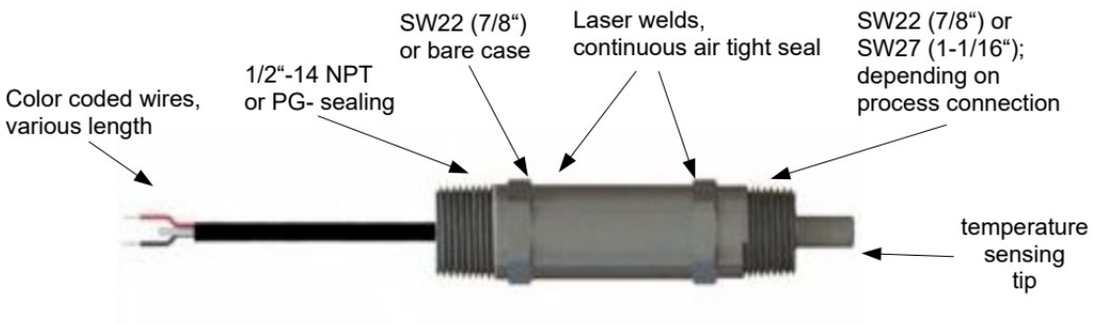
| type of output | Ui [V DC] | Ii [mA DC] | Pi [W] | Ci | Li |
|---|---|---|---|---|---|
| current 4...20 mA | 27 | 125 | 0.85 | 12.1 nF | negligible |
| voltage 0 ... 10 V (or any in this range); normal supply voltage | 27 | 125 | 0.85 | 12.1 nF | negligible |
| voltage 0 ... < 6 V (or any in this range) low supply voltage | 6 | 600 | 0.9 | 9.27 µF | negligible |

Note: Deviation to these values will be marked on the transmitter label.

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## WIRING FOR CABLE VERSIONS




| current output | BTx-xx-5 versions | | | |
|---|---|---|---|---|
| | **black** | **green** | **red** | **orange** |
| BT1-xx-5 / 4...20 mA | - Vsoc (loop -) | n. c. / free | + Vsoc (loop +) | n. c. / free |
| BT2-xx-5 / BT3-xx-5 / 4...20 mA | - Vsoc (loop -) | data (optional) | + Vsoc (loop +) | clock (optional) |

| | BTx-xx-3/4/6 versions | | | | |
|---|---|---|---|---|---|
| **voltage output** | **white** | **black** | **green** | **red** | **orange** |
| BT1-xx- 3/4/6 / voltage output | Signal/out | GND | n. c. / free | + Vsoc (+ supply) | n. c. / free |
| BT2/3-xx-3/4/6 / voltage output | Signal/out | GND | data (optional) | + Vsoc (+ supply) | clock (optional) |

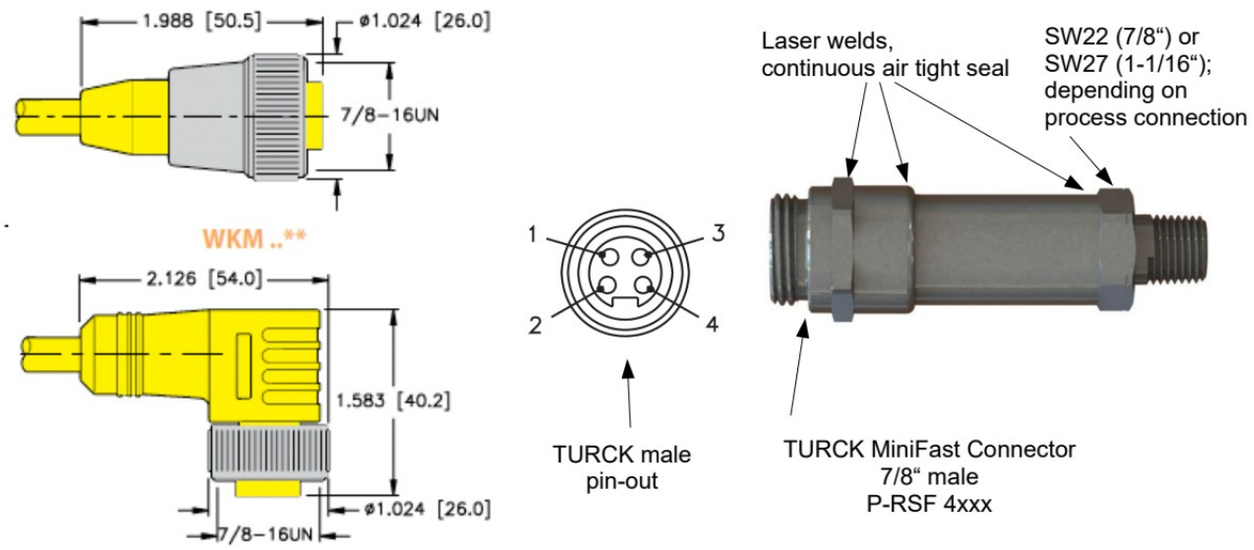
| |
|---|
| Do not connect or tie the case or earth potential to the electrical ground. |
| Signals 'data' and 'clock' shall not be connected in hazardous and explosion proof areas. |
| Pinout and wire colors may change.The actual pinout, the wire colors and the associated signals will be marked on the label, which is engraved on the transmitter housing. |

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## WIRING FOR TURCK MINIFAST CONNECTOR

TURCK connectors series P-RKM (example)




| output type / standard pinout | | Pin 1 | Pin 2 | Pin 3 | Pin 4 |
|---|---|---|---|---|---|
| 4... 20 mA loop powered | | - Vsoc (loop -) | data (optional) | + Vsoc (loop +) | clock (optional) |
| 3- wire voltage output | | GND | Signal/out | + Vsoc (+ supply) | n. c. |

Do not connect or tie the case ground to the electrical ground.

Installation of the cables and receptables has to follow the TURCK control drawings NI-2.407. Only components listed there are approved for the connection.

Signals 'data' and 'clock' shall not be connected in hazardous and explosion proof areas.

It has to be secured after installation, that no inner parts of the connectors and receptables will have contact with the outer environment or athmosphere.

Pinout at the connector may change.The actual pinout and the associated signals will be marked on the label, which is engraved on the transmitter housing.

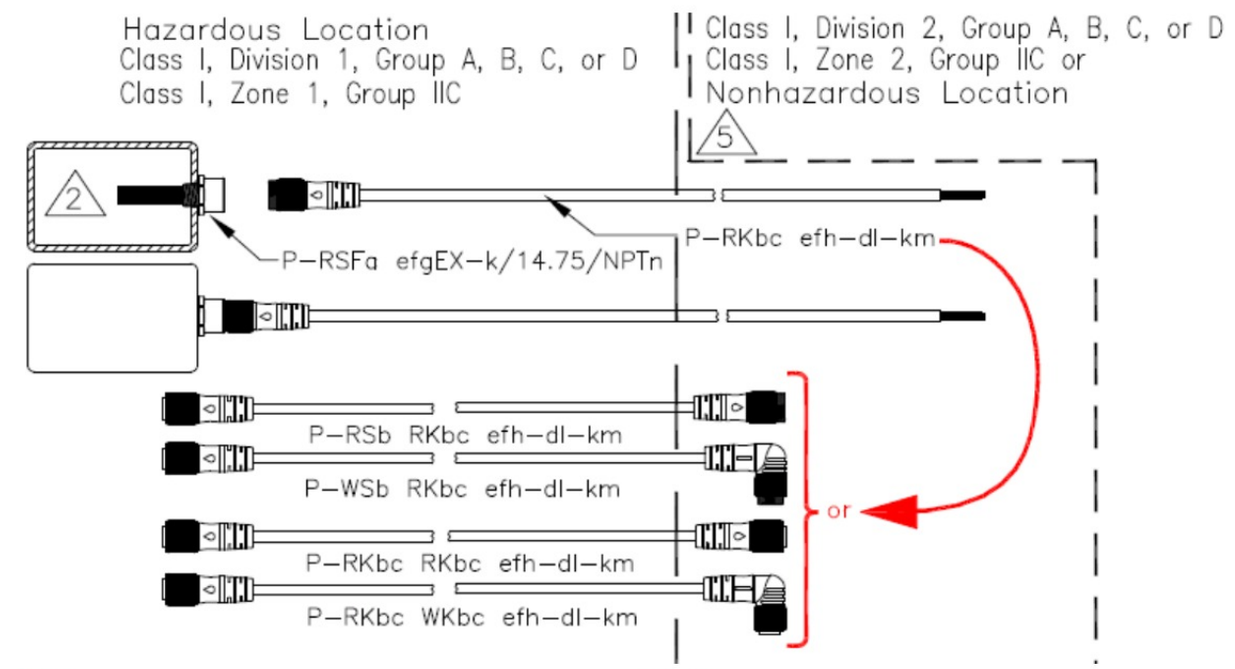
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## WIRING FOR TURCK MINIFAST - HINTS

| |
|---|
| Note: The manufacturer or distributor will only deliver the transducer itself (shown as part "A"). |
| The installation has to be completed and to be maintained with the standards according to CSA 22.2 No. 0-10 Edition 10 (R2015) and/or NEC, ANSI/NFPA70 and the dedicated drawings of the CSA/FM approved equipment (see principal schematic below). |
| Installation has to be carried out that only approved parts and assemblies are used. |

- example for installation -
For complete installation options see TURCK control drawings NI-2.407.

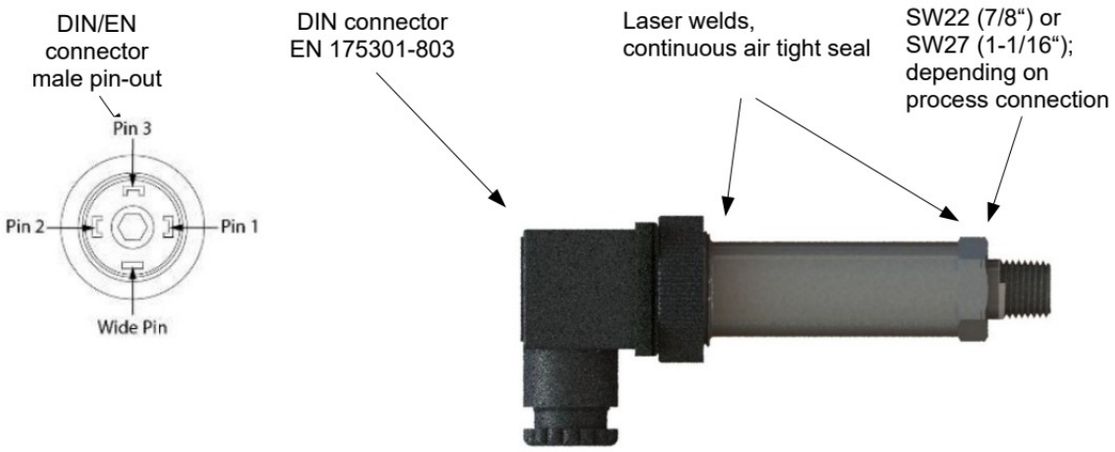



**A** explosion proof equipment **B** non- explosion proof equipment

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## WIRING FOR DIN CONNECTOR




| output type / standard pinout | | Pin 1 | Pin 2 | Pin 3 | wide pin |
|---|---|---|---|---|---|
| 4... 20 mA loop powered | | + Vsoc (loop +) | - Vsoc (loop -) | n. c. | n. c. |
| 3- wire voltage output | | + Vsoc (+ supply) | GND | Signal/out | n. c. |
| | | | | | |
| Do not connect or tie the case ground to the electrical ground. | | | | | |
| It has to be secured after installation, that no inner parts of the connectors and receptables will have contact with the outer environment or athmosphere. | | | | | |
| Pinout at the connector may change.The actual pinout and the associated signals will be marked on the label, which is engraved on the transmitter housing. | | | | | |

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## SAFETY BARRIER INSTALLATION

I. Intrinsically safe safety level is only guaranteed by installation of a certified shunt- diode Zener barrier or a single channel isolation barrier.

II. Maximum non- hazardous area voltage must not exceed 250 V.

III. Canadian installations should be in accordance with Canadian Electrical Code, Part 1. US installations should be in accordance with Article 504 in the National Electric Code, ANSI/NFPA 70.

IV. A grounding method is not provided by the manufacturer as part of the integral design of the transmitter. For units which are connected trough a grounded shunt diode safety barrier, ensure that the transmitter is mounted to a surface which is at the same potential as the barrier ground.

Requirements for safety barrier installations:

