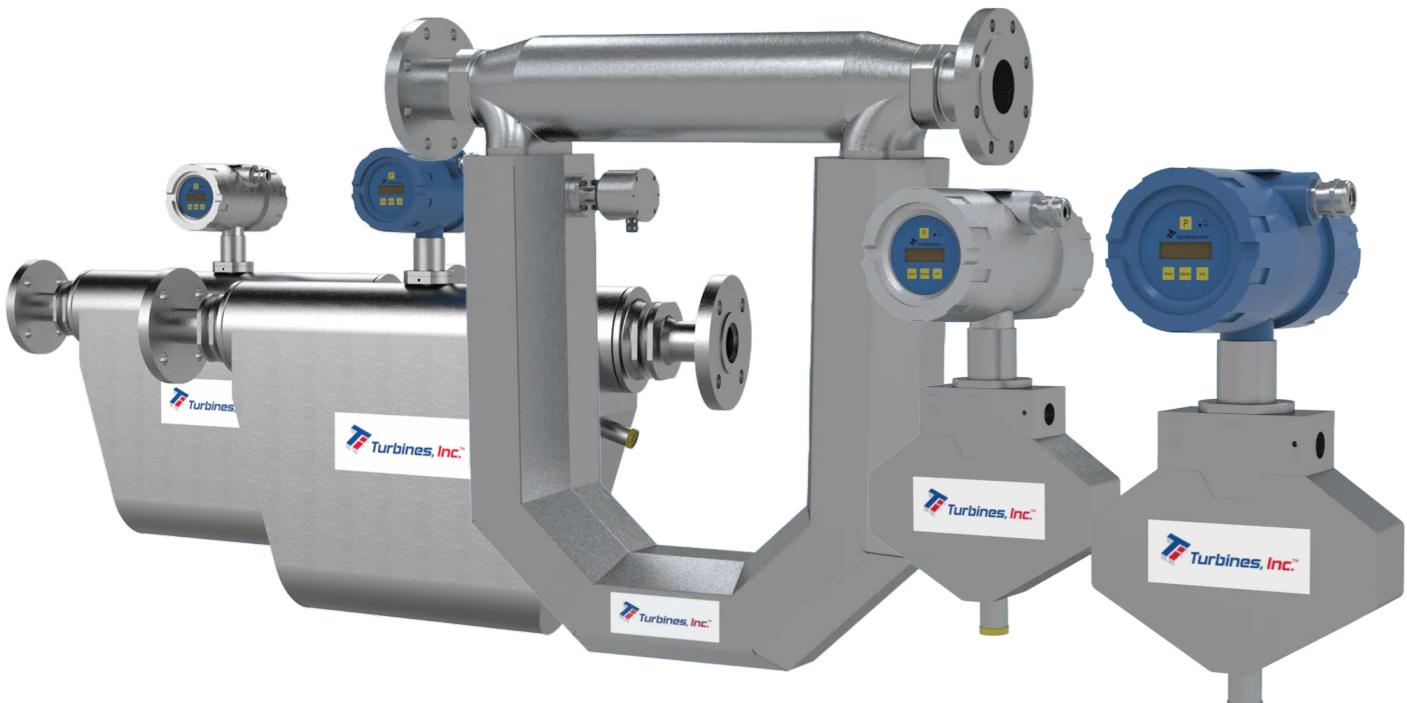


# Installation Manual

TCM\_E80\_E\_EN\_160520\_E004



**Turbines, Inc.<sup>®</sup>**

Installation Manual for Hazardous Areas

# Version

## **Manual-Version**

TCM\_E80\_E\_EN\_160520\_E004

## **SW-Version**

This manual is valid for

Main SW: Mv3.40 and higher

Display SW: Dv3.40 and higher

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# 1. General Information

## 1.1. Validity of the manual

This manual contains the information for installing and operating the TRICOR Mass Flow Meters in hazardous areas.

The knowledge of the standard TMC Series manual is required.

The manual is valid for the following transducers (remote and compact versions):

- TCM 0100
- TCM 0325
- TCM 0450
- TCMH 0450
- TCM 0650
- TCM 1550
- TCM 3100
- TCM 5500
- TCM 7900
- TCM 028K
- TCM 065K
- TCM 230K

As well as for the following remote transmitters:

- TCE 8001
- TCE 8011
- TCE 8012
- TCE 8101
- TCE 8111
- TCE 8112

## 1.2. Safety

### 1.2.1. General Safety

All statements regarding safety of operation and technical data in this manual will only apply when the TRICOR Coriolis Mass Flow Meter is operated correctly in accordance with this manual.

The data for Ingress Protection (IPnn) will only apply when all connectors are capped properly with the corresponding counterpart with the same or better IP rating. Cable glands must be populated with cables with the specified diameter and closed properly. The display cover must be closed.

During operation all openings of the housing must be closed unless otherwise is noted in this manual.

All electrical connections to the load and to the supply must be made with shielded cables unless otherwise is noted in this manual. The TCM must be grounded.

As a protection against fire in the positive supply, a fuse with a current rating not higher than the current carrying capacity of the cable used is required.

Before installing the Flow Meter and transmitter, the user is responsible to ensure that all wetted parts are compatible with the fluid or gas to be measured.

The user has to adhere to the instructions for installing electrical devices and corresponding instructions.

The devices described in this manual may only be connected and operated by authorized and qualified personnel.

### 1.2.2. Special requirements for Ex installations

In hazardous locations the covers of the electronics of the compact or wall mount version must not be opened under any circumstances if the supply voltage is alive. For operating the keys the magnet must be used.

The inputs and outputs are not power limited and must not be used to drive intrinsically save circuits.

When using long cables make sure that the maximum inductances and capacitances for the respective voltage or gas group are not exceeded.

The maximum values specified in chapter 7.3.2 must be observed at any time.

### 1.2.3. Warnings in this manual

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#### NOTE:

Notes provide important information for the correct usage of the equipment. If the notes are not observed, a malfunction of the equipment is possible.

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#### WARNING!

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Warnings provide very important information for the correct usage of the equipment. Not observing the warnings may lead to danger for the equipment and to danger for health and life of the user

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### 1.2.4. Ordering Codes and Accessories

For the complete ordering code and the list of accessories refer to the TCM manual.

## 2. Getting started

### 2.1. Unpacking

Verify that you have received the following items:

When you ordered a compact version:

- TCM \*\*\*\* with mounted electronics
- Users manual
- This installation manual for hazardous areas
- Declaration of conformity

When you ordered a remote version

- TCM \*\* (without electronics)
- TCE 8\*\*\*
- Connecting cable (with TCE 8\*\*\*-wall mounted and TCE 8\*\*\*-E just fixed to the TCE, TCE 8\*\*\*-panel mounted -L- with separated connection cable)
- Users manual
- This installation manual for hazardous areas
- Declaration of conformity

## 2.2. Operating Elements

### 2.2.1. TCE 8\*\*\*-E, TCE 8\*\*\*-wall mounted and compact version

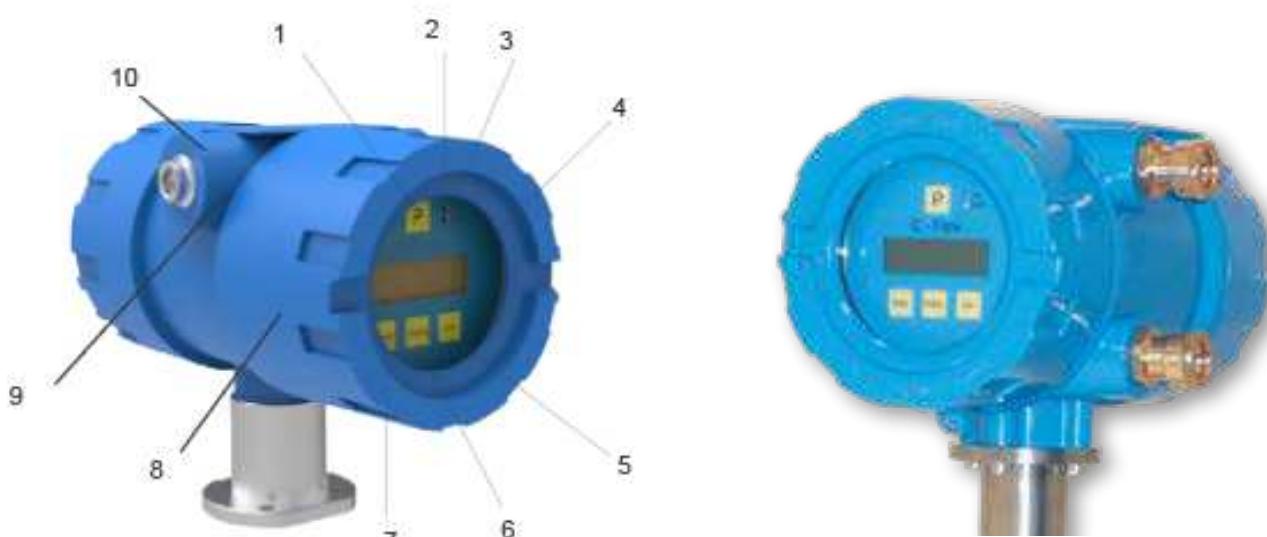


Fig. 1: Operating Elements of TCE 8\*\*\*-E (right), TCE 8\*\*\*-W (left) and compact version

- 1 = Pushbutton "P", activates/selects the different menus and confirms the settings
- 2 = LED "OK", flashes green when there is no error
- 3 = LED "ERR", flashes red when an error occurs
- 4 = Display
- 5 = Pushbutton "Info", normal: selects the error menu, setup mode: softkey
- 6 = Pushbutton "Display", normal: toggles the display, setup mode: softkey
- 7 = Pushbutton "Reset", normal: resets the batch counter, setup mode: softkey
- 8 = Front cover
- 9 = Set screw for front cover (varying position)
- 10 = Screw for protective ground

Wall mount version only (not shown on the pictures):

- Cable to the TCM sensor, length as ordered (standard: 10 ft./3 m)  
or connector for sensor cable  
or junction box for sensor cable
- Wall mounting bracket

For the rear view see chapter 2.3

## 2.2.2. TCE 8\*\*\*-L



Fig. 2: Operating Elements of TCE 8\*\*\*-L-Ex

- 1 = Pushbutton "P", activates/selects the different menus and confirms the settings
- 2 = LED "OK", flashes green when there is no error
- 3 = LED "ERR", flashes red when an error occurs
- 4 = Display
- 5 = Pushbutton "Info", normal: selects the status menu, setup mode: softkey
- 6 = Pushbutton "Display", normal: toggles the display, setup mode: softkey
- 7 = Pushbutton "Reset", normal: resets the batch counter, setup mode: softkey

For the rear view see chapter 2.3.3

# Getting started

## 2.2.3. TCM \*\*\*\* (remote version)

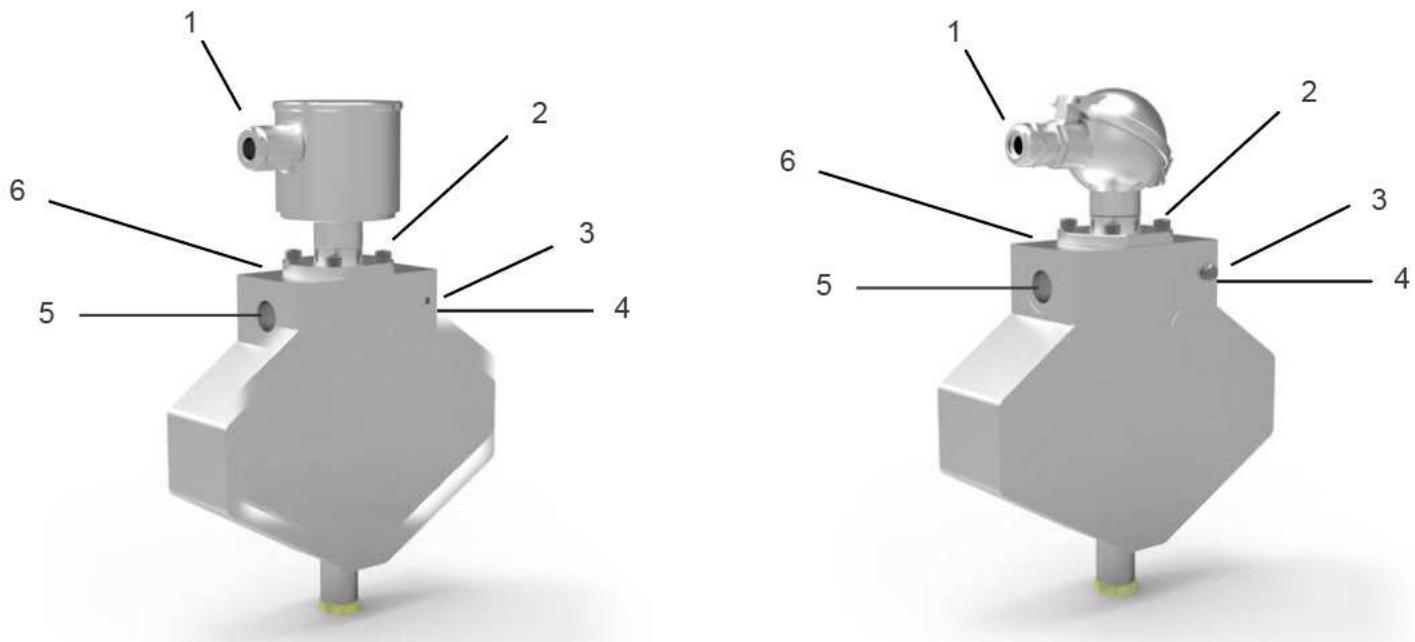


Fig. 3: Operating Elements TCM

- 1 = Cable gland for cable to the TCE
- 2 = Locking screw for screw type terminals
- 3 = Screw for protective ground (TCM 0325 through 3100 only)
- 4 = Fluid output, flange/thread as ordered
- 5 = Fluid input, flange/thread as ordered
- 6 = M6 mounting threads (back side, option, TCM 0325 through 3100 only)

## Terminal connection

Terminal	Signal	Color/Mark	
		Temperature range $\leq 100^{\circ}\text{C}$	Temperature range $>100^{\circ}\text{C}$
1	Driver +	Gray/1	Gray/1
2	Driver -	Pink/2	Gray/2
3	Sensor A +	Blue/3	Gray/3
4	Sensor A -	Red/4	Gray/4
5	Sensor B +	White/5	Gray/5
6	Sensor B -	Brown/6	Gray/6
7	PT1000 +	Green/7	Gray/7
8	PT1000 -	Yellow/8	Gray/8

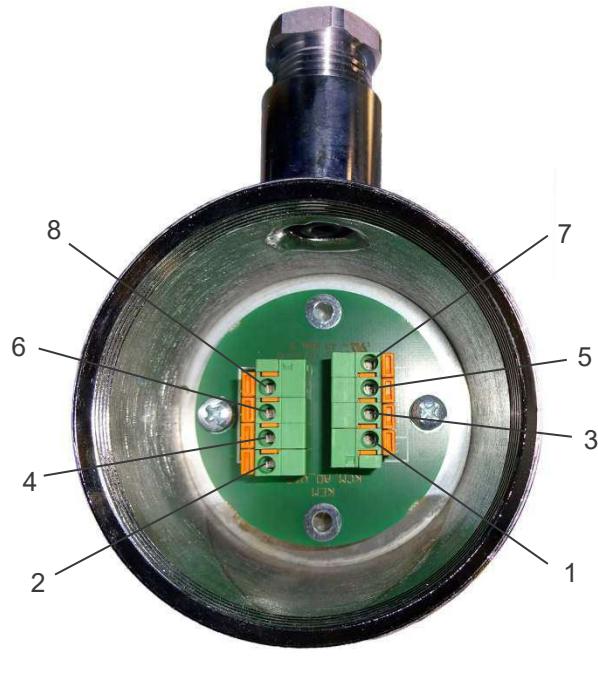
## Junction box – Type A (Alu)



Fig. 4: Electrical terminals Junction box – Type A (Alu)

## Junction box – Type H (1.4404/316L)

Medium temperature range  $\leq 100^{\circ}\text{C}$



## Junction box – Type H (1.4404/316L)

Medium temperature range  $>100^{\circ}\text{C}$

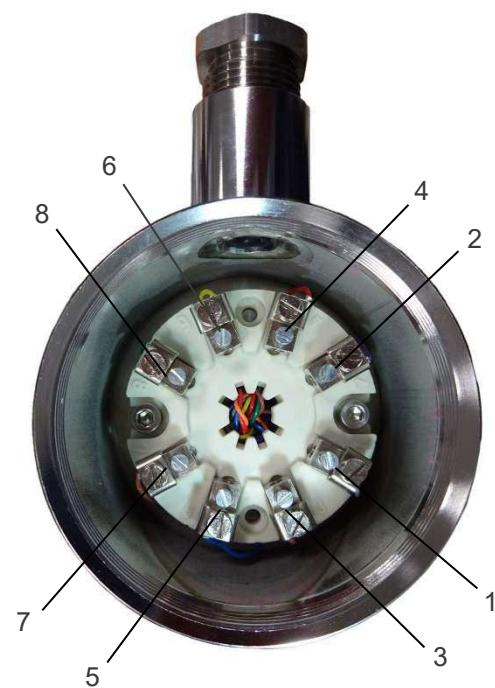


Fig. 5: Electrical terminals Junction box – Type H (1.4404/316L)

# Getting started

## 2.3. Pin Assignments

### 2.3.1. TCE 8\*\*\*-W and compact version (standard housing), Ex certified

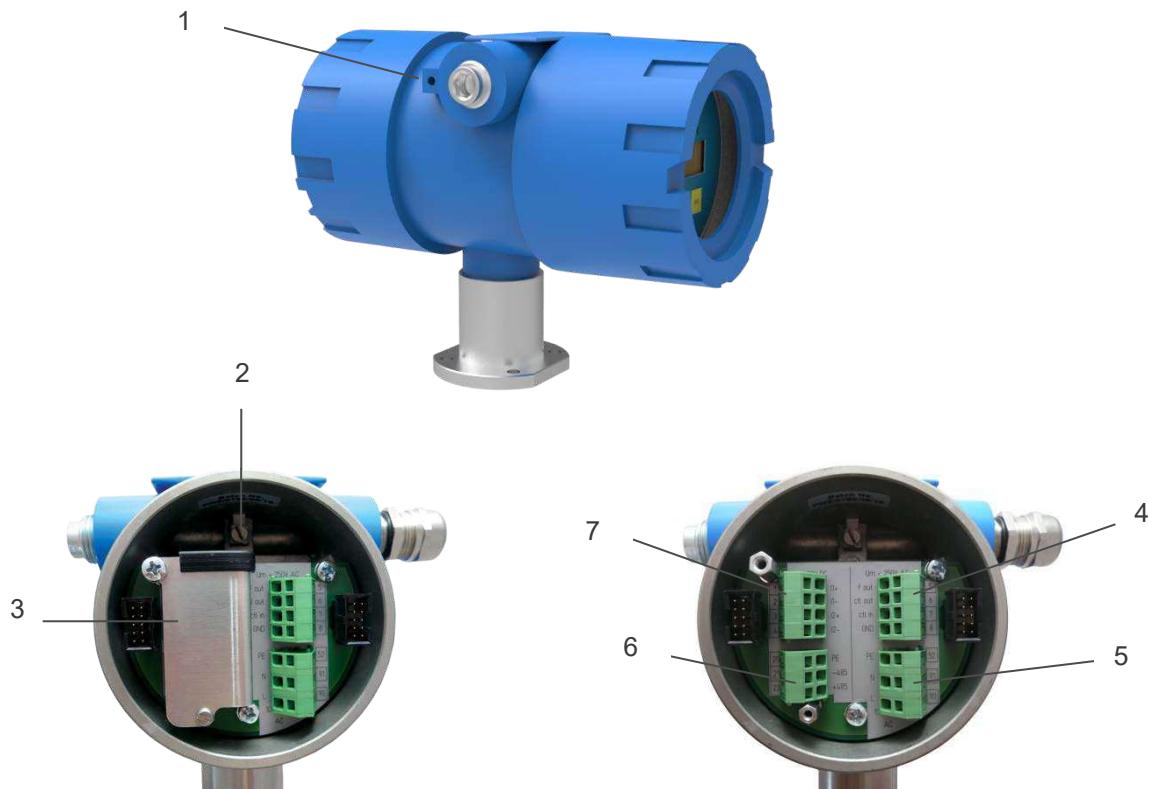


Fig. 6: Electrical terminals TCE 8\*\*\*-W-\*Ex

- 1 = Terminal screw for protective ground
- 2 = Terminal screw for protective ground
- 3 = Protective cover
- 4 = Terminal block for digital I/O signals ( $U_M = 250$  V DC)
- 5 = Terminal block power supply ( $U_M = 250$  V DC)
- 6 = Terminal block for interface ( $U_M = 30$  V DC)
- 7 = Terminal block for analog I/O signals ( $U_M = 30$  V DC)

## TCE Terminal Connections

### Terminals with $U_M = 30 \text{ V DC}$

1	+I1	Current loop 1 positive terminal
2	-I1	Current loop 1 negative terminal
3	+I2	Current loop 2 positive terminal
4	-I2	Current loop 2 negative terminal
20	COMMON	Common (for pins 21 and 22)
21	-RS485	RS485 negative line
22	+RS485	RS485 positive line
30	COMMON	Common (for pins 31 and 32)
31	FF-	Foundation Fieldbus® negative line
32	FF+	Foundation Fieldbus® positive line

### Terminals with $U_M = 250 \text{ V DC}$

5	F <sub>OUT</sub>	Frequency/pulse output
6	CTL <sub>OUT</sub>	Control output
7	CTL <sub>IN</sub>	Control input
8	GND	Ground (for pins 5 through 7)

### 24 V DC Supply

50	+V DC	Positive supply voltage (24 V DC)
51	-V DC	Supply ground
52	PE	Protective Ground

### 100...240 V AC Supply

90	L	Phase (AC voltage)
91	N	Neutral
52	PE	Protective Ground

---

### NOTE:

With option "PRESSURE COMPENSATION" the current loop 1 (Terminal 1 and 2) is an input.

---

# Getting started

## 2.3.2. TCE 8\*\*\*-E and compact version (big housing, not cCSAus)

### Electrical connections

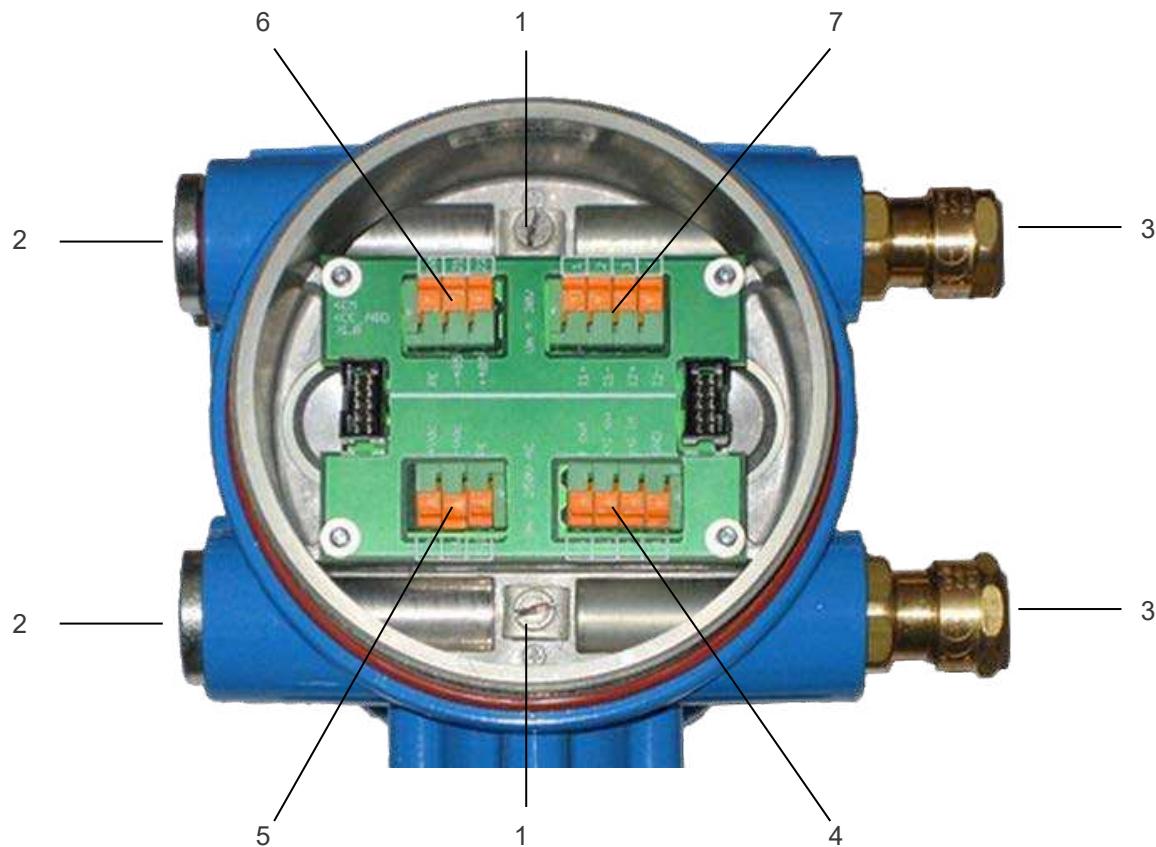


Fig. 7: Electrical terminals TCE 8\*\*\*-E-Ex and compact version

- 1 = Terminal screw for protective ground
- 2 = Blind cover for cable opening (various numbers and positions)
- 3 = Cable gland (various numbers and positions)
- 4 = Terminal block for digital I/O signals ( $U_M = 250$  V DC)
- 5 = Terminal block power supply ( $U_M = 250$  V DC)
- 6 = Terminal block for Interface ( $U_M = 30$  V DC)
- 7 = Terminal block for analog I/O signals ( $U_M = 30$  V DC)

### 2.3.3. Panel Mount version TCE 8\*\*\*-L, Ex certified

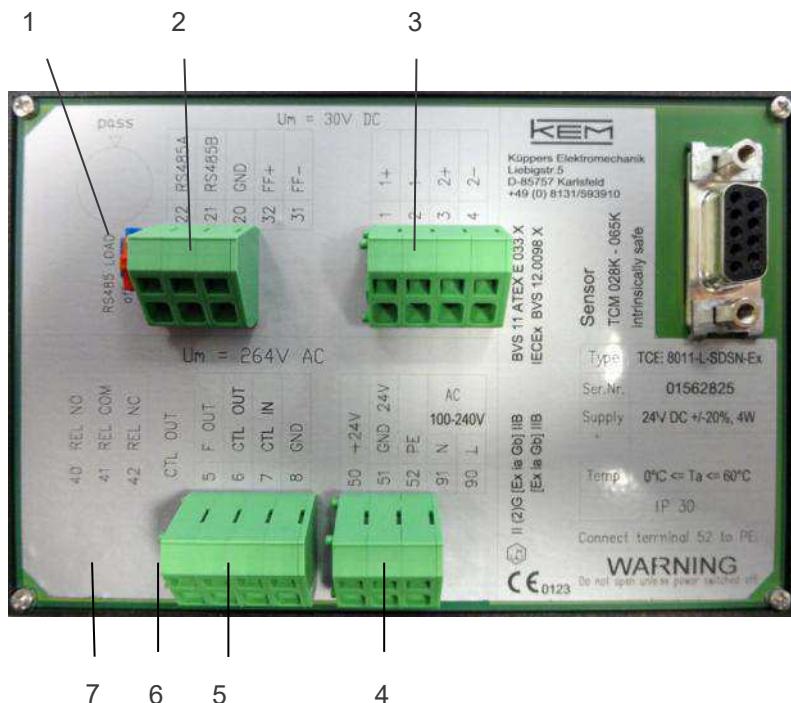


Fig. 8: Electrical terminals TCE 8\*\*\*-L-Ex

- 1 = Sliding switch for activating the  $120\ \Omega$  terminal resistance for RS-485
- 2 = Terminal blocks for interface ( $U_M = 30\text{ V DC}$ )
- 3 = Terminal blocks for analog I/O signals ( $U_M = 30\text{ V DC}$ )
- 4 = Terminal block for power supply ( $U_M = 250\text{ V DC}$ )
- 5 = Terminal block for digital I/O signals ( $U_M = 250\text{ V DC}$ )
- 6 = Sliding switch for activating the relay output (option)
- 7 = Terminal block for relay ( $U_M = 250\text{ V DC}$ )

# Getting started

## TCE Terminal Connections

### Terminals with $U_M = 30 \text{ V DC}$

1	+I1	Current loop 1 positive terminal
2	-I1	Current loop 1 negative terminal
3	+I2	Current loop 2 positive terminal
4	-I2	Current loop 2 negative terminal
20	GND	Common (for pins 21 and 22)
21	-RS485	RS485 negative line
22	+RS485	RS485 positive line
30	GND	Common (for pins 31 and 32)
31	FF-	Foundation Fieldbus® negative line
32	FF+	Foundation Fieldbus® positive line

### Terminals with $U_M = 250 \text{ V DC}$

5	F <sub>OUT</sub>	Frequency/pulse output
6	CTL <sub>OUT</sub>	Control output
7	CTL <sub>IN</sub>	Control input
8	GND	Ground (for pins 5 through 7)
40	REL NO	Relay normally open contact (option)
41	REL COM	Relay common (option)
42	REL NC	Relay normally closed contact (option)
50	+24 V DC	Positive supply voltage (24 V DC)
51	-24 V DC	Supply ground
52	PE	Protective Ground
90	L	Phase (AC voltage)
91	N	Neutral

---

### NOTE:

With option "PRESSURE COMPENSATION" the current loop 1 (Terminal 1 and 2) is an input.

---

## 3. Installation

### 3.1. Mechanical Installation

Read the installation notes in the TCM manual carefully, as the way of installation can influence the achievable accuracy under certain circumstances.

### 3.2. Electrical installation

For exact descriptions of the different circuits and for rules for calculating the signal levels please refer to the TRICOR manual.

### 3.3. Ex Installation

---

#### **WARNING!**

In hazardous locations all installations must only be carried out by qualified personnel!

Switch off all power supplies before installing or uninstalling the unit in hazardous locations!

Never connect a remote meter TCM \*\*\*\* to anything else than the specified electronics TCE 8\*\*\*. The TCM and the TCE need to have the same serial number (see type label).

---

#### 3.3.1. Locating the Compact Version

The TCM \*\*\*-\*\*-\*\*\*\*-E (or C) - \*\*\*\* -Ex is explosion proof with Ex d for the electronics and Ex i for the meter.

The inputs and outputs are not power limited and must not be used to drive intrinsically safe circuits.

---

#### **WARNING!**

Never open any cover of the electronics in hazardous locations with any supply or I/O circuits alive!

---

#### 3.3.2. Locating the Remote Version with TCE 8\*\*\*-E-\*\*\*\*-Ex or TCE 8\*\*\*-W(I)-\*\*\*\*-Ex (wall mounted)

---

#### **NOTE**

For use in hazardous locations the TCM as well as the TCE must be Ex versions!

The TCM \*\*\*-\*\*-\*\*\*\*-\*\*\*\*-Ex is intrinsically safe when driven by the corresponding TCE 8\*\*\*-Ex.

The TCE 8\*\*\*-wall mounted-\*\*\*\*-Ex is explosion proof "Ex d". It contains the safety barriers for the TCM.

The inputs and outputs of the TCE are not power limited and must not be used to drive intrinsically safe circuits

The TCE 8\*\*\*-wall mounted-\*\*\*\*-Ex can be located inside and outside the hazardous area.

---

#### **WARNING!**

Never open any cover of the electronics in hazardous locations with any supply or I/O circuits alive!

---

### 3.3.3. Locating the Remote Version with TCE 8\*\*\*-L-\*\*\*\*-Ex

#### NOTE

For use in hazardous locations the TCM as well as the TCE must be Ex versions!

The TCM \*\*\*-\*\*-\*\*\*\*-\*\*\*\*-Ex is intrinsically safe when driven by the corresponding TCE 8\*\*\*-Ex.

The TCE 8\*\*\*-L-\*\*\*\*-Ex is not explosion proof and only provides the intrinsically safe connections to the TCM.

The inputs and outputs of the TCE are not power limited and must not be used to drive intrinsically safe circuits

The TCE 8\*\*\*-L-\*\*\*\*-Ex must be located outside the hazardous area.

### 3.3.4. Connecting TCE and TCM

With the remote version the TCE and TCM must be connected before making the other electrical installations. If no TCM is connected to the TCE, the TCE will only show the error message "NO SENSOR" after power on.

For connecting TCE and TCM, only the supplied special cable must be used. For best accuracy the maximum cable length is limited to 20m.

TCE 8\*\*\*-L-\*\*\*\*:

Connect the D-Sub connector of the supplied connection cable TCC \*\*-\*\* to the D-Sub socket on the back side of the TCE and fix it with the retaining screws of the connector.

TCE 8\*\*\*-wall mounted:

Connect the round connector of the supplied connection cable TCC \*\*-\*\* to the socket on the bottom of the TCE and fix it properly by turning the fixing ring clockwise.

TCE 8\*\*\*-W (or E)-\*\*\*mounted with junction box:

Connect the wires of the supplied connection cable TCC \*\*-\*\* to the junction box of the TCE. For the correct connection see Tab. 1.

All other TCE 8\*\*\*-wall mounted:

With all other versions of the TCE the cable is fixed ex-factory.

TCM \*\*\*:

Connect the wires of the connection cable to the junction box of the TCM. For the correct connection see Tab. 1.

Terminal	Signal	Color	Wire number
1	Driver +	Grey	1
2	Driver -	Pink	2
3	Sensor A +	Blue	3
4	Sensor A -	Red	4
5	Sensor B +	White	5
6	Sensor B -	Brown	6
7	Pt1000 +	Green	7
8	Pt1000 -	Yellow	8

Tab. 1: Connections TCM \*\*\*

For safe operation the top cover of the connection box must be closed properly and the cable gland must be fixed.

### 3.3.5. Electrical connections Compact and Wall mount Version, ATEX and IECEx

The supply terminals and the digital I/O terminals are rated for  $U_M = 250$  V whereas the analog input and output and the interface terminals are rated for  $U_M = 30$  V DC.

The ATEX version in the big housing (see chapter 2.3.2) has push in terminals. For connecting cables with end sleeves no tools are required, just push the sleeve into the terminal.

If litz wires without cable end sleeves must be connected or cables must be removed, open the terminal by pushing a small screw driver into the orange operator.

With all other versions push a small screw driver into the upper (smaller) opening of the terminal, put the wire into the big opening and pull out the screw driver.

Tighten properly the cable glands before applying the power.

---

#### WARNING!

The Ex d protection of the housing is void, if any of the cable glands is not closed properly!

---

### 3.3.6. Electrical connections Compact and Wall mount Version, cCSAus

The supply terminals and the digital I/O terminals are rated for  $U_M = 250$  V whereas the analog input and output and the interface terminals are rated for  $U_M = 30$  V DC.

For making the required connections proceed as follows:

Replace the cable gland for the supply and I/O cables by a CSA or UL certified seal fitting within 18" from the housing.

Prepare the cable and the TCE, separate the single wires for a distance long enough that the wires are just separated in the seal fitting.

Connect the cables. Push a small screw driver into the upper (smaller) opening of the terminal, put the wire into the big opening and pull out the screw driver.

Seal the cable in the seal fitting according to the national standards.

---

#### WARNING!

The Ex d protection of the housing is void, if the cables are not sealed properly!

---

### 3.3.7. Electrical connections Panel Mount Version

The supply terminals and the digital I/O terminals are rated for  $U_M = 250$  V whereas the analog output and interface terminals are rated for  $U_M = 30$  V DC.

Connect the cables. Push a small screw driver into the upper (smaller) opening of the terminal, put the wire into the big opening and pull out the screw driver.

### 3.3.8. Power Supply and Grounding

For operation in hazardous areas a good connection of PE is mandatory. The cross section of the PE cable must be at least the cross section of the supply cable or  $1\text{mm}^2$ , whichever is higher.

The supply terminals (50, 51 for 24 V DC or 90, 91 for mains operation) are designed for a rated voltage of 250 V AC.

---

#### WARNING!

Applying 250 V AC to the DC supply terminals (50, 51) will not affect the Ex safety of the TCE or TCM, but will damage the supply circuit of the TCE!

---

# Installation

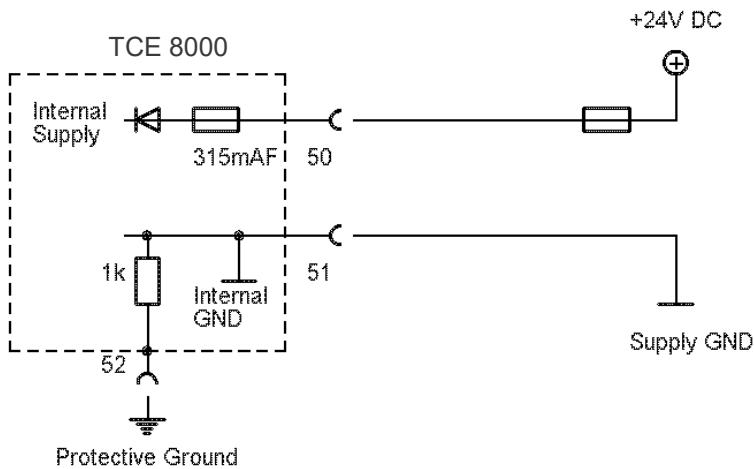


Fig. 9: Wiring diagram for power connections, DC operation

Terminal	Description
50	Positive supply voltage, 24 V $\pm 20\%$ , referred to pin 51
51	Negative supply voltage
52	Protective ground

The ground terminals 8 and 51 are internally connected together.

Ground and protective ground are internally connected via a 1 k $\Omega$  resistor. The resistor will thermally withstand a potential difference of up to 30 V between PE and GND but for proper operation this difference should be limited to 5 V.

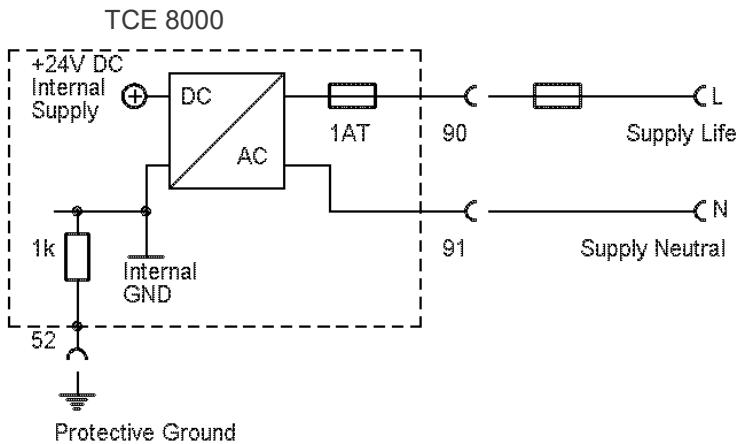


Fig. 10: Wiring diagram for power connections, AC operation

Terminal	Description
90	Mains life, referred to pin 91
91	Mains neutral
52	Protective ground

The ground terminal 8 is not connected to terminal 91.

The TCE 8\*\*\*-L-\*B\*\* can be connected to a 24 V DC and a mains supply simultaneously. The unit will operate properly as long as one of the 2 supplies is present.

### 3.3.9. Control inputs and outputs

The digital I/O terminals are designed for a rated voltage of 250 V AC.

**WARNING!**

Applying 250 V AC to the digital I/O terminals (5, 6, 7, 8) will not affect the Ex safety of the TCE or TCM, but will damage the I/O board of the TCE!

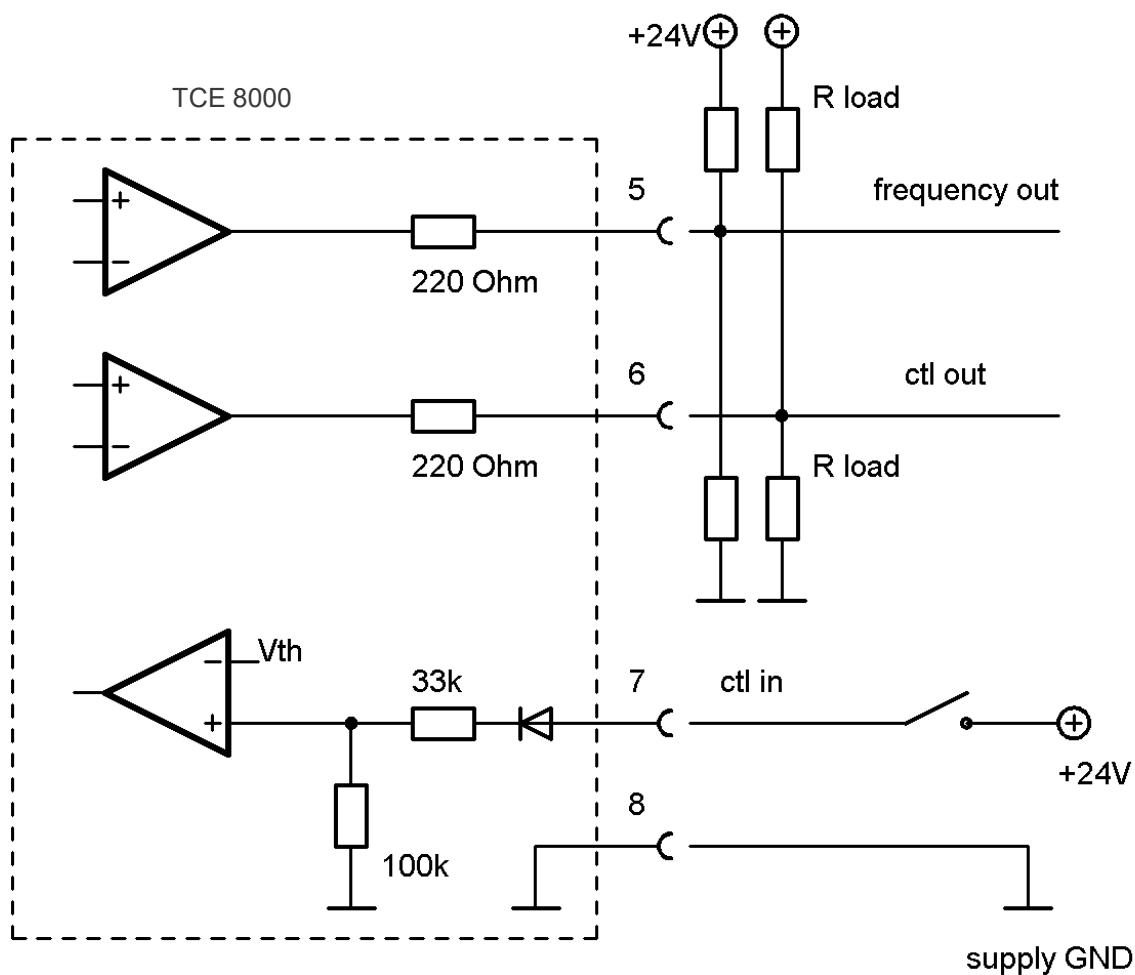


Fig. 11: Wiring diagram for digital I/O connections

Terminal	Description
5	Frequency output, active, referred to pin 8
6	Status output, active, referred to pin 8
7	Control input, active "high", referred to pin 8
8	Ground potential for digital I/O- pins.

# Installation

## 3.3.10. Analog Inputs and Outputs

The analogue current input and output terminals are designed for a rated voltage of 30 V AC.

The outputs are protected against wrong polarity. Voltages below 30 V will not damage the outputs nor affect the Ex safety.

The input provides 24 V for the sensor and is protected against externally applied Voltages up to 30 V.

The input cannot drive Ex i certified Sensors. If the sensor is located in the hazardous area, an Ex d sensor must be used.

### **WARNING!**

Applying more than 30 V DC to any of the inputs or outputs will damage the TCE and destroy the protection of the TCM!

If more than 30 V have been applied to any of the analog output pins, the unit must be returned to KEM/AWL for repair as the safety barrier might be destroyed!

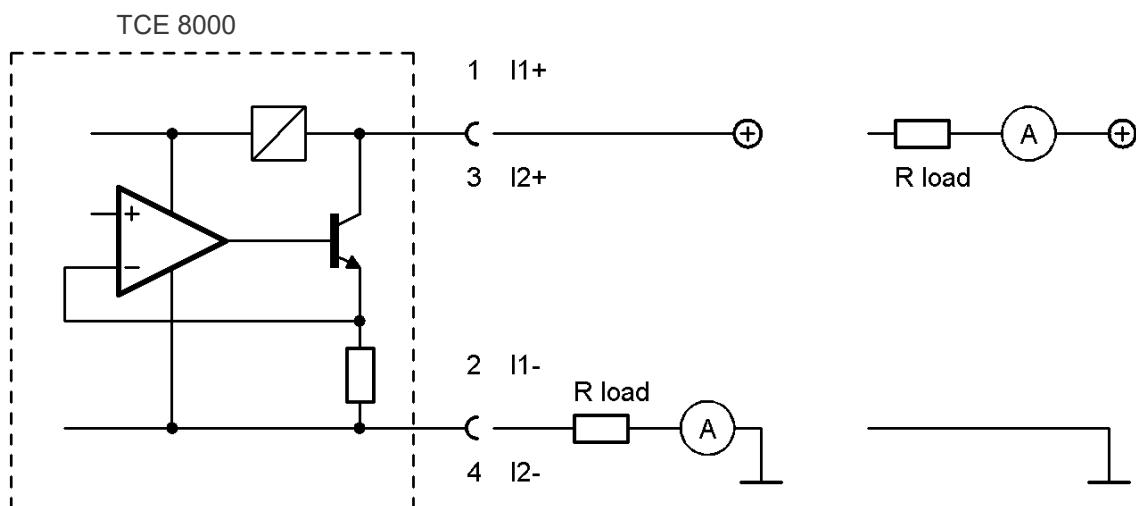


Fig. 12: Wiring diagram for 4...20 mA current loop

Terminal	Description
1	Positive terminal of the passive 4...20 mA loop 1
2	Negative terminal of the passive 4...20 mA loop 1
3	Positive terminal of the passive 4...20 mA loop 2
4	Negative terminal of the passive 4...20 mA loop 2

As the terminals are floating, the load resistor and the current meter can be placed in the positive or in the negative supply rail.

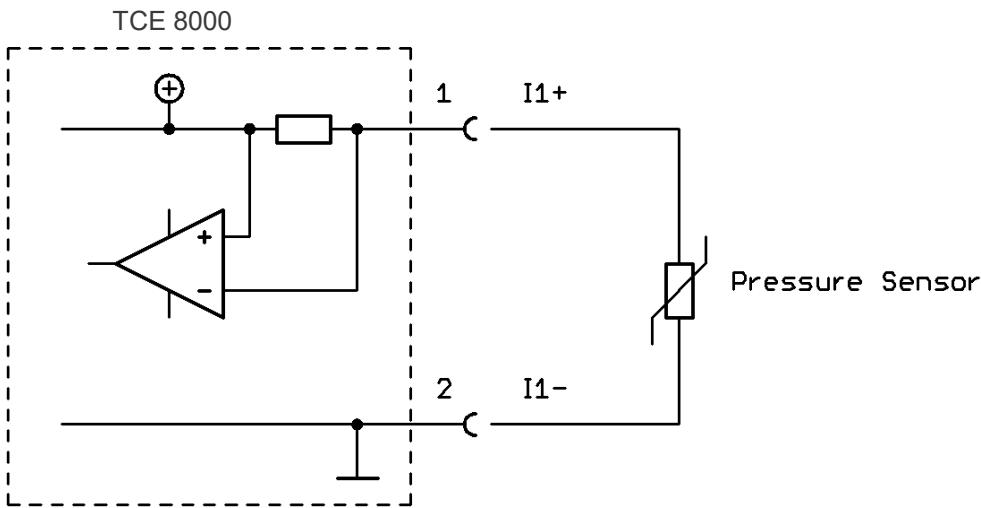


Fig. 13: Wiring diagram for 4-20 mA current input

Terminal	Description
1	Positive terminal for a passive 4-20 mA pressure sensor
2	Negative terminal for a passive 4-20 mA pressure sensor

Connect the shield of the cables to protective ground (terminal 52).

---

**WARNING!**

The analog input is not short-circuit proof. Load currents above 35 mA (permanent load) or above 50 mA (short-time load) can cause damages.

---

### 3.3.11. Relay Output

The optional relay terminals are designed for a rated voltage of 250 V AC.

The operating voltage is limited to 125 V AC maximum.

Terminal	Description
40	Relay normally open contact
41	Relay common
42	Relay normally closed contact

## 4. Manual Operation

The manual control is menu driven and mostly self-explaining. A complete description of all functions and menus can be found in the TCM manual.

---

### **WARNING!**

In hazardous areas it is not allowed to operate the unit without protective earth (PE) and with the housing not properly closed!

---

### 4.1. First Operation

After the power up sequence the display shows the preselected values (ex-factory normally flow and batch)

In case of an error the LED "ERR" will flash red.

As soon as the unit has reached the operating temperature, make the zero point calibration.

The display can be altered by pressing the key "Display".

The error code, the device status and information like serial number, SW version a.s.o. can be viewed by pressing the key "Info" for 3 seconds.

If the function is activated, the BATCH reading can be reset to zero by pressing the key "Reset".

### 4.2. CONTROL Menu

In the CONTROL menu all configurations can be made. This includes configuration of the analogue and digital outputs, customizing the display and other settings.

The menu itself is self-explaining; the function of the softkeys is indicated in the display above the pushbutton.

For entering the CONTROL menu press the pushbutton "P" for 3 seconds.

If a user defined password is set, no access to the CONTROL menu is possible without entering that password.

The submenu DISPLAY can be entered without an additional password as any changes in this submenu will not affect the operation of the unit.

The submenus SETUP, I/O-TEST and SERVICE are password protected for avoiding unintentional changes of the operating parameters.

For SETUP and I/O-TEST the password is "2207", the SERVICE password can be found in the TRICOR manual.

The submenu FACTORY cannot be accessed by the user.

Select the desired submenu with the softkeys and confirm with "P".

Every setting must be confirmed with "P" for storing the setting or with "E" for exiting without storing.

For leaving the SETUP menu press "Info" several times, until you are back in the main level.

### 4.3. Using the magnet

The explosion-proof variants with the blue Ex d housings provide a magnet to be able to operate the pushbuttons without opening the display cover.

In hazardous, wet and dusty areas the display cover must not be opened to operate the pushbuttons.

Beside every pushbutton there is a hall sensor which can be operated via the magnet attached to the housing.

For operating the pushbuttons hold the magnet to the glass.

The best positions for operating the keys are:

Pushbutton	Position
P	left upper edge of the yellow area
Reset	lower edge of the yellow area
Display	lower edge of the yellow area
Info	lower edge of the yellow area



## 5. Remote operation

As a standard the TCE 8000 is equipped with an RS-485 Interface with Modbus RTU protocol. HART® interface and a Foundation Fieldbus® are available.

Please read the TCM manual before you try to set up a remote control.

### 5.1. Serial RS485 Interface

The RS-485 terminals are designed for an operating voltage of -7 V to +12 V and a rated voltage of 30 V AC.

For connecting the interface refer to chapter 3.3.

---

#### **WARNING!**

Applying more than 30 V DC to any of the RS-485 terminals will damage the TCE and destroy the protection of the TCM!

If more than 30 V have been applied to any of the RS-485 terminals, the unit must be returned to Turbines, Inc, for repair as the safety barrier might have been destroyed!

---

### 5.2. HART®

The analogue current output terminals are designed for a rated voltage of 30 V AC.

The outputs are protected against wrong polarity. Voltages below 30 V will not damage the outputs nor affect the Ex safety.

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#### **WARNING!**

Applying more than 30 V DC to the analog output terminals will damage the TCE and destroy the protection of the TCM!

If more than 30 V have been applied to any of the analog output terminals, the unit must be returned to Turbines, Inc. for repair as the safety barrier might be destroyed!

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### 5.3. Foundation Fieldbus®

The FF terminals are designed for a rated voltage of 30 V AC.

For connecting the interface refer to chapter 3.3.

---

#### **WARNING!**

Applying more than 30 V DC respect to PE to any of the FF terminals will damage the TCE and destroy the protection of the TCM!

If more than 30 V have been applied to any of the FF terminals, the unit must be returned to Turbines, Inc. for repair as the safety barrier might be destroyed!

---

## 6. Service and Maintenance

### 6.1. Maintenance

The sensors of the TCM series as well as the electronics of the TCE 8000 series do not require regular maintenance.

### 6.2. Changing the fuses

With the Ex versions the fuses are part of the safety barriers and must only be exchanged by Turbines, Inc.

---

**WARNING!**

The Ex versions of the TCE 8000 series contain several internal fuses for protecting the intrinsically safe TCM against too high voltage and power. Those fuses are critical parts and must not be exchanged except by KEM or by service personnel authorized by KEM. If the fuses are replaced by third persons, the Ex certification for the unit will be void!

---

### 6.3. Service

The TCE 8000 does not contain any user serviceable parts.

In case of malfunction, please contact your nearest dealer or directly to Turbines, Inc.

For the addresses see chapter 8.

## 7. Listings

### 7.1. Warranty

For warranty refer to the general terms and conditions of Turbines, Inc. which can be found on the corresponding website for Turbines, Inc. ([www.turbinesincorporated.com](http://www.turbinesincorporated.com))

### 7.2. Certifications and compliances

Category	Standards or description	
EU Declaration of Conformity - EMC	Meets intent of Directive 2014/30/EU for Electromagnetic Compatibility. Compliance is given to the following specifications as listed in the Official Journal of the European Union:	
	EN 61326/2006	EMC requirements for Class A electrical equipment for measurement, control and laboratory use, including Class A radiated and Conducted Emissions <sup>1)</sup> and Immunity <sup>1)</sup> .
	IEC 61000-4-2/2009	Electrostatic Discharge Immunity (Performance criterion B)
	IEC 61000-4-3/2011	Radiated RF Electromagnetic Field Immunity (Performance criterion B)
	IEC 61000-4-4/A1-2013	Electrical Fast Transient/Burst Immunity (Performance criterion B)
	IEC 61000-4-5/2015 <sup>2)</sup>	Power Line Surge Immunity (Performance criterion B)
	IEC 61000-4-6/2014	Conducted RF Immunity (Performance criterion B)
	IEC 61000-4-11/2005 <sup>2)</sup>	Voltage Dips and Interruptions Immunity (Performance criterion B)
Australia/New Zealand Declaration of Conformity- EMC	Complies with the EMC Emission standard <sup>1)</sup>	
	AS/NZS 2064	
FCC EMC Compliance	Emissions comply with the Class A Limits of FCC Code of Federal Regulations 47, Part 15, Subpart B <sup>1)</sup> .	

<sup>1)</sup> Compliance demonstrated using high-quality shielded interface cables.

<sup>2)</sup> Applies only to units with AC mains supply instead of or additional to the SELV supply.

Category	Standards or description	
EU Declaration of Conformity – Low Voltage	Compliance is given to the following specification as listed in the Official Journal of the European Union: Low Voltage Directive 2014/35/EU	
	EN 61010-1/2010	Safety requirements for electrical equipment for measurement control and laboratory use.
Designed to meet the following US standards	UL 61010-1/2012	Standard for electrical measuring and test equipment.
Designed to meet the following Canadian standards	CAN/CSA C22.2 no. 61010-1-4/2008	Safety requirements for electrical equipment for measurement, control, and laboratory use.
International standards	IEC61010-1/2010	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Equipment Type	Test and measuring	
Safety Class	Class 1 (as defined in IEC 61010-1, Annex H) – grounded product	
ATEX IECEx	II 2G Ex d [ia] IIC T2...T4 Gb Ex d [ia] IIC T2...T4 Gb	TCE 800*-W(I)-****-Ex
	II 2G Ex d [ia] IIC T2...T4 Gb Ex d [ia] IIC T2...T4 Gb	TCM 0325...7900-**-****-C***-Ex
	II 2G Ex d [ia] IIB T2...T4 Gb Ex d [ia] IIB T2...T4 Gb	TCE 801*-W(I)-****-Ex
	II 2G Ex d [ia] IIB T4 Gb Ex d [ia] IIB T2...T4 Gb	TCM 028K...065K-**-****-C***-Ex
	II (2)G [Ex ia Gb] IIC [Ex ia Gb] IIC	TCE 800*-L-****-Ex
	II (2)G [Ex ia Gb] IIB [Ex ia Gb] IIB	TCE 801*-L-****-Ex
	II 2G Ex ia IIC T2...T4 Gb Ex ia IIC T2...T4 Gb	TCM 0325...7900-*-*-****-Ex TCM 0325...7900-*-*-****-Ex3
	II 2G Ex ia IIB T2...T4 Gb Ex ia IIB T2...T4 Gb	TCM 028K...230K-*-*-****-Ex (TCM 230K : only with remote electronics) TCM 028K...230K-*-*-****-Ex3
ATEX	II 3G Ex nA IIC T2...T4 Gc	TCE 800*-W-****-Exn TCM ****-*-*-****-Exn
cCSAus	Class I, Division 1 Group A, B, C, D, T2...T4	TCE 800*-W-****-Ex1 TCE 800*-W-****-Ex3 TCE 800*-L-****-Ex1 TCM 0325...7900-*-*-****-Ex1
	Class I, Division 1 Group A, B, C, D, T2...T4	TCM 0325...7900-**-****-C***-Ex1
	Class I, Division 1 Group C, D, T2...T4	TCE 801*-W-****-Ex1 TCE 801*-W-****-Ex3 TCE 801*-L-****-Ex1 TCM 028K...230K-*-*-****-Ex1
	Class I, Division 1 Group C, D, T2...T4	TCM 028K...230K-**-****-C***-Ex1 (TCM 230K : only with remote electronics)

Ex3: only with remote electronics.

For Ex1 and Ex3 the electronic is only available in aluminum housing.

## 7.3. Technical Data

### 7.3.1. Ex Data TCM Transducer

Please refer to EC-type Examination Certificate "BVS 11 ATEX E 033 X"

[www.turbinesincorporated.com/certificates](http://www.turbinesincorporated.com/certificates)

### 7.3.2. Ex Data TCE 8000 Transmitter

Please refer to EC-type Examination Certificate "BVS 11 ATEX E 033 X"

[www.turbinesincorporated.com/certificates](http://www.turbinesincorporated.com/certificates)

### 7.3.3. External connections

Power Supply	
DC Supply	24 V DC, ±20%
AC Supply	100 – 240 V AC
U <sub>M</sub>	250 V AC
Digital I/O	
Voltage level	24 V signal according to IEC 60946
U <sub>M</sub>	250 V AC
Analog I/O	
Signal	4 – 20 mA
U <sub>M</sub>	30 V AC
Interface	
Signal levels	See TRICOR Manual
U <sub>M</sub>	30 V AC
Relais output	
Signal	125 V AC/1 A
U <sub>M</sub>	250 V AC
Ambient Temperature	
Compact	-40 °F ... +158 °F (-40 °C ... +70 °C)
Wall mount	-40 °F ... +158 °F (-40 °C ... +70 °C)
Panel mount	+32 °F ... +140 °F (0 °C ... +60 °C)

## 7.4. WEEE and RoHS

The unit described herein is not subject to the WEEE directive and the corresponding national laws.

At the end of life forward the unit to a specialized recycling company and do not dispose it off as domestic waste.

The unit described herein fully complies with the RoHS directive.

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## 8. Contact

### Turbines, Inc. web page

[www.turbinesincorporated.com](http://www.turbinesincorporated.com)

### Turbines, Inc. – Altus (All inquiries)

15935 Highway 283 N.

Altus, Oklahoma 73521

Phone: 800-809-1387

### Primary Flow Signal Canada – Edmonton

(Canadian customers)

2236 80 Avenue NW

Edmonton AB T6P 1N2

Phone: 877-661-3569

Email: [Sales@turbinesincorporated.com](mailto:Sales@turbinesincorporated.com)

### Turbines, Inc. – Seneca (Cryogenic, Gas and High Accuracy)

112 Lumber Lane

Seneca, SC 29672

Phone: 864-882-4544

### Turbines Inc. – Odessa (Permian Basin area)

960 South Meadow Avenue

Odessa, Texas 79761

Phone: 432-333-4800



Original KEM/AWL document: TCM\_E80\_E\_EN\_160520\_E004  
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