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COMET T5140 CO2 Concentration Transmitter



General description

The transmitters are designed for measurement of carbon dioxide concentration of air without aggressive ingredients.

- T5140 ambient CO2 transmitter with 4 – 20 mA output
- T5240 ambient CO2 transmitter with 0 – 10 V output
- T5141 CO2 transmitter with cable probe with 4 – 20 mA output
- T5241 CO2 transmitter with cable probe with 0 – 10 V output
- T5145 duct mount CO2 transmitter with 4 – 20 mA output
- T5245 duct mount CO2 transmitter with 0 – 10 V output

A multiple point CO2 and temperature adjustment procedure leads to excellent CO2 measurement accuracy over the entire temperature working range; this is a must for process control and outdoor applications. The dual wavelength NDIR CO2 sensing procedure compensates automatically for ageing effects. The CO2 module is highly resistant to pollution and offers maintenance free operation and outstanding long term stability. Measured values can be read in „SLOW mode“ (filtered, averaged) or in „FAST mode“ (current values without averaging). SLOW mode has advantages in applications like climate control because of filtering short time peaks. As an example exhaled air from an employee passing the sensor could affect the climate control negatively with a short response time because the control would trigger a change of the ventilation based on this one-time measurement. On the contrary in „FAST mode“ no software filter is used

for calculating the output value. This fact adds a noise of typ. ± 30 ppm which has to be considered in terms of accuracy. Measured values are displayed on dual line LCD display. The visual indication of CO₂ concentration is provided by three-color LED. After power up of the device starts internal test. During this time (about 20s) LCD display shows (—) instead of CO₂ concentration value. For setting of all parameters of the transmitter serves the user program TSensor. Cable SP003 (optional accessory) use for connection the device to a personal computer.

- Device version TxxxxL with watertight male connector instead of a cable gland is designed for easy connection/disconnection of the output cable.
- Models marked TxxxxZ are non-standard versions of the transmitters. Description is not included in this manual.

Factory settings

If special setting was not required in the order, the device is set from the manufacturer to the following parameters:

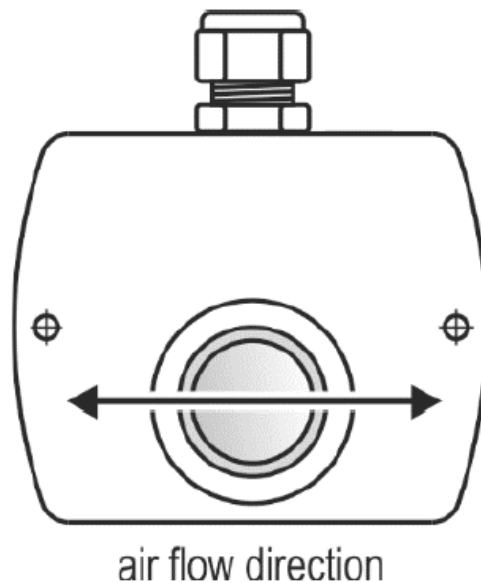
- 4 – 20 mA output: corresponds 0 to 5000 ppm (T5140 a T5145) corresponds 0 to 10 000 ppm (T5141)
- 0 – 10 V output: corresponds 0 to 5000 ppm (T5240 a T5245) corresponds 0 to 10 000 ppm (T5241)
- measurement mode: „SLOW“
- display: switched ON
- LED indication: up to 1000 ppm lights green LED from 1000 ppm to 1200 ppm lights yellow LED over 1200 ppm lights red LED

Modification of the setting is possible to do by means of the PC and TSensor program.

Device installation

The housing with electronics of the T5140 (T5240) or T5141 (T5241) transmitter is designed for wall mounting with two screws or bolts. The T5145 (T5245) transmitter install by inserting the metal stem into the Pg21 cable gland so that the measured air was fed into the head of device (see picture). To fasten the stem, it is also possible to use the flange PP4 or PP90 (see „Optional accessory“).

The external CO2 probe unpack and connect to the T5141 (T5241) device. Then place the probe into the measured environment.



The connecting terminals are accessible after unscrewing the four screws in the corners of the case and removing the lid. Pass the connecting cable through released gland and connect the wires to terminals (see „Typical application wiring”). By jumper J1 select galvanically or non-galvanically isolated output (T5140, T5141 and T5145). Tighten the gland and screw the lid (check the integrity of the seal). The female connector for connecting TxxxxL transmitter connect according to the diagram at „Typical application wiring”.

For device connection it is recommended to use a shielded cable with external diameter 3.5 to 8 mm. Maximum cable length of the current loop is 1200 m, maximum voltage output cable length is 15 m. The cable must be located at indoor rooms and should not be led in parallel along power cabling. Safety distance is up to 0.5 m, otherwise undesirable induction of interference signals can appear. For TxxxxL devices connection it is recommended to use cable with respect to the female connector specification. Do not connect shielding at connector side

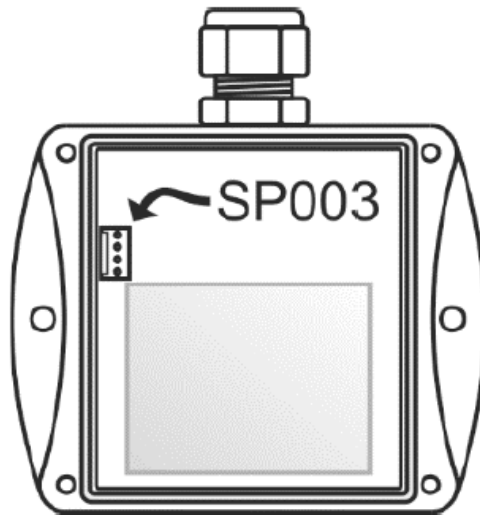
Warning

- Installation, commissioning and maintenance may only be carried out by personnel with qualification by applicable regulations and standards.
- Don't connect transmitter while power supply voltage is on.

Modification of device adjustment

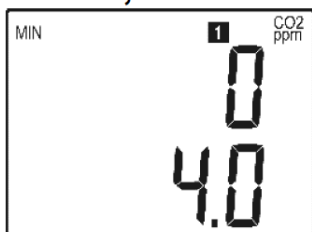
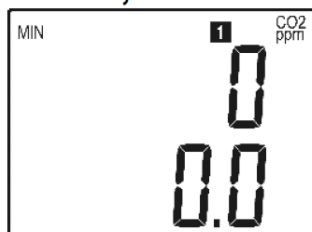
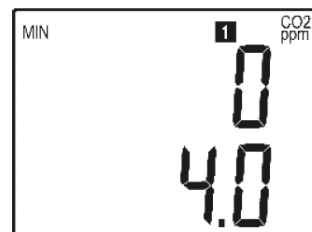
Device adjustment is performed by means of the optional SP003 communication cable, connected to USB port of the PC. It is necessary to have installed configuration program TSensor on the PC (program is free to download at www.cometsystem.com). During installation, please take care about installation of driver for USB communication:

- Unscrew four screws of the device lid and remove the lid. If device is already installed to measuring system, disconnect wires from terminals
- Connect SP003 communication cable to the PC. Installed USB driver detect connected cable and create virtual COM port inside the PC
- Run installed TSensor program and continue in accordance with his instructions
- When new setting is saved and finished, disconnect the cable from the device, connect wires into its terminals and place the lid back to the device.

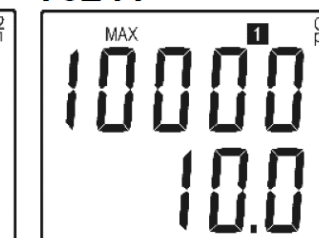


Info mode

Several settings of installed transmitter are possible to verify without a use of the computer. It is necessary to connect power supply. Unscrew the transmitter lid and shortly press button (the right of the terminal) by means of a tool (e.g. screwdriver). Upper line of the LCD display shows value of CO₂ concentration corresponding to output current 4 mA (output voltage 0 V)

T5140, T5145**T5240, T5245****T5141****T5241**

Press button again to get value of CO₂ concentration corresponding to output current 20 mA (output voltage 10 V).

T5140, T5145**T5240, T5245****T5141****T5241**

Press button again to end info mode and display actual measured values.

Warning

During info mode no measurement and no output current generation proceed. The transmitter stays at info mode 15 s, and then automatically goes back to measuring cycle.

Error states of the device

Device continuously checks its state during operation. In case error is found LCD displays corresponding error code:

- Error 0 – first line displays „Err0“ (output current value is < 3.8 mA). Check sum error of stored setting inside device's memory. This error appears if incorrect writing procedure to device's memory occurred or if damage of calibration data appeared. At this state device does not measure. It is a serious error, contact distributor of the device to fix.
- Error 2 – there is a reading „Err2“ on LCD display. The CO₂ concentration measurement error occurred.
- Error 3 – there is a reading „Err3“ on LCD display upper line. Error of internal A/D converter appeared (converter does not respond, probably damage of A/D converter).

This error does not affect CO₂ concentration measurement. It is a serious error, contact distributor of the device.

- Error 4 – there is a reading „Err4“ on LCD display. It is internal device error during initialization of CO₂ sensor. Under this condition device does not measure concentration of CO₂. Value read from device is -9999. CO₂ sensor is probably damaged. It is a serious error, contact distributor of the device. For devices with an external probe CO₂G-10 the „Err4“ indicates that the probe is not connected.

Technical support and service

Technical and service is provided by distributor. For contact see warranty certificate.

Technical data

T5140 – ambient air CO₂ transmitter

- Output: 4 to 20 mA
- Power: 9 to 30 V dc
- Power consumption: 1 W during normal operation max. 4 W (for 50 ms with 15 s period)
- Output in case of error: < 3.8 mA or > 24 mA
- Concentration of CO₂:
 - Accuracy: $\pm (50 \text{ ppm} + 3\% \text{ of measuring value})$
(at temperature 25 °C and pressure 1013 hPa)
 - Range: 0 to 5 000 ppm
 - Temp. dependence: $\pm (1 + \text{measured value [ppm]}/1000) \text{ ppm} / ^\circ\text{C}$ at the range -20 to 45 °C (-4 to 113 °F)
 - Long term stability: typ. 20 ppm / year
 - Resolution: 1 ppm
 - Response time: $t_{90} < 105 \text{ s}$ in “SLOW” measurement mode $t_{90} < 60 \text{ s}$ in “FAST” measurement mode

T5240 – ambient air CO₂ transmitter

- Output: 0 to 10 V
- Power: 15 to 30 V dc

- Power consumption: 0.5 W during normal operation max. 3 W (for 50 ms with 15 s period)
- Output in case of error: $< -0.1 \text{ V}$ or $> 10.5 \text{ V}$
- Concentration of CO₂:
 - Accuracy: $\pm (50 \text{ ppm} + 3 \% \text{ of measuring value})$
(at temperature 25 °C and pressure 1013 hPa)
 - Range: 0 to 5 000 ppm
 - Temp. dependence: $\pm (1 + \text{measured value [ppm]}/1000) \text{ ppm} / ^\circ\text{C}$ at the range -20 to 45 °C (-4 to 113 °F)
 - Long term stability: typ. 20 ppm / year
 - Resolution: 1 ppm
 - Response time: $t_{90} < 105 \text{ s}$ in “SLOW” measurement mode $t_{90} < 60 \text{ s}$ in “FAST” measurement mode

T5141 – CO₂ transmitter with external probe

- Output: 4 to 20 mA
- Power: 9 to 30 V dc
- Power consumption: 1 W during normal operation max. 4 W (for 50 ms with 15 s period)
- Output in case of error: $< 3.8 \text{ mA}$ or $> 24 \text{ mA}$
- Concentration of CO₂:
 - Accuracy: $\pm (100 \text{ ppm} + 5 \% \text{ of measuring value})$
(at temperature 25 °C and pressure 1013 hPa)
 - Range: 0 to 10 000 ppm
 - Temp. dependence: $\pm (1 + \text{measured value [ppm]}/1000) \text{ ppm} / ^\circ\text{C}$ at the range -20 to 45 °C (-4 to 113 °F)
 - Resolution: 1 ppm
 - Response time: $t_{63} < 140 \text{ s}$ in “SLOW” measurement mode $t_{63} < 75 \text{ s}$ in “FAST” measurement mode

T5241 – CO₂ transmitter with external probe

- Output: 0 to 10 V

- Power: 15 to 30 V dc
- Power consumption: 0.5 W during normal operation max. 3 W (for 50 ms with 15 s period)
- Output in case of error: $< -0.1 \text{ V}$ or $> 10.5 \text{ V}$
- Concentration of CO₂:
 - Accuracy: $\pm (100 \text{ ppm} + 5 \% \text{ of measuring value})$
(at temperature 25 °C and pressure 1013 hPa)
 - Range: 0 to 10 000 ppm
 - Temp. dependence: $\pm (1 + \text{measured value [ppm]}/1000) \text{ ppm /}^\circ\text{C}$ at the range -20 to 45 °C (-4 to 113 °F)
 - Resolution: 1 ppm
 - Response time: $t_{63} < 140 \text{ s}$ in “SLOW” measurement mode $t_{63} < 75 \text{ s}$ in “FAST” measurement mode

T5145 – CO₂ duct mount transmitter

- Output: 4 to 20 mA
- Power: 9 to 30 V dc
- Power consumption: 1 W during normal operation max. 4 W (for 50 ms with 15 s period)
- Output in case of error: $< 3.8 \text{ mA}$ or $> 24 \text{ mA}$
- Concentration of CO₂:
 - Accuracy: $\pm (50 \text{ ppm} + 3 \% \text{ of measuring value})$ (at temperature 25 °C and pressure 1013 hPa)
 - Range: 0 to 5 000 ppm
 - Temp. dependence: $\pm (1 + \text{measured value [ppm]}/1000) \text{ ppm /}^\circ\text{C}$ at the range -20 to 45 °C (-4 to 113 °F)
 - Long term stability: typ. 20 ppm / year
 - Resolution: 1 ppm
 - Response time: $t_{90} < 105 \text{ s}$ in “SLOW” measurement mode $t_{90} < 60 \text{ s}$ in “FAST” measurement mode

T5245 – CO₂ duct mount transmitter

- Output: 0 to 10 V
- Power: 15 to 30 V dc
- Power consumption: 0.5 W during normal operation max. 3 W (for 50 ms with 15 s period)
- Output in case of error: < -0.1 V or > 10.5 V
- Concentration of CO₂:
 - Accuracy: $\pm (50 \text{ ppm} + 3 \% \text{ of measuring value})$
(at temperature 25 °C and pressure 1013 hPa)
 - Range: 0 to 5 000 ppm
 - Temp. dependence: $\pm (1 + \text{measured value [ppm]}/1000) \text{ ppm} / ^\circ\text{C}$ at the range -20 to 45 °C (-4 to 113 °F)
 - Long term stability: typ. 20 ppm / year
 - Resolution: 1 ppm
 - Response time: $t_{90} < 105$ s in “SLOW” measurement mode rozsah: 0 až 2 000 ppm

General

Protection:

- IP30 T5140(L), T5240(L)
- IP65 (device with probe) T5141(L), T5241(L)
- IP20 T5145(L), T5245(L)

Recommended interval of calibration:

- 5 year

Working position:

- cable gland upwards T5140(L), T5240(L)
- any position T5141(L), T5241(L)
- any position *) T5145(L), T5245(L)

*) The holes on the stem must be routed in the direction of the air flow, see chapter

“Device installation”.

- Electromagnetic compatibility:
EN 61326-1
- Storage temperature range:
-40 to +60 °C (CO₂ external probe -25 to 60 °C)
- Storage relative humidity range:
5 to 95 %RH (CO₂ external probe 0 to 95 %RH) no condensation
- Storage atmospheric pressure range:
700 to 1100 hPa
- Cable length of probe:
1 m, 2 m or 4 m T5141(L), T5241(L)
- Weight: approximately
 - T5140(L), T5240(L) 150 g
 - T5141(L), T5241(L) 1m probe 250 g
 - T5141(L), T5241(L) 2m probe 280 g
 - T5141(L), T5241(L) 4m probe 340 g
 - T5145(L), T5245(L) 260 g
- Housing material: ASA

Operation conditions

- Operating temperature range of housing with electronics:
 - -30 to +60 °C T5140(L), T5240(L), T5145(L), T5245(L)
 - -30 to +80 °C T5141(L), T5241(L)

It is recommended to switch off the LCD display at ambient temperatures above 70 °C.
- Operating temperature range of the measuring end of stem:
 - -30 to +60 °C T5145(L), T5245(L)
- Operating temperature range of CO₂ probe:
 - -25 to +60 °C T5141(L), T5241(L) – fixed installation
 - -5 to +60 °C T5141(L), T5241(L) – moving use
- Operating relative humidity range:
 - 5 to 95 %RH T5140(L), T5240(L), T5145(L), T5245(L)

- 0 to 100 %RH (no condensation) T5141(L), T5241(L)
- 0 to 95 %RH (no condensation) external CO2 probe
- Operating pressure range: 850 to 1100 hPa

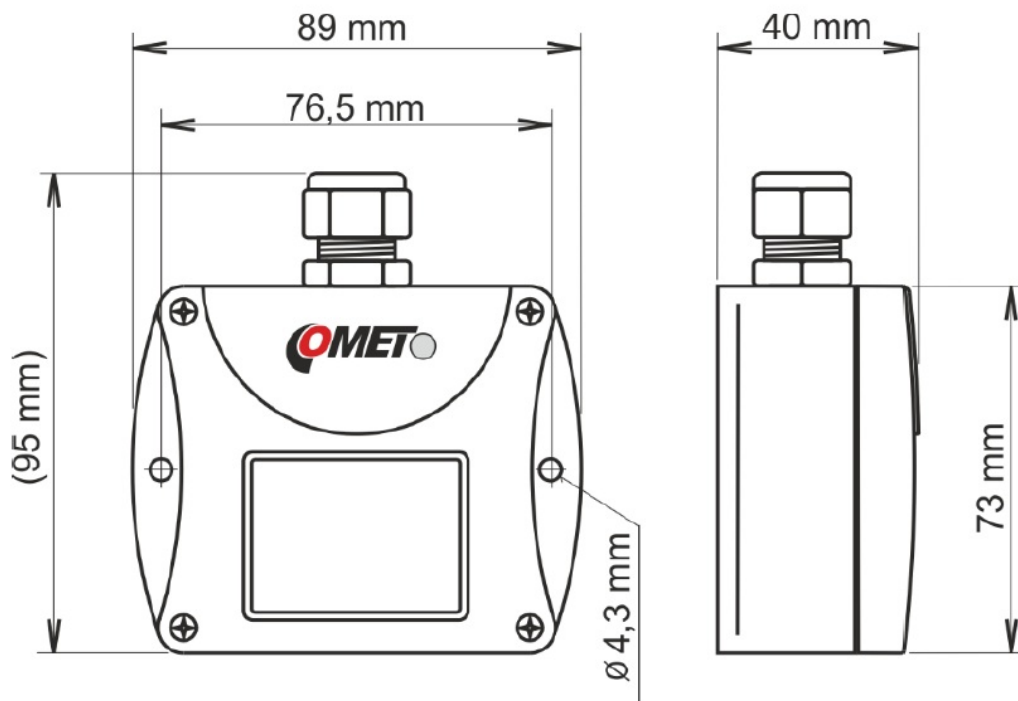
End of operation

Dispose of the device according to statutory regulations.

Dimensions

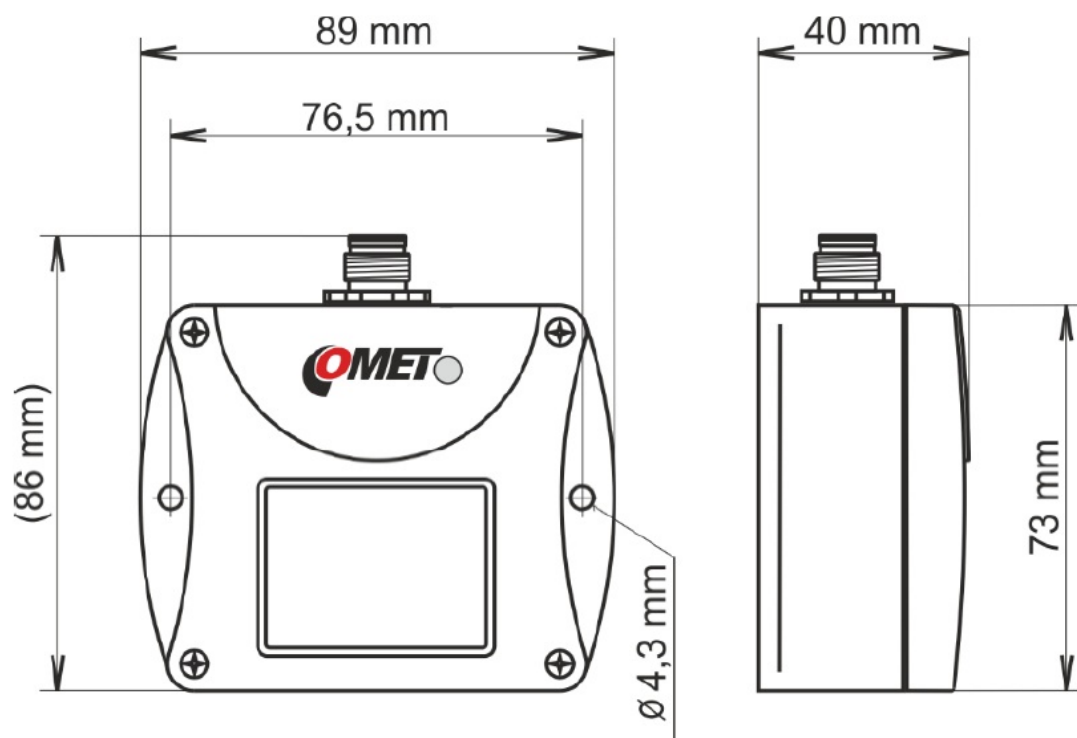
T5140

T5240



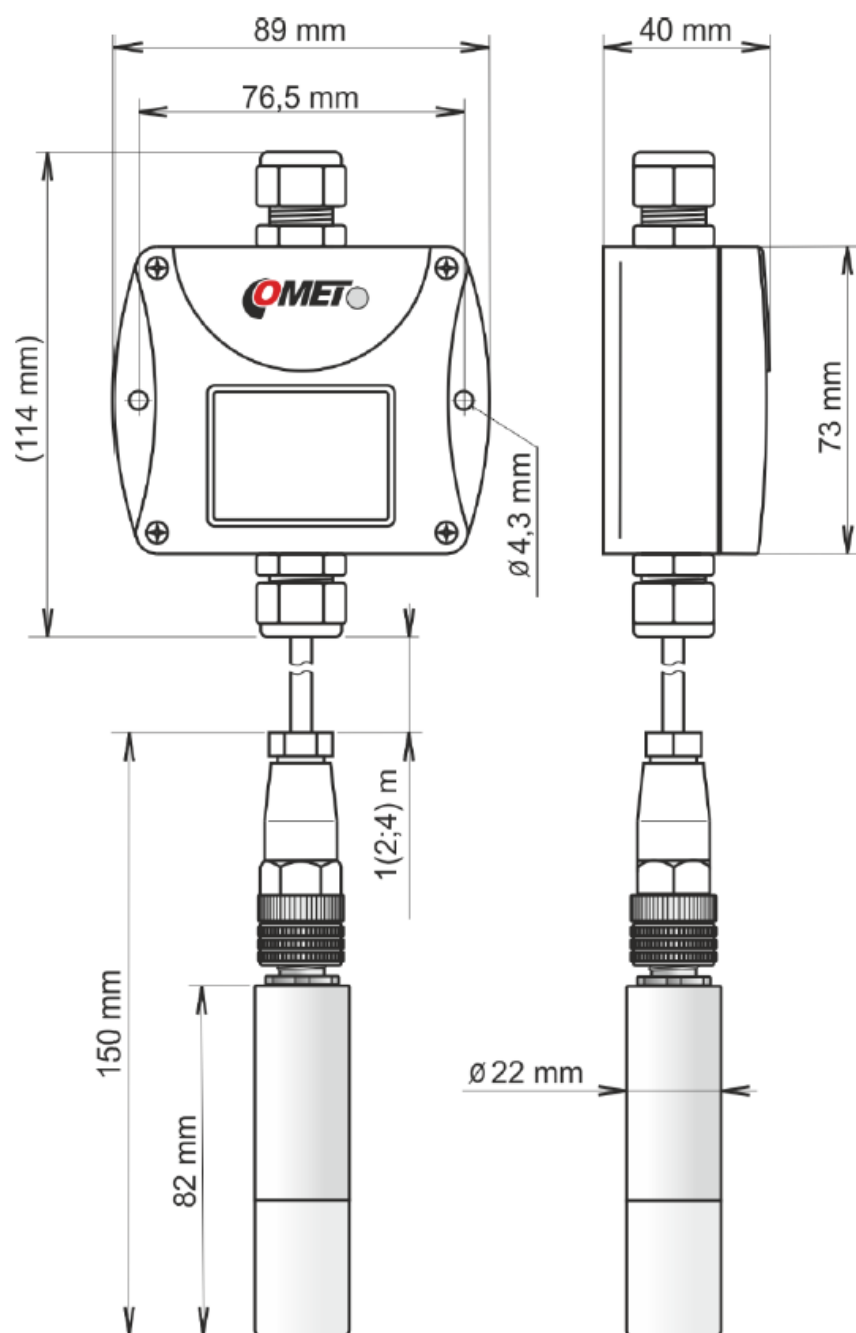
T5140L

T5240L



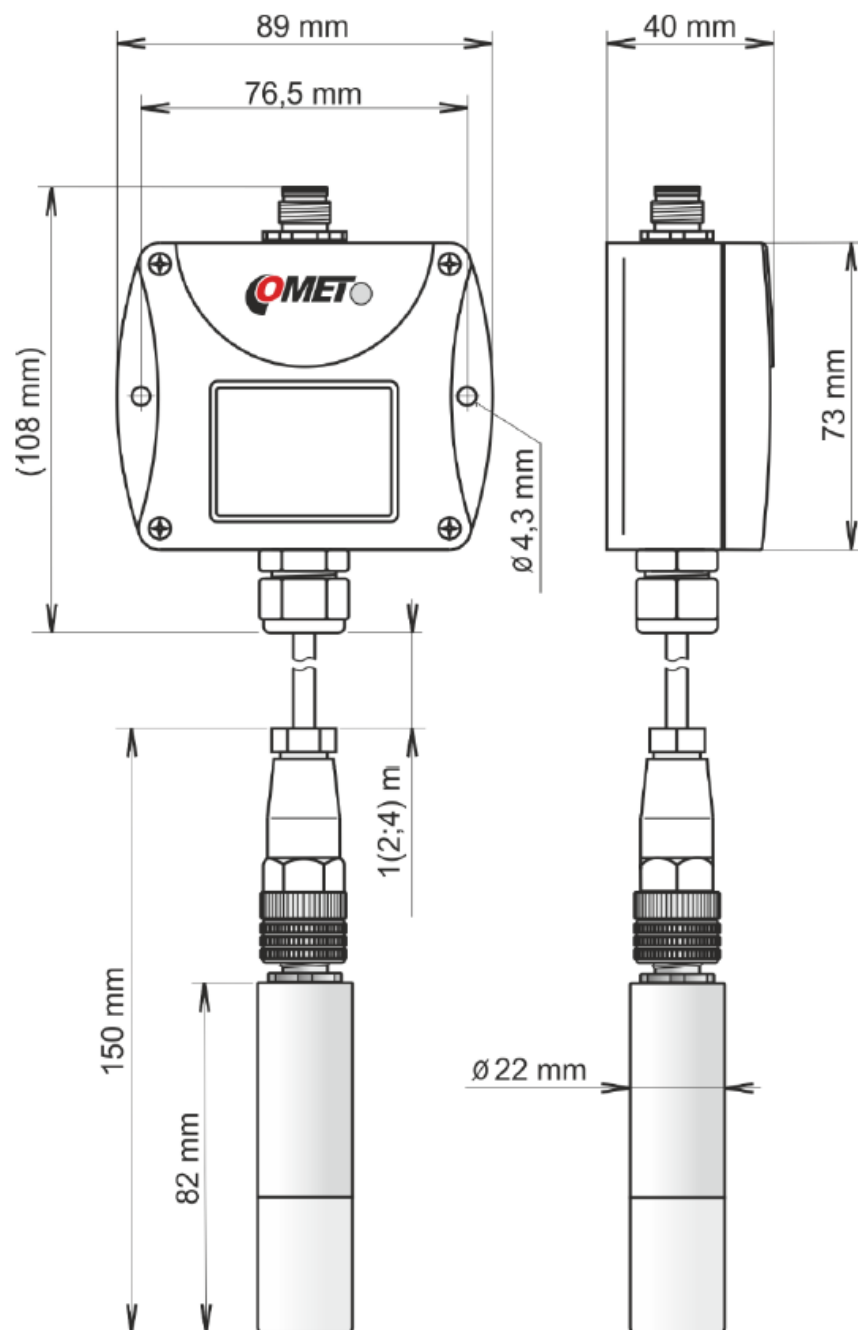
T5141

T5241



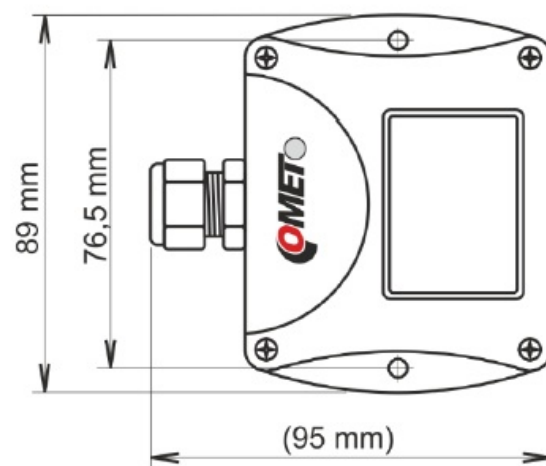
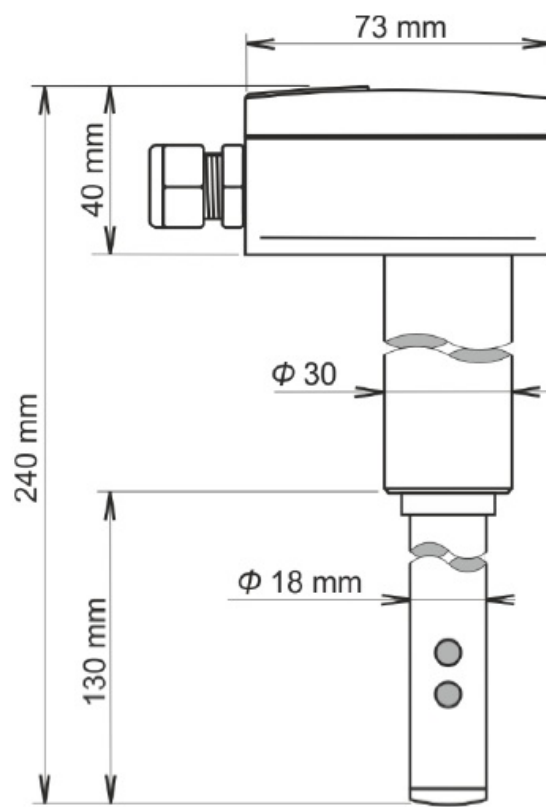
T5141L

T5241L



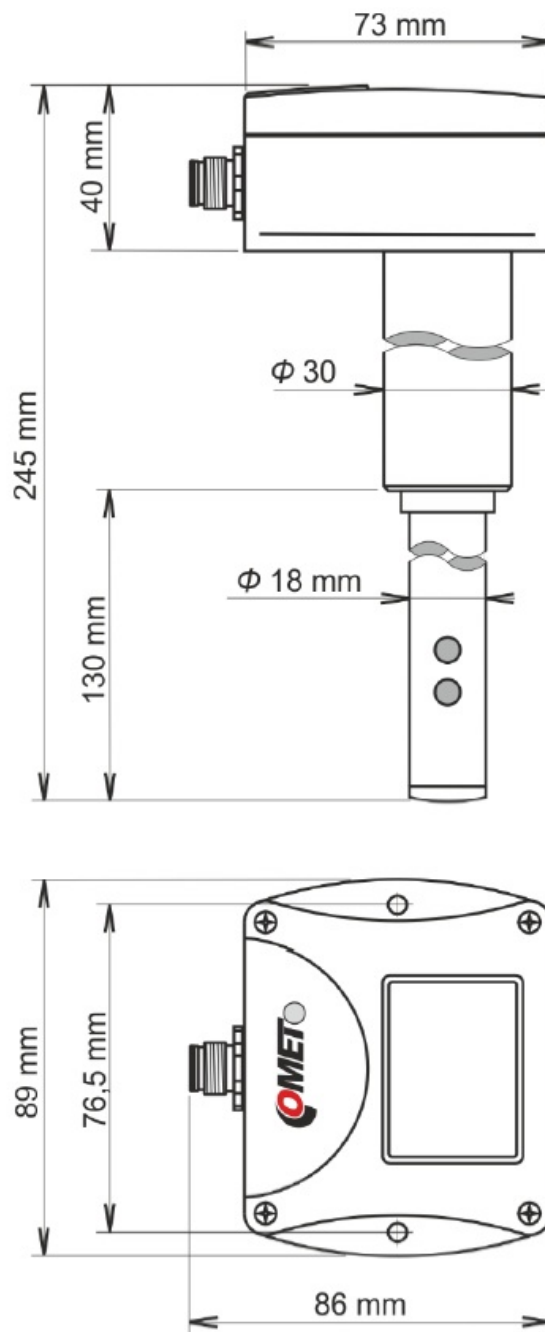
T5145

T5245



T5145L

T5245L

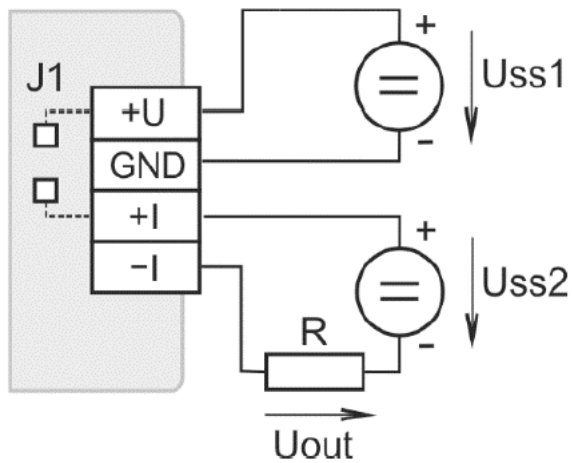


Typical application wiring

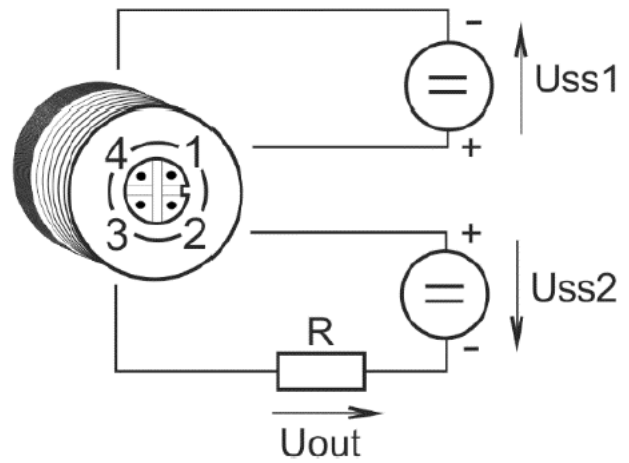
Device with 4-20 mA output can be connected to circuitry by means of galvanically isolated or galvanically non-isolated current loop. Output 0 – 10 V is galvanically non-isolated.

Galvanically isolated 4 – 20 mA output

transmitter with cable gland



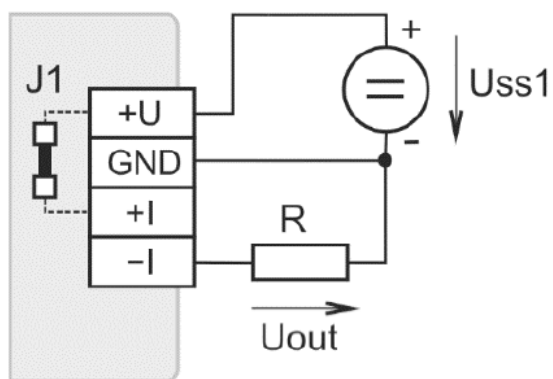
transmitter TxxxxL



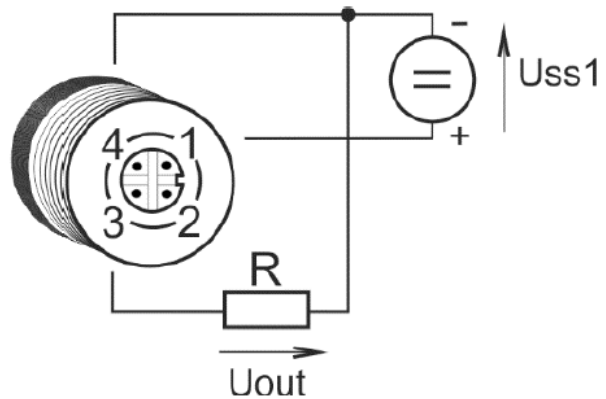
Loop resistance value $R_c = R + \text{resistance of wires}$ shall fulfill the condition $R_c[\Omega] < 40 \times U_{ss2}[V] - 360$.

Galvanically non-isolated 4 – 20 mA output

transmitter with cable gland



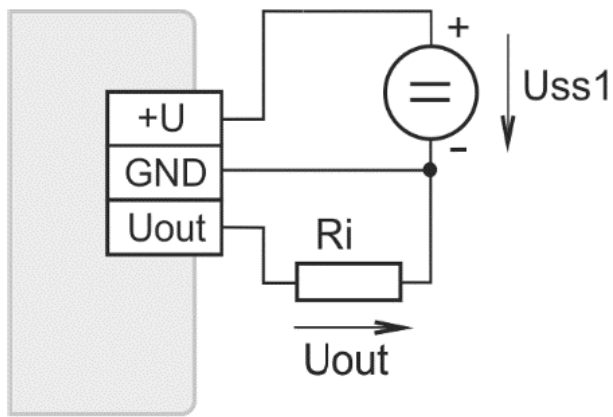
transmitter TxxxxL



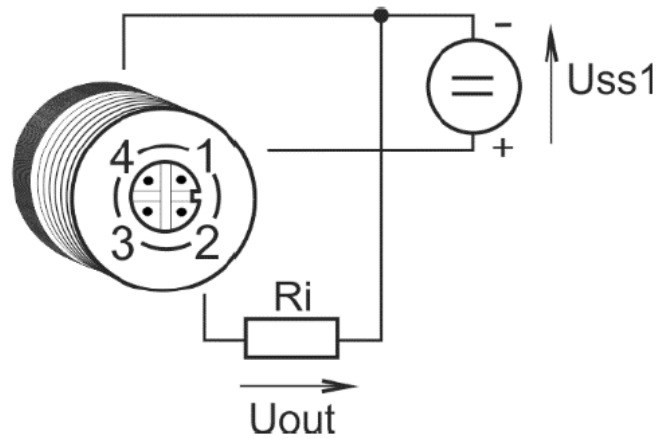
Loop resistance value $R_c = R + \text{resistance of wires}$ shall fulfill the condition $R_c[\Omega] < 40 \times U_{ss1}[V] - 360$.

Galvanically non isolated 0 – 10 V output

transmitter with cable gland



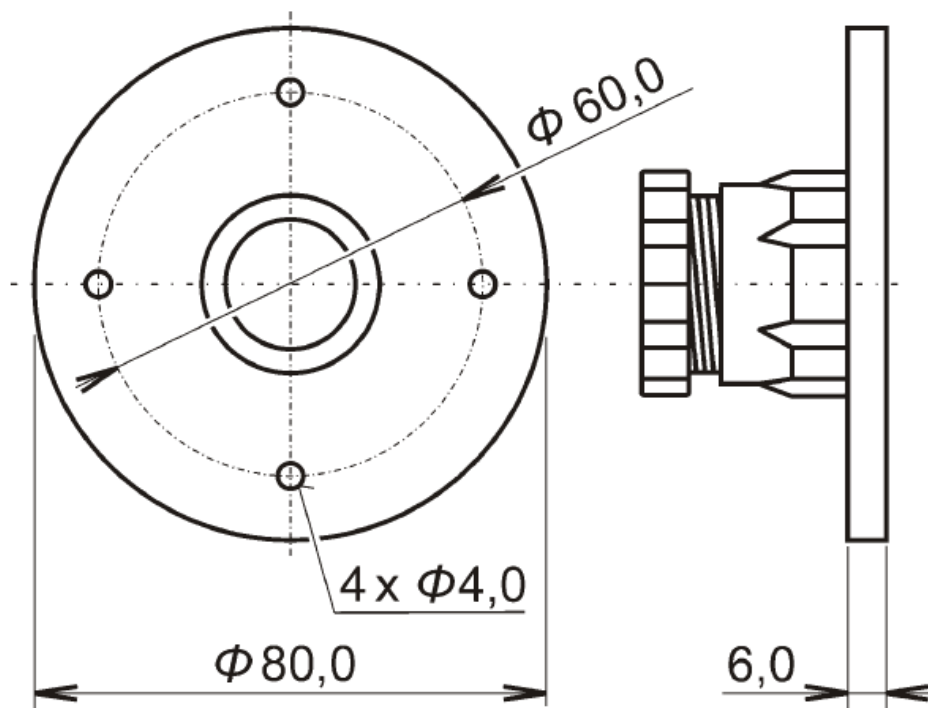
transmitter TxxxxL



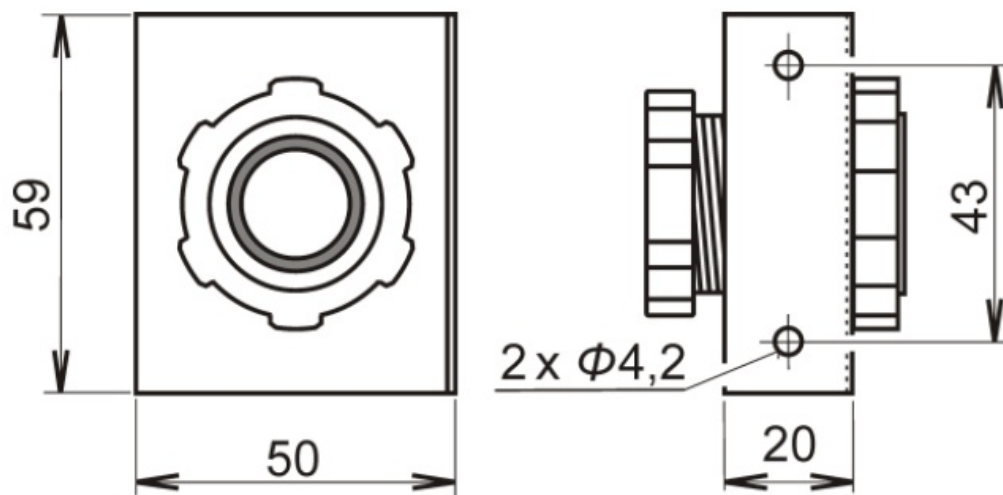
The value of the internal resistance (R_i) of the measuring instrument must be greater than 20 k Ω .

Optional accessory

Mounting flange PP4



Mounting flange PP90



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To damages caused by using the device in conflict with this manual can not be provide free repairs during the warranty period.

Read carefully instruction manual before the first device connection.

Contact address of this device's producer:

- COMET SYSTEM, s.r.o.
- Bezrucova 2901
- 756 61 Roznov pod Radhostem
- Czech Republic
- www.cometsystem.com

FAQ

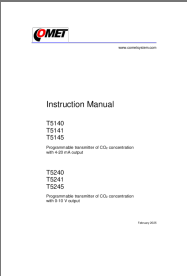
- **Q: Can I modify the factory settings of the device?**

A: Yes, you can modify the settings using a personal computer and the T Sensor program as mentioned in the manual.

- **Q: How do I know if the device is functioning correctly after power up?**

A: After power up, the device performs an internal test for about 20 seconds. During this time, the LCD display shows (—) instead of the CO2 concentration value.

Documents / Resources

	COMET T5140 CO2 Concentration Transmitter [pdf] Instruction Manual T5140, T5141, T5145, T5240, T5241, T5245, T5140 CO2 Concentration Transmitter, CO2 Concentration Transmitter, Concentration Transmitter, Transmitter
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References

- [User Manual](#)

COMET

CO2 Concentration Transmitter, COMET, Concentration Transmitter, T5140, T5140 CO2 Concentration Transmitter, T5141, T5145, T5240, T5241, T5245, Transmitter

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