



# Instruction Manual

T3113

T3113D

T3113L

T3113Ex

T3117

T3117D

T3117L

Programmable duct mount transmitter of temperature, relative humidity and other calculated humidity values with 4 - 20 mA outputs

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Manufacturer is not responsible for damages caused by using the device in conflict with this manual.

To damages caused by using the device in conflict with this manual cannot 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](http://www.cometsystem.com)

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## General description

The duct mount transmitters T3113 and T3117 with metal stem are designed for measurement of temperature and relative humidity of air without aggressive substances. Measured values are converted to other humidity interpretation: dew point temperature, absolute humidity, specific humidity, mixing ratio and specific enthalpy.

Measured and computed values are displayed on a two-line LCD display. The first line displays temperature (°C / °F). Value displayed on the second line is selectable among relative humidity and computed value. It is also possible to display both readings with cyclic overwriting (4 seconds interval) or to switch off the LCD display at all.

The transmitter communicates by means two galvanically separated current loop 4-20mA. Each loop has two-wire connection and each loop requires power from evaluation device. It is always necessary to connect loop I1 which is designed for supplying of measuring part of the device. Using the configuration software can be assigned to each current loop any measured or computed value.

All transmitter setting is performed by means of the PC connected via the optional SP003 communication cable (not included in delivery). Using TSensor software (see [www.cometsystem.com](http://www.cometsystem.com)) you can assign to each output any measured or computed value and to set its measuring range. It is also possible to assign both outputs to the same value (with the same range), if two evaluation devices are necessary to connect. The program supports make the adjustment of the device too. This procedure is described at file „*Calibration manual.pdf*“ which is installed commonly with the software.

### Device versions:

- |                       |  |
|-----------------------|--|
| <b>T3113, T3117</b>   | transmitter with cable gland for output cable connection   |
| <b>T3113L, T3117L</b> | device version with watertight male connector instead of a cable gland for easy connection/disconnection of the output cable (protection IP67) |
| <b>T3113D, T3117D</b> | transmitter with cable gland and LCD display positioned perpendicular to stem  |
| <b>T3113Ex</b>        | intrinsically safe transmitter for use in potentially explosive environments   |
| <b>T3113Z, T3117Z</b> | this marking is intended for a non-standard versions of the transmitters. Description is not included in this manual.                          |

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## T3113Ex transmitter

Transmitter T3113Ex is designed and certified for use in hazardous areas. In compliance with European Directive 2014/34/EU (ATEX) the T3113Ex transmitter conforms to European Standards EN 60079-0:2018 and EN 60079-11:2012.

The T3113Ex transmitter is intended for use in potentially explosive atmospheres consisting of a mixture of gases (group IIC) and dust (group IIIB) with air. Transmitter is suitable for applications requiring category 3G and 3D equipment.

Type Examination Certificate number FTZÚ 13 ATEX 0189X is available at [www.cometsystem.com](http://www.cometsystem.com).

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## Factory settings

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

value at output I1:	relative humidity range 4-20 mA corresponds 0 to 100 %RH
value at output I2:	temperature range 4-20 mA corresponds -30 to +125 °C
display:	switched ON
temperature unit:	°C
value displayed at line 2:	relative humidity

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## Device installation

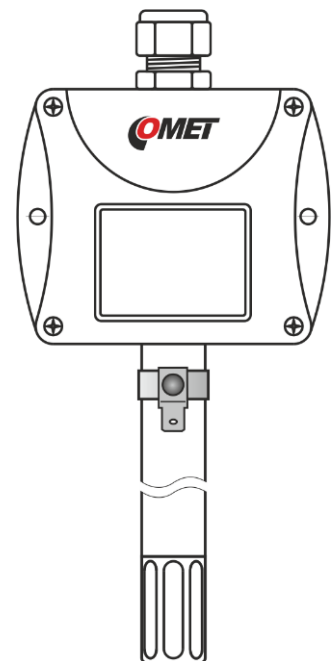
Transmitters are designed for installation into the air-conditioning duct by clamping the metal stem into the cable gland Pg21. Also it is possible to use the installation flanges PP4 or PP90 (see optional accessories). Pay particular attention to the safe installation of sensors T3113Ex.

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*”). Tighten the gland and screw the lid (check the integrity of the seal). The female connector for connecting T3113(7)L transmitter connect according to diagram at “*Typical application wiring*”.

For device connection it is recommended to use a shielded cable with a maximum length of 1200m. External diameter of the cable for T3113(7), T3113(7)D and T3113Ex connection is 4 to 8 mm. For T3313L connection use cable with respect to female connector parameters (do not connect shielding at connector side). When selecting the type of a cable for T3113Ex connection and when choosing a location for T3113Ex mounting it is necessary to observe the conditions for safe installation in potentially explosive environments. The cables should be located as far as possible from potential interference sources.

**Electrostatically ground the metal stem of the T3113Ex transmitter.** Use the supplied grounding clamp with FASTON connector (see figure). Place the clamp in the appropriate position and ground it with a flexible wire. It is necessary to ensure (e.g. with tightening tapes) that the position of the clamp on the stem does not change during operation and that the earth wire does not become disconnected. The resistance between the metal stem and the ground must be less than 1M $\Omega$ .

It is not recommended to use the device for long time under condensation conditions or water aerosol conditions. It could be the cause of water steam condensation inside the sensor's cover with a consequential increase of response time to humidity changes. It can cause sensor damage too.



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Devices don't require special operation and maintenance. It is recommend to keep clean sensor cover and periodically to verify the accuracy of measurement.

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**Warning**

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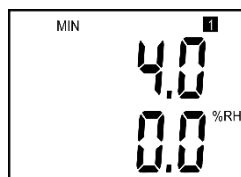
- Installation, commissioning and maintenance may only be carried out by personnel with qualification by applicable regulations and standards.
  - Don't connect transmitter while power supply voltage is on.
  - Ambient temperature of the housing with electronics of T3113Ex transmitter is not allowed exceed 60 °C.
  - Under certain extreme circumstances, the plastic enclosure of T3113Ex transmitter may store an ignition-capable level of electrostatic charge. The device shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge. The equipment shall only be cleaned with a damp cloth.
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## Info mode

Several settings of installed transmitter are possible to verify without a use of the computer. It is necessary to connect at least power of current loop I1. Unscrew the transmitter lid and shortly press button between display and interconnection terminals by means of a tool (e.g. screwdriver).



The LCD display shows the type of value assigned to 1. output (here „%RH“ = relative humidity and „1“ = loop I1). Upper line displays value of the current corresponding to measured value on the lower line (here 4 mA corresponds to 0 %RH).



Press button again to get value for upper point of the 1. output (here „%RH“ = relative humidity and „1“ = loop 1). Upper line displays value of the current corresponding to measured value on the lower line (here 20 mA corresponds to 100 %RH).



After next press of the button LCD display shows the type of value assigned to 2. output (here „°C“ = temperature and „2“ = loop I2). Upper line displays value of the current corresponding to measured value on the lower line (here 4 mA corresponds to -30 °C).



Press button again to get value for upper point of the 2. output (here „°C“ = temperature and „2“ = loop 2). Upper line displays value of the current corresponding to measured value on the lower line (here 20 mA corresponds to 80 °C).

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

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### Warning

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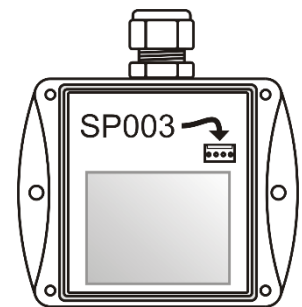
- During info mode no measurement and no output current generation proceed. The transmitter stays at info mode 15 s, and then automatically goes back to measuring cycle.
  - The verifying of settings of the T3113Ex transmitter is permitted only in a non-hazardous area.
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## 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](http://www.cometsystem.com)). During installation please take care about installation of driver for USB communication cable.

- 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



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### Warning

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- Modification of adjustment of the T3113Ex transmitter using a cable SP003 is permitted only in non-hazardous area.
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## 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 and calculated values. It is a serious error, contact distributor of the device to fix.
- Error 1** - there is a reading „Err1“ on LCD display (output current value is  $> 22$  mA). Measured or computed value is higher than upper limit. This state appears in case of:
- measured temperature is higher than approximately  $600\text{ }^{\circ}\text{C}$  (i.e. high non-measurable resistance of temperature sensor, probably opened circuit)
  - relative humidity value is higher than  $100\%$ , i.e. damaged humidity sensor, or humidity calculation of humidity is not possible (due to error during temperature measurement)
  - calculation of the computed value is not possible (error during measurement of temperature or relative humidity or value is over range)
- Error 2** - there is a reading „Err2“ on LCD display (output current value is  $< 3.8$  mA). Measured or computed value is below lower limit of allowed full scale range. This state appears in case of:
- measured temperature is lower than approximately  $-210\text{ }^{\circ}\text{C}$  (i.e. low resistance of temperature sensor, probably short circuit).
  - relative humidity value is lower than  $0\%$ , i.e. damaged sensor for measurement of relative humidity, or calculation of relative humidity is not possible (due to error during temperature measurement)
  - calculation of the computed value is not possible (error during measurement of temperature or relative humidity)
- 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). No measurement and calculations of values are proceeded. It is a serious error, contact distributor of the instrument.

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## Technical support and service

Technical support and service is provided by distributor. For contact see warranty certificate. You can use discussion forum at web address [www.forum.cometsystem.cz](http://www.forum.cometsystem.cz).

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# Technical data

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## Measured values

### Temperature:

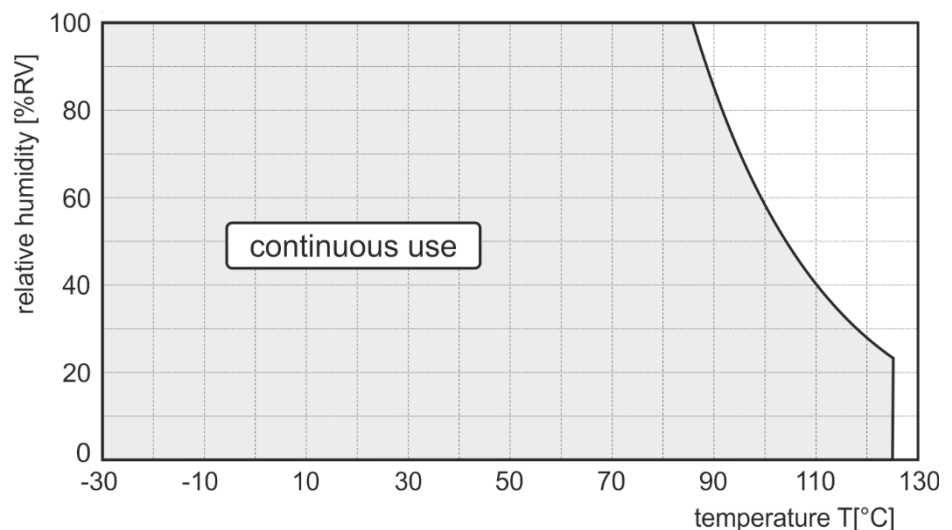
Accuracy:	$\pm 0.4\text{ }^{\circ}\text{C}$
Measuring range:	0 to $+125\text{ }^{\circ}\text{C}$
Resolution:	$0.1\text{ }^{\circ}\text{C}$
Response time:	$t_{90} < 9\text{ min}$ (temperature step $20\text{ }^{\circ}\text{C}$ )

### Relative humidity:

Accuracy:	$\pm 2.5\text{ \%RH}$ from 5 to 95 %RH at $23\text{ }^{\circ}\text{C}$
Measuring range:	0 to 100 %RH
Resolution:	$0.1\text{ \%RH}$
Response time:	$t_{90} < 30\text{ s}$ (humidity step 65 %RH, constant temperature)

Accuracy data are valid for values displayed on LCD display. For accuracy of analog outputs are valid this data in case, when the output range is set within the range of measurement.

### Relative humidity and temperature restriction:

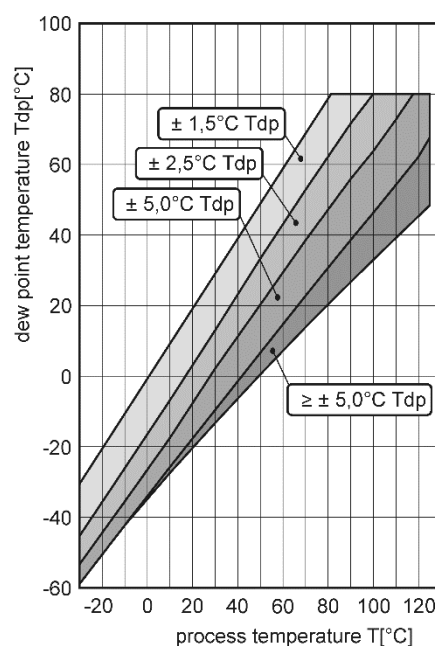
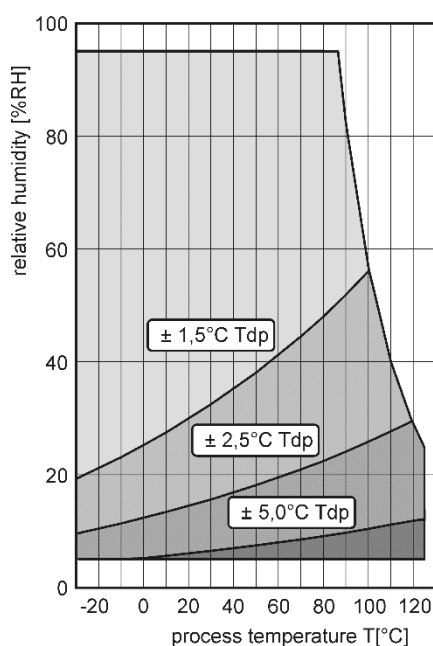


## Calculated humidity values

### Dew point temperature::

Accuracy:  $\pm 1.5^{\circ}\text{C}$  at ambient temperature  $T < 25^{\circ}\text{C}$  and  $\text{RH} > 30\%$ , for more details see graphs

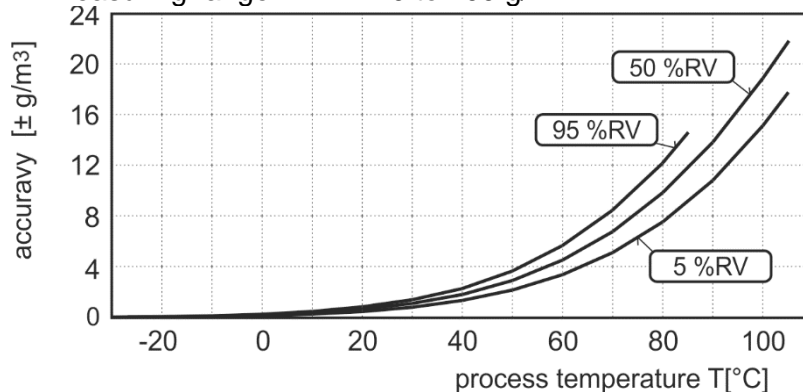
Measuring range:  $-60$  to  $+80^{\circ}\text{C}$



### Absolute humidity:

Accuracy:  $\pm 1.5 \text{ g/m}^3$  at ambient temperature  $T < 25^{\circ}\text{C}$ , for more details see graph

Measuring range: 0 to  $400 \text{ g/m}^3$



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### **Specific humidity**

This value depends on atmospheric pressure. Pressure for quantities calculation is stored in device memory. Default value is 1013hPa and can be changed by software.

Accuracy:  $\pm 2$  g/kg at ambient temperature  $T < 35$  °C  
Measuring range: 0 to 550 g/kg

### **Mixing ratio**

This value depends on atmospheric pressure. Pressure for quantities calculation is stored in device memory. Default value is 1013hPa and can be changed by software.

Accuracy:  $\pm 2$  g/kg at ambient temperature  $T < 35$  °C  
Measuring range: 0 to 995 g/kg

### **Specific enthalpy**

This value depends on atmospheric pressure. Pressure for quantities calculation is stored in device memory. Default value is 1013hPa and can be changed by software.

Accuracy:  $\pm 4$  kJ/kg at ambient temperature  $T < 35$  °C  
Measuring range: 0 to 995 kJ/kg

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## **General**

**Power supply voltage:**  
9 to 30 Vdc

**Current output in case of error:**  
< 3.8 mA or > 22 mA

**Recommended calibration interval:**  
1 year (*relative humidity 1 year, temperature 2 years*)

**Protection:**  
housing with electronics IP65, sensors are located in cover with IP40 protection

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**Working position:**

in air-conditioning duct arbitrary, in free space the steel stem downwards

**Storage temperature range:**

-30 to +80 °C


**Storage relative humidity range:**

0 to 100 %RH (no condensation)

**Certification of T3113Ex transmitter:**

Certificate: FTZÚ 13 ATEX 0189X

Marking:  II 3G Ex ic IIC T6 Gc

 II 3D Ex ic IIIB T85°C Dc

Compliance with standards:

EN 60079-0:2018

EN 60079-11:2012

Intrinsically safe parameters of current loops I1 and I2:

Ui = 30 V, Ii = 100 mA, Pi = 1W

Io = 22 mA, Ci ~ 0, Li ~ 0

Special condition for safe use (sign "X"): Under certain extreme circumstances, the plastic enclosure may store an ignition-capable level of electrostatic charge. The device shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge. The equipment shall only be cleaned with a damp cloth.

**Electromagnetic compatibility:**

EN 61326-1

**Weight:** approximately

T3113, T3113L, T3113D, T3113Ex 150 g

T3117, T3117L, T3117D 580 g

**Housing material:**

ASA



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## Operating conditions

### Temperature operating range of the housing with electronics:

-30 to +80 °C    **T3113(7)**  
-30 to +80 °C    **T3113(7)L**  
-30 to +80 °C    **T3113(7)D**

### Ambient temperature range of the housing with electronics:

-30 to +60 °C    **T3113Ex**

### Temperature operating range of the measuring end of stem:

-30 to +125 °C

### Relative humidity operating range:

0 to 100 %RH (no condensation)

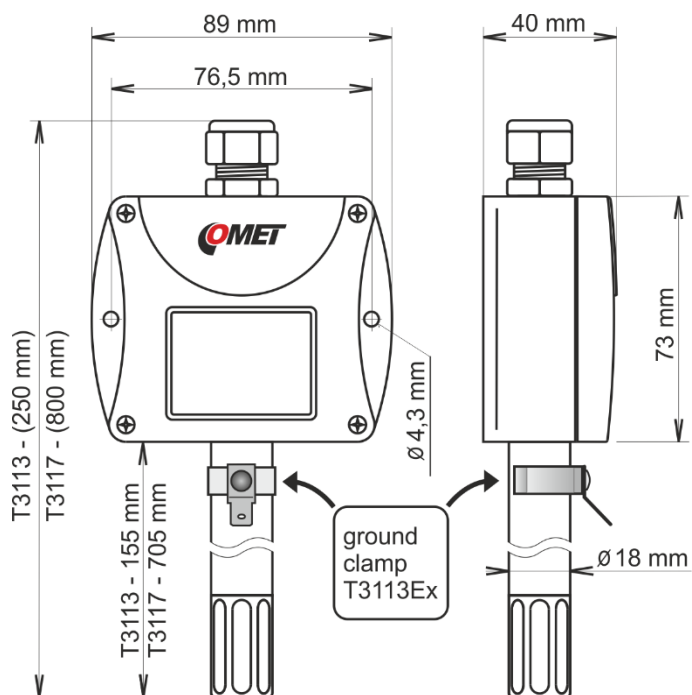
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## End of operation

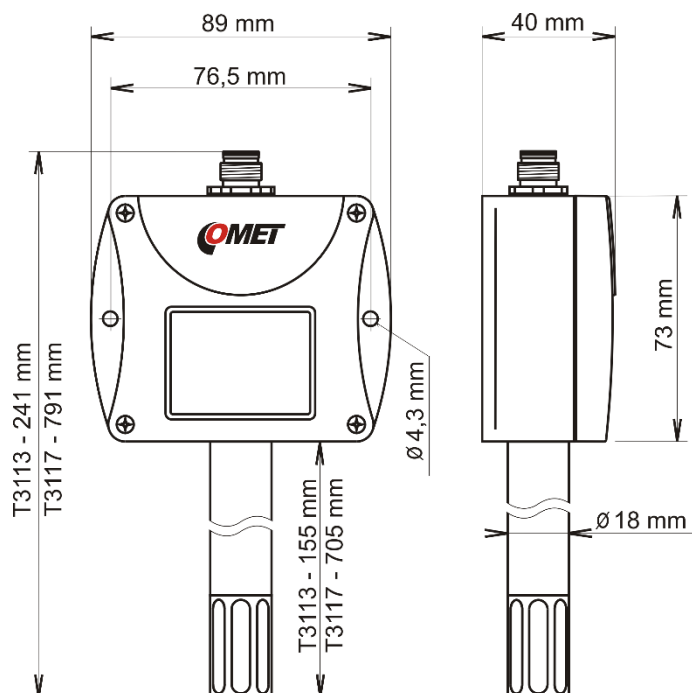
Dispose of the device according to statutory regulations.

## Dimensions

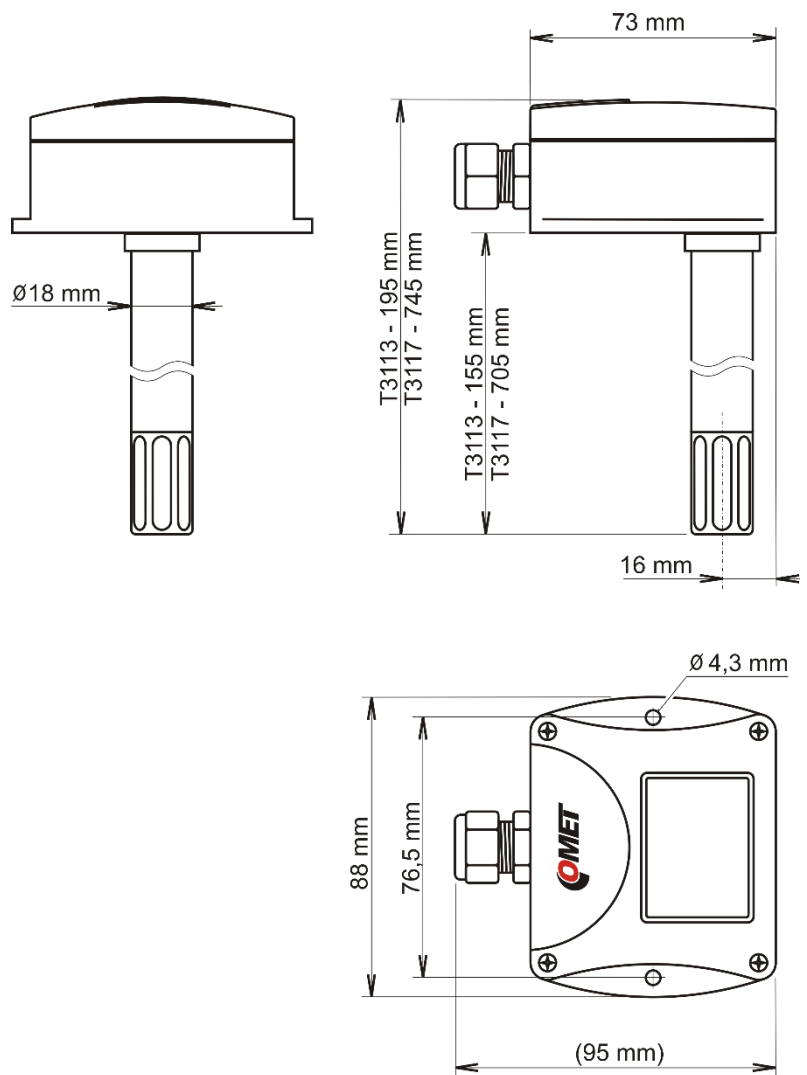
**T3113  
T3117  
T3113Ex**



**T3113L  
T3117L**

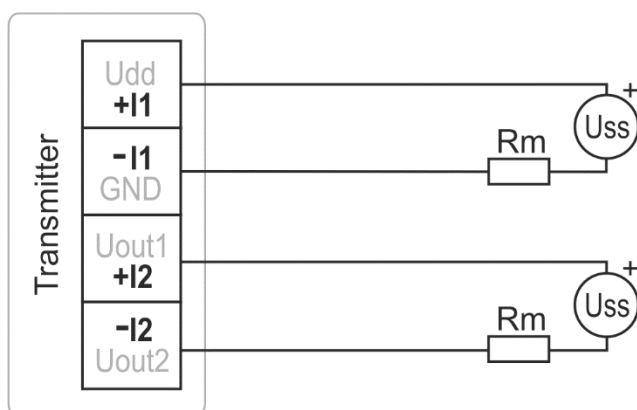


**T3113D**  
**T3117D**



## Typical application wiring

T3113  
T3113D  
T3117  
T3117D

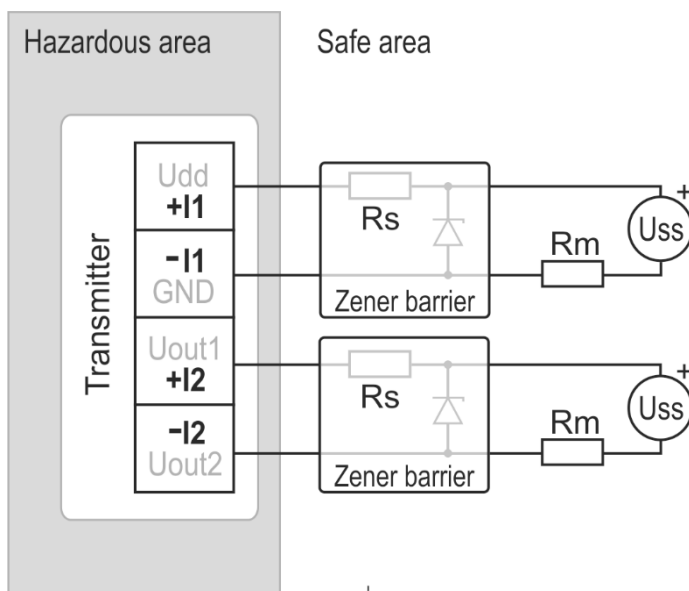


Loop resistance value  $R_c = R_m + \text{resistance of wires}$  shall fulfill the condition  $R_c[\Omega] < 40 \times U_{ss}[V] - 360$ .

T3113Ex

Hazardous area

Safe area



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

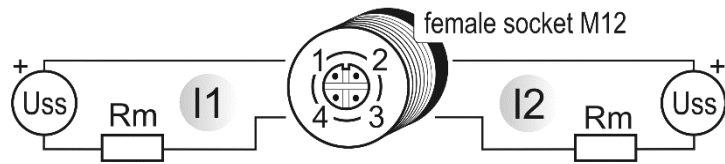
Intrinsically safe parameters of the transmitter:

$U_i = 30 \text{ V}$ ,  $I_i = 100 \text{ mA}$ ,  $P_i = 1 \text{ W}$

$I_o = 22 \text{ mA}$ ,  $C_i \sim 0$ ,  $L_i \sim 0$

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**T3113L**  
**T3117L**

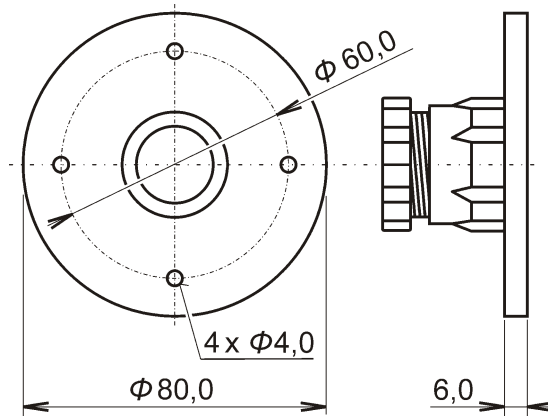


Loop resistance value  **$R_c = R_m + \text{resistance of wires}$**  shall fulfill the condition  **$R_c[\Omega] < 40 \times U_{ss}[V] - 360$** .

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## Optional accessory

### Mounting flange PP4



### Mounting flange PP90

