

# CALIBRATED SENSORS AND TRANSDUCERS

with 4 - 20 mA  
or 0 - 10 V outputs

EXPLOSIVE ENVIRONMENTS

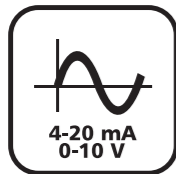
BUILDING MANAGEMENT

HEALTHCARE AND LABORATORIES



- Programmable sensors
  - Temperatures
  - Relative humidity (computed humidity values)
  - Dew point
  - Atmospheric pressure
  - CO<sub>2</sub>
- Industrial and interior design
- Temperature and humidity probes

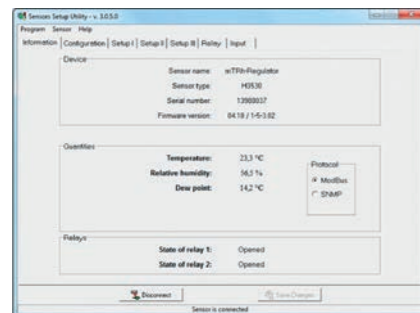




# T - Programmable sensors and transmitters

output 4 – 20 mA, 0 - 10 V

Programmable transmitters with the possibility of voltage or current output. Transmitters can be used for measuring Temperature, Relative humidity, CO<sub>2</sub> or combination. Measured values are also converted to other humidity interpretation. All transmitters are with Dual line LCD. The transmitter settings are performed by means of the PC connected via the optional SP003 communication cable. The Free program Tsensor for setting is available to download from [www.cometsystem.com](http://www.cometsystem.com)



## Software TSensor allows you to:

- » Set the desired range of the analog output
- » Assign the measured value to output
- » Select and assign the computed value
- » Make a user adjustment of the sensor
- » Turn the display off

**TSensor** - freeware software for sensor configuration.



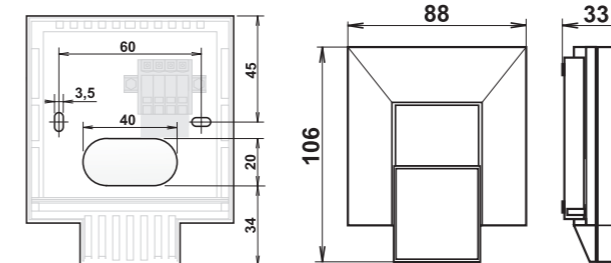
Duct mount CO<sub>2</sub> concentration transmitter with 4-20 mA or 0-10 V output.

**SP003** - Cable for transmitter adjustment via USB port.

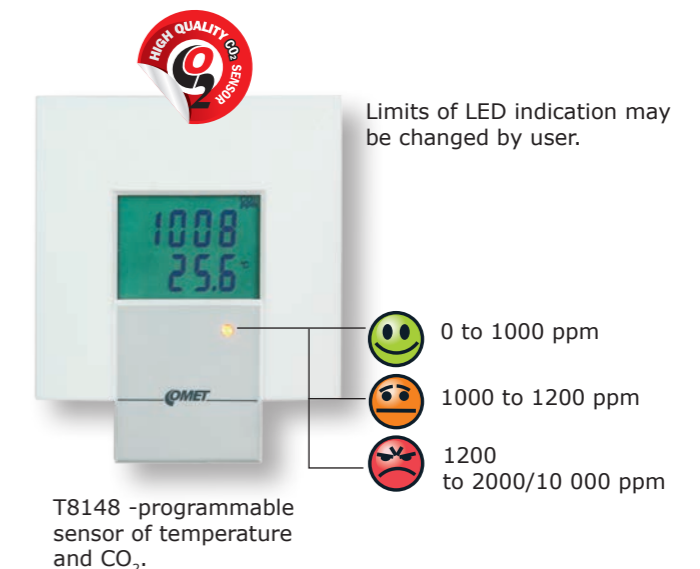
The industrial design of sensors for air conditioning.

## i Interior design

Interior sensors have all the advantages of T series sensors in industrial design. This is the same concept with a digital microprocessor. It differs by the type of housing that has been designed with regard to functional and attractive design. They are made for easy installation in a standard way into a flush-mounted wiring box.



Easy installation in a standard way into a flush-mounted wiring box. Minimal depth of the box is 40 mm.



T8148 -programmable sensor of temperature and CO<sub>2</sub>.

## Sensor models and their specification

Measured values		Temperature	Temperature + relative humidity	Temperature + CO <sub>2</sub>	Atm. pressure
SENSOR MODEL	output 4 - 20 mA	T0118	T3118	T8148	T2118
	output 0 - 10 V	T0218	T3218	T8248	T2218
temperature	range	-10 to +50 °C	-10 to +50 °C	-10 to +50 °C	-
	accuracy	±0,5 °C	±0,5 °C	±0,5 °C	-
relative humidity	range	-	5 to 95 % RH	-	-
	accuracy in range 5-60 % at 23 °C	-	±2,5 % RH	-	-
	accuracy in range 60-95 % at 23 °C	-	±3 % RH	-	-
atmospheric pressure	range	-	-	-	600 to 1100 hPa
	accuracy	-	-	-	±1,3 hPa
CO <sub>2</sub> **	range	-	-	0 to 2000 ppm*	-
	accuracy	-	-	± (50 ppm+2% of measured value)	-
computed values		NO	YES	NO	NO
protection class of the casewith electronics		IP20			

\* Optional measuring range 0-10,000 ppm at extra cost

\*\* The accuracy of CO<sub>2</sub> measurement is defined at 25 °C

## Computed values

**Dew point temperature**  
Accuracy: ±1,5°C at ambient temperature T<25°C and relative humidity RH

**Absolute humidity**  
Accuracy: ±1,5g/m<sup>3</sup> at ambient temperature T < 25°C for more details see manual.  
Range: 0 to 400 g/m<sup>3</sup>

**Specific humidity**  
Accuracy: ±2g/kg at ambient temperature T < 35°C  
Range: 0 to 550 g/kg

**Mixing ratio**  
Accuracy: ±2g/kg at ambient temperature T < 35°C  
Range: 0 to 995 g/kg

**Specific enthalpy**  
Accuracy: ± 3kJ/kg at ambient temperature T < 25°C  
Range: 0 to 995 kJ/kg

## i Industrial design

Sensors are available with integrated sensors, with sensors on the cable and with the probe to pressure environment.

Case of sensor is made of ABS which is very resistant to mechanical damage.

The terminals for the output signal and power.

All transmitter settings can be done by PC.

External mounting holes for easy and fast mounting without the need to take off lid cover.

Sealing lid protects electronics from dust and splashing water.

RTD Pt1000 temperature sensor together with state-of-the-art capacitive polymer sensor ensures excellent calibration, long term stability, inertia against water and condensation.

1.

2.

3.

### Protection of sensors

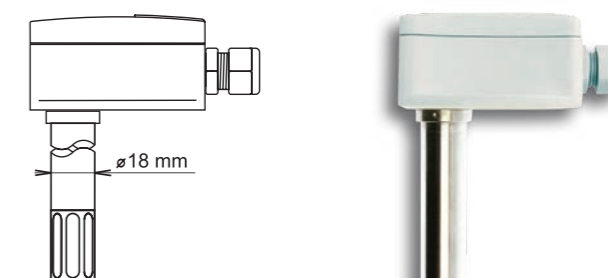
**1.** Sensor cover F5200 (F5200B - black) with filter from stainless steel mesh. Filtering ability 0.025mm.

**2.** F5300 - Teflon (PTFE) sensor cover (white colour), with increased resistance against splashing water, nonabsorbent surface, does not rust. Porous size 25µm. Temperature range -40°C to +125°C.

**3.** F0000 - Sintered bronze sensor cover for moderate aggressive environments. Filtering ability 0.025mm.

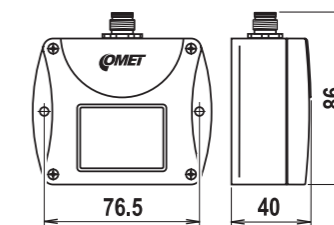
## Sensor with display placed perpendicular to the axis of the measuring stem - version TxxxxD.

This construction is suitable for installation into the air channels.



### Easy connection of the output cable

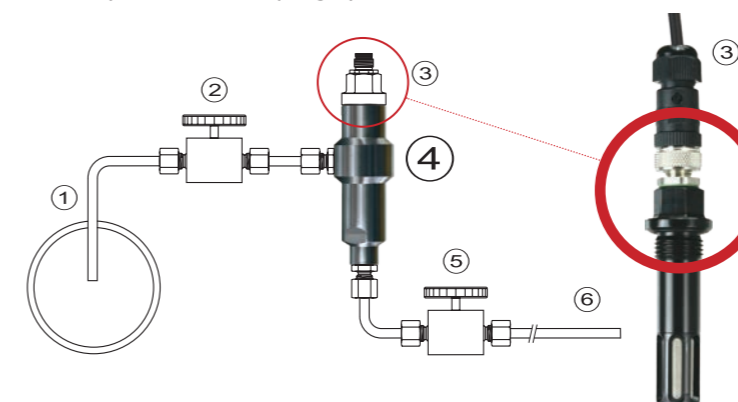
Transmitter version with watertight male connector TxxxxL. Waterproof connector for easy connection and disconnection of the output cable (connector Lumberg RSFM4 IP67). Please specify your order with letter L behind model code (e.g. TxxxxL).



**K1427** - Female connector ELKA for TxxxxL transmitters with male connector Lumberg for easy connection/disconnection of the output. IP67 protection.

### Humidity measurement of compressed air

The probe for measuring the moisture of compressed air should be placed directly on the pressure pipelines to achieve higher measurement accuracy and fast response times. But there are cases where such placement is not possible. The reason is the high air speed, high temperature, high pollution, small diameter pipes, etc. Such situation can be solved by placing the probe into the flow measuring chamber. The picture shows the basic layout of the sampling system with chamber SH- PP.



- 1 ... sampling
- 2 ... closing valve
- 3 ... probe
- 4 ... flow chamber

**SH-PP** - Flow chamber for compressed air measurement up to 25 bars - stainless steel DIN 1.4301 inlet and outlet connection - G1/8 thread humidity probe connection - G1/2 thread screw-coupling not included.

- 5 ... closing valve
- 6 ... outlet tube



### Mounting accessories



**PP90** - Right-angled stainless steel flange.



**PP4** - Plastic flat circular flange.



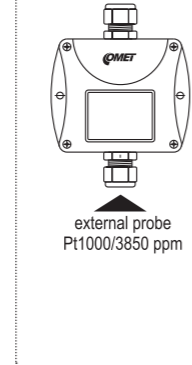
**SP004** - Plastic gland for direct mounting of the humidity probe to a 29 mm diameter hole.

Measured values		Temperature		Relative humidity	Temperature + relative humidity				Atm. pressure	CO <sub>2</sub>		
SENSOR MODEL	4 - 20 mA	T4111	T0110	T1110	T3110	T3113[D], T3117[D]	T3111	T3111P	T2114	T5141	T5140	T5145
	0 - 10 V	T4211	-	-	T0210	T0213[D]	T0211	T0211P	T2214	T5241	T5240	T5245
temperature	range	±(0,15+0,1%TMR)°C	-30 to +80 °C	-	-30 to +80 °C	-30 to +125 °C	-30 to +105 °C	-30 to +105 °C	-	-	-	-
	accuracy	accuracy of current output (device without probe) TMR ... temperature measuring range	±0,4 °C	-	±0,4 °C	±0,4 °C	±0,4 °C	±0,4 °C	-	-	-	-
relative humidity	range		-	0 to 100 %RH	0 to 100 %RH	0 to 100 %RH	0 to 100 %RH	0 to 100 %RH	-	-	-	-
	accuracy*		-	±2,5 %RH	±2,5 %RH	±2,5 %RH	±2,5 %RH	±2,5 %RH	-	-	-	-
barometric pressure	range	-	-	-	-	-	-	-	600 to 1100 hPa	-	-	-
	accuracy	-	-	-	-	-	-	-	±1,3 hPa	-	-	-
CO <sub>2</sub>	range	-	-	-	-	-	-	-	-	0 to 10000 ppm	0 to 2000 ppm**	0 to 2000 ppm**
	accuracy ***	-	-	-	-	-	-	-	-	± (110 ppm+2 % of measured value)	± (50 ppm+2% of measured value)	± (50 ppm+2% of measured value)
computed values		NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
protection class of the case with electronics		IP65 / -	IP65 / IP65	IP65 / IP40	IP65 / IP40	IP65 / IP40	IP65 / IP40	IP65 / IP40	IP54 / -	IP65 / IP65	IP30 / -	IP65 / IP20

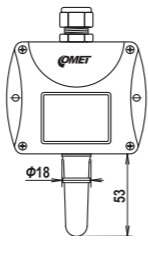
Absolute humidity <<  
Dew point temperature <<  
Mixing ratio <<  
Specific humidity <<  
Specific enthalpy <<



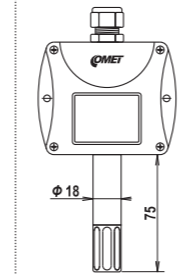
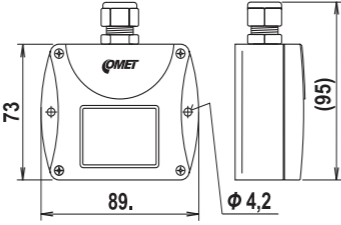
**T3113**  
– temperature and humidity transmitter  
\*\*\*\*



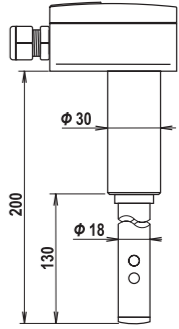
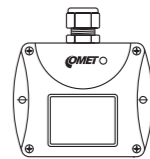
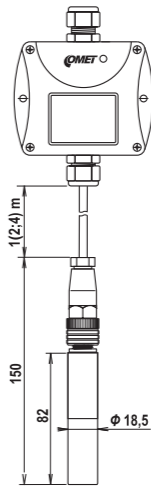
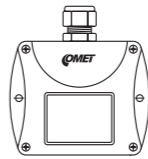
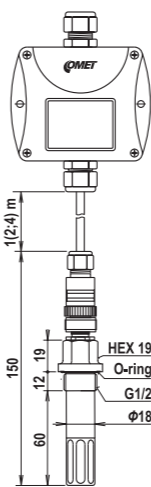
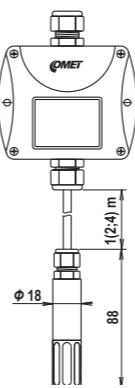
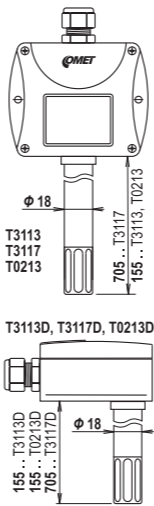
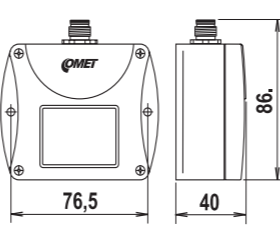
external probe  
Pt1000/3850 ppm



Device with cable gland



TxxxL version of device



# air flow direction

\* Accuracy in range of 5 to 95% at 23°C.

\*\* Custom range 10000 ppm.

\*\*\* Accuracy at 25°C and pressure of 1013 hPa.

\*\*\*\* Stems length longer than 75 mm are made of stainless steel.

### Computed values

**Absolute humidity**  
Accuracy: ±1,5g/m<sup>3</sup> at ambient temperature T < 25°C  
for more details see manual.

**Dew point temperature**  
Accuracy: ±1,5°C at ambient temperature T < 25°C and relative humidity RH > 30%, for more details see manual  
Range: -60 to +80 °C (-76 to 176 °F)

**Specific humidity**  
Accuracy: ±2g/kg at ambient temperature T < 35°C  
Range: 0 to 550 g/kg

**Mixing ratio**  
Accuracy: ±2g/kg at ambient temperature T < 35°C  
Range: 0 to 995 g/kg

**Specific enthalpy**  
Accuracy: ± 3kJ/kg at ambient temperature T < 25°C  
Range: 0 to 995 kJ/kg



# ATEX certification for use in potentially explosive environments with output 4 – 20 mA

II	3G	Ex	ic	IIC	T6	Gc
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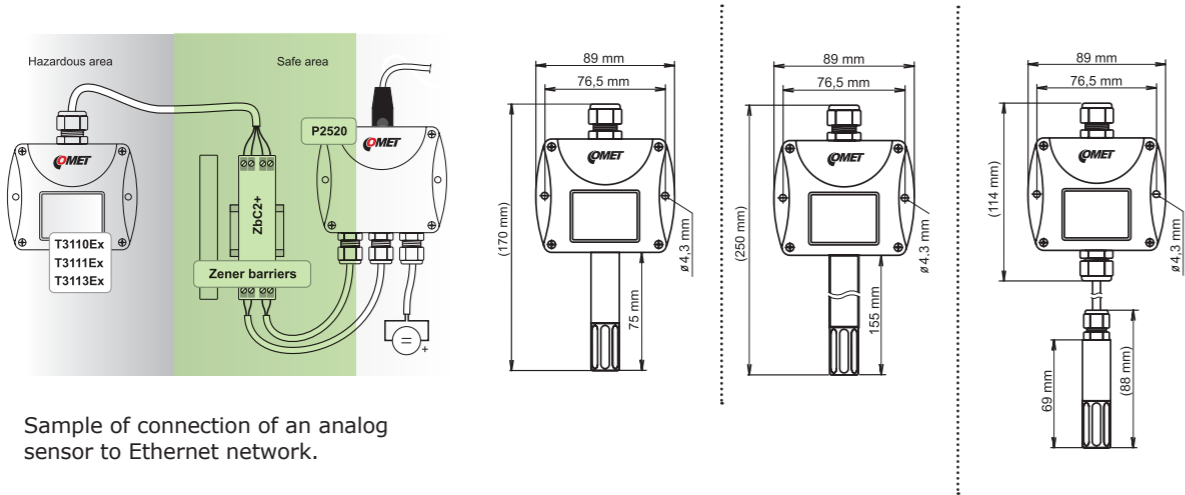
II	The product is intended to surface sites with the presence of explosive atmospheres.
3G	The product is intended for use in areas where an explosive mixture of gas (vapour, mist) and air is not likely to occur in normal operation and if it occurs it will exist only for a short time.
Ex	It identifies that a protection mode against explosions has been adopted.
ic	The protection mode by intrinsic safety according standard EN 60079-11.
IIC	The product is intended to surface sites with the presence of explosive atmosphere - subgroup of C gas.
T6	The temperature class (maximum surface temperature of the device is 85 °C at ambient temperature 60 °C).
Gc	Equipment protection level (equipment for use in explosive atmospheres due to the presence of gas, with a level of protection "increased" that is not a source of ignition in normal operation).

Programmable transmitters T3110Ex, T3111Ex, T3113Ex with 4-20 mA outputs are designed for measurement of relative humidity and temperature in a potentially explosive environments.

T311xEx transmitters are intrinsically safe. It is a way of equipment protection, which is based on the limitation of energy (electrical and thermal) at a level lower than the level that could cause ignition in a specific hazardous atmospheric mixture. Intrinsically safe Zener barriers and intrinsically safe isolation amplifiers are elemental types of intrinsically safe interfaces designed to protect electrical circuits installed in a potentially hazardous areas.



Measured values		Temperature + relative humidity		
SENSOR MODEL		T3110Ex	T3113Ex	T3111Ex
temperature	range	-30 to +80 °C	-30 to +125 °C	-30 to +105 °C
	accuracy	±0,4 °C		
relative humidity	range	0 to 100 % RH		
	accuracy	±2,5 % RH from 5 to 95 % at 23 °C		
computed values		YES		
output		4-20 mA		
recommended calibration interval		1 year		
protection class of the case		IP65 / IP40		



Sample of connection of an analog sensor to Ethernet network.

# Zener barrier ZbC2 +

certificate: FTZU 22 ATEX 0018X

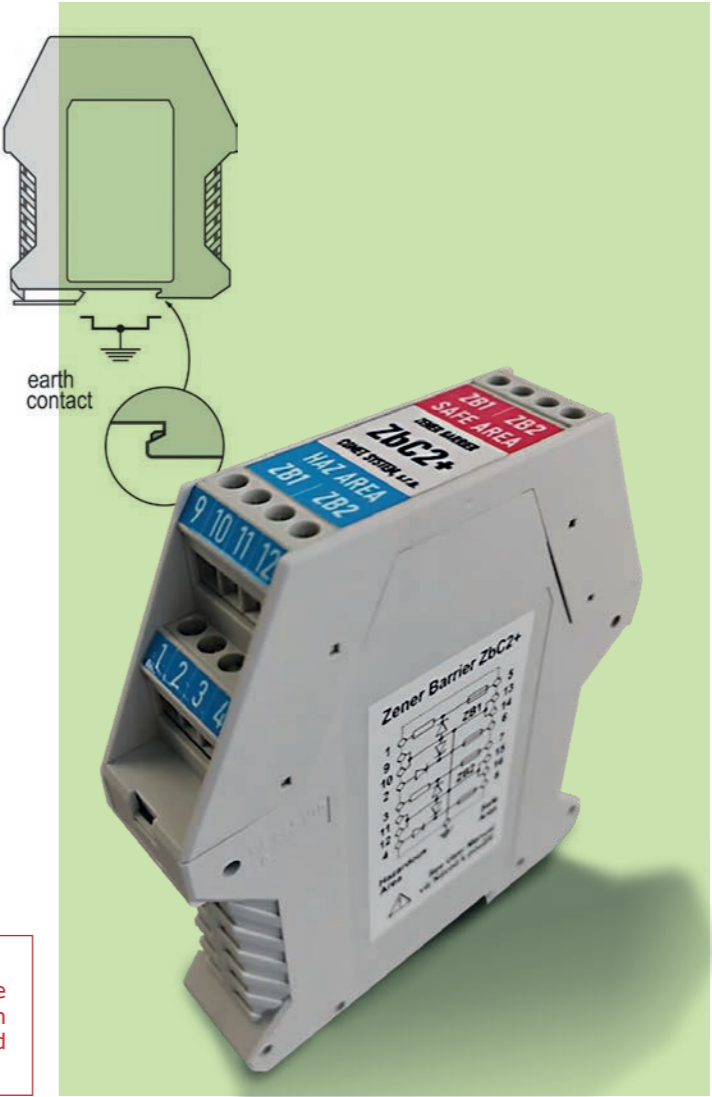
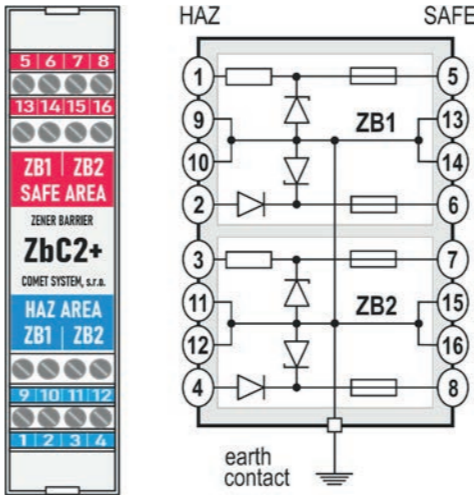
Ex	II	(3)G	Ex ic Gc	IIC
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- Voltage  $U_0$  29,4 V
- Current  $I_0$  96 mA
- Resistance  $R_{omin}$  306  $\Omega$

The Zener barrier is a certified intrinsically safe interface. It is used to connect a certified intrinsically safe device located in a potentially explosive atmosphere (Hazardous area) to a non-certified device that is in a safe area.

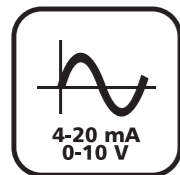
## Key features

- Two identical Zener barrier ZB1 and ZB2 in the common housing
- Positive polarity with return diode
- Series resistance  $R_{s1} = 355 \Omega$  (terminals 1-5, terminals 3-7)  
 $R_{s2} = 42 \Omega$  (terminals 2-6, terminals 4-8)
- Fuse rating 40 mA
- DIN rail mounting in a safe area



Two identical Zener barriers ZB1 and ZB2. in a common case.

**NOTICE!**  
Installation, commissioning and maintenance may only be carried out by personnel with qualification by applicable regulations and standards.



## P- Sensors with fixed and unchangeable measuring range

### Temperature sensors with 4 - 20 mA output, 0 -10 V

Transducers P4211, P4121 to P4171 without their own temperature sensor are designed for signal conversion from RTD sensor Pt1000 (3850ppm/°C) to the current flow. Probe P0120 is designed for measurement of air temperature, transducer P0132 for temperature measurement in stainless steel well (well is not included). The temperature range of all models is unchangeable and the output is an analog signal 4-20 mA. All transducers can be powered from the current loop. Protection of electronic part is IP65.

#### Sensor models and their specification

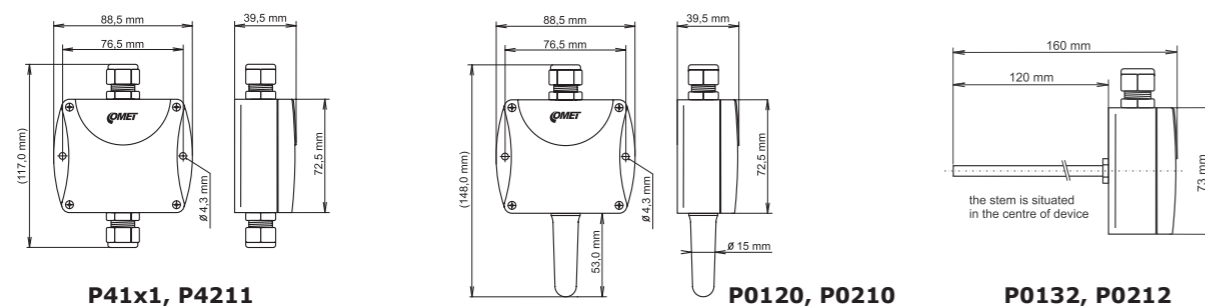
Measured range	Transducer for external probe Pt1000			Built-in temperature sensor		
	type	0 - 10 V**	accuracy	type	0 - 10 V	accuracy
- 100 °C to +200 °C	P6181*		±0,3 °C***			
- 50 °C to +50 °C	P6191*		±0,3 °C			
- 100 °C to +30 °C	P4141		±0,3 °C			
- 50 °C to +50 °C	P4191		±0,3 °C			
- 30 °C to +80 °C	P4121	P4211	±0,3 °C	P0120	P0210, P0212	±0,4 °C
0 °C to +35 °C	P4151		±0,2 °C			
0 °C to +150 °C	P4131		±0,3 °C	P0132		±0,4 °C****
0 °C to +250 °C	P4161		±0,4 °C			
0 °C to +400 °C	P4171		±0,7 °C			

\* Model for Pt100 probe - connection of a two-wire, three-wire or two-wire probe with a compensation loop

\*\* Voltage sensors can also be powered from 24 Vac

\*\*\* ± 0.4 °C above 100 °C

\*\*\*\* above 100 °C 0.4% °C from the measured value

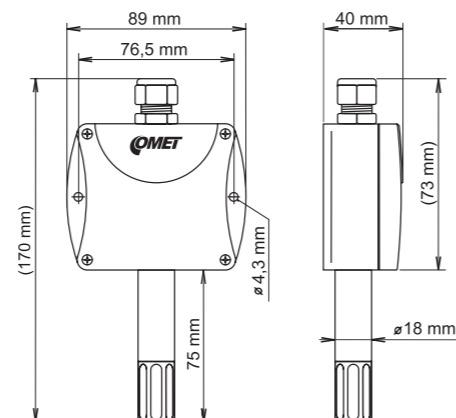


### Temperature and humidity sensor with fixed and unchangeable measuring range output 4 - 20 mA

Inexpensive sensor P3110E with 4-20mA output is designed to measure temperature and relative humidity in a no chemically aggressive environment.

Measured values		Temperature + relative humidity
SENSOR MODEL		P3110E
temperature	range	-30 to +80 °C
	accuracy	±0,6 °C
relative humidity	range	0 to 100 % RH
	accuracy*	±3% RH
output		4-20 mA
computed values		NO
protection class of the case with electronics		IP65 / IP40

\* Relative humidity accuracy from 5 to 95% at 23°C



## Protection of sensors against weather conditions Cometeo.net

Multi-plate radiation shield is used to protect weather monitor systems and provides the most accurate climate measurement results. The uniquely designed screen minimizes solar radiation reaching the sensor, minimizes radiation absorbed by the screen and maximizes ambient airflow around the weather station sensor.

The surface exposed to sunlight is made of highly reflective UV and long-term stable ASA plastic. The inner surfaces of the screen are made of matt black plastic to minimize internal reflections. Large 210mm diameter of 14 plates is designed to provide complete protection for weather sensor.

Each of the fourteen black louvres is equipped with a circular slot allowing air to flow vertically through the entire radiation shield. The slot also separates the sunlit part of the louver from the inner part and thus prevents heat transfer to the sensors.

1.

Cometeo F8000 has large diameter of lamels 210 mm and provides full protection of the measuring devices that can be located inside in the cylindrical space with a diameter of 110 mm.

2.

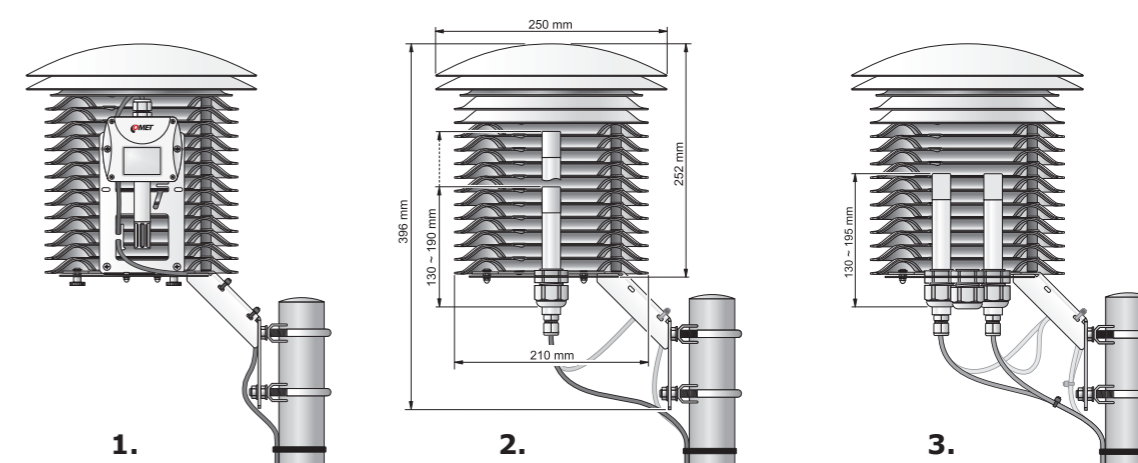
F8001 - Universal naturally ventilated weather cover any measuring probes with diameter 13 to 18 mm before weather effects. As required a weather cover can be provided another size mounting bushings for the probe.

3.

F8004 - version with four bushings  
Version 2 and 3 can be used with most devices and probes, e.g. Vaisala, Rotronic.



Operating temperature range -40 to +65 °C



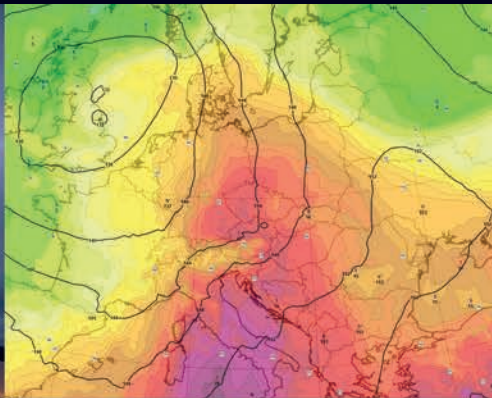
# SENSORS AND TRANSDUCERS

with output 4-20 mA  
or 0-10 V

INDUSTRY



METEOROLOGY



WAREHOUSES



The COMET System, s.r.o. company is continuously developing and improving its product. COMET System, s.r.o. reserves the right to carry out technical changes in equipment or product without any previous notice.

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