

EE210

Humidity and Temperature Sensor for Demanding Climate Control

The EE210 humidity (RH) and temperature (T) sensor is designed to meet the highest requirements in demanding climate control applications. Besides the accurate measurement of RH and T EE210 calculates various RH related parameters such as dew point temperature, absolute humidity and mixing ratio.

Outstanding Measurement Performance

Excellent performance of EE210 in polluted or aggressive environment is ensured by the encapsulated measurement electronics inside the sensing probe and the long-term stable E+E sensing element with proprietary coating.

Analogue, Digital Outputs and Display

All measured and calculated values are available on the BACnet MS/TP or Modbus RTU interface, two of them on the analogue voltage or current outputs, while up to three values can be shown simultaneously on the optional display.

Versatility

EE210 is available for wall or duct mount, with remote probe, as well as an outdoor version. The IP65/NEMA 4X enclosure minimizes installation costs and provides outstanding protection against contamination and condensation.

Easy Configuration and Adjustment

With an optional USB configuration adapter, the user can set the RS485 interface parameters, the output scaling and perform one or two point adjustment for RH and T.



Features

Appropriate for US mounting requirements

- » Knockout for 1/2" conduit fitting

External mounting holes

- » Mounting with closed cover
- » Electronics protected against construction site pollution
- » Easy and fast mounting

Electronics on the underside of the PCB

- » Optimum protection against mechanical damage during installation

Bayonet Screws

- » Open/closed with a 1/4 rotation

Cast Electronics

- » Mechanical protection
- » Condensation-resistant

E+E RH and T Sensing Element

- » Outstanding long-term stability
- » Protected solder pads
- » Tested according to automotive standard AEC-Q200

Display

- » Selectable display layout
- » Measurands freely selectable
- » Backlight optional

Smooth cover surface

- » No accumulation of dust in protruding edges

IP65 / NEMA 4X Enclosure

- » Type T13 compatible with radiation shield H010501

Watertight cable outlet

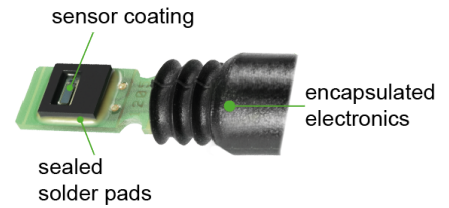
Inspection certificate according DIN EN 10204-3.1



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Protective Sensor Coating

The E+E proprietary sensor coating is a protective layer applied to the active surface of the sensing element. The coating substantially extends sensor life-time and ensures optimal measurement performance in corrosive environment (salts, off-shore applications). Additionally, it improves the sensors' long term stability in dusty, dirty or oily applications by preventing stray impedance caused by deposits on the active sensor surface.



Technical Data

Measured Values

Relative Humidity (RH)

Working range 0...100 %RH

RH accuracy¹⁾ (incl. hysteresis, non-linearity and repeatability)

Type T1 (wall), T2 (duct):

| | | |
|----------------------------|---------|-----------------------------------|
| -15...40 °C (5...104 °F) | ≤90 %RH | ±(1.3 + 0.003*measured value) %RH |
| -15...40 °C (5...104 °F) | >90 %RH | ±2.3 %RH |
| -40...60 °C (-40...140 °F) | | ±(1.5 + 0.015*measured value) %RH |

Type T3 (remote):

at 20 °C (68 °F) ±2.5 %RH

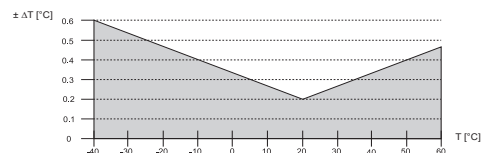
Type T13 (outdoor):

| | | |
|--------------------------|---------|-----------------------------------|
| -15...40 °C (5...104 °F) | ≤90 %RH | ±(1.6 + 0.005*measured value) %RH |
| -15...40 °C (5...104 °F) | ≥90 %RH | ±3 %RH |
| -40...60 °C (0...140 °F) | | ±(2.3 + 0.008*measured value) %RH |

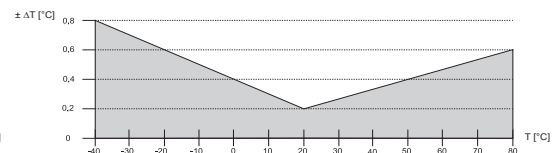
Temperature (T)

T accuracy

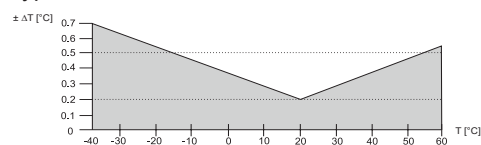
Type T1, T2



Type T3



Type T13



Calculated parameters



| | | from | up to | unit |
|-------------------------------|----|-----------|------------|----------------|
| Dew point temperature | Td | -40 (-40) | 60 (140) | °C (°F) |
| Frost point temperature | Tf | -40 (-40) | 0 (32) | °C (°F) |
| Wet bulb temperature | Tw | 0 (32) | 60 (140) | °C (°F) |
| Water vapour partial pressure | e | 0 (0) | 200 (3) | mbar (psi) |
| Mixing ratio | r | 0 (0) | 160 (1200) | g/kg (gr/lb) |
| Absolute humidity | dv | 0 (0) | 150 (60) | g/m³ (gr/ft³) |
| Specific enthalpy | h | -40 (-10) | 500 (200) | kJ/kg (BTU/lb) |

1) Traceable to intern. standards, administrated by NIST, PTB, BEV,... The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement). For Type T13: at 24 V DC and RL=250 for A6 versions.

Outputs

| | | |
|-------------------------------|--|--|
| Analogue output | 0 - 5 V / 0 - 10 V | -1 mA < I _L < 1 mA |
| | 4 - 20 mA (2-wire) for Type T13 | R _L ≤ 500 Ω 250 ≤ R _L ≤ 500 Ω recommended |
| | 0 - 20 mA (3-wire) | R _L ≤ 500 Ω |
| | Digital output | RS485 (BACnet MS/TP or Modbus RTU), EE210 = 1 unit load |
| Default settings Modbus RTU | Baud rate according ordering guide, parity even, 1 stop bit, address 242 | |
| Default settings BACnet MS/TP | Baud rate according ordering guide, parity none, 1 stop bit, address 1 | |

General

| | | |
|---|---|---|
| Power supply (Class III)  ²⁾ for 4 - 20 mA, 2-wire | 10 V + R _L x 20 mA < V ₊ < 30 V DC for Type T13: 24 V DC ±10 % recommended | |
| for 0 - 20 mA, 3-wire for 0 - 5 V / 0 - 10 V / RS485 | 15 - 35 V DC or 24V AC ±20 % | |
| Current consumption at 24 V | | |
| Voltage output | DC supply max. 12 mA; AC supply max. 34 mA _{rms} ; | with display max. 23 mA with display max. 49 mA _{rms} |
| Current output | | |
| 2-wire | DC supply max. 40 mA; | with display max. 40 mA |
| 3-wire | DC supply typ. 33 mA; AC supply typ. 65 mA _{rms} ; | with display max. 44 mA with display max. 84 mA _{rms} |
| Digital interface | DC supply typ. 5 mA; AC supply typ. 15 mA _{rms} ; | with display max. 20 mA with display max. 35 mA _{rms} |
| Display ³⁾ | Available for Type T1/T2/T3 1, 2 or 3 lines, user configurable Optional with backlight | |
| Electrical connection | Screw terminals, max. 1.5 mm ² | |
| Enclosure material | Polycarbonate, UL94 V-0 (with Display UL94HB) approved | |
| Protection rating | IP65 / NEMA 4X | |
| Cable gland | M16 x 1.5 | |
| Probe cable (for PE210) | PVC, Ø 4.3 mm, 4 x 0.25 mm ² , Length: 1.5 or 3 m (4.9 or 9.8 ft) | |
| Electromagnetic compatibility | EN 61326-1 FCC Part15 Class A | EN 61326-2-3 ICES-003 Class A Industrial Environment |
| | |  |
| Temperature ranges | Working: -40...60 °C (-40...140 °F) (-40...80 °C / -40... 176 °F for probe PE210) | |
| Without display | Storage: -40...60 °C (-40...140 °F) | |
| Temperature ranges | Working: -20...50 °C (-4...122 °F) (-40...80 °C / -40... 176 °F for probe PE210) | |
| With display | Storage: -20...60 °C (-4...140 °F) | |

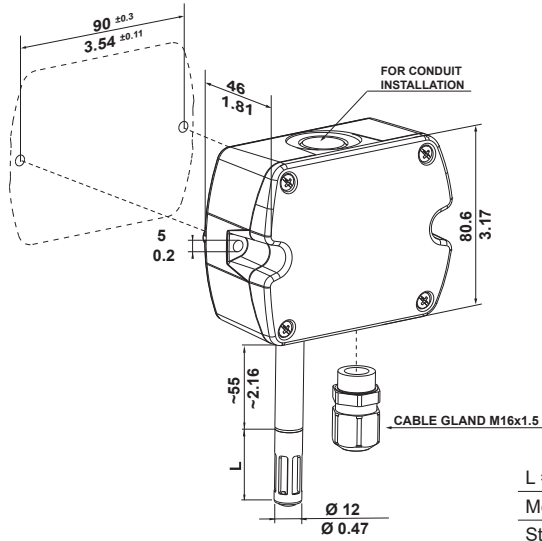
2) USA & Canada: class 2 supply required, max. supply voltage 30 V DC

3) For display operation with EE210-M1xA6 (4 - 20 mA, 2-wire) both outputs must be connected

Dimensions

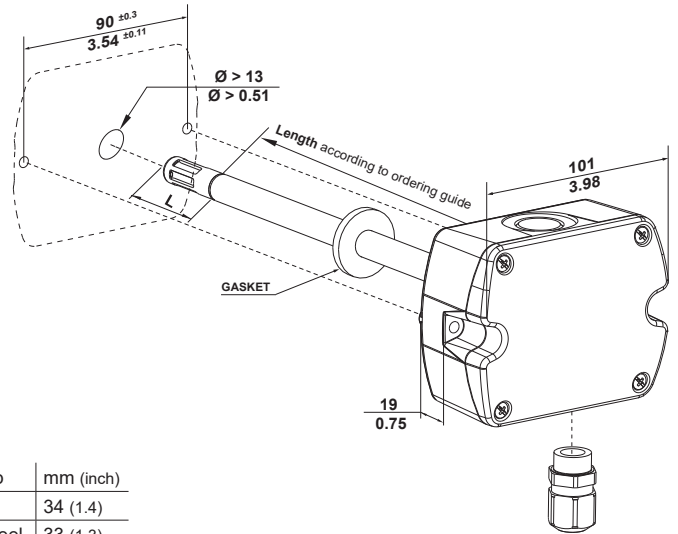
Values in mm (inch)

Type T1

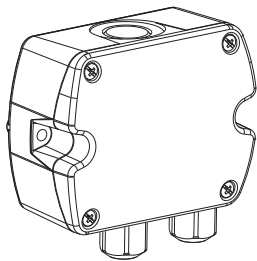


| L = filter cap | mm (inch) |
|-----------------|-----------|
| Membrane | 34 (1.4) |
| Stainless steel | 33 (1.3) |
| Metal grid | 33 (1.3) |

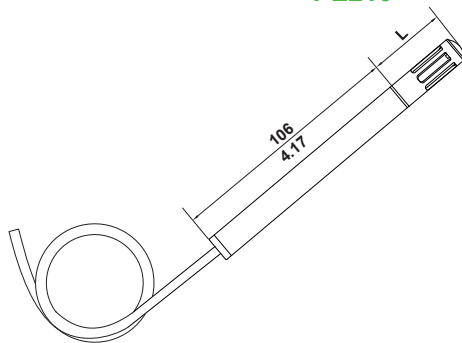
Type T2



Type T3

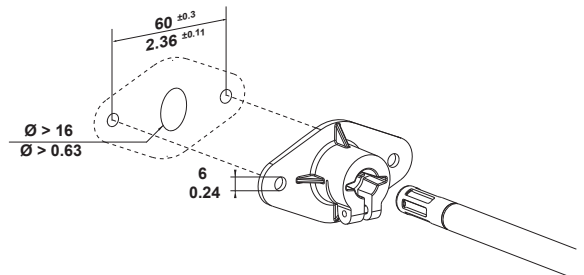


PE210



Mounting flange

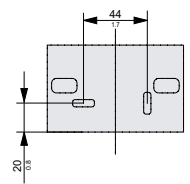
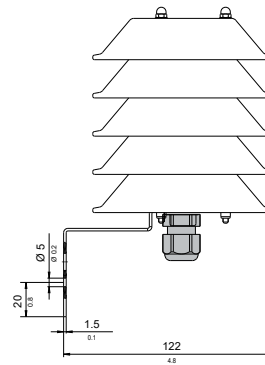
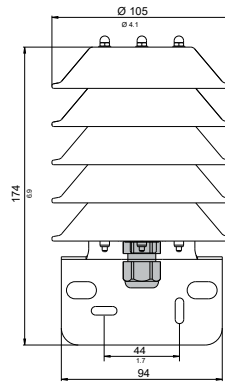
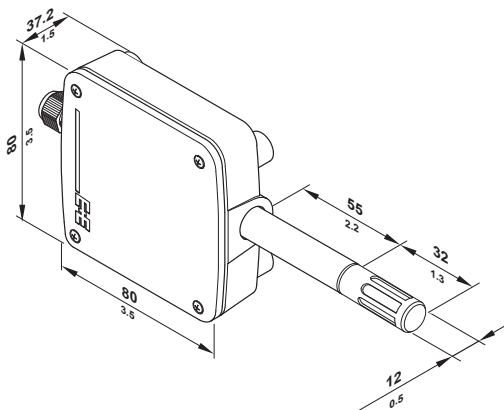
in the scope of supply for Type T2 and T3



Type T13

Radiation Shield HA010501 for Type T13

(needs to be ordered separately)



Ordering Guide

| | | EE210- | | | | |
|-----------------------------|-----------------------------------|---|---------------------|-------------------------------|---------|-----|
| Hardware Configuration | Model | RH + T | | M1 | | |
| | Type | Wall mount | T1 | T2 | T3 | T13 |
| | | Duct mount | | | | |
| | | Remote probe ¹⁾ | | | | |
| | | Outdoor | | | | |
| | Probe length | 50 mm (2") | L50 | | | |
| | | 200 mm (4") | L200 | | | |
| Output | 0 - 5 V | A2 | | | | |
| | 0 - 10 V | A3 | | A3 | | |
| | 0 - 20 mA (3-wire) | A5 | | | | |
| | 4 - 20 mA (2-wire) | A6 | | A6 | | |
| | RS485 | J3 | | | | |
| Filter | Membrane | F2 | F2 | | | |
| | Metal grid | F3 | F3 | F3 | | |
| | Stainless steel sintered | F4 | F4 | | | |
| Display²⁾ | No Display | no code | no code | no code | no code | |
| | Without backlight ³⁾ | D1 | D1 | D1 | | |
| | With backlight ⁴⁾ | D2 | D2 | D2 | | |
| Setup Analogue Outputs | Output 1 | Relative humidity RH [%] Temperature T [°C] Temperature T [°F] Other measurand (xx see measurand code below) | | no code MA1 MA2 MAxx | | |
| | Scaling 1 low | 0 Value | no code SALValue | | | |
| | Scaling 1 high | 100 Value | no code SAHValue | | | |
| | Output 2 | Temperature T [°C] Temperature T [°F] Other measurand (xx see measurand code below) | | no code MB2 MBxx | | |
| | Scaling 2 low | Value | SBLValue | | | |
| | Scaling 2 high | Value | SBHValue | | | |
| Setup RS485 | Protocol | Modbus RTU ⁵⁾ BACnet MS/TP ⁶⁾ | | P1 P3 | | |
| | Baud rate | 9600 | BD5 | | | |
| | | 19200 | BD6 | | | |
| | | 38400 | BD7 | | | |
| | | 57600 ⁷⁾ | BD8 | | | |
| 76800 ⁷⁾ | | BD9 | | | | |
| Units | Metric (SI) Non metric (US/GB) | no code U2 | | | | |

1) The PE210 probe has to be ordered as separate position

2) Factory setup: For analogue output versions the display shows the measurands selected for output 1 and output 2.

For digital output versions the display shows RH and T.

3) Not with output A5

4) Not with output A6

5) Modbus Map and setup instructions: See User Guide and Modbus Application Note at www.epluse.com/ee210

6) Product Implementation conformance Statement (PICS) available at www.epluse.com/ee210

7) Only for BACnet

Measurand Code

For Output 1 and 2 in the Ordering Guide



Please note: no mix of SI/US units allowed

| Measurand code | | MAxx / MBxx |
|----------------------------|---------|-------------|
| Relative humidity RH | [%] | 10 |
| Temperature T | [°C] | 1 |
| | [°F] | 2 |
| Dew point temperature Td | [°C] | 52 |
| | [°F] | 53 |
| Frost point temperature Tf | [°C] | 65 |
| | [°F] | 66 |
| Mixing ratio r | [g/kg] | 60 |
| | [gr/lb] | 61 |

| Measurand code | | MAxx / MBxx |
|--------------------------------|-----------------------|-------------|
| Absolute humidity dv | [g/m ³] | 56 |
| | [gr/ft ³] | 57 |
| Wet bulb temperature Tw | [°C] | 54 |
| | [°F] | 55 |
| Water vapor partial pressure e | [mbar] | 50 |
| | [psi] | 51 |
| Specific enthalpy h | [kJ/kg] | 62 |
| | [BTU/lb] | 64 |

Ordering Guide PE210

| | | | PE210- |
|------------|--------------|--------------------------|--------|
| HW Config. | Model | RH + T | M1 |
| | Filter | Membrane | F2 |
| | | Metal grid | F3 |
| | | Stainless steel sintered | F4 |
| | Cable length | 1.5 m | KL150 |
| 3 m | | KL300 | |

Order Examples

Type T1 and T2

EE210-M1T1A3F2D2SBL-40SBH60

Model: RH + T
 Type: Wall mount
 Output: 0 - 10 V
 Filter: Membrane
 Display: With backlight
 Output 1: Relative humidity
 Scaling 1: Low: 0 %RH
 High: 100 %RH
 Output 2: Temperature [°C]
 Scaling 2: Low: -40 °C
 High: 60 °C

Type T3

Position 1: Basic Device

EE210-M1T3A6MB52SBL-10SBH50

Model: RH + T
 Type: Remote probe
 Output: 4 - 20 mA
 Filter: Without
 Display: Without
 Output 1: Relative humidity
 Scaling 1: Low: 0 %RH
 High: 100 %RH
 Output 2: Dew Point Temperature [°C]
 Scaling 2: Low: -10 °C
 High: 50 °C

Position 2: Remote Probe

PE210-M1F3KL150

Model: RH + T
 Filter: Metal grid
 Cable length: 1.5 m

Type T13

Position 1:

EE210-M1T13A6F3SBL-40SBH60

Model: RH + T
 Type: Outdoor
 Output: 4 - 20 mA
 Filter: Metal grid
 Display: Without
 Output 1: Relative humidity
 Scaling 1: Low: 0 %RH
 High: 100 %RH
 Output 2: Temperature [°C]
 Scaling 2: Low: -40 °C
 High: 60 °C

Position 2:

HA010501

Radiation shield for EE210 Outdoor

Accessories

| | |
|---|---|
| USB configuration adapter | HA011066 |
| Product configuration software | EE-PCS (free download: www.epluse.com/ee210) |
| Radiation shield for EE210 Outdoor (Type T13) | HA010501 |
| Power supply adapter | V03 (see data sheet Accessories) |
| Protection cap for 12 mm probe | HA010783 |