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 ½" 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 ¼ 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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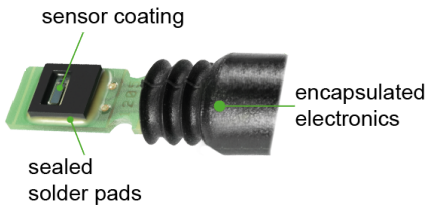
Protective Sensor Coating

The E+E proprietary sensor coating is a protective layer applied to the active surface of the RH and T sensing element. The coating substantially extends the life-time and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). Additionally, it improves the sensor's long term stability in dusty, dirty or oily applications by preventing stray impedances caused by deposits on the active sensor surface.



Technical Data

Measured Values

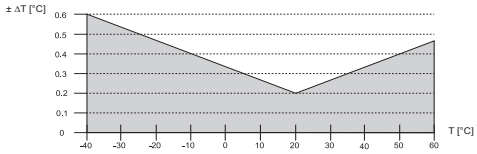
Relative Humidity (RH)

Working range	0...100 %RH	
RH accuracy[1] (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

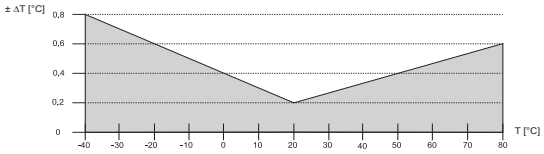
Temperature (T)

T accuracy

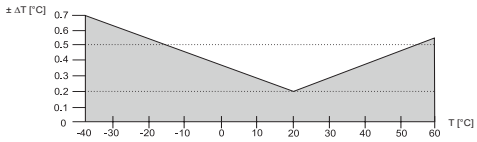
Type T1, T2



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)	R_L ≤ 500 Ω
	for Type T13	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	

General

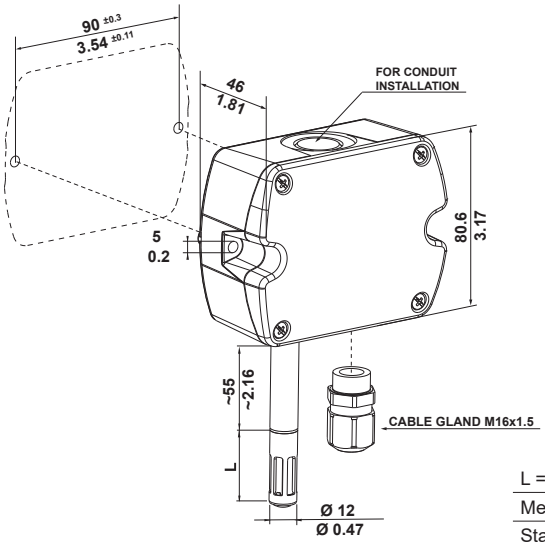
Power supply (Class III) [2)]		
for 4 - 20 mA, 2-wire	10 V + R_L x 20 mA < V+ < 30 V DC for Type T13: 24 V DC ±10 % recommended	
for 0 - 20 mA, 3-wire for 0 - 5 V / 0 - 10 V / RS485	15 - 35 V DC or 24V AC ±20 %	
Current consumption at 24 V		
Voltage output	DC supply max. 12 mA; AC supply max. 34 mA_{rms};	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 EN 61326-2-3 Industrial Environment FCC Part15 Class A ICES-003 Class A	UK CA CE
Temperature ranges Without display	Working: -40...60 °C (-40...140 °F) (-40...80 °C / -40... 176 °F for probe PE210) Storage: -40...60 °C (-40...140 °F)	
Temperature ranges With display	Working: -20...50 °C (-4...122 °F) (-40...80 °C / -40... 176 °F for probe PE210) 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

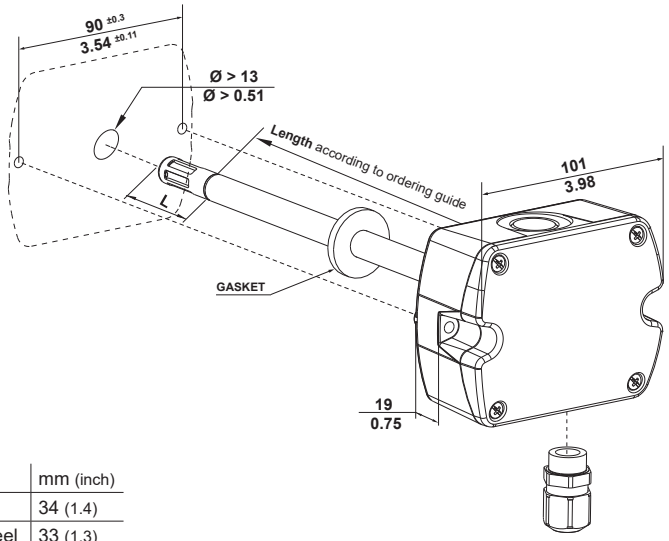
Dimensions

Values in mm (inch)

Type T1

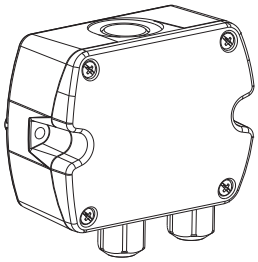


Type T2

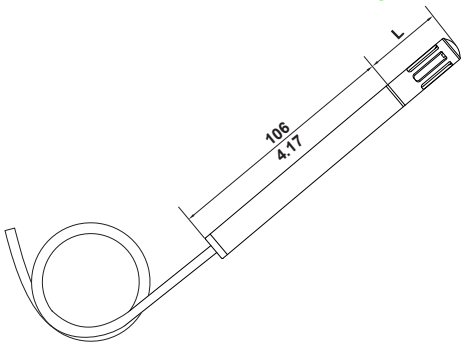


L = filter cap	mm (inch)
Membrane	34 (1.4)
Stainless steel	33 (1.3)
Metal grid	33 (1.3)

Type T3

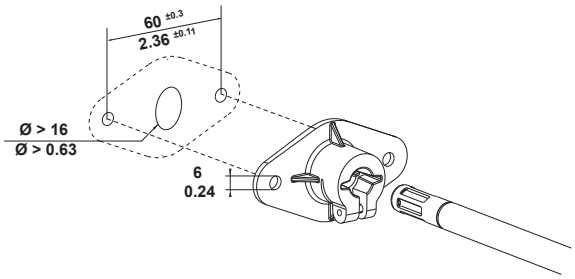


PE210

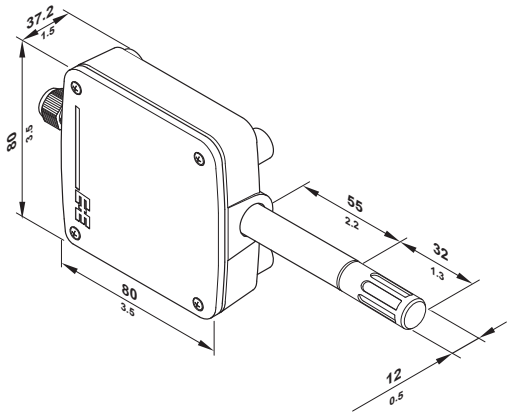


Mounting flange

in the scope of supply for Type T2 and T3

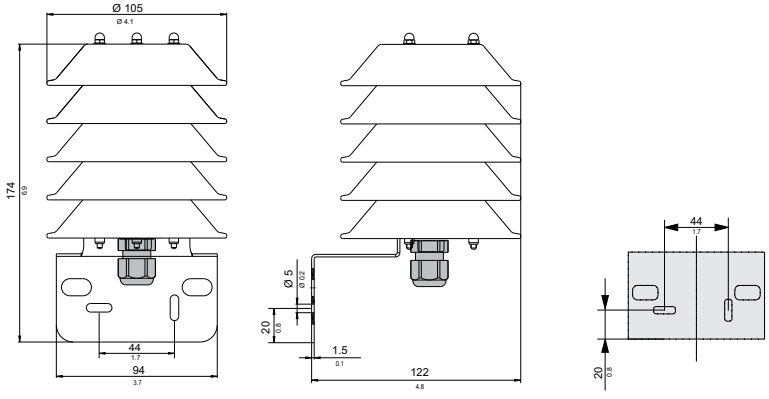


Type T13



Radiation Shield HA010501 for Type T13

(needs to be ordered separately)



Ordering Guide

			EE210-			
Hardware Configuration	**Model**	RH + T	**M1**			
	Type	Wall mount	**T1**			
		Duct mount		**T2**		
		Remote probe[1]			**T3**	
		Outdoor				**T13**
	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**		
	Display[2]	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 [%]	**no code**			
		Temperature T [°C]	**MA1**			
		Temperature T [°F]	**MA2**			
		Other measurand (**xx** see measurand code below)	**MAxx**			
	Scaling 1 low	0	**no code**			
		Value	**SAL*Value***			
	Scaling 1 high	100	**no code**			
		Value	**SAH*Value***			
	Output 2	Temperature T [°C]	**no code**			
		Temperature T [°F]	**MB2**			
		Other measurand (**xx** see measurand code below)	**MBxx**			
	Scaling 2 low	Value	**SBL*Value***			
	Scaling 2 high	Value	**SBH*Value***			
Setup RS485	**Protocol**	Modbus RTU[5]	**P1**			
		BACnet MS/TP[6]	**P3**			
	Baud rate	9600	**BD5**			
		19200	**BD6**			
		38400	**BD7**			
		57600[7]	**BD8**			
		76800[7]	**BD9**			
		115200[7]	**BD10**			
	Units	Metric (SI)	**no code**			
		Non metric (US/GB)	**U2**			

1) The PE210 probe has to be ordered as seperate 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 A3
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/m³]	56
	[gr/ft³]	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