



—  
your partner  
in sensor  
technology.

# + Datasheet EE210

Humidity and Temperature Sensor  
for Demanding Climate Control



# 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

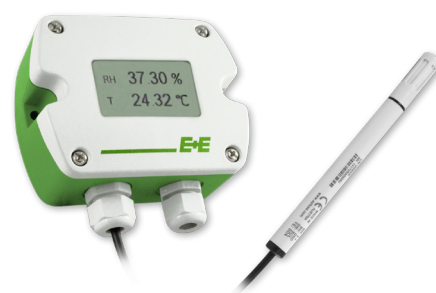
EE210 is available for wall or duct mount, with remote probe, as well as an outdoor version. The IP65/NEMA 4X enclosure minimizes installation costs and provides outstanding protection against contamination and condensation.

### 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.



EE210 duct mount (type T2)



EE210 with remote probe (type T3)



EE210 outdoor with radiation shield (type T13)



EE210 wall mount (type T1)

# Features



BACnet is a registered trademark of ASHRAE. ASHRAE does not endorse, approve or test products for compliance with ASHRAE standards. Compliance of listed products to the requirements of ASHRAE Standard 133 is the responsibility of BACnet International (BI). BTL is a registered trademark of BI.

## Display

- Selectable display layout
- Measurands freely selectable
- Backlight optional

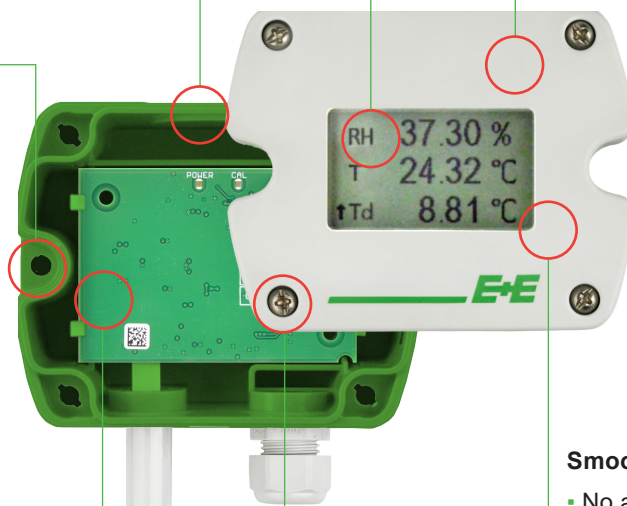
## Knockout for 1/2" conduit fitting (US)

## External mounting holes

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

## Enclosure

- Protection rating IP65/NEMA 4X
- Type T13 compatible with radiation shield H010501



## Smooth cover surface

- No accumulation of dust in protruding edges

## Electronics on the underside of the PCB

- Optimum protection against mechanical damage during installation

## Bayonet screws

- Open / close 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



## Watertight cable outlet

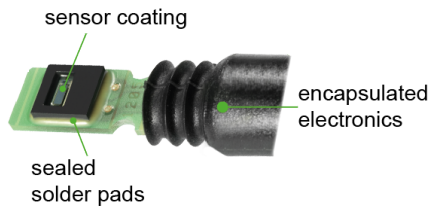
## Inspection certificate

according DIN EN 10204-3.1

# Features

## Protective Sensor Coating

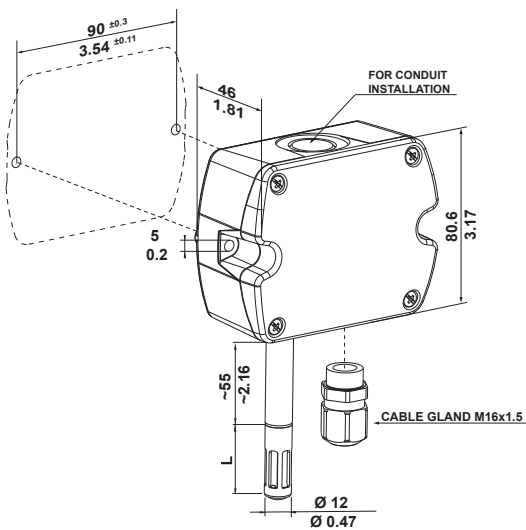
The E+E proprietary sensor coating is a protective layer applied to the active surface of the sensing element. The coating substantially extends sensor lifetime and ensures optimal measurement performance in corrosive environment (salts, off-shore applications). Additionally, it improves the sensors'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



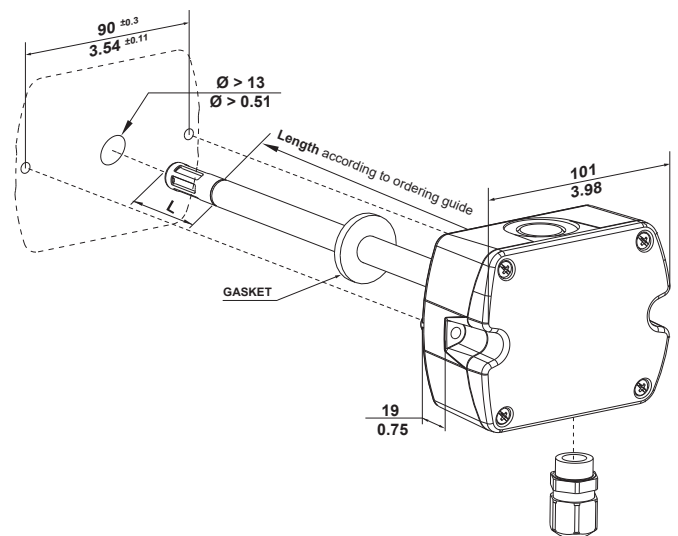
# Dimensions

Values in mm (inch)

## Type T1 (wall mount)



## Type T2 (duct mount)

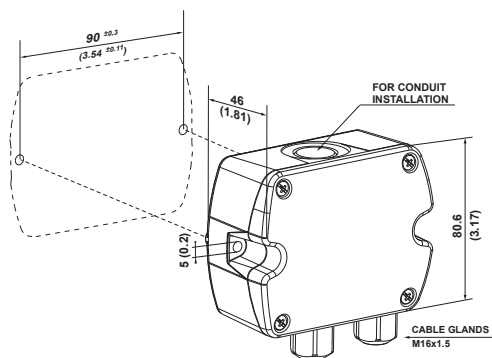


L = filter cap length	mm (inch)
Membrane	34 (1.4)
Stainless steel	33 (1.3)
Metal grid	33 (1.3)

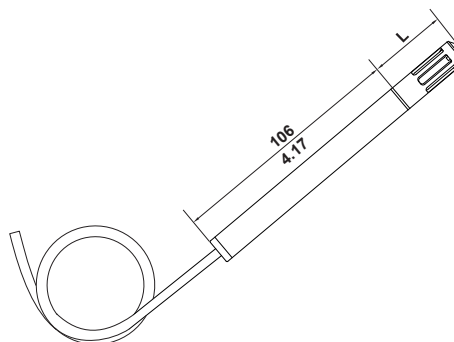
# Dimensions

Values in mm/inch

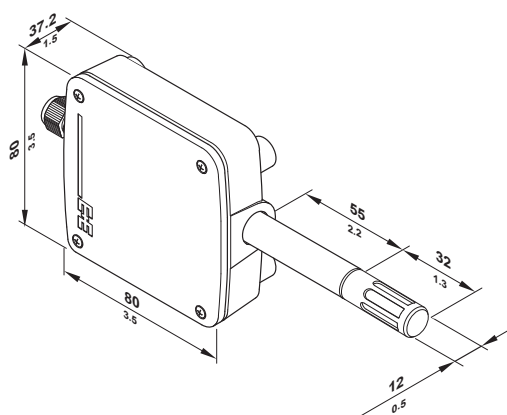
## Type T3 (remote probe)



## PE210

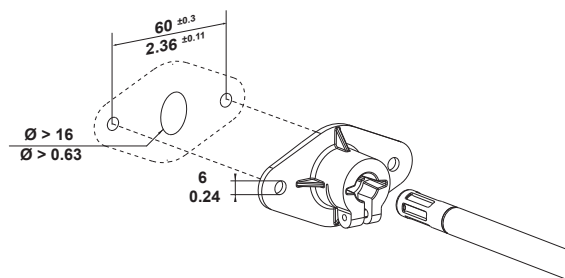


## Type T13 (outdoor)



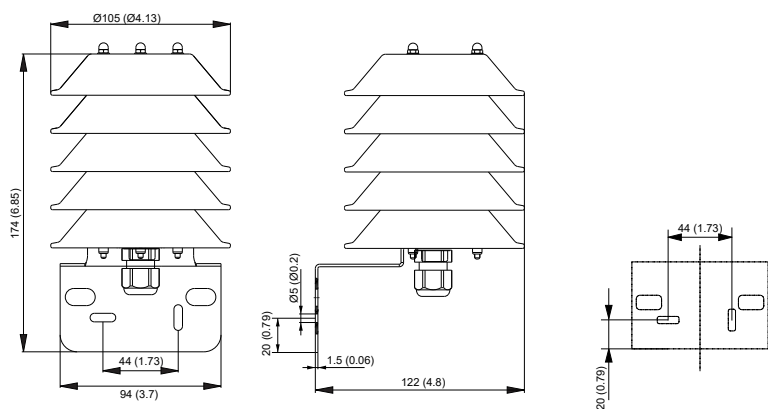
## Mounting flange

in the scope of supply for type T2 and T3



## Radiation shield HA010501 for type T13 (outdoor)

needs to be ordered separately



# Technical Data

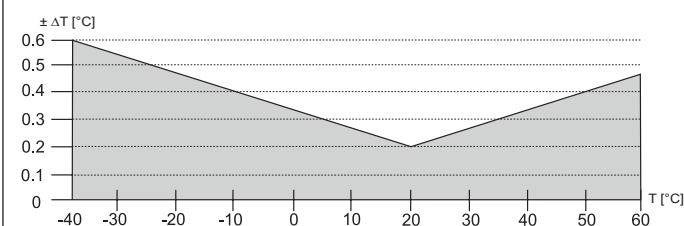
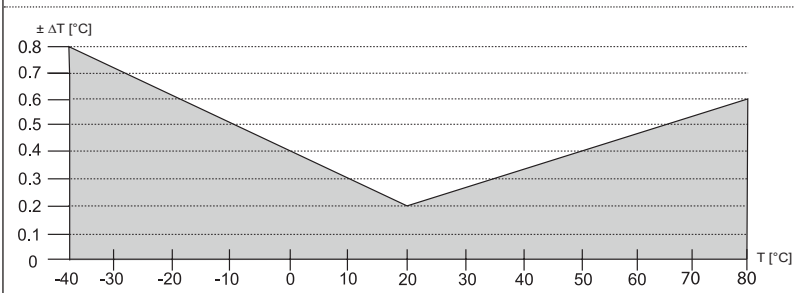
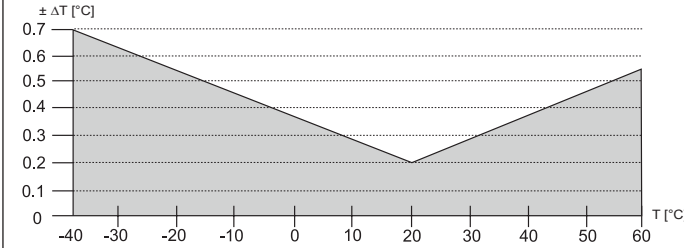
## Measurands

### Relative humidity (RH)

<b>Measuring range</b>	0...100 % RH
<b>Accuracy<sup>1)</sup></b> incl. hysteresis, non-linearity and repeatability	
<b>Type T1, T2</b> -15...+40 °C (+5...+104 °F), ≤90 %RH -15...+40 °C (+5...+104 °F), >90 %RH -40...+60 °C (-40...+140 °F)	±(1.3 + 0.003*measured value) %RH ±2.3 %RH ±(1.5 + 0.015*measured value) %RH
<b>Type T3</b> @ 20 °C (68 °F)	±2.5 %RH
<b>Type T13</b> -15...+40 °C (+5...+104 °F), ≤90 %RH -15...+40 °C (+5...+104 °F), ≥90 %RH -40...+60 °C (-40...+140 °F)	±(1.6 + 0.005*measured value) %RH ±3 %RH ±(2.3 + 0.008*measured value) %RH

1) Traceable to international 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: @ 24 V DC and RL=250 Ω for A6 Versions.

### Temperature (T)

<b>Measuring range</b>	<b>Type T1, T2, T13</b> <b>Type T3 (probe)</b> <b>Type T3 (enclosure)</b>	-40...+60 °C (-40...+140 °F) -40...+80 °C (-40...+176 °F) -40...+60 °C (-40...+140 °F)
<b>Accuracy</b>	<b>Type T1, T2</b>	
	<b>Type T3</b>	
	<b>Type T13</b>	

# Technical Data

## Measurands

### Calculated measurands

		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/m <sup>3</sup>	(gr/ft <sup>3</sup> )
Specific enthalpy	h	-40	(-10)	500	(200)	kJ/kg	(BTU/lb)

## Outputs

### Analogue




Two freely selectable and scalable outputs	0 - 5 V / 0 - 10 V 4 - 20 mA (2-wire)  0 - 20 mA (3-wire)	-1 mA < I <sub>L</sub> < 1 mA R <sub>L</sub> ≤ 500 Ω 250 ≤ R <sub>L</sub> ≤ 500 Ω recommended for type T13 R <sub>L</sub> ≤ 500 Ω	I <sub>L</sub> = load current R <sub>L</sub> = load resistance
--	--	--	---

### Digital

Digital interface	RS485 (EE210 = 1 unit load)
Protocol Factory settings Supported Baud rates Data types for measured values	Modbus RTU Baud rate according to ordering guide, parity even, 1 stop bit, Modbus address 242 9600, 19200 and 38400 FLOAT32 and INT16
Protocol Factory settings Supported Baud rates	BACnet MS/TP Baud rate according to ordering guide, parity none, 1 stop bit, BACnet address 1 9600, 19200, 38400, 57600, 76800 and 115200

# Technical Data

## General

<b>Power supply</b> class III  USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	<b>4 - 20 mA (2-wire)</b>	$(10\text{ V} + R_L \cdot 20\text{ mA}) < V_+ < 30\text{ V DC}$ for type T13: 24 V DC $\pm 10\%$ recommended	
	<b>0 - 5 V / 0 - 10 V</b> <b>0 - 20 mA (3-wire)</b> <b>RS485</b>	15 - 35 V DC or 24 V AC $\pm 20\%$	
<b>Current consumption at 24 V</b>	<b>Voltage output</b>	DC supply max. 12 mA AC supply max. 34 mA <sub>rms</sub>	with display max. 23 mA with display max. 49 mA <sub>rms</sub>
	<b>Current output 2-wire</b>	DC supply max. 40 mA	with display max. 40 mA
	<b>Current output 3-wire</b>	DC supply typ. 33 mA AC supply typ. 65 mA <sub>rms</sub>	with display max. 44 mA with display max. 84 mA <sub>rms</sub>
	<b>Digital interface</b>	DC supply typ. 5 mA AC supply typ. 15 mA <sub>rms</sub>	with display max. 20 mA with display max. 35 mA <sub>rms</sub>
<b>Electrical connection</b>	Screw terminals, max. 1,5 mm <sup>2</sup>		
<b>Cable gland</b>	M16x1,5		
<b>Display<sup>1)</sup></b>	Available for type T1/T2/T3 1, 2 or 3 lines, user configurable Optional with backlight		
<b>Temperature ranges</b>		<b>Without display</b>	<b>With display</b>
	<b>Operation</b>	-40...+60 °C (-40...+140 °F) -40...+80 °C (-40...+176 °F) for probe PE210	-20...+50 °C (-4...+122 °F) -40...+80 °C (-40...+176 °F) for probe PE210
	<b>Storage</b>	-40...+60 °C (-40...+140 °F)	-20...+60 °C (-4...+140 °F)
<b>Enclosure</b>	<b>Material</b> <b>Protection rating</b>	PC (Polycarbonate), UL94 V-0 (with display UL94 HB) approved IP65/NEMA 4X	
<b>Electromagnetic compatibility</b>	EN 61326-1 FCC Part15 Class A	EN 61326-2-3 ICES-003 Class A	Industrial environment
<b>Conformity</b>	 		

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



# Ordering Guide

Feature	Description	Code				
Hardware Configuration		EE210-				
	Model	RH + T				
	Type	Wall mount	T1	T2	T3	T13
		Duct mount				
		Remote probe <sup>1)</sup>				
		Outdoor				
	Probe length	50 mm (1.97")	L50			
		200 mm (7.84")	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				
	Metal grid	F3			F3	
	Stainless steel sintered	F4				
Display <sup>2)</sup>	Without display	No code				
	Without backlight <sup>3)</sup>	D1				
	With backlight <sup>4)</sup>	D2				
Setup Analogue Outputs	Output 1 measurand	Relative humidity RH [%]	No code			
		Temperature T [°C]	MA1			
		Temperature T [°F]	MA2			
		Other measurands (xx see measurand code)	MAxx			
	Output 1 scaling low	0	No code			
		Value	SALValue			
	Output 1 scaling high	100	No code			
		Value	SAHValue			
	Output 2 measurand	Temperature T [°C]	No code			
		Temperature T [°F]	MB2			
Other measurands (xx see measurand code)		MBxx				
Output 2 scaling low	Value	SBLValue				
Output 2 scaling high	Value	SBHValue				
Setup RS485	Protocol	Modbus RTU <sup>5)</sup>	P1			
		BACnet MS/TP <sup>6)</sup>	P3			
	Baud rate	9600	BD5			
		19200	BD6			
		38400	BD7			
		57600 <sup>7)</sup>	BD8			
		76800 <sup>7)</sup>	BD9			
	115200 <sup>7)</sup>	BD10				
Units	Metric (SI)	No code				
	Non metric (US/GB)	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](http://www.epluse.com/ee210).
- 6) Product Implementation Conformance Statement (PICS) available at [www.epluse.com/ee210](http://www.epluse.com/ee210).
- 7) Only for BACnet MS/TP.

Feature	Description	Code	
HW-Configuration		PE210-	
	Model	M1	
	Filter	Membrane	F2
		Metal grid	F3
		Stainless steel sintered	F4
Connection cable length	1.5 m (4.9 ft)	KL150	
	3 m (9.8 ft)	KL300	

# Measurand Code

For Output 1 and 2 in the Ordering Guide



Please note: no mix of SI/US units allowed.

Measurand	Unit	Code
		<b>MAxx / MBxx</b>
Relative humidity	%	<b>10</b>
Temperature	°C °F	<b>1</b> <b>2</b>
Dew point	Td °C °F	<b>52</b> <b>53</b>
Frost point	Tf °C °F	<b>65</b> <b>66</b>
Mixing ratio	r g/kg gr/lb	<b>60</b> <b>61</b>
Absolute humidity	dv g/m³ gr/ft³	<b>56</b> <b>57</b>
Wet bulb temperature	Tw °C °F	<b>54</b> <b>55</b>
Water vapour partial pressure	e mbar psi	<b>50</b> <b>51</b>
Specific enthalpy	h kJ/kg BTU/lb	<b>62</b> <b>64</b>

## Order Examples

Type T1 and T2

**EE210-M1T1A3F2D2SBL-40SBH60**

Feature	Code	Description
Model	<b>M1</b>	RH + T
Type	<b>T1</b>	Wall mount
Output	<b>A3</b>	0 - 10 V
Filter	<b>F2</b>	Membrane
Display	<b>D2</b>	With backlight
Output 1 measurand	<b>No code</b>	Relative humidity RH [%]
Output 1 scaling low	<b>No code</b>	0 %RH
Output 1 scaling high	<b>No code</b>	100 %RH
Output 2 measurand	<b>No code</b>	Temperature T [°C]
Output 2 scaling low	<b>SBL-40</b>	-40 °C
Output 2 scaling high	<b>SBH60</b>	60 °C

# Order Examples

## Type T3 Position 1: Basic Device

### EE210-M1T3A6MB52SBL-10SBH50

Feature	Code	Description
Model	M1	RH + T
Type	T3	Remote probe
Output	A6	4-20 mA (2-wire)
Display	No code	Without display
Output 1 measurand	No code	Relative humidity RH [%]
Output 1 scaling low	No code	0 %RH
Output 1 scaling high	No code	100 %RH
Output 2 measurand	MB52	Dew Point Temperature Td [°C]
Output 2 scaling low	SBL-10	-10 °C
Output 2 scaling high	SBH50	50 °C

## Position 2: Remote Probe

### PE210-M1F3KL150

Feature	Code	Description
Model	M1	RH + T
Filter	F3	Metal grid
Connection cable length	KL150	1,5 m (4.9 ft)

## Type T13 Position 1:

### EE210-M1T13A6F3SBL-40SBH60

Feature	Code	Description
Model	M1	RH + T
Type	T13	Outdoor
Output	A6	4 - 20 mA (2-wire)
Filter	F3	Metal grid
Display	No code	Without display
Output 1 measurand	No code	Relative humidity RH [%]
Output 1 scaling low	No code	0 %RH
Output 1 scaling high	No code	100 %RH
Output 2 measurand	No code	Temperature T [°C]
Output 2 scaling low	SBL-40	-40 °C
Output 2 scaling high	SBH60	60 °C

## Position 2:

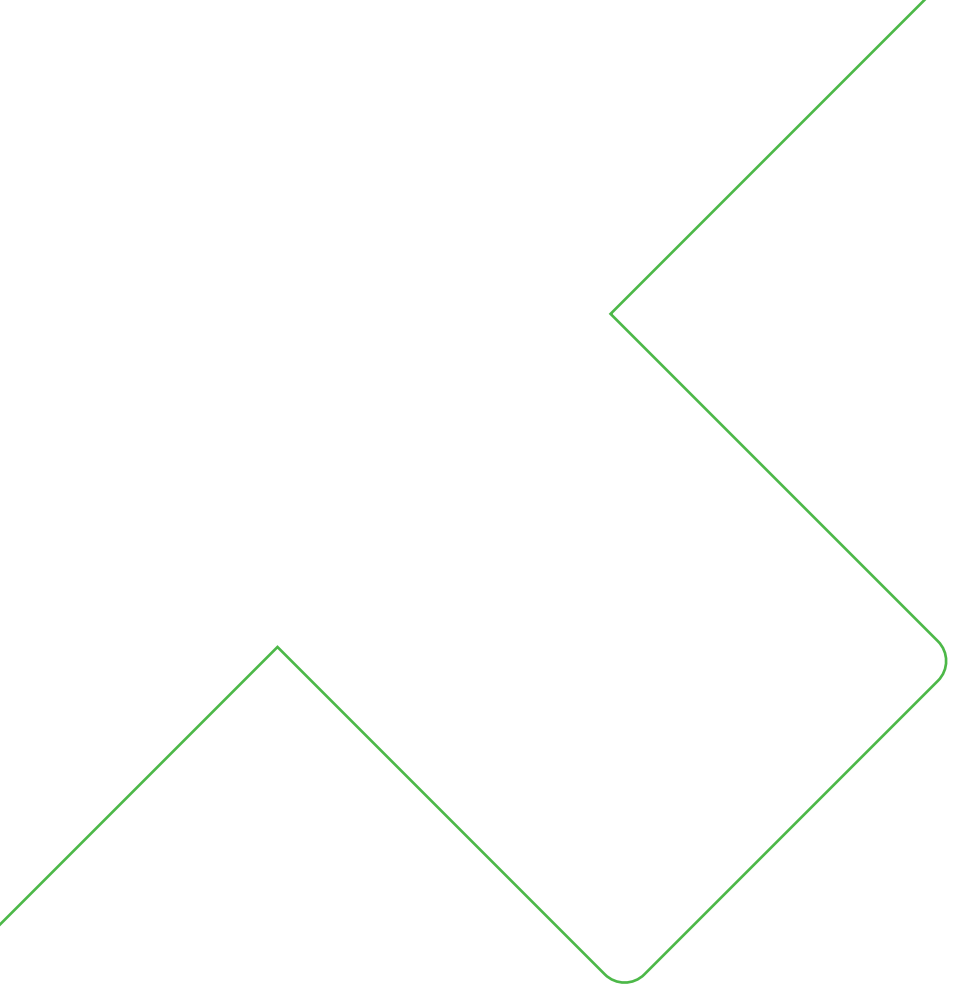
### HA010501

Radiation shield for EE210 Outdoor.

# Accessories

For further information see datasheet "[Accessories](#)".

Accessories	Code
USB configuration adapter	HA011066
Product configuration software (Free download: <a href="http://www.epluse.com/configurator">www.epluse.com/configurator</a> )	EE-PCS
Radiation shield for EE210 Outdoor (Type T13)	HA010501
Power supply adapter	V03
Protection cap for Ø12 mm probe	HA010783



Company Headquarters &  
Production Site

**E+E Elektronik Ges.m.b.H.**  
Langwiesen 7  
4209 Engerwitzdorf | Austria  
T +43 7235 605-0  
F +43 7235 605-8  
info@epluse.com  
www.epluse.com

Subsidiaries

**E+E Sensor Technology (Shanghai) Co., Ltd.**  
T +86 21 6117 6129  
info@epluse.cn

**E+E Elektronik France SARL**  
T +33 4 74 72 35 82  
info.fr@epluse.com

**E+E Elektronik Deutschland GmbH**  
T +49 6171 69411-0  
info.de@epluse.com

**E+E Elektronik India Private Limited**  
T +91 990 440 5400  
info.in@epluse.com

**E+E Elektronik Italia S.R.L.**  
T +39 02 2707 86 36  
info.it@epluse.com

**E+E Korea Co., Ltd.**  
T +82 31 732 6050  
info.kr@epluse.com

**E+E Elektronik Corporation**  
T +1 847 490 0520  
info.us@epluse.com

Version v2.11 | 09-2022  
Modification rights reserved



—  
your partner  
in sensor  
technology.

[www.epluse.com](http://www.epluse.com)