

+ Datasheet EE212

Modular Humidity and
Temperature Sensor



EE212

Modular Humidity/Temperature Sensor

The EE212 humidity (RH) and temperature (T) sensor with interchangeable sensing module is optimized for demanding climate control applications in most various industries.

Versatility

The EE212 is available for wall or duct mount as well as an outdoor version. It features two analogue outputs as well as RS485 interface with Modbus RTU protocol and optional graphic display. Besides the accurate RH and T measurement, the sensor calculates various humidity related parameters such as dew point temperature, absolute humidity and mixing ratio.

Outstanding Reliability with Patented Sensor Technology

The E+E sensing element with proprietary coating, the wide choice of filter caps and the IP65/NEMA 4X enclosure ensure excellent long-term performance of EE212 even under challenging working conditions. Easy on-site replacement of the sensing module minimises the down-time for maintenance purposes in heavily polluted or aggressive environment.

Interchangeable, Robust Sensing Module

The injection-moulded module inside the sensing head is mechanically highly stable and easy to handle. The sensing module with rapidX technology enables quick replacement without tools at any time, even during operation (hot-swap). The electronics inside the module is encapsulated and therefore best protected against condensation.

User Configurable and Adjustable

The free PCS10 Product Configuration Software and an optional stick facilitate the configuration and adjustment of the EE212. The configuration includes the measurands assignment (two on the outputs and up to three on the display), the output scaling, RS485 interface settings and the display setup.



EE212 wall mounting (type T1)

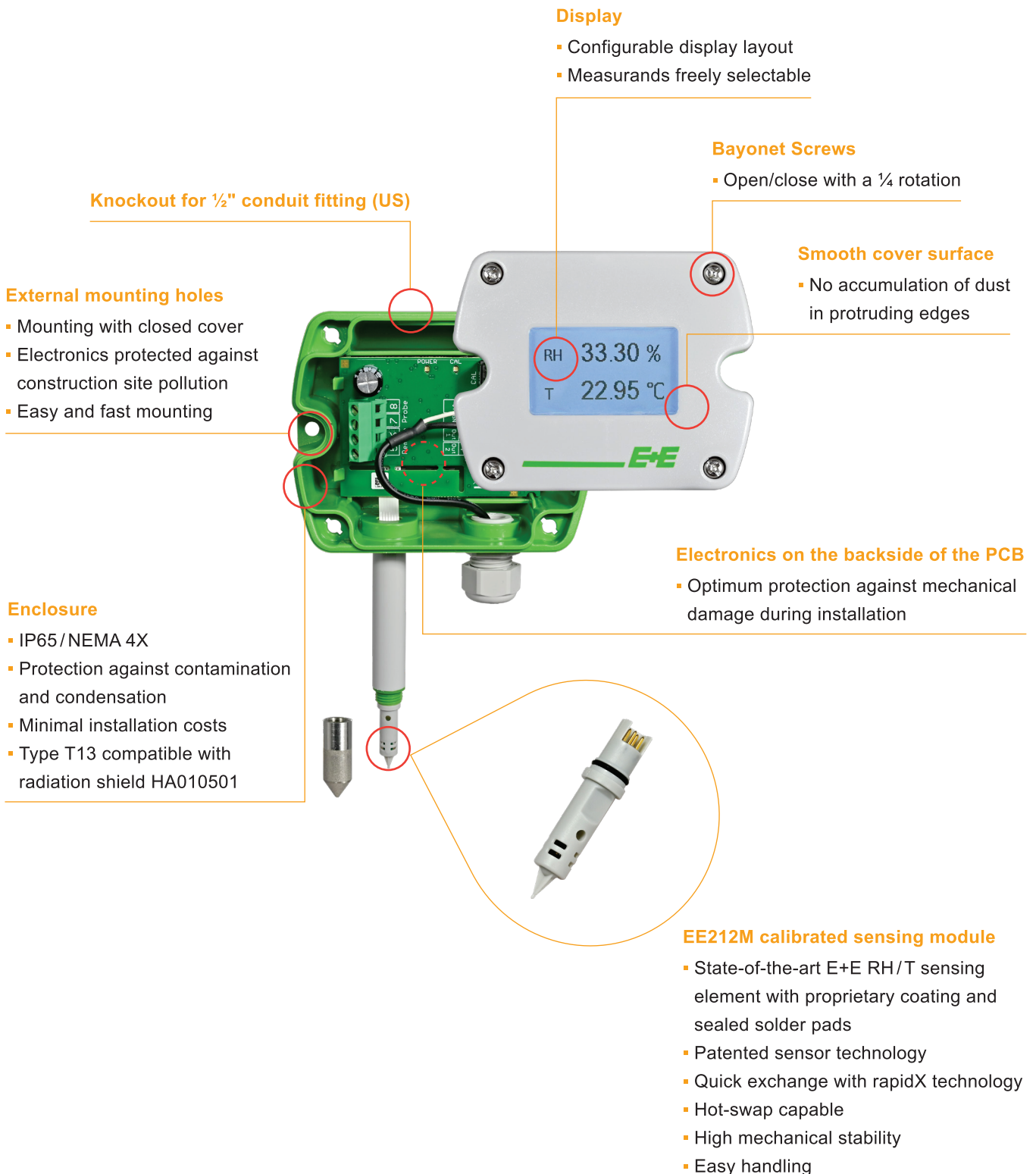


EE212 duct mounting (type T2)



EE212 outdoor (type T13)

Features



Inspection certificate

according to DIN EN 10204-3.1

Test report

according to DIN EN 10204-2.2

Features

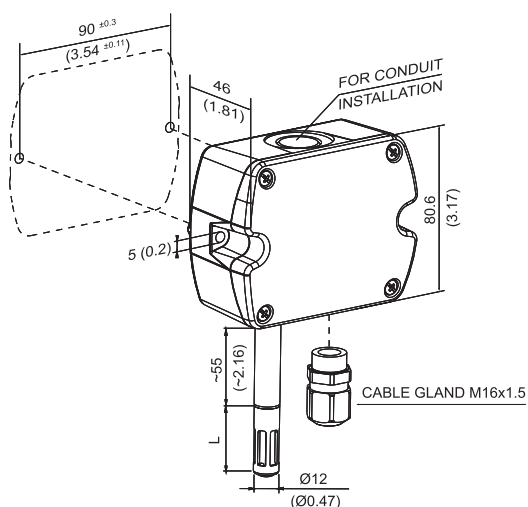
Protective Sensor Coating

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.

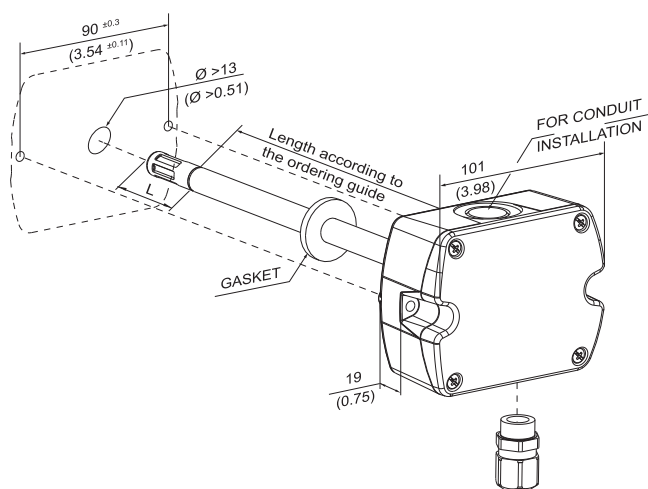
Dimensions

Values in mm / inch

Type T1



Type T2

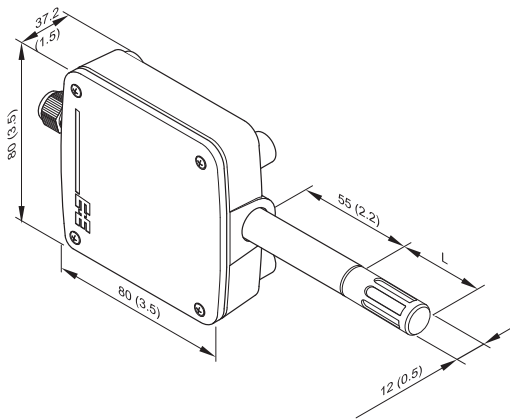


L = filter cap length	mm (inch)
Membrane	34 (1.4)
Stainless steel	33 (1.3)
Metal grid	33 (1.3)

Dimensions

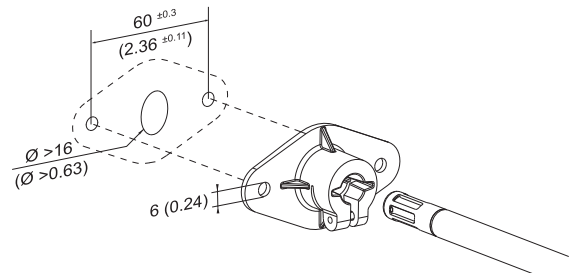
Values in mm/inch

Type T13



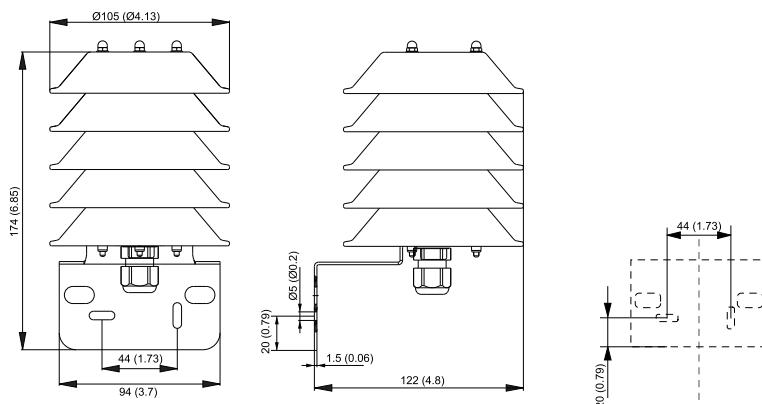
Mounting flange

in the scope of supply for type T2



Radiation shield HA010501 for type T13

needs to be ordered separately



Technical Data

Measurands

Relative humidity (RH)

Measuring range	0...100 %RH	
Accuracy ¹⁾ incl. hysteresis, non-linearity and repeatability @ 23 °C (73 °F) -15...+60 °C (5...+140 °F) -40...-15 °C (-40...+5 °F)	$\pm(1.5 + 0.005 \cdot mv) \%RH$ $\pm(1.8 + 0.007 \cdot mv) \%RH$ Additional uncertainty $\pm 0.125 \%RH/^{\circ}C^2$	

mv = measured value

- 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
- 2) Deviating from -15 °C (5 °F)

Temperature (T)

Measuring range	-40...+60 °C (-40...+140 °F)	
Accuracy	<p>The graph shows the temperature accuracy $\pm \Delta T$ in °C as a function of the measured temperature T in °C. The x-axis ranges from -40 to 60 °C, and the y-axis ranges from 0 to 0.5 °C. The accuracy is represented by a shaded area that is widest at the extremes and narrowest in the middle.</p>	

Calculated quantities

		from		up to		unit	
Dew point temperature	$T_d^{1)}$	-40	(-40)	60	(140)	°C	(°F)
Frost point temperature	$T_f^{2)}$	-40	(-40)	0	(32)	°C	(°F)
Wet bulb temperature	T_w	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 ³	(gr/ft ³)
Specific enthalpy	h	-40	(-10)	500	(200)	kJ/kg	(BTU/lb)

- 1) T_d accuracy according to RH and T uncertainties, please use the [E+E Humidity Calculator](#) for details.
 2) Equals T_d above 0 °C (32 °F).

Technical Data

Outputs




Analogue

Two freely selectable and scalable outputs	0 - 5 V / 0 - 10 V	-1 mA < I_L < 1 mA	I_L = load current
	4 - 20 mA (2-wire)	$R_L \leq 500 \Omega$	
	0 - 20 mA (3-wire)	$250 \leq R_L \leq 500 \Omega$ recommended for Type T13 $R_L \leq 500 \Omega$	R_L = load resistance

Digital

Digital interface	RS485 (EE212 = 1 unit load)
Protocol	Modbus RTU
Factory settings	Baud rate according to ordering guide, parity even, 1 stop bit, Modbus address 46
Supported Baud rates	9600, 19200 and 38400
Data types for measured values	FLOAT32 and INT16

General

Power supply class III  USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	4 - 20 mA (2-wire)	(10 V + $R_L \cdot 20 \text{ mA}$) < V_+ < 30 V DC for Type T13: 24 V DC +/-10 % recommended	
	0 - 5 V / 0 - 10 V 0 - 20 mA (3-wire) RS485	15 - 35 V DC or 24 V AC $\pm 20\%$	
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}
Electrical connection	Screw terminals max. 1.5 mm ²		
Cable gland	M16x1.5		
Display ¹⁾	Available for Type T1/T2, 1, 2 or 3 lines, user configurable Optional with backlight		
Temperature ranges		Without display	With display
	Operation	-40...+60 °C (-40...+140 °F)	-20...+50 °C (-4...+122 °F)
	Storage	-40...+60 °C (-40...+140 °F)	-20...+60 °C (-4...+140 °F)
Enclosure	Material Protection rating	PC (Polycarbonate), UL94 V-0 (with Display UL94 HB) approved IP65/NEMA 4X	
Electromagnetic compatibility	EN 61326-1:2013 FCC Part15 Class A	EN 61326-2-3:2013 ICES-003 Class A	Industrial environment
Conformity	 		

1) For display operation with EE212-xA6 (4 - 20 mA, 2-wire) both outputs must be connected.

Ordering Guide

Feature	Description	Code		
Hardware Configuration		EE212-		
	Type	Wall mount	T1	
		Duct mount		T2
		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
Setup Analogue Outputs	Filter	Membrane	F2	
		Metal grid	F3	F3
		Stainless steel sintered	F4	
	Display ¹⁾	Without display	No code	No code
		Without backlight ²⁾	D1	
		With backlight ³⁾	D2	
	Output 1 measurand	Relative humidity RH [%]	No code	
		Temperature T [°C]	MA1	
		Temperature T [°F]	MA2	
		Other measurand (xx see measurand code)	MAxx	
RS485 Setup	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 measurand (xx see measurand code)	MBxx	
	Output 2 scaling low	-40	No code	
		Value	SBLValue	
	Output 2 scaling high	60	No code	
		Value	SBHValue	
	Protocol	Modbus RTU ⁴⁾	P1	
	Baud rate	9600	BD5	
		19200	BD6	
		38400	BD7	
	Units	Metric (SI)	No code	
		Non-metric (US/GB)	U2	

1) Factory setup: the display shows the measurands selected for output 1 and output 2 for analogue versions, RH and T for digital versions.

2) Not with output A5.

3) Not with output A6.

4) Modbus Map and setup instructions: See User Guide and Modbus Application Note at www.epluse.com/ee212.

Measurand Code

For Output 1 and 2 in the Ordering Guide

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

Order Example

EE212-T2L200J3F4P1BD7

Feature	Code	Description
Type	T2	Duct mount
Probe length	L200	200 mm (4")
Output	J3	RS485
Filter	F4	Stainless steel sintered
Display	No code	Without display
Protocol	P1	Modbus RTU
Baud rate	BD7	38 400
Units	No code	Metric (SI)

Order Example

EE212-T1A6F2D1MB60SBL0SBH400

Feature	Code	Description
Type	T1	Wall mount
Output	A6	4 - 20 mA
Filter	F2	Membrane
Display	D1	Without backlight
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	MB60	Mixing ratio [g/kg]
Output 2 scaling low	SBL0	0 g/kg
Output 2 scaling high	SBH400	400 g/kg

Ordering Guide Sensing Module

Feature	Description	Code
Packaging		EE212M-
	Single packed	PK4
	Multipackage (Tray) ¹⁾	PK6

1) Minimum order quantity: 10 pcs

Order Example Sensing Module

EE212M-PK4

Feature	Code	Description
Packaging	PK4	Single packed

Accessories

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

Description	Code
USB-C configuration stick	HA011070
PCS10 Product Configuration Software (free download: www.epluse.com/pcs10)	PCS10
Radiation shield for EE212 Outdoor (Type T13)	HA010501
Power supply adapter	V03
Protection cap for Ø12 mm probe	HA010783

