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Datasheet EE211

Humidity and Temperature Sensor for Continuous High Humidity

Modbus

www.epluse.com

EE211

Humidity and Temperature Sensor for Continuous High Humidity

The EE211 is dedicated for accurate and long term stable measurement under continuous high humidity (>85 %RH) and condensing conditions in demanding climate control. It features a heated humidity (RH), and an interchangeable temperature (T) probe.

Reliability

Excellent performance of EE211 even in condensing polluted, aggressive environment is ensured by the combination of IP65 / NEMA 4X enclosure, encapsulated electronics inside the humidity probe and a long-term stable E+E sensing element with E+E proprietary coating.

Versatility

All measured and calculated data is available on the RS485 interface via Modbus RTU whereas two of the values are available on the analogue voltage or current (3-wire) output. Up to three values can be shown simultaneously on the illuminated display.

Configurable and Adjustable

An optional USB-C configuration stick and the free PCS10 Product Configuration Software facilitate the configuration of the EE211 as well as the RH and T adjustment. The T probe can also be separately adjusted, the reference can be a high accuracy dry block calibrator.

EE211 with backlit display

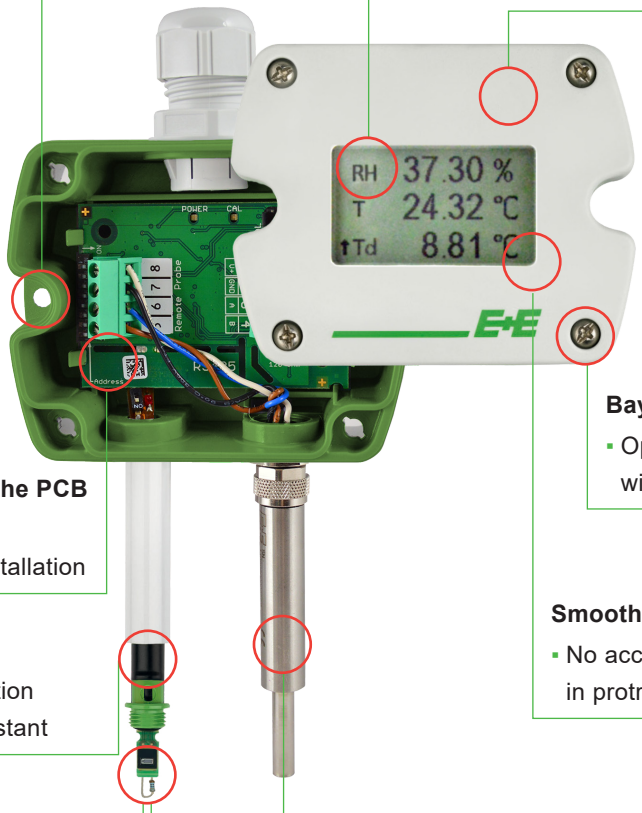
EE211 without display

Features

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

Display
- Shows up to 3 measurands
- Backlight

Enclosure
- IP65 / NEMA 4X



Bayonet screws
- Open / close with a ¼ rotation

Smooth cover surface
- No accumulation of dust in protruding edges

Electronics on the bottom of the PCB
- Optimum protection against mechanical damage during installation

Cast electronics
- Mechanical protection
- Condensation-resistant

Separate T probe EE07-M3HS2
- Intelligent, interchangeable T probe
- Remote connection possible
- Suitable for dry block calibrator

E+E humidity sensing element
- Protected by E+E proprietary coating
- Sealed solder pads
- Tested according to automotive standard AEC-Q200

Heated sensing head
- Best performance and long term stability under continious high RH and condensing conditions

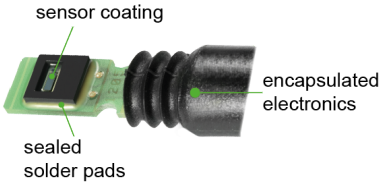
Test Report

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.



Operation Principle

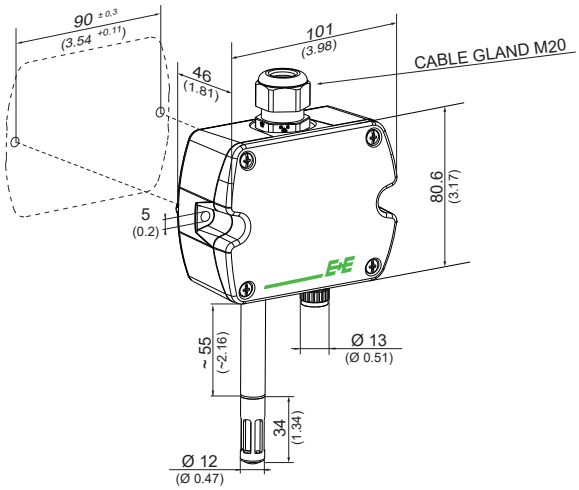
The humidity probe is continuously heated for avoiding the effects of condensation and high humidity on the sensing elements, such as corrosion, high humidity drift or stray impedances. Thus, the probe heating leads to outstanding long term stability. Based on the measured RH and T values, the EE211 calculates the dew point temperature Td whereas the separate, interchangeable T probe measures the ambient temperature. Ultimately, out of Td and T, the device calculates the relative humidity RH as well as several other parameters like absolute humidity, mixing ratio, wet bulb temperature or enthalpy.

For details on the operation principle please refer to the EE211 user guide at www.epluse.com/ee211.

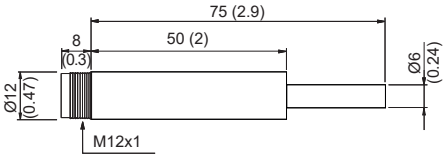
Dimensions

Values in mm (inch)

Base Unit



Temperature Probe



Technical Data

Measurands

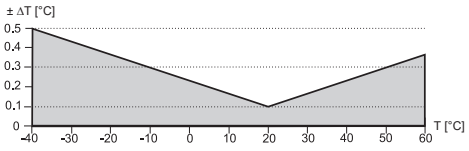
Relative humidity (RH)

Measuring range	0...100 %RH		
Accuracy[1)] incl. hysteresis, non-linearity and repeatability **-5...+30 °C (23...86 °F)**	±(1,3 + 0,007 *mv) %RH		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).

Temperature (T)

Accuracy



Outputs

Analogue

RH + T (RH: 0...100 %; T: see ordering guide)	0 - 5 V / 0 - 10 V 0 - 20 mA / 4 - 20 mA (3-wire)	-1 < I_L < 1 mA R_L ≤ 500 Ω	I_L = load current R_L = load resistance

Digital

Digital interface	RS485 (EE211 = 1 unit load)
Protocol **Factory settings** **Supported Baud rates** **Measured data types**	Modbus RTU 9600 Baud, parity even, 1 stop bit, Modbus address 239 9600, 19200, 38400 and 57600 FLOAT32 und INT16

Technical Data

General

Power supply class III USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	15 - 35 V DC or 24 V AC ±20 %				
Current consumption, at 24 V		**DC**		**AC**	
		Without display	With display	Without display	With display
	Voltage output	max. 13 mA	max. 19 mA	max. 38 mA_{rms}	max. 49 mA_{rms}
	Current output	max. 34 mA	max. 40 mA	typ. 75 mA_{rms}	typ. 85 mA_{rms}
	Digital interface	typ. 8 mA	typ. 17 mA	typ. 23 mA_{rms}	typ. 40 mA_{rms}
Electrical connection	Screw terminals max. 1.5 mm^2				
Cable gland	M20x1.5				
Display	1, 2 or 3 lines, user configurable, 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)	
T probe **Material**	Stainless steel 1.4571				
Enclosure **Material** **Protection rating**	PC (Polycarbonate), UL94V-0 (with display UL94HB) approved IP65 / NEMA 4X				
Electromagnetic compatibility	EN 61326-1 FCC Part15 Class B	EN 61326-2-3 ICES-003 Class B	Industrial environment		
Conformity	CE UKCA				

Ordering Guide

	Feature	Description	Code	
			EE211-	
Hardware Configuration	Model	RH + T	M1	
	Analogue output	0 - 5 V	A2	
		0 - 10 V	A3	
		0 - 20 mA (3-wire)	A5	
		4 - 20 mA (3-wire)	A6	
	Digital interface[1)]	RS485		J3
	Display[2)]	Without display	No code	
		Display with backlight	D2	
	T probe	Metal EE07-M3HS2	AM7	
Software Setup Outputs	Output 1 measurand	Relative humidity RH [%]	No code	
		Other measurands (xx see measurand code below)	MA*xx*	
	Output 1 scaling low	0	No code	
		Value	SAL*Value*	
	Output 1 scaling high	100	No code	
		Value	SAH*Value*	
	Output 2 measurand	Temperature T [°C]	No code	
		Temperature T [°F]	MB2	
		Other measurands (xx see measurand code below)	MB*xx*	
	Output 2 scaling low	-40	No code	
		Value	SBL*Value*	
	Output 2 scaling high	60	No code	
		Value	SBH*Value*	
	Units	Metric (SI)		No code
		Non-metric (US/GB)		U2

1) Factory setting: Baud rate 9600, parity even, 1 stop bit. Other factory settings available upon request. Baud rate choice: 9600 / 19200 / 38400 / 57600. Modbus Map and communication setting: See User Guide and Modbus Application Note at www.epluse.com/ee211.
2) Factory setting: 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.

Measurand Code

For Output 1 and 2 in the Ordering Guide

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

Ordering Example

EE211-M1A6AM7MB60SBL100SBH300

Feature	Code	Description
Model	**M1**	RH + T
Analogue output	**A6**	4 - 20 mA
Display	**No code**	Without display
T probe	**AM7**	Metal EE07-M3HS2
Output 1 measurand	**No code**	Relative humidity RH (%)
Output 1 scaling low	**No code**	0
Output 1 scaling high	**No code**	100
Output 2 measurand	**MB60**	Mixing ratio r (g/kg)
Output 2 scaling low	**SBL100**	100
Output 2 scaling high	**SBH300**	300

EE211-M1J3D2AM7U2

Feature	Code	Description
Model	**M1**	RH + T
Digital interface	**J3**	RS485
Display	**D2**	Display with backlight
T probe	**AM7**	Metal EE07-M3HS2
Unit	**U2**	Non-metric (US/GB)

Accessories

For further information refer to the Accessories datasheet.

Accessories		Code
PCS10 Product Configuration Software (Free download: www.epluse.com/pcs10)		**PCS10**
Power supply adapter		**V03**
Protection cap for 12 mm (0.47") probe		**HA010783**
USB-C configuration stick		**HA011070**
Cable for T probe (M12x1 socket, M12x1 plug)	**2 m (6.6 ft)** **5 m (16.4 ft)** **10 m (32.8 ft)**	**HA010801** **HA010802** **HA010803**

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