# 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, 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 4 enclosure, encapsulated electronics inside the humidity probe and the long-term stable HCT01 sensor with E+E proprietary coating.

### Versatility

All measured and calculated data is available on the Modbus RTU interface 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.

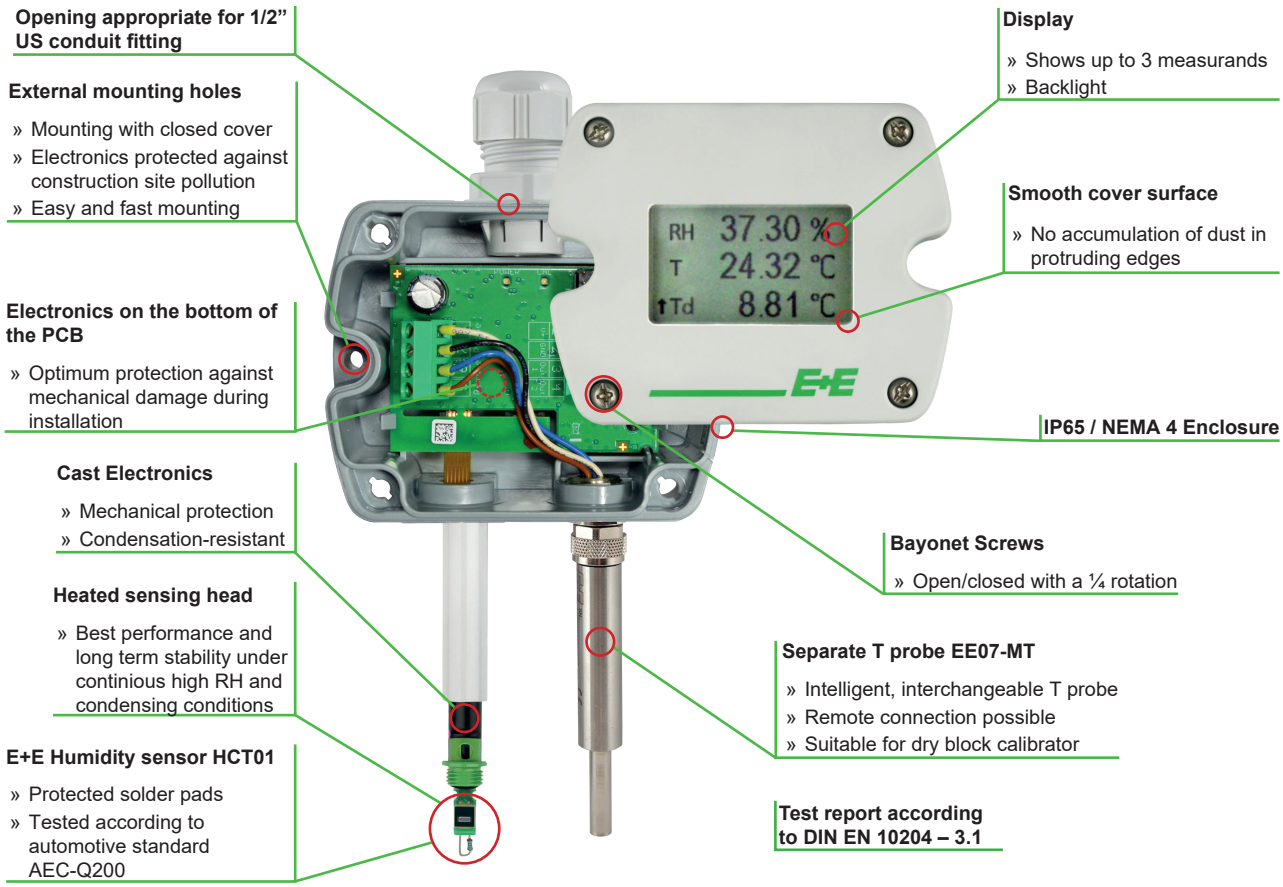
### Configurable and Adjustable

An optional USB configuration adapter and the free EE-PCS 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.

## Applications

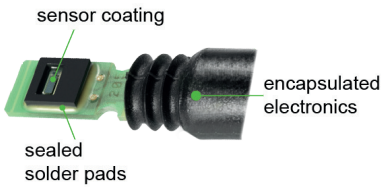
- Fruit and vegetable storage
- Cooling, ripening and environmental chambers
- Green houses and incubators
- Mushroom industry

## Features



## Protective Sensor Coating

The E+E proprietary sensor coating is a hygroscopic layer applied to the active surface of the HCT01 sensing element. The coating extends substantially 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.

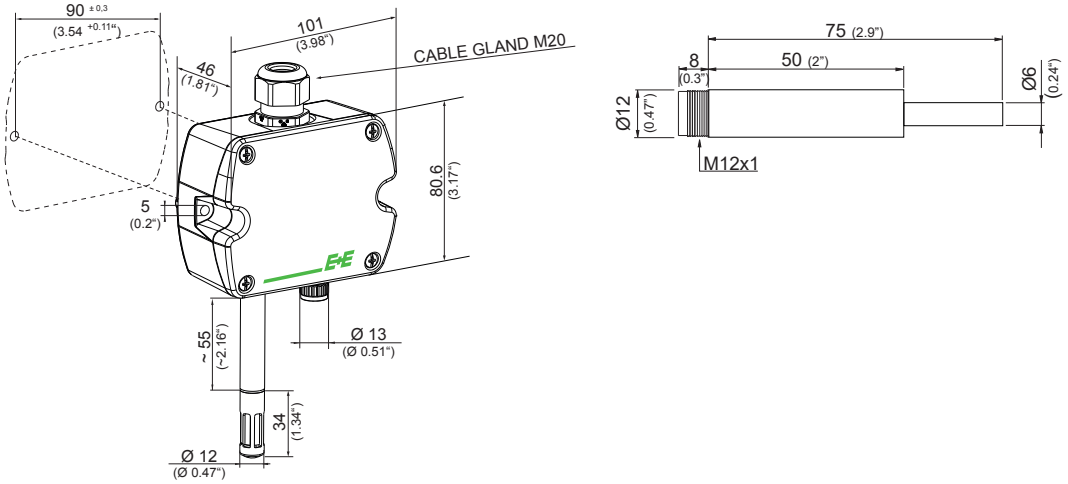



## Operation Principle

The humidity probe is continuously heated for avoiding the effects of condensation and high humidity onto 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 in mm (inch)



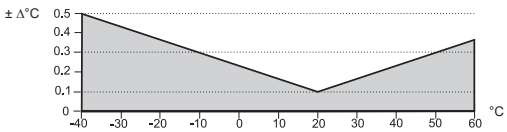

## Technical Data

### Measurands

**Relative Humidity (RH)**

| | |
|---|---|
| Sensor | E+E Sensor HCT01-00D, protected by E+E proprietary coating |
| Working range | 0...100 % RH |
| RH accuracy[1] (incl. hysteresis, non-linearity and repeatability) | ±(1.3 + 0.007*measured value) % RH -5...30 °C (23...86 °F) |

**Temperature (T)**

| | |
|---|---|
| Sensor | Pt1000 (tolerance class A, DIN EN 60751) |
| T-accuracy (at 20 °C (68 °F) : ±0,1 °C) |  |



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).

## Outputs

| | | | |
|---|---|---|---|
| **Analogue output** | 0-5 V / 0-10 V | -1 mA < $I_L$ < 1 mA | $I_L$ = load current |
| (RH: 0...100 %; T: see ordering guide) | 0-20 mA / 4-20 mA (3-wire) | $R_L$ ≤ 500 Ohm | $R_L$ = load resistor |
| **Digital interface** | RS485, Modbus RTU, max. 32 unit load devices in one bus | | |

## General

| | |
|---|---|
| Power supply (Class III) | 15 - 35 V DC[1] or 24 V AC ±20 % |

Current consumption at 24 V

| | AC | | DC | |
|---|---|---|---|---|
| | without Display | with Display | without Display | with Display |
| Voltage ouput | max. 38 $mA_{rms}$ | max. 49 $mA_{rms}$ | max. 13 mA | max. 19 mA |
| Current ouput | typ. 75 $mA_{rms}$ | typ. 85 $mA_{rms}$ | max. 34 mA | max. 40 mA |
| Digital interface | typ. 23 $mA_{rms}$ | typ. 40 $mA_{rms}$ | typ. 8 mA | typ. 17 mA |

| | |
|---|---|
| Display | 1, 2 or 3 lines, user configurable, with backlight |
| Connection | Screw terminals, max. 1.5 mm2 |
| Enclosure material | Polycarbonate, UL94V-0 (with display UL94HB) approved |
| T-probe material | Stainless steel 1.4571 |
| Protection class | IP65 / NEMA 4 |
| Cable gland | M20 x 1.5 |
| Electromagnetic compatibility (Industrial Environment) | EN61326-1<br>EN61326-2-3 |
| Temperature range | Operation / storage: -40...60 °C (-40...140 °F) |
| Temperature range with display | Operation: -20...50 °C (-4...122 °F)<br>Storage: -20...60 °C (-4...140 °F) |

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

## Ordering Guide

| | | | | EE211 | |
|---|---|---|---|---|---|
| Hardware | **Model** | humidity + temperature | | M1 | |
| | **Output** | 0-5 V | | A2 | |
| | | 0-10 V | | A3 | |
| | | 0-20 mA | | A5 | |
| | | 4-20 mA | | A6 | |
| | | RS485 - Modbus RTU[1] | | | J3 |
| | **Display**[2] | none | | no code | |
| | | yes | | D2 | |
| | **Temperature probe** | Metal EE07-MT | | AM7 | |
| Setup analogue outputs | **Output 1** | relative humidity RH | % | no code | |
| | | other measurand | (xx see Measurand Code below) | MA*xx* | |
| | **Scaling 1 low** | 0 | | no code | |
| | | *value* | | SAL*value* | |
| | **Scaling 1 high** | 100 | | no code | |
| | | *value* | | SAH*value* | |
| | **Output 2** | temperature | °C | no code | |
| | | temperature | °F | MB2 | |
| | | other measurand | (xx see Measurand Code below) | MB*xx* | |
| | **Scaling 2 low** | -40 | | no code | |
| | | *value* | | SBL*value* | |
| | **Scaling 2 high** | 60 | | no code | |
| | | *value* | | SBH*value* | |
| Setup RS485 | **Unit** | metric-SI | | | no code |
| | | non-metric | | | U2 |

1) Factory setting: Baud rate 9600, Even Parity, Stopbits 1. Other factory settings available upon request. Baud rate choice: 9600 / 19200 / 38400.
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

| | | xx |
|---|---|---|
| dew point Td | °C | 52 |
| | °F | 53 |
| frost point Tf | °C | 65 |
| | °F | 66 |
| mixing ratio r | g/kg | 60 |
| | gr/lb | 61 |
| absolute humidity dv | g/m³ | 56 |
| | gr/ft³ | 57 |

| | | xx |
|---|---|---|
| wet bulb temperature Tw | °C | 54 |
| | °F | 55 |
| water vapour partial pressure e | mbar | 50 |
| | psi | 51 |
| enthalpy h | kJ/kg | 62 |
| | BTU/lb/kg | 64 |

# Order Examples

### EE211-M1A6AM7MB60SBL100SBH300

Model: Humidity + Temperature
Output: 4-20 mA
Display: none
Temperature probe: Metal EE07-MT

Output 1: relative humidity RH (%)
Scaling 1 low: 0
Scaling 1 high: 100

Output 2: mixing ratio r (g/kg)
Scaling 2 low: 100
Scaling 2 high: 300

### EE211-M1J3D2AM7U2

Model: Humidity + Temperature
Output: RS485
Display: yes
Temperature probe: Metal EE07-MT

Unit: non-metric

# Accessories

- Product configuration software — EE-PCS (free download: www.epluse.com)
- Power supply adapter — V03 (see data sheet Accessories)
- Protection cap for 12 mm (0.47") probe — HA010783
- USB configuration adapter — HA011066
- Cable for T-Probe (M12x1 socket, M12x1 plug)
  - 2 m (6.6 ft) — HA010801
  - 5 m (16.4 ft) — HA010802
  - 10 m (32.8 ft) — HA010803