E+E

your partner
in sensor
technology.

# Datasheet EE160

## Humidity and Temperature Sensor for Building Automation


Modbus

ASHRAE BACnet™

www.epluse.com

# EE160

## Humidity and Temperature Sensor for Building Automation

The EE160 is optimized for cost effective, accurate measurement of relative humidity (RH) and temperature (T) in building automation.

### Reliable

Best long-term stability even in polluted or aggressive environment is ensured by the encapsulated measurement electronics inside the probe and E+E proprietary coating of the sensing element.

### Versatile

The measured data is available on two voltage or current (2-wire) outputs, or on the RS485 interface with BACnet MS/TP or Modbus RTU protocol. Additionally, the EE160 features a passive T output.

### Functional Design

EE160 is available for wall or duct mount. The IP65 / NEMA 4X enclosure minimizes installation costs and provides outstanding protection against contamination and condensation.

### Comfortable Configuration and Adjustment

With an optional configuration adapter and the free PCS10 Product Configuration Software, the user can set the RS485 interface parameters, the output scaling and perform one or two point adjustment for RH and T.

EE160 for wall mounting

EE160 for duct mounting

# Features

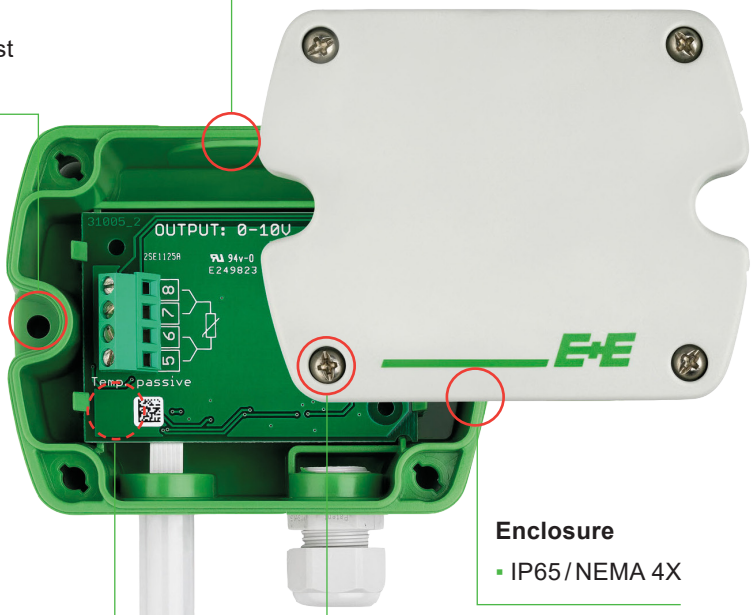
**Appropriate for US mounting requirements**

- Knockout for ½" conduit fitting

**External mounting holes**

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






**Electronics on the backside of the board**

- Optimum protection against mechanical damage during installation

**Enclosure**

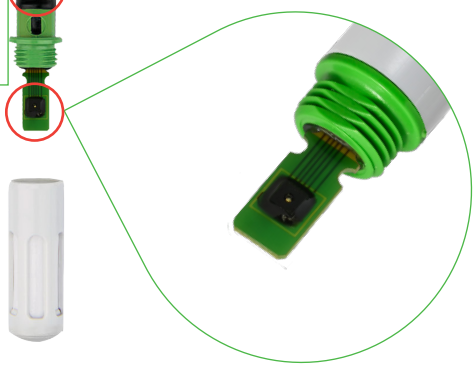
- IP65 / NEMA 4X

**Bayonet screws**

- Open/close with a ¼ rotation

**Encapsulated electronics**

- Protected against condensation
- Rugged construction



**E+E humidity sensing element**

- Very robust
- Protected sensor surface and solder pads
- Patented sensor technology

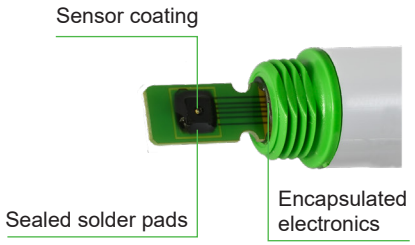
**Inspection certificate**

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.

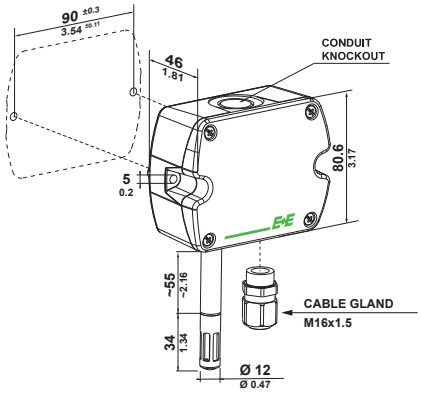



Sensing head with sensor coating and underfiller

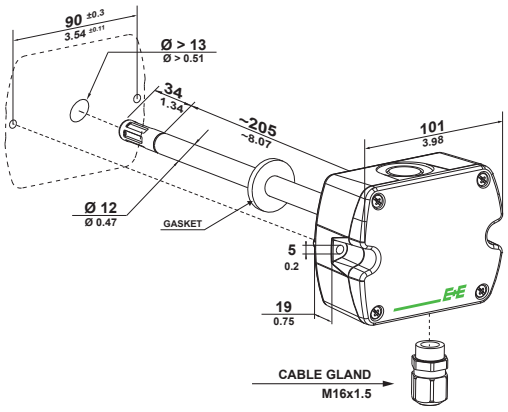
# Dimensions

Values in mm (inch)

### Type T1 wall mount

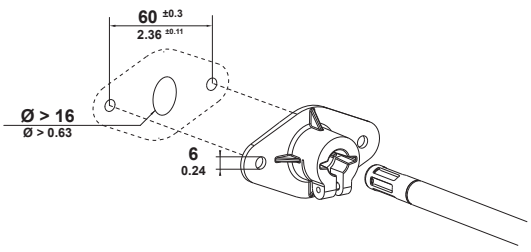



### Type T2 duct mount




### Mounting flange

in the scope of supply for type T2



# Technical Data

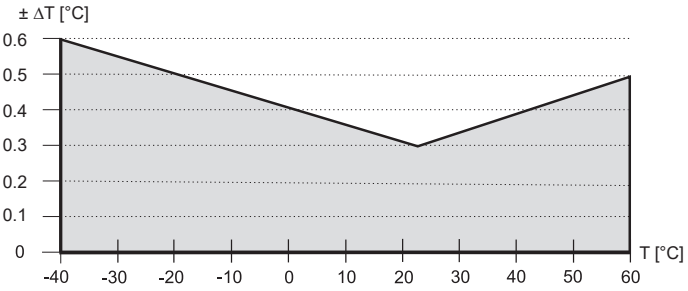
## Measurands

### Relative Humidity (RH)

| | | |
|---|---|---|
| **Measuring range** | | 0...100 %RH, non-condensing |
| **Accuracy**[1)] | **23 °C (0…100 %RH)** | ±2.5 %RH |
| | **0…+40 °C (0…100 %RH)** | ±3 %RH |
| | **-20…+60 °C (0…100 %RH)** | ±4 %RH |
| | **-40…-20 °C (0…100 %RH)** | ±5 %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).

### Temperature (T)

| | |
|---|---|
| **Measuring range** | -40...+60 °C (-40...+140 °F) |
| **Accuracy** |  |



## Outputs

### Analogue

| | | | |
|---|---|---|---|
| **RH: 0...100 %, T: see ordering guide** | 4 - 20 mA (2-wire)<br>0 - 10 V | $R_L \leq 500\ \Omega$<br>$0\ mA < I_L < 1\ mA$ | $R_L$ = load resistance<br>$I_L$ = load current |

### T Sensor Passive

| | |
|---|---|
| **Type acc. to ordering code** | 4-wire connection |

### Digital

| | |
|---|---|
| **Digital interface** | RS485 (EE160 = 1 unit load) |
| **Protocol**<br>**Factory settings**<br>**Supported baud rates**<br>**Data types for measured values** | Modbus RTU<br>Baud rate acc. to ordering code, parity even, 1 stop bit, Modbus address 245<br>9 600, 19 200 and 38 400<br>FLOAT32 and INT16 |
| **Protocol**<br>**Factory settings**<br>**Supported baud rates** | BACnet MS/TP<br>Baud rate acc. to ordering code, parity none, 1 stop bit, BACnet address 2<br>9 600, 19 200, 38 400, 57 600, 76 800 and 115 200 |

# Technical Data

## General

| | | | | |
|---|---|---|---|---|
| **Power supply** class III<br>USA & Canada: Class 2 supply necessary, max. voltage 30 V DC | **4 - 20 mA (2-wire)** | (10 V + $R_L$ * 20 mA) < V+ < 35 V DC | | |
| | **0 - 10 V**<br>**RS485** | 15 - 35 V DC or 24 V AC ±20% | | |
| **Current consumption**, typ. | | **4 - 20 mA output** | **0 - 10 V output** | **RS485** |
| | **24 V DC supply** | max. 40 mA | 5 mA | 5 mA |
| | **24 V AC supply** | - | 13 $mA_{rms}$ | 15 $mA_{rms}$ |
| **Electrical connection** | Screw terminals max. 1.5 $mm^2$ (AWG 16) | | | |
| **Cable gland** | M16x1.5 | | | |
| **Storage conditions** | -40...+60 °C (-40...+140 °F) | | | |
| **Enclosure**<br>**Material**<br>**Protection rating** | <br>Polycarbonate (PC), UL94 V-0 approved<br>IP65 / NEMA 4X | | | |
| **Electromagnetic compatibility** | EN 61326-1<br>FCC Part15 ClassA | EN 61326-2-3<br>ICES-003 ClassA | Industrial environment | |
| **Conformity** | EN 45545-2 (HL3) | CE UKCA | | |

# Ordering Guide

| | Feature | Description | Code | | |
|---|---|---|---|---|---|
| | | | EE160- | | |
| Hardware configuration | Model | RH + T | M1 | | M1 |
| | | RH + T + T passive | | M8 | |
| | Type | Wall mount | | T1 | |
| | | Duct mount | | T2 | |
| | Output | 0 - 10 V | | A3 | |
| | | 4 - 20 mA | | A6 | |
| | | RS485 | | | J3 |
| | T sensor passive[1] | Pt100 DIN A | | TP1 | |
| | | Pt1000 DIN A | | TP3 | |
| | | NTC10k | | TP5 | |
| | | Ni1000, TK6180 | | TP9 | |
| | Filter | Membrane | | No code | |
| Setup analogue out | Relative humidity | 0...100 %RH | | No code | |
| | Temperature[2] | T [°C] | | No code | |
| | | T [°F] | | MB2 | |
| | T scaling low | -40 | | No code | |
| | | Value | | SBL*Value* | |
| | T scaling high | 60 | | No code | |
| | | Value | | SBH*Value* | |
| Setup - RS485 | Protocol | Modbus RTU[3] | | | P1 |
| | | BACnet MS/TP[4] | | | P3 |
| | Baudrate | 9 600 | | | BD5 |
| | | 19 200 | | | BD6 |
| | | 38 400 | | | BD7 |
| | | 57 600[5] | | | BD8 |
| | | 76 800[5] | | | BD9 |
| | | 115 200[5] | | | BD10 |
| | Units[2] | Metric (SI) | | | No code |
| | | Non-metric (US/GB) | | | U2 |

1) With Model M8 only / T sensor. Details see www.epluse.com/R-T_Characteristics.
2) Can not be changed with PCS10.
3) Modbus map and configuration guide see user manual or Modbus application note at www.epluse.com/ee160.
4) Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee160.
5) For BACnet MS/TP only.

# Order Example

## EE160-M8T1A6TP1SBL-10SBH50

| Feature | Code | Description |
|---|---|---|
| Model | M8 | RH + T + T passive |
| Type | T1 | Wall mount |
| Output | A6 | 4 - 20 mA |
| T sensor passive | TP1 | Pt100 DIN A |
| Filter | No code | Membrane |
| Relative humidity | No code | 0...100 %RH |
| Temperature | No code | T [°C] |
| Scale T low | SBL-10 | -10 °C |
| Scale T high | SBH50 | +50 °C |

# Order Example

**EE160-M1T2J3P1BD5U2**

| Feature | Code | Description |
|---|---|---|
| **Model** | **M1** | RH + T |
| **Type** | **T2** | Duct mount |
| **Output** | **J3** | RS485 |
| **Filter** | **No code** | Membrane |
| **Protocol** | **P1** | Modbus RTU |
| **Baud rate** | **BD5** | 9600 |
| **Units** | **U2** | Non-metric |

# Accessories

For further information see datasheet Accessories.

| Accessories | Code |
|---|---|
| **E+E Product configuration software**<br>(Free download: www.epluse.com/pcs10) | **PCS10** |
| **Power supply adapter** | **V03** |
| **Protection cap for Ø12 mm probe** | **HA010783** |
| **USB configuration adapter for EE160-M1TxJ3 (digital)** | **HA011066** |
| **USB configuration adapter for EE160-MxTxAx (analogue)** | **HA011069** |

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