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technology.

# + Datasheet EE160

**Humidity and Temperature Sensor  
for Building Automation**



# 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

## Encapsulated electronics

- Protected against condensation
- Rugged construction

## Enclosure

- IP65/NEMA 4X

## Bayonet screws

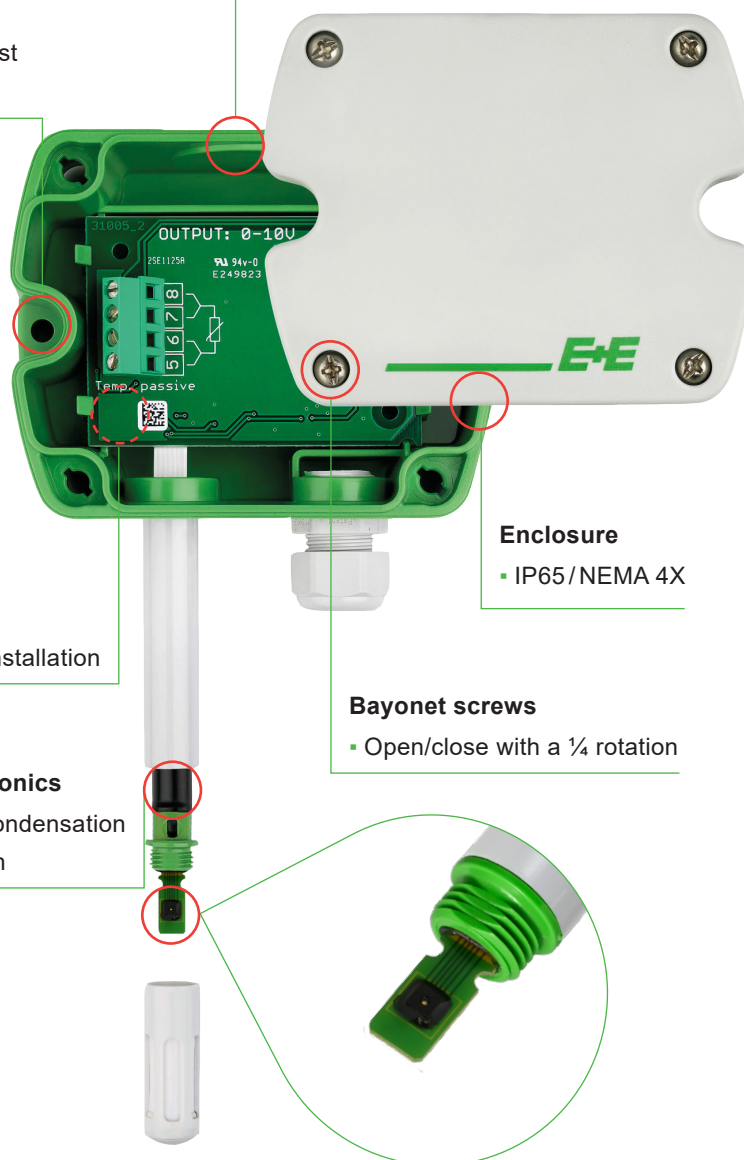
- Open/close with a ¼ rotation

## E+E humidity sensing element

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

## Inspection certificate

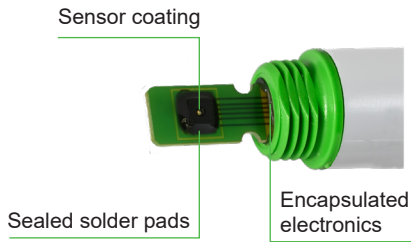
According to DIN EN 10204-3.1



# 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.

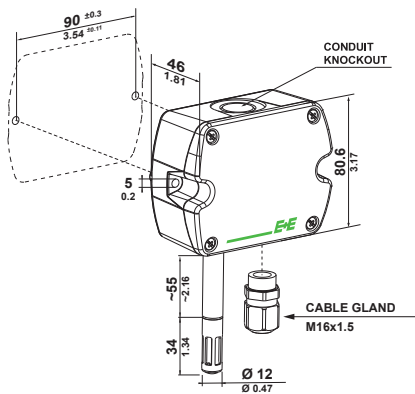


Sensing head with sensor coating and underfiller

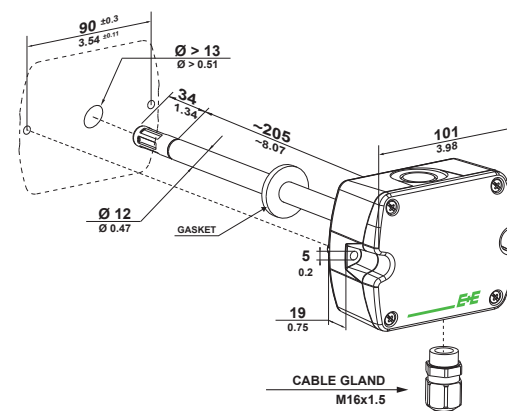
# Dimensions

Values in mm (inch)

## Type T1 wall mount

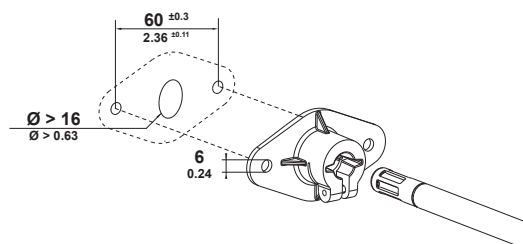


## Type T2 duct mount



## Mounting flange

in the scope of supply for type T2



# Technical Data

## Measurands

### Relative Humidity (RH)

<b>Measuring range</b>	0...100 %RH, non-condensing								
<b>Accuracy<sup>1)</sup></b> (incl. hysteresis, non-linearity and repeatability)	<table border="0"> <tr> <td>23 °C (0...100 %RH)</td> <td>±2.5 %RH</td> </tr> <tr> <td>0...+40 °C (0...100 %RH)</td> <td>±3 %RH</td> </tr> <tr> <td>-20...+60 °C (0...100 %RH)</td> <td>±4 %RH</td> </tr> <tr> <td>-40...-20 °C (0...100 %RH)</td> <td>±5 %RH</td> </tr> </table>	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
23 °C (0...100 %RH)	±2.5 %RH								
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-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)

<b>Measuring range</b>	-40...+60 °C (-40...+140 °F)																								
<b>Accuracy</b>	<table border="1"> <caption>Accuracy vs Temperature</caption> <thead> <tr> <th>T [°C]</th> <th>±ΔT [°C]</th> </tr> </thead> <tbody> <tr> <td>-40</td> <td>0.6</td> </tr> <tr> <td>-30</td> <td>0.5</td> </tr> <tr> <td>-20</td> <td>0.45</td> </tr> <tr> <td>-10</td> <td>0.4</td> </tr> <tr> <td>0</td> <td>0.35</td> </tr> <tr> <td>10</td> <td>0.3</td> </tr> <tr> <td>20</td> <td>0.3</td> </tr> <tr> <td>30</td> <td>0.35</td> </tr> <tr> <td>40</td> <td>0.4</td> </tr> <tr> <td>50</td> <td>0.45</td> </tr> <tr> <td>60</td> <td>0.5</td> </tr> </tbody> </table>	T [°C]	±ΔT [°C]	-40	0.6	-30	0.5	-20	0.45	-10	0.4	0	0.35	10	0.3	20	0.3	30	0.35	40	0.4	50	0.45	60	0.5
T [°C]	±ΔT [°C]																								
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50	0.45																								
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## Outputs

### Analogue

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




<b>Type acc. to ordering code</b>	4-wire connection
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### Digital

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

# 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 V + R <sub>L</sub> * 20 mA) < V+ < 35 V DC		
	<b>0 - 10 V RS485</b>	15 - 35 V DC or 24 V AC ±20%		
<b>Current consumption, typ.</b>		<b>4 - 20 mA output</b>	<b>0 - 10 V output</b>	<b>RS485</b>
	<b>24 V DC supply</b>	max. 40 mA	5 mA	5 mA
	<b>24 V AC supply</b>	-	13 mA <sub>rms</sub>	15 mA <sub>rms</sub>
<b>Electrical connection</b>	Screw terminals max. 1.5 mm <sup>2</sup> (AWG 16)			
<b>Cable gland</b>	M16x1.5			
<b>Storage conditions</b>	-40...+60 °C (-40...+140 °F)			
<b>Enclosure</b>  <b>Material</b> <b>Protection rating</b>	Polycarbonate (PC), UL94 V-0 approved IP65/NEMA 4X			
<b>Electromagnetic compatibility</b>	EN 61326-1 FCC Part15 ClassA	EN 61326-2-3 ICES-003 ClassA	Industrial environment	
<b>Conformity</b>	EN 45545-2 (HL3)			

# Ordering Guide

Feature	Description	Code		
Hardware configuration		EE160-		
	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 <sup>1)</sup>	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 <sup>2)</sup>	T [°C]		No code
		T [°F]		MB2
	T scaling low	-40		No code
		Value		SBLValue
	T scaling high	60		No code
Value		SBHValue		
Setup - RS485	Protocol	Modbus RTU <sup>3)</sup>		P1
		BACnet MS/TP <sup>4)</sup>		P3
	Baudrate	9600		BD5
		19200		BD6
		38400		BD7
		57600 <sup>5)</sup>		BD8
		76800 <sup>5)</sup>		BD9
	Units <sup>2)</sup>	Metric (SI)		No code
		Non-metric (US/GB)		U2

1) With Model M8 only / T sensor. Details see [www.epluse.com/R-T\\_Characteristics](http://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](http://www.epluse.com/ee160).

4) Product Implementation Conformance Statement (PICS) available at [www.epluse.com/ee160](http://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 (Free download: <a href="http://www.epluse.com/pcs10">www.epluse.com/pcs10</a> )	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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