E+E

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in sensor
technology.

Datasheet EE160

Humidity and Temperature Sensor for Building Automation

Modbus

www.epluse.com

EE160

Humidity and Temperature Sensor for Building Automation

The EE160 is optimised 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 Modbus RTU protocol. Additionally, the EE160 features a passive T output and an optional display visualises RH and T values simultaneously.

Functional Design

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

Comfortable Configuration and Adjustment

With the optional configuration stick and the free PCS10 Product Configuration Software, the user can set the RS485 interface parameters, adjust output scaling and perform offset or two-point adjustments for RH and T.

EE160 for wall mounting with display

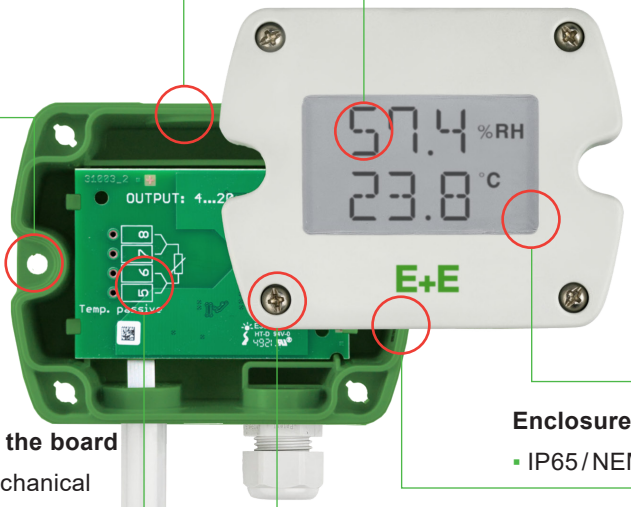
EE160 for duct mounting without display

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

Display
- Two display lines for RH and T values
- Unit selection °C / °F according to the order code
- Threshold setting for T using PCS10



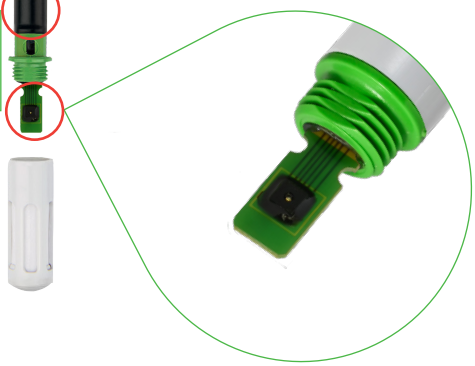
Smooth cover surface
- No dust accumulation in protruding edges

Enclosure
- IP65 / NEMA 4X

Electronics on the backside of the board
- Optimum protection against mechanical damage during installation

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

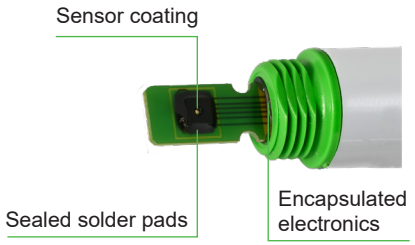
Inspection certificate

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

Accredited Traceable Calibration Certificate

Internationally recognised certificates for the calibration of measuring instruments from accredited laboratories document the traceability of the measurements to the International System of Units (SI). The E+E Elektronik calibration laboratory offers two levels of traceable calibrations.

- As a Designated Institute (DI) of the Republic of Austria, the E+E calibration laboratory maintains Austria's national measurement standards for humidity, dew point temperature, air velocity and CO_2. This authorises the E+E calibration laboratory to issue calibration certificates at the level of a National Metrological Institute (NMI).
- The E+E calibration laboratory is accredited by Akkreditierung Austria in accordance with DIN EN ISO/IEC 17025 with the identification number 0608. This allows the laboratory to issue ISO 17025 certificates for the measurands humidity, temperature, dew point temperature, air velocity, flow, pressure and CO_2.

Visit www.eplusecal.com for detailed information on calibration and to enquire a certificate of accredited traceable calibration for the EE160 from the Designated Institute / E+E Elektronik calibration laboratory.

ISO 9001 Calibration Certificate

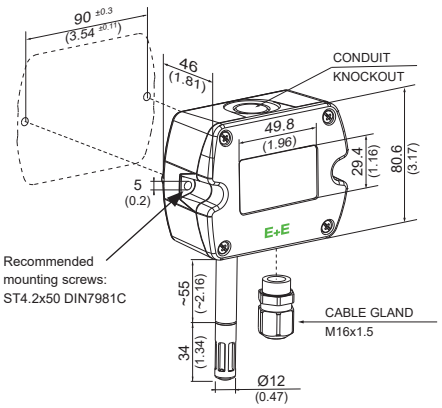
An ISO 9001 calibration certificate documents the comparative measurement of a device against high quality reference equipment (factory level standard). The comparison is performed in accordance with internal procedures that comply with ISO 9001 and provides information on the specimen's measuring accuracy. The reference equipment is traceable to national standards, however, the calibration process is not accredited. Therefore, an ISO 9001 calibration is neither traceable nor internationally comparable.

Visit www.epluse.com/iso9001cal for detailed information on calibration and to enquire an ISO 9001 calibration certificate.

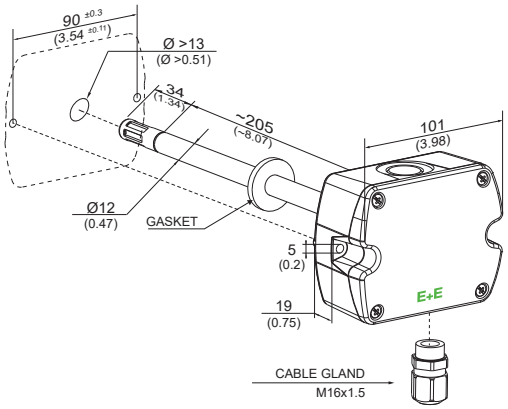
Dimensions

Values in mm (inch)

Type T1 wall mount

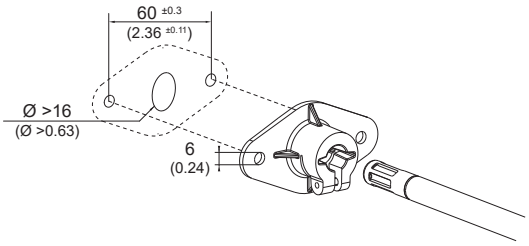


Type T2 duct mount



Mounting flange

in the scope of supply for type T2



Technical Data

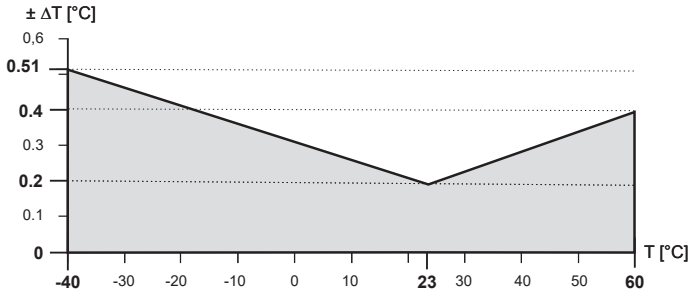
Measurands

Relative Humidity (RH)

Measuring range	0...100 %RH, non-condensing	
Accuracy[1] (incl. hysteresis, non-linearity and repeatability)		
23 °C (0…100 %RH)	±2 %RH	
0…+40 °C (0…100 %RH)	±2.5 %RH	
-20…+60 °C (0…100 %RH)	±3.5 %RH	
-40…-20 °C (0…100 %RH)	±4.5 %RH	
Factory calibration uncertainty[2]		
0...90 %RH	±(0.7 + 0.003 * mv) %RH	mv = measured value
>90...100 %RH	±1 %RH	

1) Defined against E+E calibration reference.
2) Defined at 23 °C (73,4 °F) with a coverage factor k=2, corresponding to a confidence level of 95 %.

Temperature (T)

Measuring range	-40...+60 °C (-40...+140 °F)
Accuracy[1]	
Factory calibration uncertainty[2]	±0.1 °C (±0.18 °F)

1) Defined against E+E calibration reference.
2) Defined at 23 °C (73.4 °F) with a coverage factor k=2, corresponding to a confidence level of 95 %.

Outputs

Analogue

RH: 0...100 %, T: see ordering guide	4 – 20 mA (2-wire) 0 – 10 V	R_L ≤ 500 Ω 0 mA < I_L < 1 mA	R_L = load resistance I_L = load current
Accuracy @23 °C (68 °F)	± 0.075 % fs		fs = full scale (20 mA, 10 V)

T Sensor Passive

Type acc. to ordering code	4-wire connection

Digital

Digital interface	RS485 (EE160 = 1 unit load)
Protocol **Factory settings** **Supported baud rates** **Data types for measured values**	Modbus RTU Baud rate acc. to ordering code, parity even, 1 stop bit, Modbus address 245 9 600, 19 200, 38 400, 57 600, 76 800 and 115 200 FLOAT32 and INT16

Technical Data

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 * 20 mA) < V+ < 35 V DC		
	0–10 V **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	According to output current, max. 40 mA	<3 mA / <5 mA with Display	5 mA
	24 V AC supply	-	<8 mA_{rms} / <10 mA_{rms} with Display	15 mA_{rms}
Electrical connection	Screw terminals max. 1.5 mm^2 (AWG 16)			
Cable gland	M16x1.5			
Display[1)]	LC display with two lines for RH and T values			
Temperature range		**Without display**	**With display**	
	Operation	-40...+60 °C (-40...+140 °F)	-20...+60 °C (-4...+140 °F)	
	Storage	-40...+60 °C (-40...+140 °F)	-20...+60 °C (-4...+140 °F)	
Enclosure **Material** **Protection rating**	Polycarbonate (PC), UL94 V-0 approved IP65 / NEMA 4X			
Electromagnetic compatibility	EN 61326-1 FCC Part15 Class A	EN 61326-2-3 ICES-003 Class A	Industrial environment	
Conformity	EN 45545-2 (HL3)	CE UKCA		

1) For display operation with EE160-MxA6 (4–20 mA, 2-wire) both outputs must be connected.

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	
	Filter	Membrane	No code		
	Display	Without display	No code		
		With display without backlight	D1		
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
	Baudrate	9 600			BD5
		19 200			BD6
		38 400			BD7
	Units[2]	Metric (SI)			No code
		Non-metric (US/GB)			U2
	Accredited Traceable Calibration Certificate in accordance with DIN EN ISO/IEC 17025		see www.eplusecal.com		
	ISO 9001 Calibration Certificate		see www.epluse.com/iso9001cal		

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.

Order Example

EE160-M8T1A6TP1D1SBL-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
Display	D1	With display without backlight
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: www.epluse.com/pcs10)	**PCS10**
Power supply adapter 24 V DC	**V03**
Protection cap for Ø12 mm (0.47") probe, RAL6018	**HA010783**
USB-C configuration stick	**HA011070**

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