EE160

HVAC Humidity and Temperature Sensor

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 protection 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 4 enclosure minimizes installation costs and provides outstanding protection against contamination and condensation.

Comfortable Configuration and Adjustment
With an optional configuration adapter and the free EE-PCS 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.

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 underside of the board
  - Optimum protection against mechanical damage during installation

- Encapsulated electronics
  - Mechanical protection
  - Waterproof

- E+E humidity sensor HCT01
  - Very robust
  - Protected sensor surface and solder pads
  - Tested according to automotive standard AEC-Q200

- Test report according to DIN EN 10204 – 3.1

IP65 / NEMA 4 Enclosure

Bayonet screws
- Open/close with a ¼ rotation

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**Protective Sensor Coating**

The E+E proprietary sensor coating is a permeable 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.

**Technical Data**

**Measurands**

<table>
<thead>
<tr>
<th>Relative humidity</th>
<th>E+E Sensor HCT01-00D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor</td>
<td></td>
</tr>
<tr>
<td>Working range</td>
<td>10...95 % RH</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±2.5 % RH</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
</tr>
<tr>
<td>Sensor</td>
<td>Pt1000 (tolerance class B, DIN EN 60751)</td>
</tr>
<tr>
<td>T-Accuracy at 20 °C</td>
<td>±0.3 °C</td>
</tr>
</tbody>
</table>

**Outputs**

- **Analogue output** (RH: 0...100%; T: see ordering guide)
  - 0-10 V
  - 4-20 mA (two-wire) R < 500 Ohm
- **Digital interface** (RS485 (BACnet MS/TP or Modbus RTU) max. 32 unit load devices in one bus)
- **Passive T-sensor** 4-wire connection, see ordering guide

**General**

- **Power supply**
  - for 0 - 10 V / RS485 15 - 35V DC or 24V AC ±20 %
  - for 4 - 20 mA 10V + R x 20 mA < U < 35V DC
- **Typical current consumption**
  - 4 - 20 mA output 0 - 10 V output RS485
  - 24V DC supply max. 40 mA 5 mA 5 mA
  - 24V AC supply - 13 mA_{rms} 15 mA_{rms}
- **Connection** Screw terminals, max. 1.5 mm²
- **Housing material** Polycarbonate, UL94V-0 approved
- **Protection class** IP65 / NEMA 4
- **Cable gland** M16 x 1.5
- **Electromagnetic compatibility** EN61326-1
  EN61326-2-3
- **Temperature range**
  - Operation: -40...60 °C (-40...140 °F)
  - Storage: -20...60 °C (-4...140 °F)

1) Traceable to intern. standards, administered 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).
### Ordering Guide

#### Hardware configuration

<table>
<thead>
<tr>
<th>Model</th>
<th>Output</th>
<th>Passive T-Sensor</th>
<th>Type</th>
<th>Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EE160-</strong></td>
<td>humidity + temperature</td>
<td>0-10 V (3x) 4-20 mA RS485</td>
<td>Pt 100 DIN A (x3) Pt 1000 DIN A (6x) NTC 10k N1000, TK6180</td>
<td>wall mount (A) duct mount (C) membrane (B)</td>
</tr>
</tbody>
</table>

#### Analogue outputs setup

**OUTPUT SCALING**

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>°F</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20...80</td>
<td>024</td>
<td>metric (M)</td>
</tr>
<tr>
<td>-40...60</td>
<td>002</td>
<td>non-metric (N)</td>
</tr>
<tr>
<td>-10...50</td>
<td>003</td>
<td></td>
</tr>
<tr>
<td>0...50</td>
<td>004</td>
<td></td>
</tr>
</tbody>
</table>

#### Digital interface setup

**PROTOCOL**

<table>
<thead>
<tr>
<th>Baudrate (baud)</th>
<th>Parity</th>
<th>Stopbits</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus RTU</td>
<td>odd</td>
<td>1 stopbit</td>
<td>metric (M)</td>
</tr>
<tr>
<td>BACnet MS/TP</td>
<td>even</td>
<td>2 stopbits</td>
<td>non-metric (N)</td>
</tr>
</tbody>
</table>

#### Order Examples

**EE160-HT6xAPAB-Tx003M**
- Model: humidity + temperature
- Output: 4-20 mA
- Passive T-Sensor: Pt 100 DIN A
- Type: wall mount
- Filter: membrane
- Output scaling: -10...50 °C
- Unit: metric

**EE160-HTx3xPBB-1AE1N**
- Model: humidity + temperature
- Output: RS485
- Type: duct mount
- Filter: membrane
- Protocol: Modbus RTU
- Baudrate: 9600
- Parity: even
- Stopbits: 1
- Unit: non-metric

#### Accessories (see data sheet „Accessories“)

- Product configuration software: EE-PCS (free download: www.epluse.com/EE160)
- Power supply adapter: V03
- Protection cap for 12 mm probe: HA010783
- USB configuration adapter for EE160-HTx3 (RS485): HA011066
- Product configuration adapter for EE160-HT3x/6x (analogue output): see data sheet EE-PCA

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1) Only with output 3x, 6x / T-sensor details see www.epluse.com/R-T_Characteristics
2) Other scaling upon request
5) Only for BACnet