The EE300Ex intrinsically safe sensor reliably measures relative humidity (RH) and temperature (T) in explosion hazard areas. It complies with the classifications for Europe (ATEX), International (IECEx), USA / Canada (FM) for flammable gas and dust applications.

The entire device can be placed in the explosion endangered area. The remote sensing probe allows for classification up to T6.

Measurement performance
The well proven E+E humidity sensors and competence in calibration allow for highly accurate and long term stable measurement over the full range 0…100 % RH and -40…180 °C (-40...356 °F), with pressure rating up to 20 bar (300 psi).

Besides the RH and T measurement, the EE300Ex calculates all humidity related parameters such as dew point temperature (Td), frost point temperature (Tf), absolute humidity (dv) or mixing ratio (r).

Moisture in oil measurement
The EE300Ex with ATEX and IECEx approval is suitable also for measuring water content (X) in ppm and water activity (aw) in isolation, lubrication and hydraulic oils. Typical applications include oil purifiers and online monitoring of lubrication and hydraulic oils.

Supply and outputs
The device can be powered by any intrinsically safe supply unit or via Zener barriers. The measured or calculated data is available on two 4…20 mA, 2-wire outputs and on the LCD display.

Robust, functional design
The stainless steel enclosure and sensing probe are suitable for harsh environment in challenging industrial applications. The EE300Ex design facilitates the installation as well as the replacement of the measuring section (electronics and probe) without time consuming wiring.

Easy Configuration and Adjustment
The setup of the analogue outputs as well as the adjustment of the RH and T reading can be easily performed with the optional EE-PCA Product Configuration Adapter and the free EE-PCS Product Configuration Software.

Typical Applications

<table>
<thead>
<tr>
<th>Chemical process control</th>
<th>Gas and dust in zone 0 / 20 and Div. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmaceutical applications</td>
<td>Stainless steel enclosure and probe</td>
</tr>
<tr>
<td>Explosive / hazardous storage rooms</td>
<td>Best accuracy up to 180 °C (356 °F)</td>
</tr>
<tr>
<td>Flour mills</td>
<td>Pressure tight up to 20 bar (300 psi)</td>
</tr>
<tr>
<td>Oil purifiers</td>
<td>Inspection certificate according to DIN EN 10204-3.1</td>
</tr>
</tbody>
</table>
Protective sensor coating

The E+E proprietary sensor coating is a hygroscopic layer applied to the sensing elements, their leads and soldering points. The coating substantially extends sensor life-time and ensures optimal measurement performance in corrosive environments (salts, off-shore applications). Additionally, it improves the long term stability of E+E sensors in dusty, dirty or oily applications by preventing stray impedance caused by deposits on the active sensor surface or on the electrical connections.

### Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Pressure range</th>
<th>Working range</th>
<th>Probe Ø mm (inch)</th>
</tr>
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<tbody>
<tr>
<td>T1 Wall mount</td>
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<td>-40…60 °C (-40…140°F)</td>
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</tr>
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### Dimensions in mm (inch)

**Types: T1 / T7 / T10**

**Enclosure**

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**Type: T7**

Remote probe 20 bar (300 psi) with sliding fitting for assembly / disassembly under pressure

**Type: T10**

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Measurands

Relative humidity

- Measuring range: 0...100 % RH
- Accuracy:
  - Including hysteresis, non-linearity and repeatability, traceable to international standards, administered by NIST, PTB, BEV ...
  - -15...40 °C (5...104 °F) ≤90 % RH ± (1.3 + 0.3%*mv) % RH
  - >90 % RH ± 2.3 % RH
  - -25...70 °C (-13...158 °F) ± (1.4 + 1%*mv) % RH
  - -40...180 °C (-40...356 °F) ± (1.5 + 1.5%*mv) % RH
  - mv = measured value
- Temperature dependence electronics, typ.: 0.03 % RH/°C
- Response time t90: < 30 s with stainless steel filter at 20 °C (68 °F)

Temperature

- Measuring range:
  - Wall mount: -40...60 °C (-40...140 °F)
  - Remote probe: -40...180 °C (-40...356 °F)
- Accuracy:
  - Temperature dependence of electronics, typ.: 0.005 °C/°C

Calculated parameters

- Dew point temperature Td
- Frost point temperature Tf
- Wet bulb temperature Tw
- Water vapour pressure e
- Mixing ratio r
- Absolute humidity dv
- Specific enthalpy h
- Water activity aw
- Water content X

Units:
- °C (°F)
- mbar (psi)
- g/kg (gr/lb)
- kJ/kg (Btu/lb)
- ppm

Outputs

- Freely selectable and scalable outputs: 2 x 4-20 mA (2-wire) galvanically isolated
- Rs = (Vcc-9V)/20mA
- Output 1 must be connected!

General

- Supply voltage V\_cc\_min = (9+R\_L*0.02) V DC  V\_cc\_max = 28 V DC  R\_L = load resistor
- Current consumption Max. 20 mA per channel
- Protection class of enclosure IP65 / NEMA 4
- Cable gland M16 for cable diameter 5 - 10 mm (0.2" - 0.4")
- M20 for cable diameter 10 - 14 mm (0.4" - 0.6")
- Electrical connection Screw terminals max. 1.5 mm² (AWG 16)
- Working temperature range Probe: excluding measuring range
  - Electronics without display: -40...60 °C (-40...140 °F)
  - Electronics with display: -20...60 °C (-4...140 °F)
- Storage temperature range Electronics and probe: -20...60 °C (-22...140 °F)
- Electromagnetic compatibility EN 61326-1  EN 61326-2-3  ICES-003 ClassB  FCC Part15 ClassB
- Material Enclosure: stainless steel 1.4404
  - Probe cable: PTFE
  - Probe (without filter): stainless steel 1.4301

1) 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).
Ex - Classifications

Europe (ATEX)

Certificate: TPS 13 ATEX 38892 003 X by TÜV SÜD Product Service GmbH
Safety factors: $U_i = 28\text{V}; \ I_i = 100\text{mA}; \ P_i = 700\text{mW}; \ C_i = 2.2\text{nF}; \ L_i = 0\text{mH}$

**Ex-Designation:**
- Transmitter without display: II 1 G Ex ia IIC T4 Ga / II 1 D Ex ia IIC T80°C Da
- Transmitter with display: II 2 G Ex ia IIC T4 Gb / II 1 G Ex ia IIB T4 Ga
- Remote probe: II 1 G Ex ia IIC T6-T1 Ga / II 1 D Ex ia IIC T80°C...220°C Da

International (IECEx)

Certificate: IECEx FMG 14.0017 X by FM Approvals
Safety factors: $6.4\text{Vdc} \leq U_i \leq 28\text{Vdc}; \ I_i = 100\text{mA}; \ P_i = 700\text{mW}; \ C_i = 2.2\text{nF}; \ L_i = 0\text{mH}$

**Ex-Designation:**
- Transmitter without display: Ex ia IIC T4 Ta = -40°C to 60°C Ga / Ex ia IIC T131°C Da
- Transmitter with display: Ex ia IIC T4 Ta = -40°C to 60°C Gb / Ex ia IIB T4 Ta = -40°C to 60°C Ga
- Remote probe: Ex ia IIC T6-T1 Ta = -70°C to 200°C Ga / Ex ia IIC T80°C Da
USA (FM)
Certificate: No. FM17US0302X by FM Approvals
Safety factors: 6.4 Vdc ≤ Vmax (or Ui) ≤ 28Vdc; Imax (or ii) = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH
Ex-Designation:
Equipment Group I: EE300Ex without display
Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C
Class I, Zone 0, AEx ia IIC T4 Ta = -40°C to +60°C Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T131°C Ta = -40°C to +60°C Da; Entity – M1_139080; IP65
Remote Probe:
Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Class I, Zone 0, AEx ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T80°C Da; Entity – M1_139080; IP65
Equipment Group II: EE300Ex with display
Class I, Division 1, Groups C, and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Zone 0, AEx ia IIB T4 Ta = -40°C to +60°C Ga; Entity – M1_139080
Class I, Zone 1, AEx ia IIC T4°C Ta = -40°C to +60°C Gb; Entity – M1_139080
Remote Probe:
Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Class I, Zone 0, AEx ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T80°C Da; Entity – M1_139080; IP65
CANADA (FM)
Certificate: No. FM17CA0154X by FM Approvals
Safety factors: 6.4 Vdc ≤ Vmax (or Ui) ≤ 28Vdc; Imax (or ii) = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH
Ex-Designation:
Equipment Group I: EE300Ex without display
Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080; IP65
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Zone 20, Ex ia IIIC T131°C Ta = -40°C to +60°C Da; Entity – M1_139080; IP65
Remote Probe:
Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
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Zone 20, Ex ia IIIC T80°C Da; Entity – M1_139080; IP65
Equipment Group II: EE300Ex with display
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Class I, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080
Zone 0, Ex ia IIB T4 Ta = -40°C to +60°C Ga; Entity – M1_139080
Zone 20, Ex ia IIIC T80°C Da; Entity – M1_139080; IP65
Remote Probe:
Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Zone 0, Ex ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, Ex ia IIIC T80°C Da; Entity – M1_139080; IP65
The USA and Canada approvals are valid for air and gas measurement only.
Ordering Guide EE300Ex-M1

### Hardware Configuration

**Type**
- Wall mount
- Remote probe with cut-in fitting, pressure tight, 20 bar (300 psi)
- Remote probe with sliding fitting, pressure tight, 20 bar (300 psi)

**Display**
- Without display
- With display

**Electrical Connection**
- 2 x M16 cable gland
- 1/2" NPT conduit
- 2 x M20 cable gland

**Probe Cable Length**
- 1 m (3.3 ft)
- 2 m (6.6 ft)
- 5 m (16.4 ft)
- 10 m (32.8 ft)

**Probe Length**
- Wall mount, 50 mm (1.97 in)
- 65 mm (2.6 in)
- 100 mm (3.94 in)
- 200 mm (7.9 in)
- 400 mm (15.8 in)

**Process Connection (Zone Feedthrough)**
- Without probe fitting
- G1/2" ISO - cut-in fitting, Ø 12 mm (0.47")
- 1/2" weld cut-in fitting, Ø 12 mm (0.47")
- 1/2" NPT - cut-in fitting, Ø 12 mm (0.47")
- G1/2" ISO - sliding fitting, Ø 13 mm (0.51")
- 1/2" NPT - sliding fitting, Ø 13 mm (0.51")

**Filter**
- Stainless steel sintered
- PTFE
- Stainless steel grid, stainless steel body, up to 180 °C
- Catalytic fo H2O2 sterilisation
- Stainless steel with boreholes Ø 3 mm (0.12")

**Sensing Element Protection**
- Without coating
- With coating

**Ex Approval**
- ATEX (Europe)
- IECEx (International)
- FM (USA)
- FM (Canada)

**Output 1**
- Measurand (xx see measurand code below)
- Scaling 1 low Value
- Scaling 1 high Value
- Output 2
- Measurand (xx see measurand code below)
- Scaling 2 low Value
- Scaling 2 high Value

**Measurand Code for output 1 and 2 in the ordering guide**
- MAxx / MBxx
- Relative humidity %
- Temperature °C
- Dew point Td °C
- Frost point TF °C
- Mixing ratio r g/kg g/lb
- Absolute humidity dv g/m³ g/ft³
- Wet bulb temperature Tw °C
- Water vapour partial pressure e mbar psi
- Specific enthalpy h kJ/kg BTU/lb
- Water activity aw
- Water content X in mineral transformer oil (1) ppm
- Water content X in customer specific oil (1) ppm

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1) No display possible for environments with combustible dust, fibers and flyings and in gases with EPL Ga IIC (Gas Groups A, B for Division 1)
2) Allowed only in combination with PA0
3) May not be used in EPL Ga IIC (Gas Groups A, B for Division 1)
4) Not appropriate for moisture in oil measurement, obligatory for all other applications, free of charge
5) Assign the most relevant measurand to output 1

---

**Measurand Code for output 1 and 2 in the ordering guide**

<table>
<thead>
<tr>
<th>Measurand Code</th>
<th>MAxx</th>
<th>MBxx</th>
</tr>
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<tbody>
<tr>
<td>Relative humidity</td>
<td>%</td>
<td>10</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>1</td>
</tr>
<tr>
<td>Dew point Td</td>
<td>°F</td>
<td>52</td>
</tr>
<tr>
<td>Frost point TF</td>
<td>°C</td>
<td>65</td>
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<tr>
<td>Mixing ratio r</td>
<td>g/kg</td>
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<tr>
<td>Absolute humidity dv</td>
<td>g/m³</td>
<td>56</td>
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<tr>
<td>Wet bulb temperature Tw</td>
<td>°C</td>
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<tr>
<td>Water vapour partial pressure e</td>
<td>mbar psi</td>
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<tr>
<td>Specific enthalpy h</td>
<td>kJ/kg BTU/lb</td>
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<tr>
<td>Water activity</td>
<td>aw</td>
<td>67</td>
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<tr>
<td>Water content X in mineral transformer oil (1)</td>
<td>ppm</td>
<td>70</td>
</tr>
<tr>
<td>Water content X in customer specific oil (1)</td>
<td>ppm</td>
<td>70PPMxx</td>
</tr>
</tbody>
</table>

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1) For approval FM (USA / Canada) not allowed.
Order Example

Example 1:

**EE300Ex-M1A6HS2T7D1E2K10L200PA20F4C1EX1/MA1SAL-40SAH180MB10SBL0SBH100**

- **Type:** Remote probe up to 20 bar (300 psi)
- **Display:** With display
- **Electrical Connection:** 2 x M16 cable gland
- **Probe Cable:** 10 m (32.8 ft)
- **Probe Length:** 200 mm (7.9"
- **Process connection** (Zone Feedthrough): G1/2" ISO - cut-in fitting, Ø 12 mm (0.47"
- **Filter:** Stainless steel sintered
- **Sensing Element Protection:** With coating
- **Ex Approval:** ATEX (Europe)
- **Output 1:** Temperature [°C]
  - **Scaling Output 1:** -40...180 °C
- **Output 2:** Relative humidity [% RH]
  - **Scaling Output 2:** 0...100 % RH

Example 2:

**EE300Ex-M1A6HS2T1D0E2K0L50PA0F9C1EX3/MA2SAL-40SAH140MB53SBL-40SBH140**

- **Type:** Wall mount
- **Display:** Without display
- **Electrical Connection:** 2 x M16 cable gland
- **Probe Cable:** Wall mount
- **Probe Length:** 50 mm (1.97"
- **Process connection** (Zone Feedthrough): Without probe fitting
- **Filter:** Stainless steel grid
- **Sensing Element Protection:** With coating
- **Ex Approval:** FM (USA)
- **Output 1:** Temperature [°F]
  - **Scaling Output 1:** -40...140 °F
- **Output 2:** Dew point temperature [°F]
  - **Scaling Output 2:** -40...140 °F

Accessories

- Blank cover for enclosure base: HA011401
- Safety barrier, 1-channel, STAHL 9002/13-280-093-001: HA011410
- Intrinsically safe supply unit, 1-channel, STAHL 9160/13-11-11: HA011405
- Intrinsically safe supply unit, 2-channel, STAHL 9160/23-11-11: HA011406
- Sealing plug for unused M16 cable glands: HA011402
- Sealing plug for unused M20 cable glands: HA011404
- Ball valve with 1/2 ISO female thread, ATEX certified: HA011403
- Product Configuration Software: EE-PCS (free download: www.epluse.com/configurator)
- Adapter Kit for configuration and adjustment (must be ordered together, see datasheet EE-PCA):
  - Pos. 1: Product Configuration Adapter: EE-PCA
  - Pos. 2: Connection cable: HA011068