The EE300Ex intrinsically safe transmitter measures reliably relative humidity (RH) and temperature (T) in explosion hazard areas. It complies with the classifications for Europe (ATEX), International (IECEx), USA / Canada (FM) and China (NEPSI) for flammable gas and dust applications. The EE300Ex is also certified for gas applications according Korean (KCs) and Japan (TIIS) certifications.

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 300 bar (4351 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, IECEx, NEPSI and KCs 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 and 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.

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**Typical Applications**

- chemical process control
- pharmaceutical applications
- explosive / hazardous storage rooms
- flour mills
- oil purifiers

**Features**

- gas and dust in zone 0 / 20 and Div. 1
- stainless steel enclosure and probe
- best accuracy up to 180 °C (356 °F)
- pressure tight up to 300 bar (4351 psi)
- inspection certificate according to DIN EN 10204 – 3.1
Protective sensor coating

The E+E proprietary sensor coating is a protective layer applied to the active surface and leads of the sensing elements. The coating substantially extends the lifetime and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). Additionally, it improves the long term stability in dusty or dirty applications by preventing stray impedances caused by deposits on the active sensor surface.

Models

<table>
<thead>
<tr>
<th>Model</th>
<th>pressure range</th>
<th>working range</th>
<th>Ø-probe mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A -</td>
<td>0.1...20 bar (1.5...300 psi)</td>
<td>-40...60 °C (-40...140°F)</td>
<td>12 (0.47)</td>
</tr>
<tr>
<td>E -</td>
<td>0.1...20 bar (1.5...300 psi)</td>
<td>-40...180 °C (-40...356°F)</td>
<td>12 (0.47)</td>
</tr>
<tr>
<td>M -</td>
<td>0.1...20 bar (1.5...300 psi)</td>
<td>-40...180 °C (-40...356°F)</td>
<td>13 (0.51)</td>
</tr>
</tbody>
</table>

Dimensions in mm (inches)

Model A / E / M / U

<table>
<thead>
<tr>
<th>housing</th>
<th>Ø12</th>
<th>151 (5.9)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>09 (3.5)</td>
<td>179 (7)</td>
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</table>

Model U

<table>
<thead>
<tr>
<th>remote probe for sensor retraction tool PN250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø12 (0.47)</td>
</tr>
</tbody>
</table>

Model E

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

| Ø12 (0.47) | 151 (5.9) |

Model E / M

remote probe 20 bar (300 psi) / 300 bar (4351 psi) with cut-in fitting

<table>
<thead>
<tr>
<th>L - length of filter</th>
<th>mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>stainless steel sintered filter</td>
<td>33 (1.3&quot;)</td>
</tr>
<tr>
<td>PTFE-filter</td>
<td>33 (1.3&quot;)</td>
</tr>
<tr>
<td>stainless steel grid filter</td>
<td>39 (1.5&quot;)</td>
</tr>
<tr>
<td>oil filter</td>
<td>32 (1.26&quot;)</td>
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</tbody>
</table>
Technical Data EE300Ex

### Measurands

#### Relative humidity

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>0...100 % RH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>± (3.5 + 0.3%*mv) % RH</td>
</tr>
</tbody>
</table>

*Note: Measuring range includes hysteresis, non-linearity and repeatability, traceable to international standards, administered by NIST, PTB, BEV...*

- constituting value ≤90 % RH: ± (1.3 + 0.3%*mv) % RH
- >90 % RH: ± 2.3 % RH
- ≤90 % RH: ± (1.4 + 1%*mv) % RH
- >90 % RH: ± (1.5 + 1.5%*mv) % RH

**Temperature dependence of electronics**

- typ. 0.03 % RH/°C

**Response time**

- < 30 sec. 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**

- wall mount: -40...60 °C (-40...140 °F)
- remote probe: -40...180 °C (-40...356 °F)

**For TIIS (Japan):**

- model A, E, M, U: -40...60 °C (-40...140 °F)

**Mixing ratio**

- wall mount: -40...60 °C (-40...140 °F)

**Water activity**

- wall mount: -40...60 °C (-40...140 °F)

#### Calculated parameters

<table>
<thead>
<tr>
<th></th>
<th>wall mount</th>
<th>up to</th>
<th>remote probe</th>
<th>units</th>
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<tbody>
<tr>
<td>Dew point temperature</td>
<td>Td</td>
<td>60 (140)</td>
<td>100 (212)</td>
<td>°C</td>
</tr>
<tr>
<td>Frost point temperature</td>
<td>Tf</td>
<td>60 (140)</td>
<td>100 (212)</td>
<td>°C</td>
</tr>
<tr>
<td>Wet bulb temperature</td>
<td>Tw</td>
<td>60 (140)</td>
<td>100 (212)</td>
<td>°C</td>
</tr>
<tr>
<td>Water vapour pressure</td>
<td>e</td>
<td>200 (3)</td>
<td>1100 (15)</td>
<td>mbar</td>
</tr>
<tr>
<td>Mixing ratio</td>
<td>r</td>
<td>425 (2900)</td>
<td>999 (9999)</td>
<td>g/kg</td>
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<tr>
<td>Absolute humidity</td>
<td>dv</td>
<td>150 (60)</td>
<td>700 (300)</td>
<td>g/m³</td>
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<tr>
<td>Specific enthalpy</td>
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<td>400 (150000)</td>
<td>2800 (99999)</td>
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<tr>
<td>Water content</td>
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<td>-</td>
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<td>[ppm]</td>
</tr>
</tbody>
</table>

#### Outputs

- freely selectable and scalable outputs
- 2 x 4-20 mA (2-wire) galvanically isolated
- Output 1 must be connected!

#### General

- Supply voltage
  - V_{cc, min} = (9+R_L*0.02) VDC
  - V_{cc, max} = 28 V DC
- Protection class of housing: 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 electronics without display: -40...60 °C (-40...140 °F)
  - electronics with display: -20...60 °C (-4...140 °F)
- Storage temperature range: -20...60 °C (-22...140 °F)
- Electromagnetic compatibility: EN61326-1, EN61326-2-3, ICES-003 ClassB
- Material: stainless steel 1.4404, PTFE

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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 IIIIC 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 IIIIC 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 IIIIC 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 IIIIC T80°C Da

China (NEPSI)

Certificate: Cert NO. GYJ16.1417X by NEPSI
Safety factors: \( U_i = 28\, \text{Vdc} \), \( I_i = 100\, \text{mA} \), \( P_i = 700\, \text{mW} \), \( C_i = 2.2\, \text{nF} \), \( L_i = 0\, \text{mH} \)

Ex-Designation:
- Transmitter without display: Ex ia IIC T4 Ga, Ex iaD 20 T131
- Transmitter with display: Ex ia IIC T4 Gb, Ex ia IIB T4 Ga
- Remote probe: Ex ia IIC T1~T6 Ga, Ex iaD 20 T80

Japan (TIIS)

Certificate: Nr. TC22061 by TIIS
Safety factors: \( U_i = 28\, \text{Vdc} \), \( I_i = 100\, \text{mA} \), \( P_i = 700\, \text{mW} \), \( C_i = 2.2\, \text{nF} \), \( L_i = 0\, \text{mH} \)

Ex-Designation, only for gas:
- IIC T4 Gb

Korea (KCs)

Remote probe
Certificate: 17-AV4BO-0107X by KCs
Safety factors: \( 6.4 \, \text{Vdc} \leq U_i \leq 28\, \text{Vdc} \), \( I_i \leq 100\, \text{mA} \), \( P_i \leq 700\, \text{mW} \), \( C_i \leq 2.2\, \text{nF} \), \( L_i = 0\, \text{mH} \)

Ex-Designation, only for gas:
- Transmitter: Ex ia IIC T4 (Ta = -40°C ~ +60°C)
- Remote probe: Ex ia IIC T6~T1 (Ta = -70°C ~ +200°C)

Wall mount
Certificate: 16-AV4BO-0364X by KCs
Safety factors: \( 6.4 \, \text{Vdc} \leq U_i \leq 28\, \text{Vdc} \), \( I_i \leq 100\, \text{mA} \), \( P_i \leq 700\, \text{mW} \), \( C_i \leq 2.2\, \text{nF} \), \( L_i = 0\, \text{mH} \)

Ex-Designation, only for gas:
- Ex ia IIC T4 (Ta = -40°C ~ +60°C)
USA (FM)

Certificate: No. FM17US0302X by FM Approvals
Safety factors:
- $6.4 \text{ Vdc} \leq V_{\text{max (or } Ui)} \leq 28 \text{ Vdc}$;
- $I_{\text{max (or } Ii)} = 100 \text{ mA}$; $P_i = 700 \text{ mW}$;
- $C_i = 2.2 \text{nF}$; $L_i = 0 \text{ mH}$

Ex-Designation:

Equipment Group I: EE300Ex without display
- Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$; Entity – M1_139080; IP65
- Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$
- Class I, Zone 0, EX ia IIC T4 $Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Ga; Entity – M1_139080; IP65
- Zone 20, AEX ia IIC T131°C $Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Da; Entity – M1_139080; IP65

Remote Probe:
- Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$; Entity – M1_139080; IP65
- Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$
- Class I, Zone 0, AEX ia IIC $T_6 \ldots T_1$ Ga; Entity – M1_139080; IP65
- Zone 20, AEX ia IIC $T_80°C$ Da; Entity – M1_139080; IP65

Equipment Group II: EE300Ex with display
- Class I, Division 1, Groups C, and D; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$; Entity – M1_139080
- Class I, Division 2, Groups A, B, C, D, E, and G; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$; Entity – M1_139080
- Class I, Zone 0, AEX ia IIB $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Ga; Entity – M1_139080
- Class I, Zone 1, AEX ia IIC $T_4°C Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Gb; Entity – M1_139080

Remote Probe:
- Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$; Entity – M1_139080; IP65
- Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$
- Class I, Zone 0, AEX ia IIC $T_6 \ldots T_1$ Ga; Entity – M1_139080; IP65
- Zone 20, AEX ia IIC $T_80°C$ Da; Entity – M1_139080; IP65

CANADA (FM)

Certificate: No. FM17CA0154X by FM Approvals
Safety factors:
- $6.4 \text{ Vdc} \leq V_{\text{max (or } Ui)} \leq 28 \text{ Vdc}$;
- $I_{\text{max (or } Ii)} = 100 \text{ mA}$; $P_i = 700 \text{ mW}$;
- $C_i = 2.2 \text{nF}$; $L_i = 0 \text{ mH}$

Ex-Designation:

Equipment Group I: EE300Ex without display
- Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$; Entity – M1_139080
- Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$
- Zone 0, Ex ia IIC $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Ga; Entity – M1_139080
- Zone 20, Ex ia IIC $T_131°C Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Da; Entity – M1_139080

Remote Probe:
- Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$; Entity – M1_139080; IP65
- Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$
- Class I, Zone 0, Ex ia IIC $T_6 \ldots T_1$ Ga; Entity – M1_139080; IP65
- Zone 20, Ex ia IIC $T_80°C$ Da; Entity – M1_139080; IP65

Equipment Group II: EE300Ex with display
- Class I, Division 1, Groups C, and D; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$; Entity – M1_139080
- Class I, Division 2, Groups A, B, C, D, E, and G; $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$; Entity – M1_139080
- Zone 0, Ex ia IIB $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Ga; Entity – M1_139080
- Zone 1, Ex ia IIB $T_4 Ta = -40^\circ \text{C} \to +60^\circ \text{C}$ Gb; Entity – M1_139080

Remote Probe:
- Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$; Entity – M1_139080; IP65
- Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; $T_6 \ldots T_1$
- Zone 0, Ex ia IIC $T_6 \ldots T_1$ Ga; Entity – M1_139080; IP65
- Zone 20, Ex ia IIC $T_80°C$ Da; Entity – M1_139080; IP65

The USA and Canada approvals are valid for air and gas measurement only.
## Ordering Guide EE300Ex-HT

### Hardware Configuration

<table>
<thead>
<tr>
<th>Model</th>
<th>wall mount</th>
<th>remote probe up to 20 bar (290 psi)</th>
<th>remote probe up to 300 bar (4351 psi)</th>
<th>remote probe for sensor retraction tool PN250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display 1)</td>
<td>without display</td>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with display</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>2 x M16 cable gland</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 x M20 cable gland</td>
<td>C</td>
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<td></td>
</tr>
<tr>
<td>Probe Cable</td>
<td>wall mount</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 m (3.3 ft)</td>
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<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>2 m (6.6 ft)</td>
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<td>5 m (16.4 ft)</td>
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<td>Probe Length</td>
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<td>300 mm (11.8&quot;)</td>
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<td>Feedthrough (probe fitting)</td>
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<td>1/2 ISO - cut-in fitting; 12 mm (0.47&quot;)</td>
<td>A</td>
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<tr>
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<td>Filter</td>
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<td>stainless steel grid H2O2 3)</td>
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<td>oil</td>
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<tr>
<td>Sensor Protection</td>
<td>without coating</td>
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<tr>
<td></td>
<td>with coating 4)</td>
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<tr>
<td>Ex-Certification</td>
<td>ATEX (Europe)</td>
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<td>TIIS (Japan)</td>
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</tr>
<tr>
<td>Units</td>
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<td></td>
<td>non metric / US [°F] 5)</td>
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<tr>
<td>Output 1 6)</td>
<td>relative humidity</td>
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<td>select according „Measurand Code“ below</td>
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<tr>
<td></td>
<td>other measurand 7)</td>
<td>yyy 8)</td>
<td>select according data sheet „Scaling Outputs“</td>
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<tr>
<td>Scaling Output 1</td>
<td>range</td>
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<td></td>
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<tr>
<td>Output 2</td>
<td>temperature 7)</td>
<td>Tx</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>other measurand</td>
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<tr>
<td>Scaling Output 2</td>
<td>range</td>
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</table>

### Measurand Code

<table>
<thead>
<tr>
<th>Measurand Code</th>
<th>UW</th>
<th>M</th>
<th>N</th>
</tr>
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<tbody>
<tr>
<td>temperature</td>
<td>Tx</td>
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</tr>
<tr>
<td>dew point temperature</td>
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<td></td>
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</tr>
<tr>
<td>frost point temperature</td>
<td>TF</td>
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<tr>
<td>wet bulb temperature</td>
<td>TW</td>
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<tr>
<td>water vapour partial pressure</td>
<td>Ex</td>
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<td>mixture ratio</td>
<td>Rx</td>
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<td>absolute humidity</td>
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<td>specific enthalphy</td>
<td>Hx</td>
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<td>water activity 9)</td>
<td>AW</td>
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<tr>
<td>water content in mineral transformer oil 9)</td>
<td>Xm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>water content customized oil 9)</td>
<td>Xk</td>
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</tr>
</tbody>
</table>

1) No display possible for environments with combustible dust, fibers and flyings and in gases with EPL Ga IIC (Groups A, B)
2) Not possible with sliding fitting (Code F, H)
3) May not be used in EPL Ga IIC (Gas Groups A, B)
For approval KCs (Korea) not allowed in IIC Zone 0
For approval TIIS (Japan) not allowed in models A, E, M and U
4) Not appropriate for moisture in oil measurement
5) Not allowed for approval KCs (Korea) models A, E, M and U
6) Assign to output 1 the most relevant measurand
7) For approval TIIS (Japan), models A, E, M and U maximum temperature working range is -40...60 °C (-40...140 °F)
8) Maximum number code allowed for approval TIIS (Japan) is 170.

9) For approval KCs (Korea) not allowed in model A
For approval FM (USA / Canada) and TIIS (Japan) not allowed.
Order Example

Example 1:

EE300EX-HT6SMDBHFAD1AT/MTx052UW001

Model: remote probe up to 300 bar (4351 psi)
Display: with display
Electrical Connection: 2 x M16 cable gland
Probe Cable: 10 m (32.8 ft)
Probe Length: 200 mm (7.9)
Zone feedthrough: stainless steel sintered
Filter: stainless steel sintered
Sensor Protection: with coating
Ex-Certification: ATEX

Units: metric
Output 1: temperature
Scaling Output 1: -40...180 °C
Output 2: relative humidity
Scaling Output 2: 0...100 % RH

Example 2:

EE300EX-HT6SAxBxxxIxFM/NTx083TD083

Model: wall mount
Display: without display
Electrical Connection: 2 x M16 cable gland
Probe Cable: wall mount
Probe Length: wall mount
Zone feedthrough: without probe fitting
Filter: stainless steel grid
Sensor Protection: without coating
Ex-Certification: USA (FM)

Units: non metric
Output 1: temperature
Scaling Output 1: -40...140 °F
Output 2: dew point temperature
Scaling Output 2: -40...140 °F

Accessories

Blank cover for housing base
Safety barrier, 1-channel, STAHL 9002/13-280-093-001
Intrinsically safe supply unit, 1-channel, STAHL 9160/13-11-11
Intrinsically safe supply unit, 2-channel, STAHL 9160/23-11-11
Sealing plug for unused M16 cable glands
Sealing plug for unused M20 cable glands
Ball valve with 1/2 ISO female thread, Ex certified
Sensor retraction tool PN250
Sensor retraction tool PN40
Product Configuration Software
Adapter Kit for configuration and adjustment
(must be ordered together, see datasheet EE-PCA):
Pos. 1: Product Configuration Adapter
Pos. 2: Connection cable

HA011401
HA011410
HA011405
HA011406
HA011402
HA011404
HA011403
ZM-WA-025-040-EST
BG-WA-103-045-EST
EE-PCS (free download: www.epluse.com/configurator)
EE-PCA
HA011068