

TRANSMITTERS FOR INTRINSICALLY SAFE APPLICATION

EE30EX Series

EE30EX series transmitters from E+E Elektronik are designed for the accurate measurement of humidity and temperature in the range between 0...100% RH and -40...180°C (-40...356°F). Models for pressure tight installations from 0.01...15 bar (0.15...218psi) complete the range of products.

EE30EX meets the **ATEX requirement** and **IECEX standards** of intrinsically safe machinery:

Applied standards for ATEX:

EN50014:1997
EN50020:1994
EN50284:1998

Applied standards for IECEX:

IEC 60079-0:2004
IEC 60079-11:1999
IEC 60079-26:2004

The EC type examination was carried out by Physikalisch Technische Bundesanstalt (PTB), the German national institute for science and technology.

The transmitters of EE30EX series consist of:

- EE30EX supply and evaluation unit, classified according to **II (1) G [EEx ia] IIC** subject to EC-type examination certificate **PTB 99 ATEX 2042** and **[EEx ia] IIC** according to **IECEXPTB 05.0031**.
- sensor driver unit and sensor probe, classified according **II 1/2 G EE ia IIC T6** subject to EC-type examination certificate **PTB 99 ATEX 2043 X** and **EEx ia IIC T6** according to **IECEX PTB 05.0032X**.

The sensor probe can be employed in zone 0 and in temperature class T6 (apparatus group II, category 1). For EE30EX versions D and E the cable length between sensing probe and sensor driver unit can be up to 10m (32.8ft). The maximum length of the cable between the supply and evaluation unit and the sensor driver unit is 100m (328ft).

The analogue output signals for humidity and temperature are available as current or as voltage.

State-of-the-art microprocessor technology makes both analogue outputs free selectable and scaleable via RS232 serial interface.

Besides measurement of humidity and temperature EE30EX series calculate the values of the following physical quantities:

- | | |
|---------------------------|----|
| - 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 |

These are available on the RS232 serial interface, on the analogue outputs and on integrated LC display.

The communication with a PC is assisted by an user friendly software, running under MS Windows™ which enables the user to change original factory settings easily.

Configuration Software

The Configuration Software is used for:

- flexible, easy and fast setup of the analogue outputs resp. of the RS232 serial interface.
- adjustment of the humidity and temperature outputs.
- exchange of the sensor.

Typical Applications

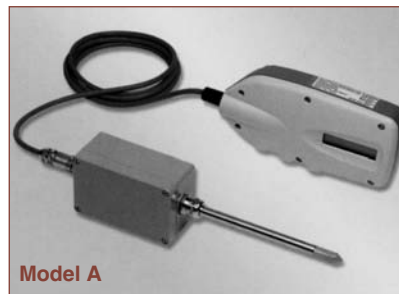
- Chemical processes
- Pharmaceutical applications
- Explosive endangered storage rooms

Features

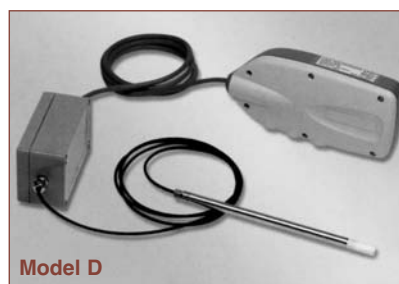
- EC-Type examination according to ATEX
- Approved to IECEX
- Approved for zone 0
- Highest accuracy up to 180°C (356°F)
- Dew point, absolute humidity,...measurement
- Include MS Windows™ Software
- Interchangeable humidity sensor



**Humidity / Temperature
Transmitter for Intrinsically
Safe Application**



Model A



Model D

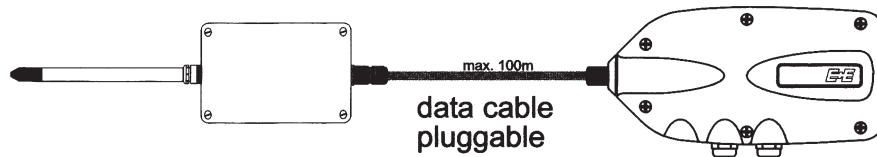
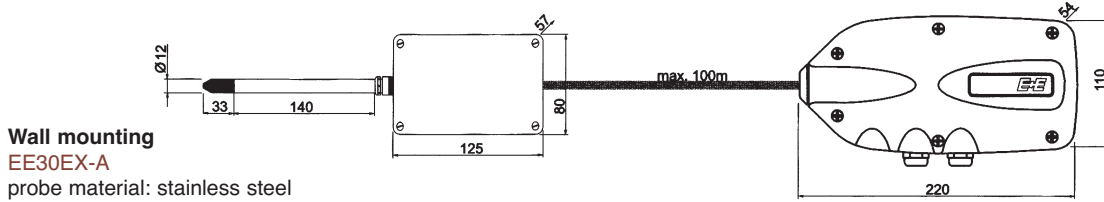


Model E

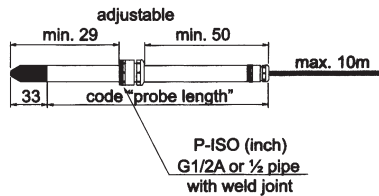
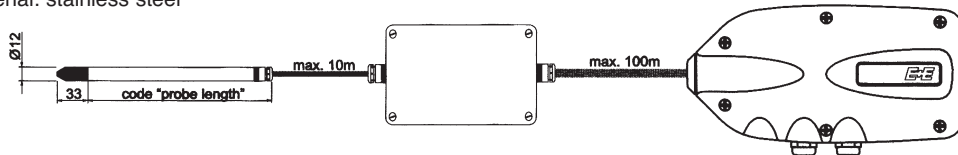
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Housing Dimensions (mm)

1 m = 3.28ft/ 1ft = 0.30 m
1 mm = 0.03937"/ 1" = 25.4 mm



Remote probe up to 180°C (356°F)
EE30EX-D
probe material: stainless steel



Pressure tight probe up to 15 bar (218psi)
EE30EX-E
probe material: stainless steel

Classifications

NEW

Europe:

EU (94/9/EG, ATEX 100a)

- supply and evaluation unit:

Ex II (1) G [EEx ia] IIC
PTB 99 ATEX 2042

- sensor unit:

Ex II 1/2 G EEx ia IIC T6
PTB 99 ATEX 2043 X

- environmental specifications:

T_{amb}: -20...+60°C (-4...140°F)
P_{amb}: 0.8...1.1bar (11.6...16psi)

International:

- supply and evaluation unit:

Ex [EEx ia] IIC
IECEX PTB 05.0031

- sensor unit:

Ex EEx ia IIC T6
IECEX PTB 05.0032X

- environmental specifications:

T_{amb}: -20...+60°C (-4...140°F)
P_{amb}: 0.8...1.1bar (11.6...16psi)



TRANSMITTERS FOR INTRINSICALLY SAFE APPLICATION

Technical Data EE30EX

Measuring Values

Relative Humidity

| | | |
|--|-------------------------------------|-----------------------|
| Humidity sensor ¹⁾ | HC1000-400 | |
| Working range ¹⁾ | 0...100% RH | |
| Accuracy including hysteresis and nonlinearity | | |
| - with special calibration against certificate standards | ±1% RH (0...90% RH) | ±2% RH (90...100% RH) |
| - standard calibration | ±2% RH (0...90% RH) | ±3% RH (90...100% RH) |
| Temperature dependence electronic | typ. 0.06% RH/°C | (typ. 0.03% RH/°F) |
| Temperature dependence sensor head | typ. 0.03% RH/°C (typ. 0.02% RH/°F) | |
| Response time with filter at 20°C / t ₉₀ | < 30 sec. | |

Temperature

| | | |
|-----------------------------|--------------------------------|---------------------------|
| Temperature sensor | Pt1000 (DIN EN 60751, class A) | |
| Measuring range sensor head | EE30EX-A | -20...60°C (-4...140°F) |
| | EE30EX-D | -40...180°C (-40...356°F) |
| | EE30EX-E | -40...180°C (-40...356°F) |
| Accuracy (typ.) | | |
| Temperature dependence | typ. ± 0.005°C/°C | |

Max. Adjustable Measurement Range ³⁾

| | | from | to | EE30EX-A | EE30EX-D/E | units |
|-------------------------|----|--------------|--------------|---------------|---------------|---------------------------------------|
| Humidity | RH | 0 | 100 | 100 | 100 | % RH |
| Temperature | T | -40 (-40) | 60 (140) | 180 (356) | 180 (356) | °C (°F) |
| Dew-point temperature | Td | -80 (-112) | 60 (140) | 100 (212) | 100 (212) | °C (°F) |
| Frost-point temperature | Tf | -80 (-112) | 0 (32) | 0 (32) | 0 (32) | °C (°F) |
| Wet-bulb temperature | Tw | 0 (32) | 60 (140) | 100 (212) | 100 (212) | °C (°F) |
| Water vapour pressure | e | 0 (0) | 200 (3) | 1100 (15) | 1100 (15) | mbar (psi) |
| Mixing ratio | r | 0 (0) | 425 (2900) | 999 (9999) | 999 (9999) | g/kg (gr/lb) |
| Absolute humidity | dv | 0 (0) | 150 (60) | 700 (300) | 700 (300) | g/m ³ (gr/f ³) |
| Specific enthalpy | H | -50 (-15000) | 400 (150000) | 2800 (999999) | 2800 (999999) | kJ/kg (lbf/lb) |

Outputs

| | | |
|---|-------------------------------|--|
| Two freely selectable and scaleable outputs | 0 - 5V 0 - 10V 4 - 20mA | -1mA < I _L < 1mA -1mA < I _L < 1mA R _L < 360 Ohm |
| Serial interface | RS232C | |

General

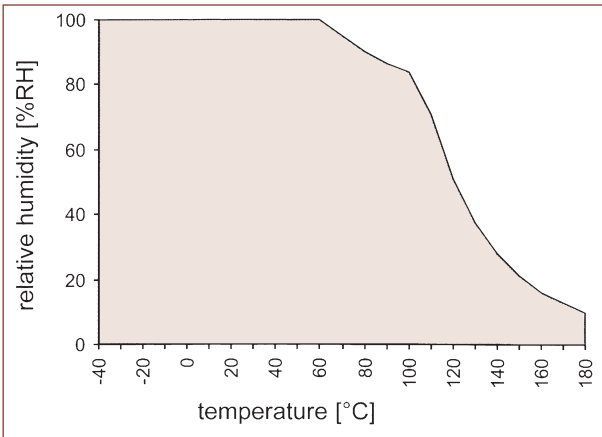
| | | |
|--|---|---------------------------------|
| Supply voltage | SELV 24V DC/V AC±35% | SELV = Safety Extra Low Voltage |
| Current consumption | ≤ 150mA (24V DC); ≤ 280mA (24V AC) | |
| Pressure range for pressure tight sensor probe | 0.01...15bar (0.15...218psi) | |
| System requirements for software | MS Windows™ 98 or later; serial interface | |
| Housings | supply-and evaluation unit | ABS-plastic / IP65 |
| | sensor driver unit | AlSi12 / IP65 |
| Cable gland | PG 7 and PG 9; for cable diameter 5 - 9 mm (0.2 - 0.35") | |
| Electrical connection | screw terminals max. 1.5mm ² (AWG 16) | |
| Sensor protection | sintered stainless steel filter, PTFE filter or metal grid filter | |
| Temperature range | sensor probe: | According measuring range |
| | electronic sensor driver device: | -20...60°C (-4...140°F) |
| | electronic supply- and evaluation device: | -40...60°C (-40...140°F) |
| | electronic with display: | 0...40°C (32...104°F) |
| Storage temperature range | electronic and sensor head | -30...60°C (22...140°F) |
| Electromagnetic compatibility according | EN61000-6-4 EN61000-6-2 | |

¹⁾ Refer to the working range of the humidity sensor.

³⁾ Refer to accuracies of calculated values.

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Working Range Humidity Sensor



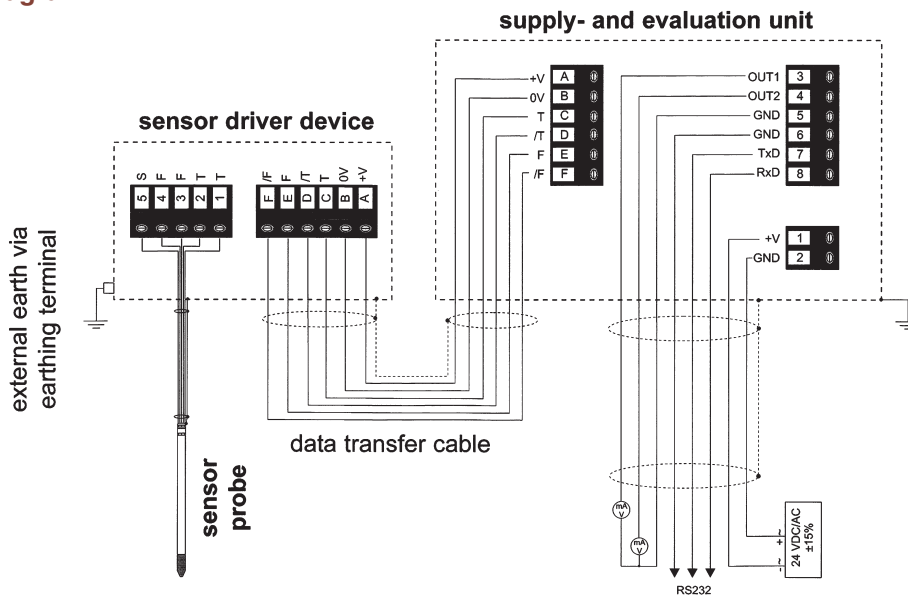
The specified working range for the humidity sensor element is shown in terms of humidity/temperature limits.

Although the sensors would not deteriorate beyond the limits, their performance can only be specified within the limits for the working range.

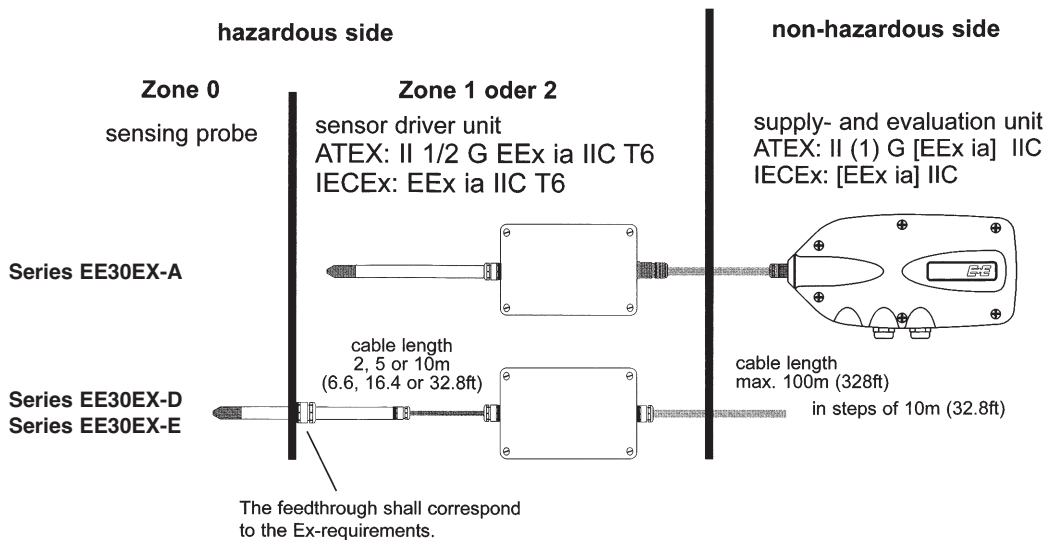
Sensing Head with Protective Coating

For use in heavy polluted or aggressive environment E+E has developed a special protective coating process (order code: HC01). Both humidity and temperature sensor elements are covered with a polymer film. Extensive tests have proved an amazing improvement of the resistance to chemical pollutants which leads to a much better long term stability of the transmitter.

Connection Diagram



Installation



TRANSMITTERS FOR INTRINSICALLY SAFE APPLICATION

Ordering Guide EE30EX

Position 1 - Transmitter

| | | EE30EX-A | EE30EX-D | EE30EX-E | | | |
|--|---|-----------------|---------------------|----------|--|---|-----|
| Hardware Configuration | | | | | | | |
| Filter | stainless steel sintered filter | 3 | 3 | 3 | | | |
| | PTFE Filter ¹⁾ | 5 | 5 | 5 | | | |
| | metal grid (up to 120°C / 248°F) ¹⁾ | 6 | 6 | 6 | | | |
| | stainless steel grid filter (up to 180°C / 356°F) | 9 | 9 | 9 | | | |
| | stainless steel filter | 10 | 10 | 10 | | | |
| Cable length | 2m (6.6ft) | | 02 | 02 | | | |
| | 5m (16.4ft) | | 05 | 05 | | | |
| | 10m (32.8ft) | | 10 | 10 | | | |
| Probe length | 200mm (7.9") | | 5 | 5 | | | |
| | 400mm (15.8") | | 6 | 6 | | | |
| Pressure tight Feedthrough | 1/2" male thread | | HA03 | HA03 | | | |
| | 1/2" pipe weld joint | | HA05 | HA05 | | | |
| | 1/2" NPT thread | | HA07 | HA07 | | | |
| Data cable | not pluggable | | | | | | |
| | pluggable | P02 | P02 | P02 | | | |
| Display | without display | | | | | | |
| | with display | D01 | D01 | D01 | | | |
| Coating sensor | no | | | | | | |
| | yes | HC01 | HC01 | HC01 | | | |
| Calibration | standard | | | | | | |
| | High-humidity calibration | CA01 | CA01 | CA01 | | | |
| Software Configuration | | | | | | | |
| Physical parameters of outputs | Relative humidity | RH | [%] | (A) | Output 1 | Select according to Ordering Guide (A - H, J) | |
| | Temperature | T | [°C or °F] | (B) | | | |
| | Dew point temperature | Td | [°C or °F] | (C) | Output 2 | | |
| | Frost point temperature | Tf | [°C or °F] | (D) | | | |
| | Wet bulb temperature | Tw | [°C or °F] | (E) | | | |
| | Water vapour partial pres. | e | [mbar] | (F) | | | |
| | Mixture ratio | r | [g/kg] | (G) | | | |
| | Absolute humidity | dv | [g/m ³] | (H) | | | |
| | Specific enthalpy | h | [KJ/kg] | (J) | | | |
| Type of Output signals | 0-5V | | | (2) | Select according to Ordering Guide (2, 3, 6) | | |
| | 0-10V | | | (3) | | | |
| | 4-20mA | | | (6) | | | |
| Measure value units | metric / SI | | | | E01 | E01 | E01 |
| | not metric / US | | | | | | |
| Scaling of T-output Scaling of Td-output in °C or °F | -40... 60 (T02) | -40...120 (T12) | -40...160 (T33) | | Output T | Select according to Ordering Guide (Txx) | |
| | -10... 50 (T03) | -20...100 (T14) | -40...180 (T52) | | | | |
| | 0... 50 (T04) | +20...120 (T15) | -40...140 (T83) | | Output Td | Select according to Ordering Guide (Txx) | |
| | 0...100 (T05) | 0...120 (T16) | 32...120 (T90) | | | | |
| | 0... 60 (T07) | 0... 80 (T21) | 32...140 (T91) | | | | |
| | -30... 70 (T08) | -40... 80 (T22) | 32...180 (T92) | | | | |
| | -30...120 (T09) | -20... 80 (T24) | 32...132 (T96) | | | | |
| | -20...120 (T10) | -20... 60 (T25) | | | | | |

Position 2 - Data Cable

| Data cable | maximal 100m (32ft) / transmitter | xxxm | xxxm | xxxm |
|------------|-----------------------------------|------|------|------|
|------------|-----------------------------------|------|------|------|

¹⁾ to be used for the apparatus group II B only

Ordering Example

Position 1 - Transmitter:

EE30EX-E3056HA03P02/BC-T05-Td14

Humidity/Temperature Transmitter Series EE30EX

Model: For pressure tight installations
 Filter: stainless steel sintered filter
 Cable length: 5m (16.4ft)
 Probe length: 400mm (15.8")
 Feedthrough: 1/2" male thread
 Data cable: pluggable
 Output 1: T
 Output 2: Td
 Output signal: 0-10V
 Scaling of T-output: 0...100°C
 Scaling of Td-output: -20...100°

Position 2 - Data cable:

Data cable 60m (196.8ft)