

EE300Ex-HT

Humidity and Temperature Transmitter for Intrinsically Safe Applications



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 it 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.



wall mount



remote probe

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

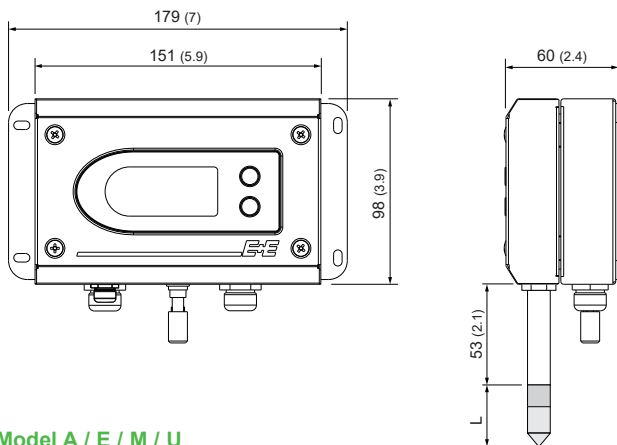
Protective sensor coating

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.

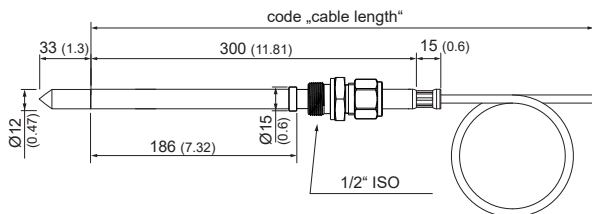
Models

Model	pressure range	working range	Ø-probe mm (inch)
A - wall mount		-40...60 °C (-40...140°F)	12 (0.47)
remote probe, 20 bar	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356°F)	12 (0.47)
E - remote probe with sliding fitting for assembly / disassembly under pressure	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356°F)	13 (0.51)
M - remote probe, 300 bar	0.01...300 bar (0.15...4351 psi)	-40...180 °C (-40...356°F)	12 (0.47)
U - remote probe for sensor retraction tool PN250	0.01...250 bar (0.15...3626 psi)	-40...180 °C (-40...356°F)	12/15 (0.47/0.59)

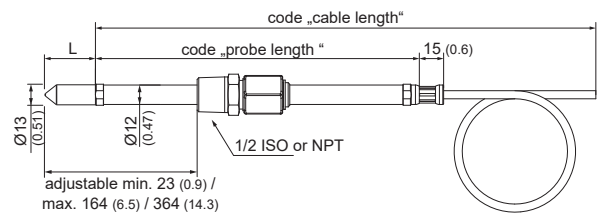
Dimensions in mm (inches)



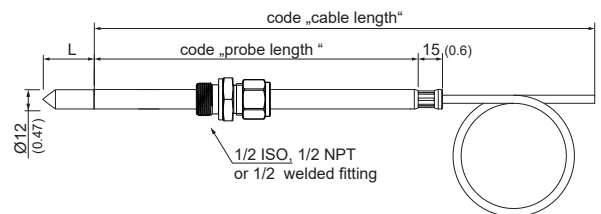
Model A / E / M / U
housing



Model U
remote probe for sensor retraction tool PN250



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



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

L - length of filter	mm (inch)
stainless steel sintered filter	33 (1.3")
PTFE-filter	33 (1.3")
stainless steel grid filter	39 (1.5")
oil filter	32 (1.26")

Technical Data EE300Ex

Measurands

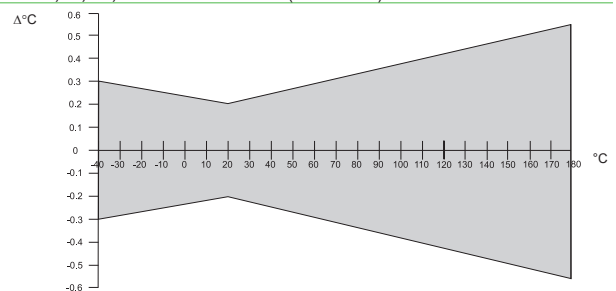
Relative humidity

Measuring range	0...100 % RH		
Accuracy ¹⁾			
(including hysteresis, non-linearity and repeatability, traceable to international standards, administrated by NIST, PTB, BEV...)	-15...40 °C (5...104 °F)	≤90 % RH	± (1.3 + 0.3%*mv) % RH
	-15...40 °C (5...104 °F)	>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 t_{90}	< 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)
	For TIIS (Japan):
	model A, E, M, U: -40...60 °C (-40...140 °F)

Accuracy



Temperature dependence of electronics typical 0.005 °C/°C

Calculated parameters

		from	up to		units
			wall mount	remote probe	
Dew point temperature	Td	-40 (-40)	60 (140)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	60 (140)	100 (212)	°C (°F)
Wet bulb temperature	Tw	0 (32)	60 (140)	100 (212)	°C (°F)
Water vapour pressure	e	0 (0)	200 (3)	1 100 (15)	mbar (psi)
Mixing ratio	r	0 (0)	425 (2900)	999 (9999)	g/kg (gr/lb)
Absolute humidity	dv	0 (0)	150 (60)	700 (300)	g/m ³ (gr/ft ³)
Specific enthalpy	H	0 (0)	400 (150000)	2800 (999999)	kJ/kg (Btu/lb)
Water activity	aw	0	-	1	[]
Water content	x	0	-	100000	[ppm]

Outputs

freely selectable and scalable outputs 2 x 4-20 mA (2-wire) galvanically isolated $R_L = (V_{cc}-9V)/20mA$
 Output 1 must be connected!

General

Supply voltage	$V_{cc, min} = (9+R_L \cdot 0.02) VDC$ $V_{cc, max} = 28 V DC$ $R_L =$ load resistor		
Current consumption	max 20 mA per channel		
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 mm ² (AWG 16)		
Working temperature range	probe	according 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	EN61326-1	EN61326-2-3	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: $U_i = 28V$; $I_i = 100mA$; $P_i = 700mW$; $C_i = 2.2nF$; $L_i \approx 0mH$

Ex-Designation:

Transmitter without display II 1 G Ex ia IIC T4 Ga / II 1 D Ex ia IIIC 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 IIIC T80°C...220°C Da

International (IECEX)

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

Ex-Designation:

Transmitter without display Ex ia IIC T4 Ta = -40°C to 60°C Ga / Ex ia IIIC 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 IIIC T80°C Da

China (NEPSI)

Certificate: Cert NO. GYJ16.1417X by NEPSI
 Safety factors: $U_i = 28Vdc$; $I_i = 100mA$; $P_i = 700mW$; $C_i = 2.2nF$; $L_i = 0mH$

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: $U_i = 28Vdc$; $I_i = 100mA$; $P_i = 700mW$; $C_i = 2.2nF$; $L_i = 0mH$
 $T_a = -40^\circ C$ to $60^\circ C$

Ex-Designation, only for gas:

IIC T4 Gb

Korea (KCs)

Remote probe

Certificate: 17-AV4BO-0107X by KCs
 Safety factors: $6.4 Vdc \leq U_i \leq 28Vdc$; $I_i \leq 100mA$; $P_i \leq 700mW$; $C_i \leq 2.2nF$; $L_i = 0mH$

Ex-Designation, only for gas:

Transmitter Ex ia IIC T4 ($T_a = -40^\circ C \sim +60^\circ C$)
 Remote probe Ex ia IIC T6~T1 ($T_a = -70^\circ C \sim +200^\circ C$)

Wall mount

Certificate: 16-AV4BO-0364X by KCs
 Safety factors: $6.4 Vdc \leq U_i \leq 28Vdc$; $I_i \leq 100mA$; $P_i \leq 700mW$; $C_i \leq 2.2nF$; $L_i = 0mH$

Ex-Designation, only for gas:

Ex ia IIC T4 ($T_a = -40^\circ C \sim +60^\circ C$)

USA (FM)

Certificate: No. FM17US0302X by FM Approvals
Safety factors: $6.4 \text{ Vdc} \leq V_{\text{max}} \text{ (or } U_{\text{i}}) \leq 28 \text{ Vdc}$; $I_{\text{max}} \text{ (or } I_{\text{i}}) = 100 \text{ mA}$; $P_{\text{i}} = 700 \text{ mW}$;
 $C_{\text{i}} = 2.2 \text{ nF}$; $L_{\text{i}} = 0 \text{ mH}$

Ex-Designation:

Equipment Group I: EE300Ex without display

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; 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 and D; 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: $6.4 \text{ Vdc} \leq V_{\text{max}} \text{ (or } U_{\text{i}}) \leq 28 \text{ Vdc}$; $I_{\text{max}} \text{ (or } I_{\text{i}}) = 100 \text{ mA}$; $P_{\text{i}} = 700 \text{ mW}$;
 $C_{\text{i}} = 2.2 \text{ nF}$; $L_{\text{i}} = 0 \text{ mH}$

Ex-Designation:

Equipment Group I: EE300Ex without display

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; 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
Zone 0, Ex ia IIC T4 Ta = -40°C to +60°C Ga; Entity – M1_139080; IP65
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
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

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 and D; 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 1, Ex ia IIB T4 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
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-HT

		EE300Ex-HT6S			
		A	E	M	U
Hardware Configuration	Model	wall mount			
		remote probe up to 20 bar (290 psi)			
		remote probe up to 300 bar (4351 psi)			
		remote probe for sensor retraction tool PN250			
	Display ¹⁾	without display		X	
		with display		D	
	Electrical Connection	2 x M16 cable gland			B
		1/2" NPT conduit adapter			C
		2 x M20 cable gland			G
	Probe Cable	wall mount	X		
	1 m (3.3 ft)		C	C	C
	2 m (6.6 ft)		E	E	E
	5 m (16.4 ft)		G	G	G
	10 m (32.8 ft)		H	H	H
Probe Length	wall mount	X			
	65 mm (2.56") ²⁾		C	C	
	200 mm (7.9")		F	F	
	300 mm (11.8)				G
	400 mm (15.8)		H	H	
Feedthrough (probe fitting)	without probe fitting	X	X	X	
	1/2 ISO - cut-in fitting; 12 mm (0.47")		A	A	A
	1/2 weld cut-in fitting; 12 mm (0.47")		B	B	
	1/2 NPT - cut-in fitting; 12 mm (0.47")		C	C	
	1/2 ISO - sliding fitting; 13 mm (0.51")		F		
	1/2 NPT - sliding fitting; 13 mm (0.51")		H		
Filter	stainless steel sintered	D	D	D	D
	PTFE ³⁾	E	E	E	
	stainless steel grid	I	I	I	
	H ₂ O ₂ ³⁾	L	L	L	
	oil	M	M	M	
Sensor Protection	without coating			X	
	with coating ⁴⁾			1	
Ex-Certification	ATEX (Europe)			AT	
	IECEX (International)			IC	
	NEPSI (China)			CN	
	FM (Canada)			CA	
	FM (USA)			FM	
	KCs (Korea)			KC	
	TIIS (Japan)			JP	
Setup - Output	Units	metric / SI [°C]		M	
		non metric / US [°F] ⁵⁾		N	
	Output 1 ⁶⁾	relative humidity			UW
		other measurand ⁷⁾			select according „Measurand Code“ below
	Scaling Output 1	range			yyy ⁸⁾
Output 2	temperature ⁷⁾			Tx	
	other measurand			select according „Measurand Code“ below	
Scaling Output 2	range			yyy ⁸⁾	
				select according data sheet „Scaling Outputs“	

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.

Measurand Code

relative humidity	UW
temperature	Tx
dew point temperature	TD
frost point temperature	TF
wet bulb temperature	TW
water vapour partial pressure	Ex

mixture ratio	Rx
absolute humidity	DV
specific enthalpy	Hx
water activity ⁹⁾	AW
water content in mineral transformer oil ⁹⁾	Xm
water content customized oil ⁹⁾	Xk

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-HT6SMDBHAFAD1AT/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: 1/2 ISO - cut-in fitting
 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