EE300Ex-HT

Humidity and Temperature Transmitter for Intrinsically Safe Applications


wall mount


remote probe

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 (KC) 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 KC 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.

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

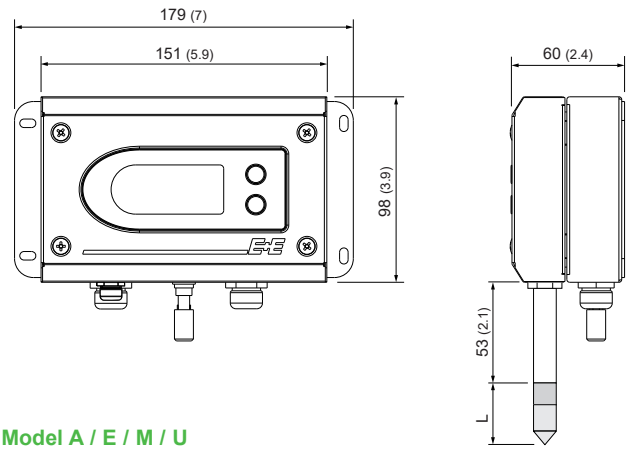
Protective sensor coating

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.

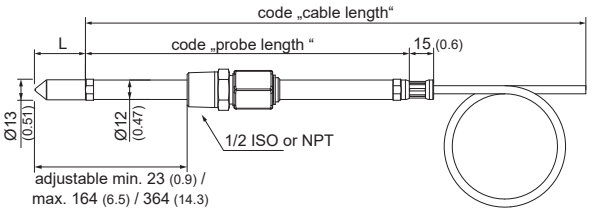
Models

Model		pressure range	working range	Ø-probe mm (inch)
A -	wall mount		-40...60 °C (-40...140°F)	12 (0.47)
E -	remote probe, 20 bar	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356°F)	12 (0.47)
	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)

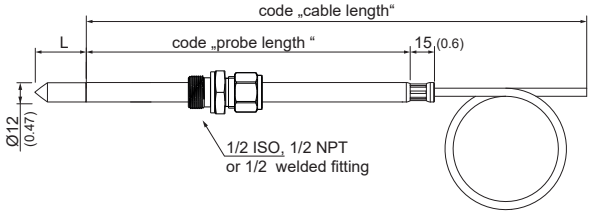
Dimensions in mm (inches)



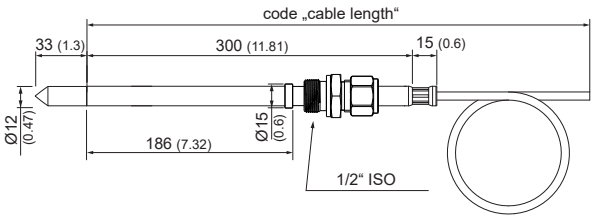
Model A / E / M / U
housing



Model 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



Model U
remote probe for sensor retraction tool PN250

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

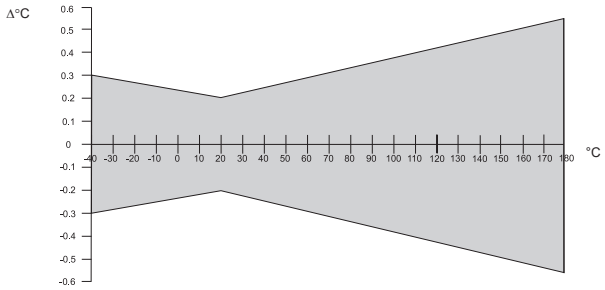
Relative humidity

Measuring range	0...100 % RH		
Accuracy[1)]			
(including hysteresis, non-linearity and repeatability,	-15...40 °C (5...104 °F)	≤90 % RH	± (1.3 + 0.3%*mv) % RH
traceable to international standards, administrated by NIST, PTB, BEV...)	-15...40 °C (5...104 °F)	>90 % RH	± 2.3 % RH
	-25...70 °C (-13...158 °F)		± (1.4 + 1%*mv) % RH
mv = measured value	-40...180 °C (-40...356 °F)		± (1.5 + 1.5%*mv) % RH
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 wall mount	up to remote probe	units
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)	1100 (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/m³ (gr/ft³)
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 Output 1 must be connected!	R_L = (Vcc-9V)/20mA

General

Supply voltage	$V_{cc\ min}$ = (9+R_L*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 mm² (AWG 16)	
Working temperature range	probe electronics without display electronics with display	according measuring range -40...60 °C (-40...140 °F) -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 Industrial Environment	ICES-003 ClassB FCC Part15 ClassB
Material	enclosure probe cable probe (without filter)	stainless steel 1.4404 PTFE 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:	Ui = 28V; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li ≈ 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 ≤ Ui ≤ 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 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:	Ui = 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 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:	Ui = 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH Ta = -40°C to 60°C

Ex-Designation, only for gas:

IIC T4 Gb

Korea (KC)

Remote probe

Certificate:	17-AV4BO-0107X by KCs
Safety factors:	6.4 Vdc ≤ Ui ≤ 28Vdc; Ii ≤ 100mA; Pi ≤ 700mW; Ci ≤ 2.2nF; Li = 0mH

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 Vdc ≤ Ui ≤ 28Vdc; Ii ≤ 100mA; Pi ≤ 700mW; Ci ≤ 2.2nF; Li = 0mH

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 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 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 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
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			
Hardware Configuration	**Model**	wall mount	A			
		remote probe up to 20 bar (290 psi)		E		
		remote probe up to 300 bar (4 351 psi)			M	
		remote probe for sensor retraction tool PN250				U
	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_2O_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		
		KC (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] select according data sheet „Scaling Outputs“		
	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 KC (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 KC (Korea) models A, E, M and U
6) Assign to ouptut 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 enthalphy	Hx
water activity [9]	AW
water content in mineral transformer oil [9]	Xm
water content customized oil [9]	Xk

9) For approval KC (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:	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	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, Ex certified	HA011403
Sensor retraction tool PN250	ZM-WA-025-040-EST
Sensor retraction tool PN40	BG-WA-103-045-EST