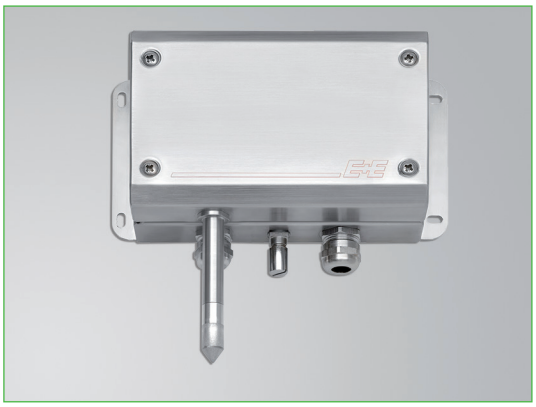
EE300Ex-HT

Humidity/Temperature Transmitter for Intrinsically Safe Applications



EE300Ex - wall mounting

EE300Ex - remote sensing probe

The EE300Ex humidity / temperature transmitter has been designed specifically for measurement in explosion hazard areas. It complies with the classifications for **Europe (ATEX), International (IECEx) and USA / Canada (FM)**.
Accurate measurement over the full range of 0…100 % RH and -40…180 °C (-40...356 °F) is also possible in applications under pressure from 0.01 … 300 bar (4351 psi).

The EE300Ex can be used in flammable gas and dust applications. The entire transmitter can be placed in a explosion hazardous area. With the remote sensing probe a temperature classification up to T6 can be reached.
With a stainless steel enclosure and sensing probe the EE300Ex is the ideal transmitter for challenging industrial applications. The 2-part construction facilitates simple installation and rapid replacement of the measuring section without time consuming wiring. The well proven E+E humidity sensors ensure reliable measurement performance and long term stability.

Based on 2-wire technology, the transmitter can be powered by any intrinsically safe power source or via Zener barriers. The measured values are available on two 4…20mA analog outputs. In addition to the measured values for humidity and temperature, the EE300Ex calculates dew point, frost point, absolute humidity, mixing ratio and other humidity related physical quantities.

When outside of the hazardous measurement area, the setup of the EE300Ex can be easily customized by using the supplied configuration software. This includes the configuration of the analog outputs and the calibration of the humidity and temperature during service.

Measurement of moisture in oil:
Besides measurement in the air, the EE300Ex can be employed for measurement of both absolute water content (x) in ppm or relative water activity (aw) in oils.
Typical applications include oil purifiers and online monitoring of lubrication and hydraulic oils on off shore oil rigs.
The USA and Canada approval is valid for air and gas measurement only.

Dew point measurement in natural gas.
EE300Ex measures reliably dew point in natural gas down to -20 °C (-4 °F) at a line pressure up to 250 bar (3625 psi).
The optional sensor retraction tool (see accessories) allows for easily installation and removal of the sensing probe for service or calibration without interruption of the gas flow in the pipeline.

Typical Applications

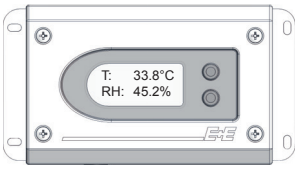
chemical process control
pharmaceutical applications
explosive / hazardous storage rooms
flour mills
moisture in oil measurement
dew point measurement in natural gas hubs

Features

approved for gas and dust
installation in zone 0 / Div. 1
calculation of related physical quantities
stainless steel housing and probe
highest accuracy up to 180 °C (356 °F)
pressure tight up to 300 bar (4351 psi)

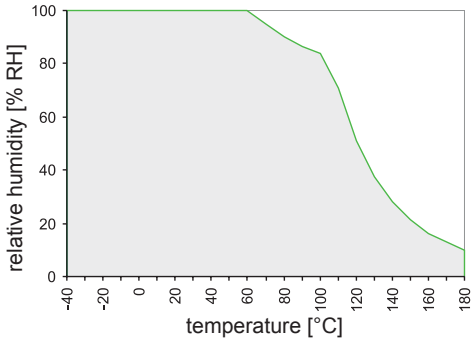
Display

Two of the measured or calculated physical quantities can be selected with push buttons on the front cover to be shown on the optional display.
EE300Ex version with display is not available for environments with combustible dust, Fibers and Flyings and gases with EPL Ga IIC (Group A&B).



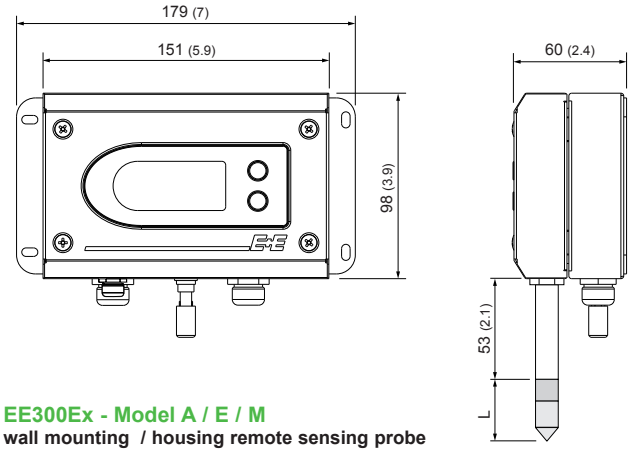
Humidity Sensor - Working Range and Coating

The gray area shows the allowed measurement range for the humidity sensor. Operating points outside of this range do not lead to destruction of the sensing element, but the specified measurement accuracy cannot be guaranteed.
Harsh industrial processes as well as heavily contaminated and/ or corrosive environments may affect the humidity
sensor and lead to measurement drift. The E+E proprietary coating significantly reduces these effects and considerably improves the long-term stability of the transmitter.



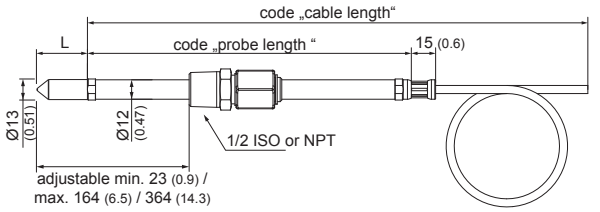
Models and Dimensions in mm (inches)

Model		pressure range	working range	Ø-probe
A -	wall mounting		-40...60°C (-40...140°F)	12 (0.47)
E -	remote sensing probe up to 20 bar (300 psi)	0.1...20 bar (1.5...300 psi)	-40...180°C (-40...356°F)	12 (0.47)
	remote sensing probe up to 20 bar (300 psi) 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 sensing probe up to 300 bar (4351 psi)	0.01...300 bar (0.15...4351 psi)	-40...180°C (-40...356°F)	12 (0.47)
U -	remote sensing probe for sensor retraction tool PN250	0.01...300 bar (0.15...4351 psi)	-40...180°C (-40...356°F)	12/15 (0.47/0.59)

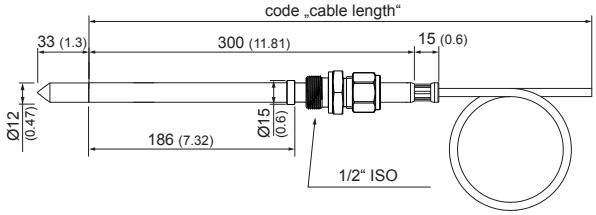


EE300Ex - Model A / E / M
wall mounting / housing remote sensing probe

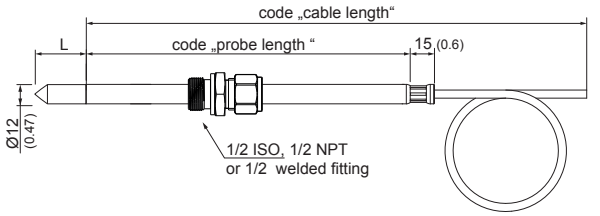
L - length of filter [mm]	
stainless steel sintered filter	33 (1.3)
PTFE-filter	33 (1.3)
stainless steel grid filter	39 (1.5)
oil filter	32 (1.26)



EE300Ex - Model E
remote sensing probe 20 bar (300 psi) with sliding fitting



EE300Ex - Model U
remote sensing probe for sensor retraction tool 250 bar (3625 psi)



EE300Ex - Model E / M
remote sensing probe 20 bar (300 psi) / 300 bar (4351 psi) with cut-in fitting

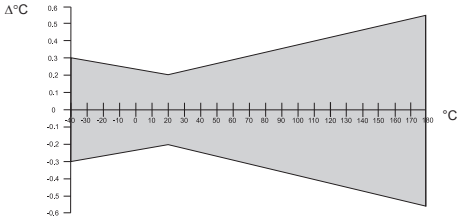
Technical Data EE300Ex

Measuring values

Relative humidity

Humidity sensor[1]		HC1000
Measuring range[1]		0...100 % RH
Accuracy[2] (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
Temperature dependence electronics		typ. 0.03 % RH/°C
Response time with filter at 20 °C (68 °F) / t_{90}		< 30 sec.

Temperature

Temperature sensor		Pt1000 (Tolerance class A, DIN EN 60751)
Measuring range sensor head	wall mounting:	-40...60 °C (-40...140 °F)
	remote sensing probe:	-40...180 °C (-40...356 °F)
Accuracy		

Temperature dependence of electronics	typical 0.005 °C/°C

Calculation functions

		from		to				unit	
				wall mounting		*remote sensing probe*			
Dew/Frost point temp.	Td/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 (CH1) must be connected!	R_L=(Vcc-9V)/20mA

General

Supply voltage (Class III)	$V_{cc\ min}$=(9+R_L*0.02) VDC $V_{cc\ max}$=28 V DC		
Current consumption	max 20 mA per channel		
Pressure range for pressure tight sensor probe	refer to model		
Serial interface for communication [3]	RS232		
System requirements for software	WINDOWS XP or later		
Protection class of housing	IP65 / Nema 4		
Cable gland	M16 for cable diameter 5 - 10 mm (0.2 - 0.4)		
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)		
Temperature range	sensor head	according measuring range	
	electronic	-40...60 °C (-40...140 °F)	
	electronic with display	-20...60 °C (-4...140 °F)	
Storage temperature range	electronic and sensor head	-20...60 °C (22...140 °F)	
Electromagnetic compatibility according	EN61326-1 Industrial Environment	EN61326-2-3	ICES-003 ClassB FCC Part15 ClassB
Material	Housing	Stainless Steel 1.4404	
	Probe cable	PTFE	
	Probe (without Filter)	Stainless Steel 1.4301	

1) Refer to the working range of the humidity sensor.
2) 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).
3) Configuration adapter E-PCA and cable HA011061 necessary.

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 sensing probe	II 1 G Ex ia IIC T6-T1 Ga	/	II 1 D Ex ia IIIC T80°C...220°C Da

International (IECEx)

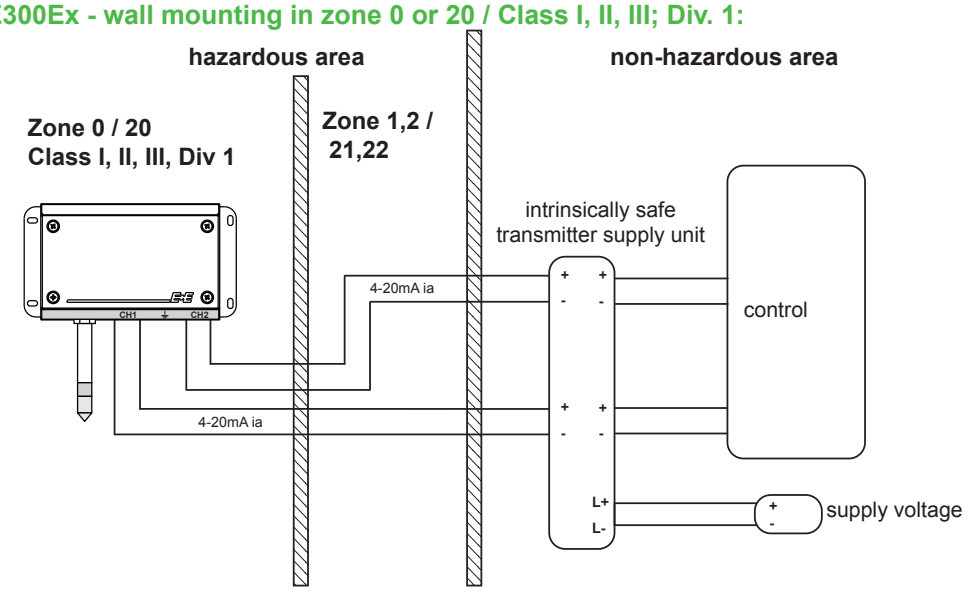
Certificate:	IECEx FMG 14.0017 X by FM Approvals		
Safety factors:	6.4 Vdc ≤ U_i ≤ 28Vdc; I_i = 100mA; P_i = 700mW; C_i = 2.2nF; L_i = 0mH		
Ex-Designation:			
Transmitter without display	Ex ia IIC T4 Ta = -40°C to 60°C Ga	/	Ex ia IIIC T131°C Da
Transmitter with display	Ex ia IIC T4 Ta = -40°C to 60°C Gb	/	Ex ia IIB T4 Ta = -40°C to 60°C Ga
Remote sensing probe	Ex ia IIC T6-T1 Ta = -70°C to 200°C Ga	/	Ex ia IIIC T80°C Da

USA and Canada (FM)

Certificate:	by FM Approvals
Safety factors:	6.4 Vdc ≤ V_{max} (or U_i) ≤ 28Vdc; I_{max} (or I_i) = 100mA; P_i = 700mW; C_i = 2.2nF; L_i = 0mH
Ex-Designation:	
Transmitter without display	IS/I,II,III/1/ABCDEFG/T4 -40°C < Ta < 60°C; Entity – M1_1309080; IP65 *USA:* NI/I,II,III/2/ABCDEFG/T4 -40°C < Ta < 60°C *Canada:* NI/I/2/ABCD/T4 -40°C < Ta < 60°C I/0/AEx ia IIC T4 -40°C < Ta < 60°C; Entity – M1_1309080; IP65 I/0/Ex ia IIC T4 -40°C < Ta < 60°C Ga; Entity – M1_1309080; IP65 20/ AEx ia IIIC T131°C -40°C < Ta < 60°C; Entity – M1_1309080; IP65
Transmitter with display	IS/I/1/CD/T4 -40°C < Ta < 60°C; Entity – M1_1309080 IS/I/2/ABCD/T4 -40°C < Ta < 60°C; Entity – M1_1309080 NI/I/2/ABCD/T4 -40°C < Ta < 60°C I/0/AEx ia IIB T4 -40°C < Ta < 60°C; Entity – M1_1309080 I/1/AEx ia IIC T4 -40°C < Ta < 60°C; Entity – M1_1309080 I/0/Ex ia IIB T4 -40°C < Ta < 60°C Ga; Entity – M1_1309080 I/1/Ex ia IIC T4 -40°C < Ta < 60°C Gb; Entity – M1_1309080
Remote sensing probe	IS/I,II,III/1/ABCDEFG/T6-T1 Entity – M1_1309080; IP65 *USA:* NI/I,II,III /2/ABCDEFG/T6-T1 *Canada:* NI/I/2/ABCD/T6-T1 I/0/AEx ia IIC T6-T1 Entity – M1_1309080; IP65 I/0/Ex ia IIC T6-T1 Ga Entity – M1_1309080; IP65 20/ AEx ia IIIC T80°C Entity – M1_1309080; IP65

Mounting Example

EE300Ex - wall mounting in zone 0 or 20 / Class I, II, III; Div. 1:



Ordering Guide EE300Ex-HT

			EE300Ex-HT6S			
Hardware Configuration	**Model**	wall mounting	A			
		remote sensing probe up to 20 bar (300p si)		E		
		remote sensing probe up to 300 bar (4351 psi)			M	
		remote sensing probe for sensor retraction tool PN250				U
	Display	without display	x	x	x	x
		with display [1]	D	D	D	D
	Electrical Connection	2 x M16 cable gland	B	B	B	B
	Probe - Cable Length	wall mounting	x			
		1 m (3.3 ft)		C	C	C
		2 m (6.6f t)		E	E	E
		5 m (16.4 ft)		G	G	G
		10 m (32.8 ft)		H	H	H
	Probe Length	wall mounting	x			
		65 mm (2.56)		C	C	
		200 mm (7.9)		F	F	
		300 mm (11.8)				G
		400 mm (15.8)		H	H	
	Zone 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 filter	D	D	D	D
		PTFE filter [2]	E	E	E	
		stainless steel grid filter on stainless steel body	I	I	I	
		H2O2 filter [2]	L	L	L	
		oil filter	M	M	M	
	Sensor Protection	without coating	x	x	x	x
		with coating [3]	1	1	1	1
	Ex-Certification	Europe (ATEX)	AT	AT	AT	AT
		International (IECEx)	IC	IC	IC	
		USA / Canada (FM)	FM	FM	FM	
	Special option	no				
		dew point measurement in natural gas		Gx	Gx	Gx
Software Configuration	**Measured Value Units**	metric / SI [°C]	M	M	M	M
		non metric / US [°F]	N	N	N	N
	Physical Parameters Output 1	relative humidity	UW	UW	UW	UW
		temperature	Tx	Tx	Tx	Tx
		dew point temperature	TD	TD	TD	TD
		frost point temperature	TF	TF	TF	TF
		wet bulb temperature	TW	TW	TW	TW
		water vapour partial pressure	Ex	Ex	Ex	Ex
		mixture ratio	Rx	Rx	Rx	Rx
		absolute humidity	DV	DV	DV	DV
		specific enthalphy	Hx	Hx	Hx	Hx
		water activity		AW	AW	
		water content in mineral transformer oil		Xm	Xm	
		water content customized oil		Xk	Xk	
	Scaling Range Output 1	UW, Tx,...	yyy (select according „scaling ranges“, next page)			
	Physical Parameters Output 2	relative humidity	UW	UW	UW	UW
		temperature	Tx	Tx	Tx	Tx
		dew point temperature	TD	TD	TD	TD
		frost point temperature	TF	TF	TF	TF
		wet bulb temperature	TW	TW	TW	TW
		water vapour partial pressure	Ex	Ex	Ex	Ex
		mixture ratio	Rx	Rx	Rx	Rx
		absolute humidity	DV	DV	DV	DV
		specific enthalphy	Hx	Hx	Hx	Hx
		water activity		AW	AW	
		water content in mineral transformer oil		Xm	Xm	
		water content customized oil		Xk	Xk	
	Scaling Range Output 2	UW, TD,...	yyy (select according „scaling ranges“, next page)			

[1] No display possible for environments with combustible dust, fibers and flyings and in gases with EPL Ga IIC (Group A&B)
[2] Filter cap must not be used in EPL Ga IIC (Gas Group A&B)
[3] Do not use in oil

Scaling Ranges

UW - Relative Humditiy [% RH]											
001	0...100										

Tx - Temperature / TD - Dew Point Temperature / TF- Frost Point Temperature / TW- Wet Bulb Temperature [°C or °F]											
002	-40...60	007	0...60	015	20...120	083	-40...140				
003	-10...50	008	-30...70	022	-40...80						
004	0...50	012	-40...120	024	-20...80						
005	0...100	014	-20...100	052	-40...180						

Ex - Water vapour partial pressure [mbar]											
001	0...200	002	0...1000								

Rx - Mixture ratio [g/kg]											
001	0...400	002	0...900								

DV - Absolute Humidity [g/m³]											
001	0...150	002	0...700								

Hx - Specific Enthalphy [kJ/kg]											
001	-50...400	002	-50...2800								

AW - Water Activity [ ]											
001	0...1										

Xm or Xk - Water Content [ppm]											
001	0...100	005	0...6000	009	0...20000						
002	0...500	006	0...5000	010	0...200						
003	0...1000	007	0...300	011	0...100000						
004	0...10000	008	0...30000								

Other scaling ranges on request.

Order Example

Example 1:

EE300EX-HT6SMDBHFAD1AT/MTx052UW001

Model:	remote sensing probe up to 300bar
Display:	with display
Electrical Connection:	2 x M16 cable gland
Probe - Cable Length:	10 m (32.8 ft)
Probe Length:	200 mm (7.9)
Zone feedthrough:	1/2 ISO - cut-in fitting
Filter:	stainless steel sintered filter
Sensor Protection:	with coating
Ex-Certification:	ATEX
Measured Value Units:	metric
Physical Parameters Output 1:	temperature
Scaling Range Output 1:	-40...180 °C
Physical Parameters Output 2:	relative humidity
Scaling Range Output 2:	0...100 %RH

Example 2:

EE300EX-HT6SAxBxxxIxFM/NTx083TD083

Model:	wall mounting
Display:	without display
Electrical Connection:	2 x M16 cable gland
Probe - Cable Length:	wall mounting
Probe Length:	wall mounting
Zone feedthrough:	without probe fitting
Filter:	stainless steel grid filter
Sensor Protection:	without coating
Ex-Certification:	USA / Canada (FM)
Measured Value Units:	non metric
Physical Parameters Output 1:	temperature
Scaling Range Output 1:	-40...140 °F
Physical Parameters Output 2:	dew point temperature
Scaling Range Output 2:	-40...140 °F

Accessories

Configuration adapter for PC	(EE-PCA)
ATEX Connection cable with protective circuit - EE300Ex to configuration adapter	(HA011061)
Blank cover for housing base	(HA011401)
Safety Barrier, 1-channel, STAHL 9002/13-280-093-001	(HA011410)
Intrinsically safe Transmitter Supply Unit, 1-channel, STAHL 9160/13-11-11	(HA011405)
Intrinsically safe Transmitter Supply Unit , 2-channel, STAHL 9160/23-11-11	(HA011406)
Sealing plug for unused cable glands	(HA011402)
Ball valve with 1/2 ISO female thread with Ex-Certification	(HA011403)
Sensor retraction tool PN250	(ZM-WA-025-040-EST)
Sensor retraction tool PN40	(BG-WA-103-045-EST)