

EE300Ex-HT



Humidity/Temperature Transmitter for Intrinsically Safe Applications

The EE300Ex humidity and temperature transmitter fulfils the requirements of the ATEX directives on intrinsically safe operating equipment for use in potentially explosive atmospheres in zone 0 / 20 and up to T6 temperature class.

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 ... 300bar (4351psi).

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.

The entire EE300Ex can be placed in the explosion hazardous area. 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.



EE300Ex - wall mounting



EE300Ex - remote sensing probe

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.

Typical Applications

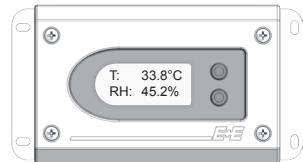
- chemical process control
- pharmaceutical applications
- explosive / hazardous storage rooms
- flour mills

Features

- approved to EPL Ga / Da (gas/dust)
- installation in zone 0
- calculation of related physical quantities
- stainless steel housing and probe
- highest accuracy up to 180°C (356°F)
- pressure tight up to 300bar (4351psi)
- moisture in oil measurement

Display

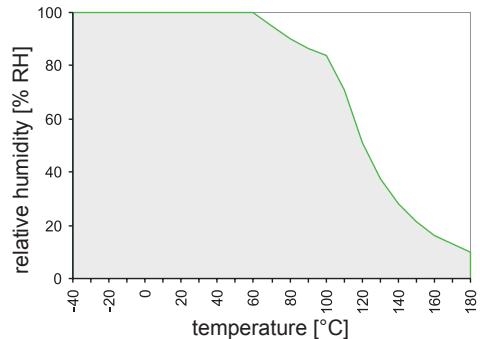
Two of the measured or calculated physical quantities can be selected with push buttons on the front cover to be shown on the optional display.
EE300Ex version with display is not available for environments with combustible dust (EPL Da, Db, Dc) and EPL Ga IIC!



Humidity Sensor - Working Range and Coating

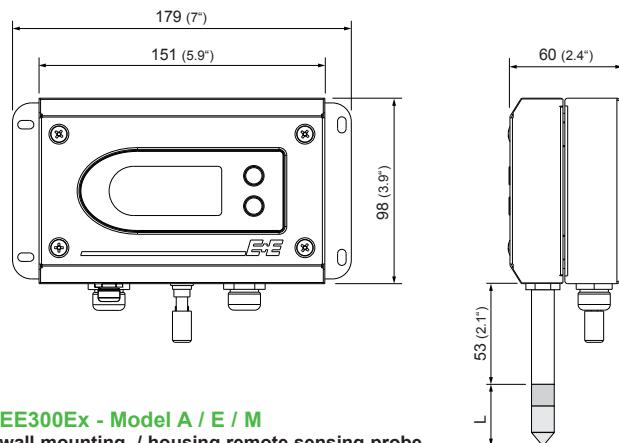
The gray area shows the allowed measurement range for the humidity sensor. Operating points outside of this range do not lead to destruction of the sensing element, but the specified measurement accuracy cannot be guaranteed.

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.



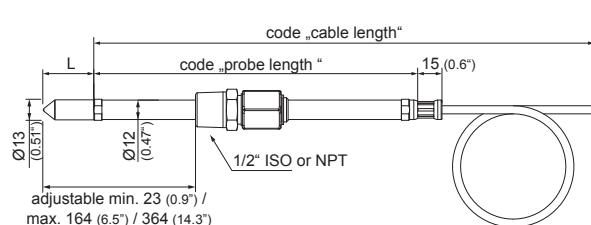
Models and Dimensions [mm]

Model	pressure range	working range	Ø-probe
A - wall mounting		-40...60°C (-40...140°F)	12mm (0.47")
	remote sensing probe up to 20bar (300psi)	0.1...20bar (1.5...300psi)	-40...180°C (-40...356°F)
E -	remote sensing probe up to 20bar (300psi) with moveable fitting for assembly / disassembly under pressure	0.1...20bar (1.5...300psi)	-40...180°C (-40...356°F)
M -	remote sensing probe up to 300bar (4351psi)	0.01...300bar (0.15...4351psi)	-40...180°C (-40...356°F)

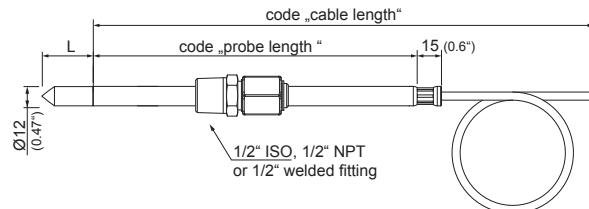


EE300Ex - Model A / E / M
wall mounting / housing remote sensing probe

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 20bar (300psi)
with sliding fitting



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

Technical Data EE300Ex

Measuring values

Relative humidity

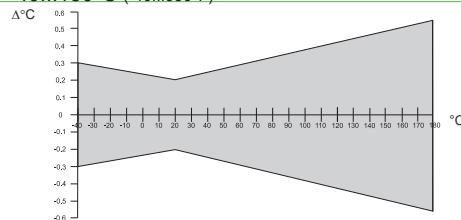
Humidity sensor ¹⁾	HC1000
Measuring range ¹⁾	0...100% RH
Accuracy ²⁾ (including hysteresis, non-linearity and repeatability, traceable to international standards, administrated by NIST, PTB, BEV...)	
-15...40°C (5...104°F) ≤90% RH	± (1.3 + 0.3%*mv) % RH
-15...40°C (5...104°F) >90% RH	± 2.3% RH
-25...70°C (-13...158°F)	± (1.4 + 1%*mv) % RH
-40...180°C (-40...356°F)	± (1.5 + 1.5%*mv) % RH

Temperature dependence electronics

Response time with filter at 20°C (68°F) / t ₉₀	< 30 sec.
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Temperature

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



Temperature dependence of electronics

typical 0.005 °C/°C

Max. selectable Scaling Range

	from	to	unit
		wall mounting	remote sensing probe
Humidity	RH	0	100
Temperature	T	-40 (-40)	60 (140)
Dew point temperature	Td	-40 (-40)	60 (140)
Frost point temperature	Tf	-40 (-40)	0 (32)
Wet bulb temperature	Tw	0 (32)	60 (140)
Water vapour pressure	e	0 (0)	200 (3)
Mixing ratio	r	0 (0)	425 (2900)
Absolute humidity	dv	0 (0)	150 (60)
Specific enthalpy	H	-50 (-15000)	400 (150000)
Water activity	Aw	0	-
Water content	x	0	-

Outputs

Two freely selectable and scalable outputs 4 - 20 mA (2-wire) R_L=(V_{cc}-9V)/20mA

General

Supply voltage (Class III)	V _{cc,min} =(9+R _L *0.02)VDC V _{cc,max} =28VDC
Current consumption	max 20mA 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 mm ² (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 EN61326-2-3 ICES-003 ClassB Industrial Environment FCC Part15 ClassB

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 HA011050 and cable HA011055 necessary.



Ex - Classifications

ATEX

TPS 13 ATEX 38892 003 X

Safety factors

U_i: 28V; I_i: 100mA; P_i: 700mW; C_i: 2,2nF; L_i ≈ 0mH

Ex-Designation

Transmitter without display

II 1 G Ex ia IIC T4 Ga / II 1 D Ex ia IIIC T70°C Da IP65

Transmitter with display

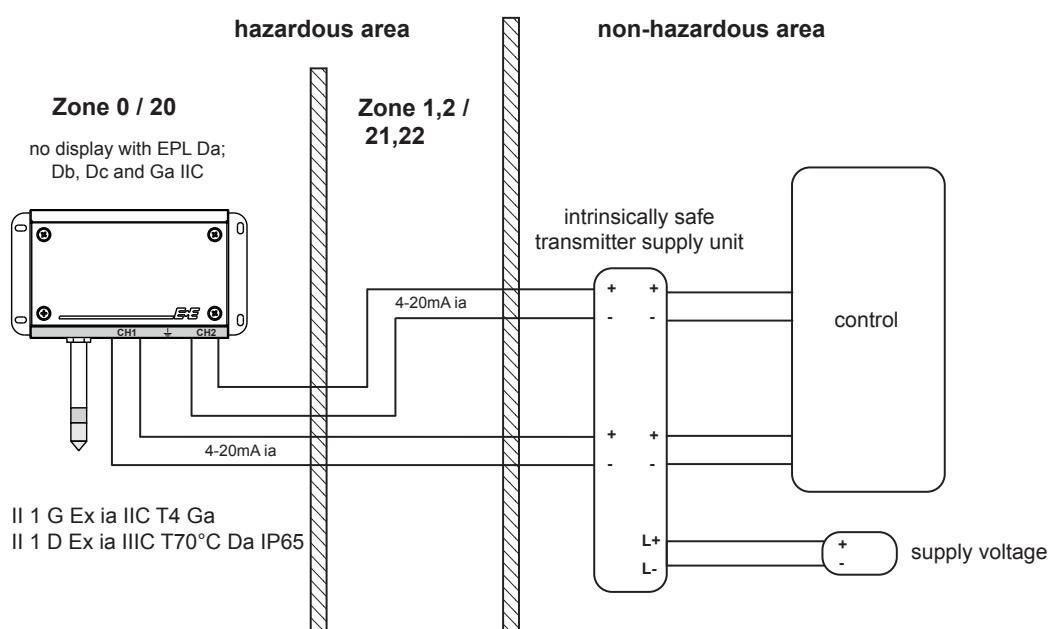
II 2 G Ex ia IIC T4 Gb / II 1 G Ex ia IIB T4 Ga

remote sensing probe

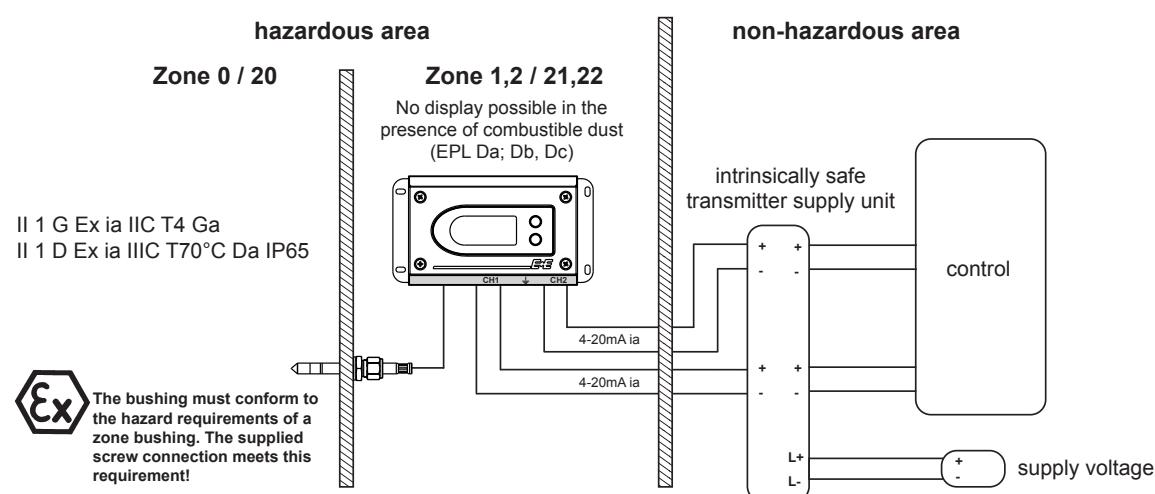
II 1 G Ex ia IIC T6 Ga / II 1 D Ex ia IIIC T70°C Da IP65

Mounting Examples

EE300Ex - wall mounting in zone 0 / 20:



EE300Ex - remote sensing probe in zone 0 / 20 and electronics in zone 1 / 21 or 2 / 22:



Ordering Guide EE300Ex-HT

		EE300Ex-HT6S	EE300Ex-HT6S	EE300Ex-HT6S		
Hardware Configuration	Model	wall mounting remote sensing probe up to 20 bar (300psi) remote sensing probe up to 300 bar (4351psi)	A	E	M	
	Display	without display with display ¹⁾	X D	X D	X D	
	Electrical Connection	2 x M16 cable gland	B	B	B	
	Probe - Cable Length	wall mounting 1m (3.3ft) cable length 2m (6.6ft) cable length 5m (16.4ft) cable length 10m (32.8ft) cable length	X	C E G H	C E G H	
	Probe Length	wall mounting 200mm (7.9") probe length 400mm (15.8") probe length	X	F H	F H	
	Zone Feedthrough (probe fitting)	without probe fitting 1/2" ISO - cut-in fitting; 12mm (0.47") 1/2" weld cut-in fitting; 12mm (0.47") 1/2" NPT - cut-in fitting; 12mm (0.47") 1/2" ISO - sliding fitting; 13mm (0.51") 1/2" NPT - sliding fitting; 13mm (0.51")	X	x A B C F H	x A B C	
	Filter	stainless steel sintered filter PTFE filter ²⁾ stainless steel grid filter on stainless steel body oil filter	D E I M	D E I M	D E I M	
	Sensor Protection	without coating with coating ³⁾	X 1	X 1	X 1	
	Ex-Certification	ATEX approval	AT	AT	AT	
	Measured Value Units	metric / SI [°C] non metric / US [°F]	M N	M N	M N	
Software Configuration	Physical Parameters Output 1	relative humidity temperature dew point temperature frost point temperature wet bulb temperature water vapour partial pressure mixture ratio absolute humidity specific enthalphy water activity water content in mineral transformer oil water content customized oil	UW Tx TD TF TW Ex Rx DV Hx	UW Tx TD TF TW Ex Rx DV Hx AW Xm Xk	UW Tx TD TF TW Ex Rx DV Hx AW Xm Xk	
		Scaling Range Output 1	UW, Tx,...	yyy (select according „scaling ranges“, next page)		
		relative humidity dew point temperature frost point temperature wet bulb temperature water vapour partial pressure mixture ratio absolute humidity specific enthalphy water activity water content in mineral transformer oil water content customized oil	UW TD TF TW Ex Rx DV Hx	UW TD TF TW Ex Rx DV Hx	UW TD TF TW Ex Rx DV Hx	
		Scaling Range Output 2	UW, TD,...	yyy (select according „scaling ranges“, next page)		

¹⁾ No display possible in the presence of combustible dust, zone 20,21 and 22 (EPL Da, Db, Dc) and zone 0 (EPL Ga IIC)

2) Filter cap must not be used in EPL Ga IIC

3) Do not use in oil

Scaling Ranges

UW - Relative Humidity [% 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			
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					

Please observe the maximum adjustable scaling of the outputs (see Technical Data).

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: 10m (32.8ft)
 Probe Length: 200mm (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%

Example 2:

EE300EX-HT6SAxBxxIxAT/MTx002TD002

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: ATEX
 Measured Value Units: metric
 Physical Parameters Output 1: temperature
 Scaling Range Output 1: -40..60°C
 Physical Parameters Output 2: dew point temperature
 Scaling Range Output 2: -40..60°C

Accessories

Configuration adapter for PC	(HA011050)
Connection cable for EE300Ex and 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)
Blank cover for unused cable glands	(HA011402)
Ball valve with ISO 1/2" female thread with Ex-Certification	(HA011403)