

# 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.

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.



EE300Ex - wall mounting



EE300Ex - remote sensing probe

## Typical Applications

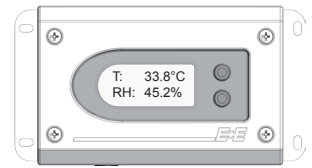
- chemical process control
- pharmaceutical applications
- explosive / hazardous storage rooms
- flour mills

## 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

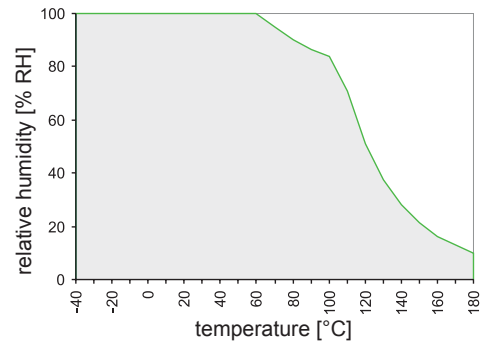
## Display

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!



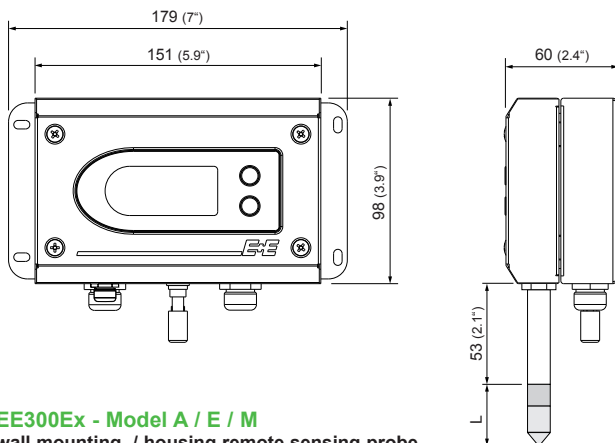
## Humidity Sensor - Working Range and Coating

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.



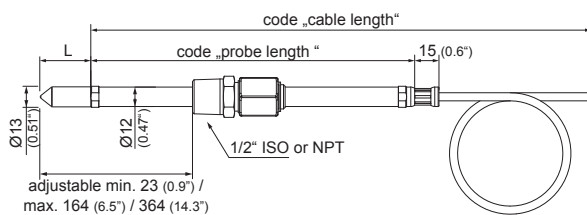
## Models and Dimensions [mm]

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)	12mm (0.47")
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)	13mm (0.51")
M - remote sensing probe up to 300bar (4351psi)	0.01...300bar (0.15...4351psi)	-40...180°C (-40...356°F)	12mm (0.47")

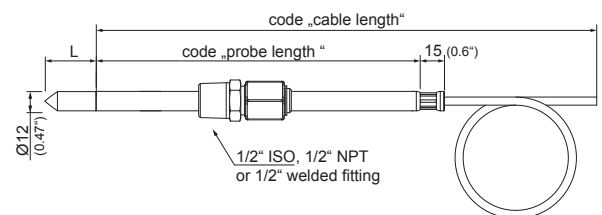


**EE300Ex - Model A / E / M**  
wall mounting / housing remote sensing probe

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

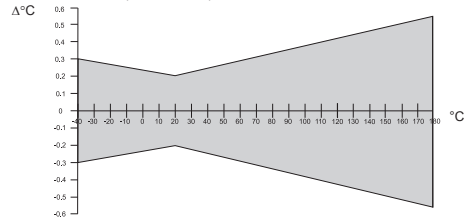
#### Relative humidity

Humidity sensor <sup>1)</sup>	HC1000
Measuring range <sup>1)</sup>	0...100% RH
Accuracy <sup>2)</sup> (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 <sub>90</sub>	< 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

#### Max. selectable Scaling Range

		from	to		unit
			wall mounting	remote sensing probe	
Humidity	RH	0	100	100	%RH
Temperature	T	-40 (-40)	60 (140)	180 (356)	°C (°F)
Dew point temperature	Td	-40 (-40)	60 (140)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	0 (32)	°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/m <sup>3</sup> (gr/ft <sup>3</sup> )
Specific enthalpy	H	-50 (-15000)	400 (150000)	2800 (999999)	kJ/kg (lbf/lb)
Water activity	Aw	0	-	1	[ ]
Water content	x	0	-	100000	[ppm]

### 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 <sup>3)</sup>	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 <sup>2</sup> (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
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 HA011050 and cable HA011061 necessary.

## Ex - Classifications

ATEX

TPS 13 ATEX 38892 003 X

Safety factors

U<sub>i</sub>: 28V; I<sub>i</sub>: 100mA; P<sub>i</sub>: 700mW; C<sub>i</sub>: 2,2nF; L<sub>i</sub> ≈ 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

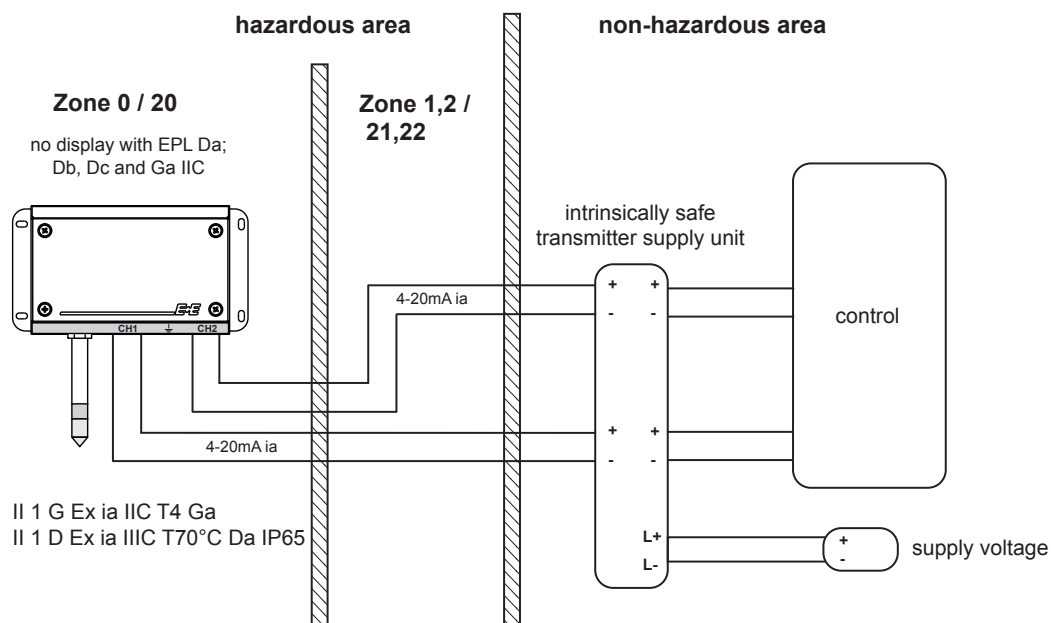
II 2 G Ex ia IIC T4 Gb / II 1 G Ex ia IIB T4 Ga

remote sensing probe

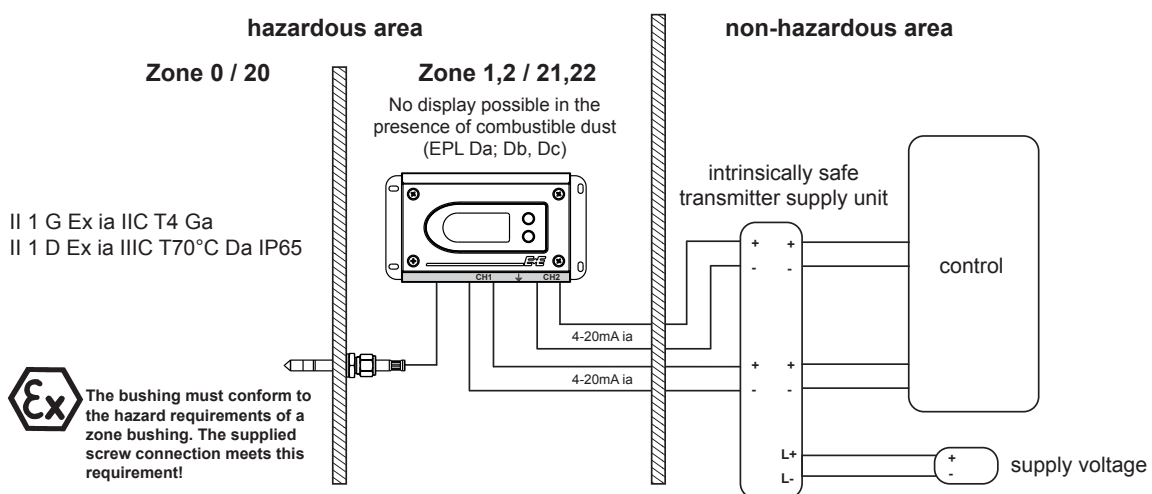
II 1 G Ex ia IIC T6 Ga / II 1 D Ex ia IIIC T70°C Da IP65

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

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

<sup>2)</sup> Filter cap must not be used in EPL Ga IIC

<sup>3)</sup> 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 Enthalpy [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-HT6SMBHFAD1AT/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-HT6SAxBxxxIxAT/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)
Sealing plug for unused cable glands	(HA011402)
Ball valve with ISO 1/2" female thread with Ex-Certification	(HA011403)