

EE100Ex

Intrinsically Safe Humidity and Temperature Sensor



The EE100Ex intrinsically safe sensor reliably measures relative humidity (RH) and temperature (T) in explosion-hazard areas. It complies with the ATEX (Europe), IECEx (international), Korea (KCs) and Japan (CSA) classifications for applications in gas up to Zone 1.

Measurement Performance

With its very robust sensing head, the proprietary sensor protection and encapsulated measurement electronics inside the probe, the EE100Ex stands for best accuracy and long term stability over the working range 0...100 % RH and -40...60 °C (-40...140 °F).

Reliable in Harsh Environment

The entire device can be placed in explosion-hazardous areas. Due to the rugged metal IP65 enclosure and the choice of filter caps, the EE100Ex performs reliably in a wide range of demanding applications such as utility tunnels, hazardous storage rooms or pharmaceutical industry.

Power Supply and Outputs

The device can be powered by any intrinsically safe power source or via Zener barriers. Besides measuring RH and T, the EE100Ex calculates the dew point (Td) and frost point (Tf) temperature. The measured data is available on two galvanically isolated 4...20 mA (2-wire) outputs.

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.



Model T1 -
wall mount



Model T3 -
fixed remote probe

Features

E+E sensing element HCT01

- » Long-term stability
- » Protected solder pads
- » Tested according to automotive standard AEC-Q200

Cast electronics

- » Mechanical protection
- » Condensation-resistant

Interchangeable
probe with M12
connector
(Model T23)

Approved for installation in gas Zone 1

- » ATEX: II 2G Ex ia IIB T4 Gb
- » IECEx: Ex ia IIB T4 Gb Ta = -40 °C to 60 °C
- » Korea: Ex ia IIB T4
- » Japan: Ex ia IIB T4 Gb (Ta = -40 °C bis 60 °C)

Aluminum enclosure

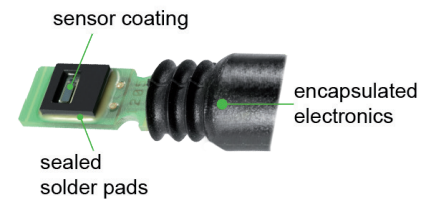
- » IP65 protection class
- » External mounting holes and grounding connection

Inspection certificate
according to DIN EN 10204-3.1



Protective Sensor Coating

The E+E proprietary sensor coating is a permeable layer applied to the active surface of the RH sensing element. The coating extends substantially the life-time and the measurement performance of the E+E sensor in corrosive environment. Additionally, it improves the long term stability in dusty and dirty applications by preventing stray impedances caused by deposits on the active sensor surface.



Ex - Classifications

Europe (ATEX with order code "EX8")

Certificate: TPS 19 ATEX 038892 0008 X by TÜV SÜD Product Service GmbH
Safety data: $U_i = 28 \text{ V}$; $I_i = 100 \text{ mA}$; $P_i = 700 \text{ mW}$; $C_i = 2.2 \text{ nF}$; $L_i \approx 0 \text{ mH}$
Ex-Designation: II 2G Ex ia IIB T4 Gb

International (IECEx with order code "EX8")

Certificate: IECEx TPS 18.0014 X by TÜV SÜD Product Service GmbH
Safety data: $U_i = 28 \text{ Vdc}$; $I_i = 100 \text{ mA}$; $P_i = 700 \text{ mW}$; $C_i = 2.2 \text{ nF}$; $L_i \approx 0 \text{ mH}$
Ex-Designation: Ex ia IIB T4 Gb Ta = -40°C to 60°C

Korea (KCs with order code "EX5")

Certificate: 20-AV4BO-0440X by KCs
Safety data: $U_i = 28 \text{ Vdc}$; $I_i = 100 \text{ mA}$; $P_i = 700 \text{ mW}$ (per channel); $C_i = 2.2 \text{ nF}$; $L_i = \text{negligible small}$
Ex-Designation: Ex ia IIB T4 $-40^\circ\text{C} \leq T_{\text{amb}} \leq +60^\circ\text{C}$: humidity/temperature sensor
 $-40^\circ\text{C} \leq T_{\text{amb}} \leq +40^\circ\text{C}$: connection cable

Japan (CSA with order code "EX6")

Certificate: CSAUK 20JPN060X by CSA Group Testing UK Ltd
Safety data: $U_i = 28 \text{ V DC}$; $I_i = 100 \text{ mA}$; $P_i = 700 \text{ mW}$ (per channel); $C_i = 2.2 \text{ nF}$; $L_i \approx 0$
Ex-Designation: Ex ia IIB T4 Gb (Ta = -40°C to 60°C)

Technical Data

Measurands

Relative Humidity (RH)

Measurement range 0...100 % RH

Accuracy¹⁾ (incl. hysteresis, non-linearity and repeatability)

wall mount model (T1)

20...30 °C (68...86 °F)

RH ≤ 90 %

±2 % RH

20...30 °C (68...86 °F)

RH > 90 %

±3 % RH

-20...40 °C (-4...104 °F)

±3 % RH

remote probe models (T3, T23)

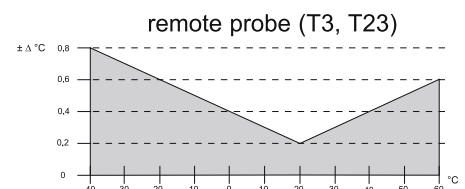
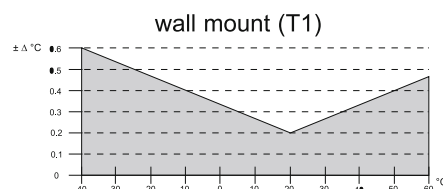
at 20 °C (68 °F)

±2.5 % RH

Temperature (T)

Accuracy and

measurement range



Calculated parameters²⁾

dew point temperature [Td]

frost point temperature [Tf]

1) Traceable to intern. standards, administrated by NIST, PTB, BEV,... 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). Accuracy is specified for models T3, T23 with an airflow >0.0m/s, for model T1 with an airflow 0.2 m/s.

2) For the accuracy please use "E+E humidity calculator" or refer to document "Principles of humidity measurement", available on www.eplus.com

Output

Analogue outputs

2 x 4...20 mA, 2-wire, user configurable

General

Supply voltage U_v

from intrinsically safety barrier
safety data

$11\text{ V} + R_L \cdot 0.02\text{ A} < U_v < 28\text{ V DC}$ (R_L = load resistor)
 $U_i=28\text{ V}$; $I_i=100\text{ mA}$; $P_i=700\text{ mW}$; $C_i = 2.2\text{ nF}$; $L_i \approx 0\text{ mH}$

Electrical connection

screw terminals, max. 1.5 mm^2

Cable glands (brass, nickel plated)

M16 x 1.5 for cable diameter 4.5 - 10 mm (0.18" - 0.39")

M20 x 1.5 for cable diameter 7 - 13 mm (0.28" - 0.51")

Protection class (enclosure and probe)

IP65

Working temperature ranges

model T1, T3:

$-40...60\text{ }^\circ\text{C}$ ($-40...140\text{ }^\circ\text{F}$)

model T23: electronics, probe

$-40...60\text{ }^\circ\text{C}$ ($-40...140\text{ }^\circ\text{F}$)

M12 probe cable

$-25...60\text{ }^\circ\text{C}$ ($-13...140\text{ }^\circ\text{F}$)

Storage temperature range

$-20...60\text{ }^\circ\text{C}$ ($-4...140\text{ }^\circ\text{F}$)

Material

enclosure

aluminium (Al Si9 Cu3)

probe

ABS (model T1)

polycarbonate (model T3, T23)

Safety area installation

EPL: Gb (Gas - Zone 1)

Ex Certificates

ATEX

II 2G Ex ia IIB T4 Gb

IECEx

Ex ia IIB T4 Gb $T_a = -40\text{ }^\circ\text{C}$ to $60\text{ }^\circ\text{C}$

Korea (KCs)

Ex ia IIB T4 $-40\text{ }^\circ\text{C} \leq T_{amb} \leq +60\text{ }^\circ\text{C}$

Japan (CSA)

Ex ia IIB T4 Gb ($T_a = -40\text{ }^\circ\text{C}$ to $60\text{ }^\circ\text{C}$)

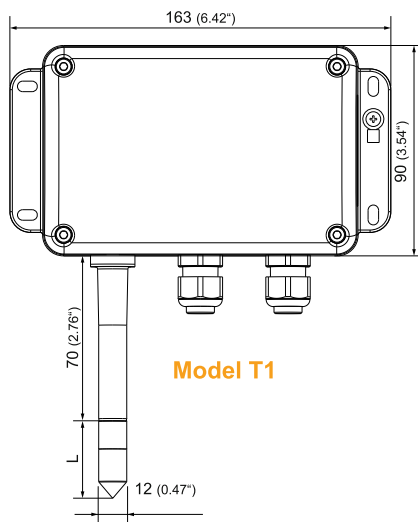
Electromagnetic compatibility according

EN61326-1 EN61326-2-3

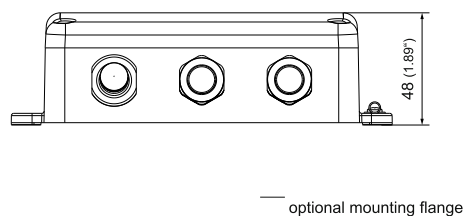
Industrial Environment



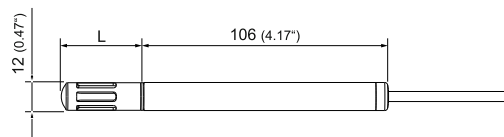
Dimensions in mm (inches)



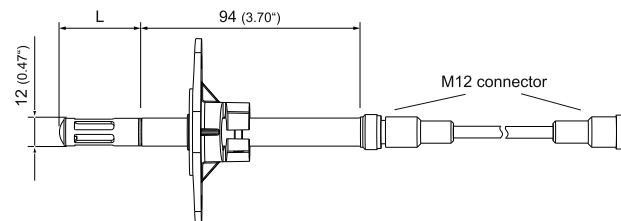
L = filter cap	Length in mm
Membrane filter	34 (1.4")
Stainless steel sinter filter	33 (1.3")
PTFE filter	33 (1.3")



Probe of model T3



Probe of model T23



Accessories

Protection cap for 12 mm probe	HA010783
Plastic mounting flange Ø12 mm (0.47"), black	HA010214
Wall mounting plastic clip Ø12 mm (0.47")	HA010211
Safety barrier, 1-channel, STAHL 9002/13-280-093-001	HA011410
Intrinsically safe supply unit, 1-channel, PC MACX MCR-EX-SL-RPSSI-I	HA011411*)
Intrinsically safe supply unit, 2-channel, PC MACX MCR-EX-SL-RPSS-2I-2I	HA011412*)
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
Product Configuration Software	EE-PCS
	(free download: www.epluse.com/configurator)
Adapter kit for configuration and adjustment consisting of (see datasheet EE-PCA):	
Pos. 1: Product Configuration Adapter	EE-PCA
Pos. 2 : Connection cable	HA011068
*) Only for ATEX and IECEx	

Ordering Guide

		EE100Ex-		
Hardware	Model	wall mount fixed remote probe pluggable interchangeable remote probe	T1	T3 T23
	Filter	membrane stainless steel sintered PTFE	F2 F4 F5	
	Probe cable length ¹⁾	1 m (3.3 ft) 2 m (6.6 ft) 3 m (9.8 ft)	K1 K3	K2
	Electrical connection	one cable gland M16 x 1.5 one cable gland M20 x 1.5 two cable glands M16 x 1.5 two cable glands M20 x 1.5	E29 E30 E22 E21	
	Ex-approval	KCs (Korea) CSA (Japan) ATEX and IECEx	EX5 EX6 EX8	
	Measurand output 1 ²⁾	relative humidity RH [%] temperature T [°C] temperature T [°F] dew point Td [°C] dew point Td [°F] frost point Tf [°C] frost point Tf [°F]	MA10 MA1 MA2 MA52 MA53 MA65 MA66	
Software	Scaling out 1 low	value	SAL value	
	Scaling out 1 high	value	SAH value	
	Measurand output 2	relative humidity RH [%] temperature T [°C] temperature T [°F] dew point Td [°C] dew point Td [°F] frost point Tf [°C] frost point Tf [°F]	MB10 MB1 MB2 MB52 MB53 MB65 MB66	
	Scaling out 2 low	value	SBL value	
	Scaling out 2 high	value	SBH value	

1) cable: fixed for T3 version, pluggable and interchangeable for T23 version (only cable supplied by E+E is allowed).
 2) assign the most relevant measurand parameter to output 1. Output 1 must always be connected

Spare parts (only for T23 version)

Replacement probe		EE100ExP-
Filter	membrane	F2
	stainless steel sintered	F4
	PTFE	F5
M12 probe cable*	2 m (6.6 ft)	HA010826

* Only cable supplied by E+E is permitted.

Order Example

EE100Ex-T1F2E22EX8MA10SAL0SAH100MB1SBL0SBH50

Model: wall mount
 Filter: membrane
 Electrical Connection: two cable glands M16 x 1.5
 Ex-Approval: ATEX / IECEx
 Measurand output 1: relative humidity RH [%]
 Scaling out 1 low: 0
 Scaling out 1 high: 100
 Measurand output 2: temperature [°C]
 Scaling out 2 low: 0
 Scaling out 2 high: 50