



User Manual



EE300Ex

HUMIDITY / TEMPERATURE

SENSOR

YOUR PARTNER IN SENSOR TECHNOLOGY



E+E Elektronik Ges.m.b.H. doesn't accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

The document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described products can be improved and changed at any time without prior notice.

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1 General

This user manual is part of the scope of supply and serves for ensuring proper handling and optimal functioning of the device.

The user manual shall be read before commissioning the equipment and it shall be provided to all staff involved in transport, installation, operation, maintenance and repair.

The user manual may not be used for the purposes of competition without the written consent of E+E Elektronik® and may not be forwarded to third parties. Copies may be made for internal purposes. All information, technical data and diagrams included in these instructions are based on the information available at the time of writing.

1.1 Explanation of Symbols



This symbol indicates safety information.

It is essential that all safety information is strictly observed. Failure to comply with this information can lead to personal injuries or damage to property. E+E Elektronik® assumes no liability if this happens.



This symbol indicates instructions.

The instructions shall be observed in order to reach optimal performance of the device.



This symbol indicates regulations that must be observed in hazardous areas at risk of explosion.

1.2 Safety Instructions

1.2.1 General Safety Instructions



- Avoid any unnecessary mechanical stress and inappropriate use.
- When replacing the filter cap make sure not to touch the sensing elements.
- For sensor cleaning and filter cap replacement please see “Cleaning instructions” at www.epluse.com.
- Installation, electrical connection, maintenance and commissioning shall be performed by qualified personnel only.

1.2.2 Mounting, Start-up and Operation

The device has been produced under state of the art manufacturing conditions, has been thoroughly tested and has left the factory fulfilling all safety criteria.

The manufacturer has taken all precautions to ensure safe operation of the device. The user must ensure that the device is set up and installed in a manner that does not have a negative effect on its safe use.

The user is responsible for observing all applicable safety guidelines, local and international, with respect to safe installation and operation on the device. This user manual contains information and warnings that must be observed by the user in order to ensure safe operation.

- Mounting, start-up, operation and maintenance of the device may be performed by qualified staff only.
- Such staff must be authorized by the plant operator to carry out the mentioned activities.
- The qualified staff must have read and understood this user manual and must follow the instructions contained within.
- All process and electrical connections shall be thoroughly checked by authorized staff before putting the system into operation.
- Do not install or start start-up a device supposed to be faulty. Make sure that such devices are not accidentally used by marking them clearly as faulty.
- A faulty device may only be investigated and possibly repaired by qualified, trained and authorized staff. If the fault cannot be fixed, the device shall be removed from the system.
- Service operations other than described in this operating manual may only be performed by the manufacturer.

1.3 Environmental Aspects



Products from E+E Elektronik® are developed and manufactured observing of all relevant requirements with respect to environment protection. Please observe local regulations for the device disposal.



For disposal, the individual components of the device must be separated according to local recycling regulations. The electronics shall be disposed of correctly as electronics waste.

1.4 ESD Protection

The sensing elements and the electronics board are ESD (electrostatic discharge) sensitive components of the device and must be handled as such. The failure to do so may damage the device by electrostatic discharges when touching exposed sensitive components.

1.5 Scope of Supply

- EE300Ex according to ordering guide
- User manual
- Inspection certificate according to DIN EN 10204-3.1

1.6 Accessories

1.6.1 EE300Ex-M1 Humidity and Temperature Sensor

Blind front 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, ATEX certified	HA011403
Product configuration adapter (see data sheet EE-PCA)	EE-PCA
Connection cable for EE-PCA	HA011068

1.6.2 EE300Ex-M3 Temperature Sensor

Blind front 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
Product configuration adapter (see data sheet EE-PCA)	EE-PCA
Connection cable for EE-PCA	HA011068

2 Product Description

2.1 General

The EE300Ex-M1 and the EE300Ex-M3 intrinsically safe sensors are intended for the measurement of relative humidity (RH) and temperature (T) or temperature alone, in the explosion hazard areas, in gas and dust up to Zone 0/20. The entire device can be placed in the explosion endangered area.

The sensor may only be powered by an intrinsically safe power supply device or protective barriers. It features a 2 wire 4...20 mA design and has two individually scalable analogue outputs.

In addition to the measured RH and T, the EE300Ex-M1 calculates also the following parameters:

- Absolute humidity dv
- Wet-bulb temperature Tw
- Specific enthalpy h
- Dew point temperature Td
- Frost point temperature Tf
- Mixing ratio r
- Water vapour partial pressure e



Besides measurement in the air, the EE300Ex-M1 with ATEX or IECEx approval is also suitable for measuring water content (X) in ppm and water activity (aw) in isolation, lubrication and hydraulic oils.

EE300Ex-M1 humidity and temperature sensor types:

Type	Pressure range	Temperature range	Probe Ø)
T1 Wall mount	ambient	-40...60 °C (-40...140 °F)	12 mm (0.47")
T7 Remote probe with cut-in fitting, pressure tight	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356 °F)	12 mm (0.47")
T9 Remote probe with cut-in fitting, pressure tight	0.01...300 bar (0.15...4 351 psi)	-40...180 °C (-40...356 °F)	12 mm (0.47")
T10 Remote probe with sliding fitting for assembly / disassembly under pressure, pressure tight	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356 °F)	13 mm (0.51")
T22 Remote probe for sensor retraction tool PN250, pressure tight	0.01...250 bar (0.15...3 626 psi)	-40...180 °C (-40...356 °F)	12 mm (0.47")

EE300Ex-M3 temperature sensor models:

Type	Pressure range	Temperature range	Probe Ø)
T1 Wall mount	ambient	-40...60 °C (-40...140 °F)	6 mm (0.24")
T24 Remote probe	0.1...20 bar (1.5...300 psi)	-70...200 °C (-94...392 °F)	6 mm (0.24")

Disclaimer

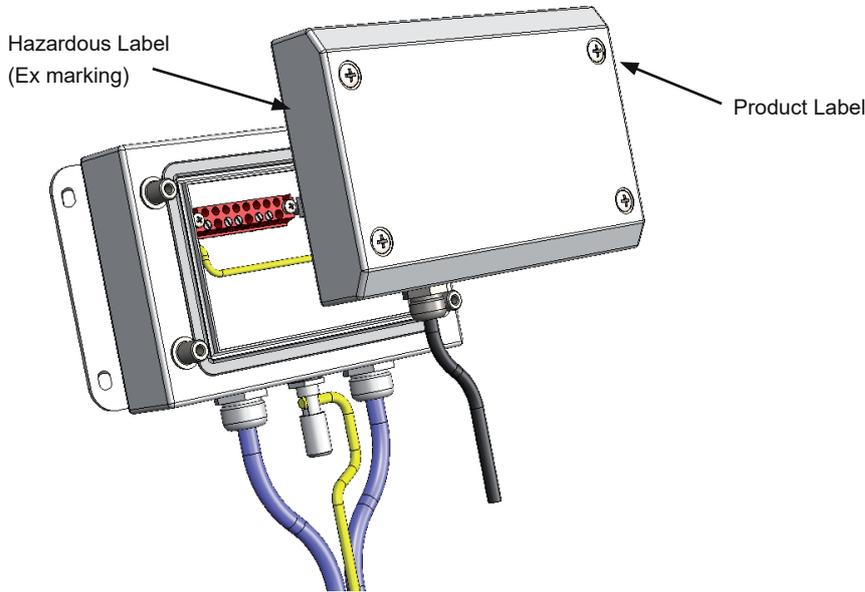
The manufacturer cannot be held responsible for damages as a result of incorrect handling, installation and maintenance of the device. Unauthorized modifications of the product lead to loss of all warranty claims.

The manufacturer or his authorized agent can be only be held liable in case of willful or gross negligence. In any case, the scope of liability is limited to the corresponding amount of the order issued to the manufacturer. The manufacturer assumes no liability for damages incurred due to failure to comply with the applicable regulations, operating instructions or the operating conditions. Consequential damages are excluded from the liability.

2.2 EE300Ex Labelling

Each EE300Ex is characterized for one certification. The sensor has two labels. The “product label” shows the ordering code and type of the Ex Certificate. The “hazardous label” shows the Ex marking and the certificate number. See the examples below.

EE300Ex with IECEx, USA, Canada, Korea or Japan labeling must not be installed in the European Union.



ATEX hazardous label (for EE300Ex without display)

E+E Elektronik A-4209 Engerwitzdorf		
TPS 13 ATEX 38892 003 X		
II 1 G Ex ia IIC T4 Ga	Ui = 28V li = 100mA	
II 1 D Ex ia IIIC T200 80°C Da	Pi = 700mW Ci = 2,2nF	
Electrical Data - See Manual	Li = negligibly small	
-40°C ≤ Ta ≤ 60°C	Series: G 122021	

ATEX product label (Example) Order Code “EX1”

HUMIDITY / TEMPERATURE SENSOR		
EE300Ex-M1A6HS2T10D0E2K5L200PA25F4C1EX1		
CH1: RH:4-20mA = 0...100 %RH		
CH2: T: 4-20mA = 0...50 °C		
Supply: (9 + RL x 0.02) - 28 V DC		
S/N: 200293490048		www.epluse.com

IECEx hazardous label (for EE300Ex without display)

E+E Elektronik A-4209 Engerwitzdorf	
IECEx FMG 14.0017 X	
Ex ia IIC T4 Ga	6.4Vdc ≤ Ui ≤ 28Vdc
Ex ia IIIC T131°C Da	li = 100mA Pi = 700mW
Electrical Data - See Manual	Ci = 2,2nF
-40°C ≤ Ta ≤ 60°C	Li = negligibly small
	Series: G 122021

IECEx product label (Example) Order Code “EX2”

HUMIDITY / TEMPERATURE SENSOR		
EE300Ex-M1A6HS2T10D0E2K5L200PA25F4C1EX2		
CH1: RH:4-20mA = 0...100 %RH		
CH2: T: 4-20mA = 0...50 °C		
Supply: (9 + RL x 0.02) - 28 V DC		
S/N: 200293490048		www.epluse.com

USA hazardous label (for EE300Ex without display)

E+E Elektronik A-4209 Engerwitzdorf		
FM17US0302X		
CL I,II,III DIV 1 GP ABCDEFG T4		
CL I,II,III DIV 2 GP ABCDEFG T4		
CL I ZN 0 AEx ia IIC T4 Ga	ZN 20 AEx ia IIIC T131°C Da	
Ta = -40°C to 60°C, Entity - M1_1309080, IP65	Series: G 122021	

USA product label (Example) Order Code “EX3”

HUMIDITY / TEMPERATURE SENSOR		
EE300Ex-M1A6HS2T10D0E2K5L200PA25F4C1EX3		
CH1: RH:4-20mA = 0...100 %RH		
CH2: T: 4-20mA = 0...50 °C		
Supply: (9 + RL x 0.02) - 28 V DC		
S/N: 200293490048		www.epluse.com

CANADA hazardous label (for EE300Ex without display)

E+E Elektronik A-4209 Engerwitzdorf		
FM17CA0154X		
CL I,II,III DIV 1 GP ABCDEFG T4		
CL I,II,III DIV 2 GP ABCDEFG T4		
ZN 0 Ex ia IIC T4 Ga	ZN 20 Ex ia IIIC T131°C Da	
Ta = -40°C to 60°C, Entity - M1_1309080, IP65	Series: G 122021	

CANADA product label (Example) Order Code “EX9”

HUMIDITY / TEMPERATURE SENSOR		
EE300Ex-M1A6HS2T10D0E2K5L200PA25F4C1EX9		
CH1: RH:4-20mA = 0...100 %RH		
CH2: T: 4-20mA = 0...50 °C		
Supply: (9 + RL x 0.02) - 28 V DC		
S/N: 200293490048		www.epluse.com

2.3 Certification

EUROPE:

The EE300Ex sensor fulfills the **ATEX Directives** on intrinsically safe operating equipment.

Applied standards for ATEX:

- **EN IEC 60079-0:2018**
- **EN 60079-11:2012**

The EU-Type Examination has been carried out by TÜV SÜD Product Service GmbH.

Certified to EU-Type Examination **TPS 13 ATEX 38892 003 X**.

Entity parameters $U_i = 28V$; $I_i = 100mA$; $P_i = 700mW$; $C_i = 2,2nF$; $L_i \approx 0mH$

Ex-Designation

Sensor without display ⓧ II 1G Ex ia IIC T4 Ga / ⓧ II 1D Ex ia IIIC T₂₀₀ 80°C Da
 Sensor with display ⓧ II 2G Ex ia IIC T4 Gb / ⓧ II 1G Ex ia IIB T4 Ga
 Remote probe ⓧ II 1G Ex ia IIC T6...T1 Ga / ⓧ II 1D Ex ia IIIC T₂₀₀ 80°C...200°C Da

Working temperature range for the probes:

Specification of the temperature class „TKG“ for use in gas area exposed to explosion hazards and „TKD“ for use in dust area exposed to explosion hazards as a function of the ambient temperature „Tamb“ for the humidity and temperature probe and the temperature probe:

TKG	TKD	Humidity and Temperature Probe	TKG	TKD	Temperature Probe
T6	80°C	-40°C ≤ Tamb ≤ +60°C	T6	80°C	-70°C ≤ Tamb ≤ +60°C
T5	95°C	-40°C ≤ Tamb ≤ +75°C	T5	95°C	-70°C ≤ Tamb ≤ +75°C
T4	130°C	-40°C ≤ Tamb ≤ +110°C	T4	130°C	-70°C ≤ Tamb ≤ +110°C
T3	195°C	-40°C ≤ Tamb ≤ +175°C	T3	195°C	-70°C ≤ Tamb ≤ +175°C
T2	200°C	-40°C ≤ Tamb ≤ +180°C	T2	220°C	-70°C ≤ Tamb ≤ +200°C
T1	200°C	-40°C ≤ Tamb ≤ +180°C	T1	220°C	-70°C ≤ Tamb ≤ +200°C

INTERNATIONAL:

Applied Standard for IECEx:

- **IEC 60079-0:2011**
- **IEC 60079-11:2011**

The Certificate of Conformity has been carried out by FM Approvals.

Certificate No.: **IECEx FMG 14.0017 X**

Entity parameters: $6.4 Vdc \leq U_i \leq 28Vdc$; $I_i = 100mA$; $P_i = 700mW$; $C_i = 2,2nF$; $L_i = 0mH$

Ex-Designation

Sensor without display Ex ia IIC T4 Ga / Ex ia IIIC T131°C Da
 Sensor with display Ex ia IIC T4 Gb / Ex ia IIB T4 Ga
 Remote probe Ex ia IIC T6-T1 Ga / Ex ia IIIC T80°C Da

Humidity and temperature probe:

- T6 temperature class based on $-40^\circ C (-40^\circ F) \leq Ta \leq 60^\circ C (140^\circ F)$
- T5 temperature class based on $-40^\circ C (-40^\circ F) \leq Ta \leq 75^\circ C (167^\circ F)$
- T4 temperature class based on $-40^\circ C (-40^\circ F) \leq Ta \leq 110^\circ C (230^\circ F)$
- T3 temperature class based on $-40^\circ C (-40^\circ F) \leq Ta \leq 175^\circ C (347^\circ F)$
- T2 temperature class based on $-40^\circ C (-40^\circ F) \leq Ta \leq 180^\circ C (356^\circ F)$
- T1 temperature class based on $-40^\circ C (-40^\circ F) \leq Ta \leq 180^\circ C (356^\circ F)$

Temperature probe:

- T6 temperature class based on $-70^{\circ}\text{C} (-94^{\circ}\text{F}) \leq T_a \leq 60^{\circ}\text{C} (140^{\circ}\text{F})$
- T5 temperature class based on $-70^{\circ}\text{C} (-94^{\circ}\text{F}) \leq T_a \leq 75^{\circ}\text{C} (167^{\circ}\text{F})$
- T4 temperature class based on $-70^{\circ}\text{C} (-94^{\circ}\text{F}) \leq T_a \leq 110^{\circ}\text{C} (230^{\circ}\text{F})$
- T3 temperature class based on $-70^{\circ}\text{C} (-94^{\circ}\text{F}) \leq T_a \leq 175^{\circ}\text{C} (347^{\circ}\text{F})$
- T2 temperature class based on $-70^{\circ}\text{C} (-94^{\circ}\text{F}) \leq T_a \leq 200^{\circ}\text{C} (392^{\circ}\text{F})$
- T1 temperature class based on $-70^{\circ}\text{C} (-94^{\circ}\text{F}) \leq T_a \leq 200^{\circ}\text{C} (392^{\circ}\text{F})$

Chinese (IECEX based):

Certificate of Conformity has been carried out by NEPSI.

Cert NO.**GYJ16.1417X**

Entity parameters: $U_i = 28\text{Vdc}$; $I_i = 100\text{mA}$; $P_i = 700\text{mW}$; $C_i = 2.2\text{nF}$; $L_i = 0\text{mH}$

Ex-Designation

Without display:

Ex ia IIC T4 Ga

Ex iaD 20 T131

With display:

Ex ia IIC T4 Gb

Ex ia IIB T4 Ga

Remote sensing probe

Ex ia IIC T1-T6

Ex iaD 20 T80

Temperature operating range	Equipment	Temperature Class
$-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$	Integrated sensor	T4/T131
$-40^{\circ}\text{C} \sim +60^{\circ}\text{C} / -70^{\circ}\text{C} \sim +60^{\circ}\text{C}$	Remote temperature-humidity-probe/ Remote temperature probe	T6/T80
$-40^{\circ}\text{C} \sim +75^{\circ}\text{C} / -70^{\circ}\text{C} \sim +75^{\circ}\text{C}$		T5
$-40^{\circ}\text{C} \sim +110^{\circ}\text{C} / -70^{\circ}\text{C} \sim +110^{\circ}\text{C}$		T4
$-40^{\circ}\text{C} \sim +175^{\circ}\text{C} / -70^{\circ}\text{C} \sim +175^{\circ}\text{C}$		T3
$-40^{\circ}\text{C} \sim +180^{\circ}\text{C} / -70^{\circ}\text{C} \sim +200^{\circ}\text{C}$		T2
$-40^{\circ}\text{C} \sim +180^{\circ}\text{C} / -70^{\circ}\text{C} \sim +200^{\circ}\text{C}$		T1

SPECIFIC CONDITIONS OF USE:

1. There is no display permitted in the dust hazardous area and the gas hazard area EPL Ga for group IIC.
2. There is no filter cap made of plastic or with plastic parts permitted in the gas hazard area EPL Ga for group IIC.
3. EE300Ex remote probe (temperature - humidity 12 mm and temperature 6 mm) must be earthed.
4. The software configuration port of the EE300Ex may only be used with the EE-PCA configuration adapter and the HA011068 connection cable.
5. For use EE300Ex with remote probe in EPL Ga the remote probe must be installed in a metallic grounded protective tube.
6. In case of using both measuring channels, each channel must be driven separately with their own galvanic safety barrier.

KOREA:

Applied law for South Korea:
Article 34 of the Occupational Safety & Health Act

The Certificate of Conformity has been carried out by KC.

Certificate Gas:

Remote sensor: 20-AV4BO-0253X
Transmitter without Display: 20-AV4BO-0254X
Transmitter with Display: 20-AV4BO-0257X (EPL Ga - Zone 0)
20-AV4BO-0258X (EPL Gb - Zone 1)

Certificate Dust:

Remote sensor: 20-AV4BO-0256X
Transmitter without Display: 20-AV4BO-0255X

Entity parameters: $6.4 \text{ Vdc} \leq U_i \leq 28 \text{ Vdc}$; $I_i = 100 \text{ mA}$; $P_i = 700 \text{ mW}$; $C_i = 2.2 \text{ nF}$; $L_i = 0 \text{ mH}$

Ex-Designation

Transmitter (without display): Ex ia IIC T4 $-40^\circ\text{C} \leq T_{\text{amb}} \leq +60^\circ\text{C}$
Ex iaD 20 IP6X T131 $^\circ\text{C}$ $-40^\circ\text{C} \leq T_{\text{amb}} \leq +60^\circ\text{C}$
Transmitter (with display): Ex ia IIC T4 $-40^\circ\text{C} \leq T_{\text{amb}} \leq +60^\circ\text{C}$ (up to Zone 1)
Ex ia IIB T4 $-40^\circ\text{C} \leq T_{\text{amb}} \leq +60^\circ\text{C}$
Remote sensing probe : Ex ia IIC T6-T1 / Ex iaD 20 IP6X T80 $^\circ\text{C}$ $-40^\circ\text{C} \leq T_{\text{amb}} \leq +60^\circ\text{C}$

Humidity and temperature probe:

- T6 temperature class based on -40°C (-40°F) $\leq T_a \leq 60^\circ\text{C}$ (140°F)
- T5 temperature class based on -40°C (-40°F) $\leq T_a \leq 75^\circ\text{C}$ (167°F)
- T4 temperature class based on -40°C (-40°F) $\leq T_a \leq 110^\circ\text{C}$ (230°F)
- T3 temperature class based on -40°C (-40°F) $\leq T_a \leq 175^\circ\text{C}$ (347°F)
- T2 temperature class based on -40°C (-40°F) $\leq T_a \leq 180^\circ\text{C}$ (356°F)
- T1 temperature class based on -40°C (-40°F) $\leq T_a \leq 180^\circ\text{C}$ (356°F)

Temperature probe:

- T6 temperature class based on -70°C (-94°F) $\leq T_a \leq 60^\circ\text{C}$ (140°F)
- T5 temperature class based on -70°C (-94°F) $\leq T_a \leq 75^\circ\text{C}$ (167°F)
- T4 temperature class based on -70°C (-94°F) $\leq T_a \leq 110^\circ\text{C}$ (230°F)
- T3 temperature class based on -70°C (-94°F) $\leq T_a \leq 175^\circ\text{C}$ (347°F)
- T2 temperature class based on -70°C (-94°F) $\leq T_a \leq 200^\circ\text{C}$ (392°F)
- T1 temperature class based on -70°C (-94°F) $\leq T_a \leq 200^\circ\text{C}$ (392°F)

In area with explosive gas group IIC, the EE300Ex must be mounted in zone 1.

In gas Ex area of group IIB the installation in zone 0 is permitted.

Conditions for safe use:

- Applying of the operating instructions provided by the manufacturer (document number: BA_EE300Ex_e_1.11, BA_HA011068)
- The serial software configuration port of the EE300Ex may only be used with the Product Configuration Adapter (EE-PCA) and the Connection Cable (HA011068).
- There is no display permitted in gas hazard area Zone 0 for group IIC and in the dust hazard area.
- There is no filter cap made of plastic or with plastic parts permitted in the gas hazard area Zone 0 for group IIC.
- EE300Ex remote probe (temperature – humidity 12 mm and temperature 6 mm) must be earthed. For use EE300Ex with remote probe in Zone 0 the remote probe must be installed in a metallic grounded protective tube.
- EE300Ex with the connector option may not be used in dust hazard area and in gas hazard area Zone 0 for group IIC.
- In case of using both measuring channels, each channel must be driven separately with their own galvanic safety barrier.

JAPAN:

Type Approval Certificate has been carried out by TIIS.

Certificate No.: **TC22061**

Entity parameters: $U_i = 28V_{dc}$; $I_i = 100mA$; $P_i = 700mW$; $C_i = 2.2nF$; $L_i = 0mH$

Ex-Designation

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

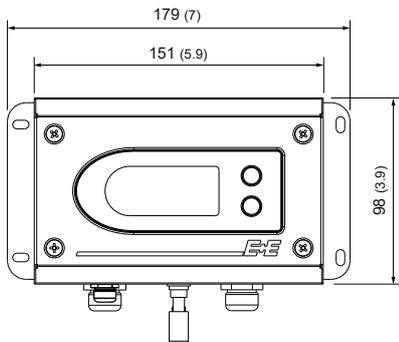
No installation in Ga permitted. EE300Ex must be mounted in Zone 1 or Zone 2.

No dust certification or temperature probe without humidity.

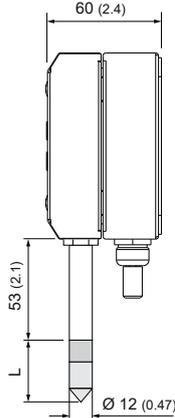
No plastic filter caps allowed.

2.4 Dimensions (mm / inch)

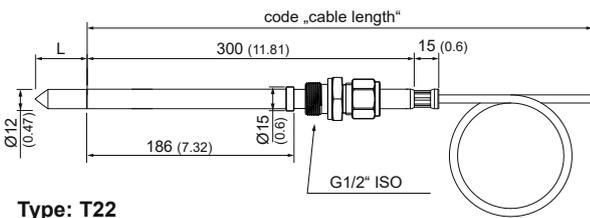
2.4.1 EE300Ex-M1: Humidity and Temperature Sensor



Types: T1 / T7 / T9 / T10 / T22
Enclosure

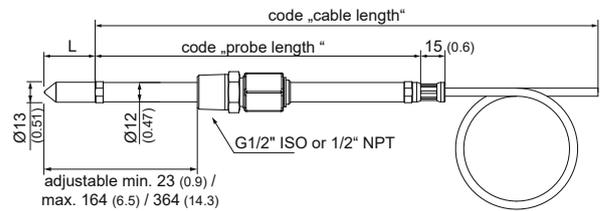


Type: T1
Wall mount

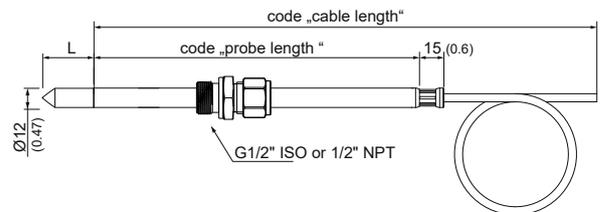


Type: T22
Remote probe for sensor retraction tool PN250

L - length of filter	mm (inch)
Stainless steel sintered filter	33 (1.3")
PTFE filter, H ₂ O ₂ filter	33 (1.3")
Stainless steel grid filter	39 (1.5")
Oil filter	32 (1.26")



Type: T10
Remote probe 20 bar (300 psi) with sliding fitting for assembly / disassembly under pressure



Types: T7 / T9
Remote probe T7: 20 bar (300 psi)
Remote probe T9: 300 bar (4351 psi) with weld or cut-in fitting

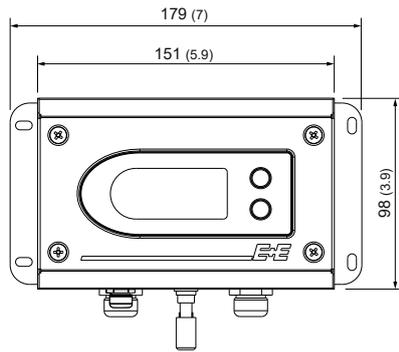


Pressure-tight probe up to 300 bar (4 351 psi) has leak rate A according to EN 12266-1

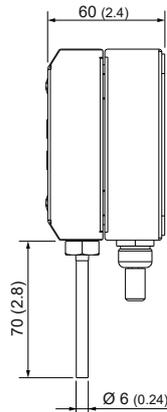
Pressure-tight probe up to 20 bar (300 psi) has leak rate B according to EN 12266-1

Leak rate can lead to gas accumulation in the enclosure

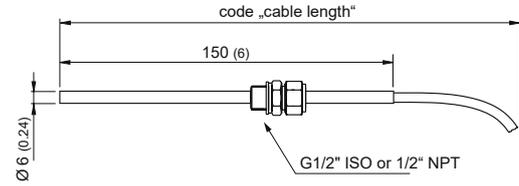
2.4.2 EE300Ex-M3: Temperature Sensor



Types: T1/T24
Enclosure



Type: T1
Wall mount



Type: T24
Remote probe 0.1...20bar (1.5...300psi) with cut-in fitting

3 Installation

3.1 General



The EE300Ex is certified according to ATEX 2014/34/EU Directive and IECEx Scheme.



The use of the EE300EX in explosion hazard areas is only permitted under following atmospheric conditions:
 $-20\text{ °C } (-4\text{ °F}) \leq T \leq 40\text{ °C } (104\text{ °F})$
 $0.8\text{ bar } (12\text{ psi}) \leq p \leq 1.1\text{ bar } (16\text{ psi})$
 air normally 21 % (v/v)

The EE300Ex may be employed beyond above atmospheric conditions range only observing EN 1127-1 and only in line with the manufacturer's instructions.



The EE300Ex may only be supplied by intrinsically safe power supply devices or via protective barriers. This applies also for the case when just the probe is located inside the explosion hazard area. The rules for wiring intrinsically safe electrical circuits according to EN 60079-14, EN 60079-25, IEC 60079-14, IEC 60079-25 (proof of intrinsic safety in the system description) as well as all applicable national regulations must be strictly observed.



The intrinsically safe circuitry shall include an overvoltage protection device if the analysis according EN 1127-1 reveals a risk of lightning strike. Requirements for the installation of overvoltage protection devices are set in European Normative EN 60079-25.

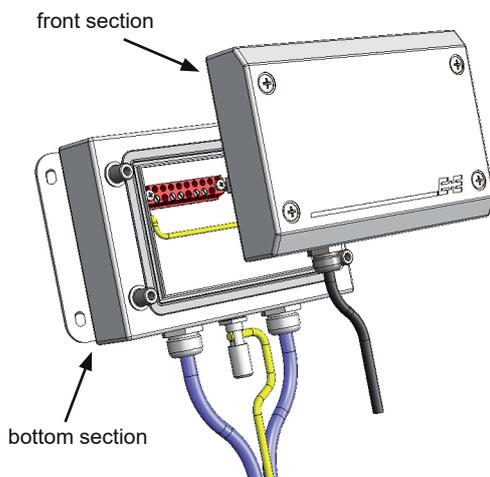


The manufacturing date of each EE300Ex is shown on the hazardous product label, at the bottom right corner, as follows:
WWYYYY
WWweek of the year
YYYY.....year

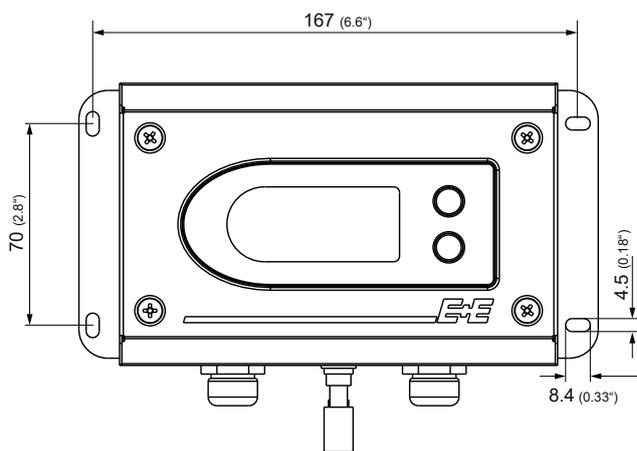
3.2 Enclosure

The EE300Ex features has a modular design and consists of:

- Bottom section with the connection and grounding terminals
- Front section with the electronics and the probe



3.2.1 Drilling Pattern for Installing the Enclosure (mm / inch)



To mount the bottom section use
4 screws diameter < 4.5 mm (0.18")



When the front section has been removed from the hazard area, e.g. for calibration, the empty bottom section shall be protected against dirt and electrostatic charge with the blind front cover HA011401 (see accessories).



Unused cable glands shall be closed with appropriate sealing plugs (see accessories).

3.3 Assembly in Category 1 (Zone 0 / 20)



Only intrinsically safe power supply devices are approved to supply EE300Ex in category 1.



In areas belonging to gas group IIC, it must be ensured that during installation and operation, the possibility of impact and friction sparks has been excluded in rarely occurring fault situations.



Work on open sensor must only be performed if it is guaranteed that no explosive atmosphere is present.



In category 1, the sensor line should be laid in an earthed metallic protective hose. Ensure that there are no dust or fibers and flyings deposits in the protective tube.



CH1 and CH2 must be galvanically isolated from one another during operation.



There is no display permitted in the gas hazard area EPL Ga for Group IIC and in the dust hazard area for groups IIIA, IIIB and IIIC.

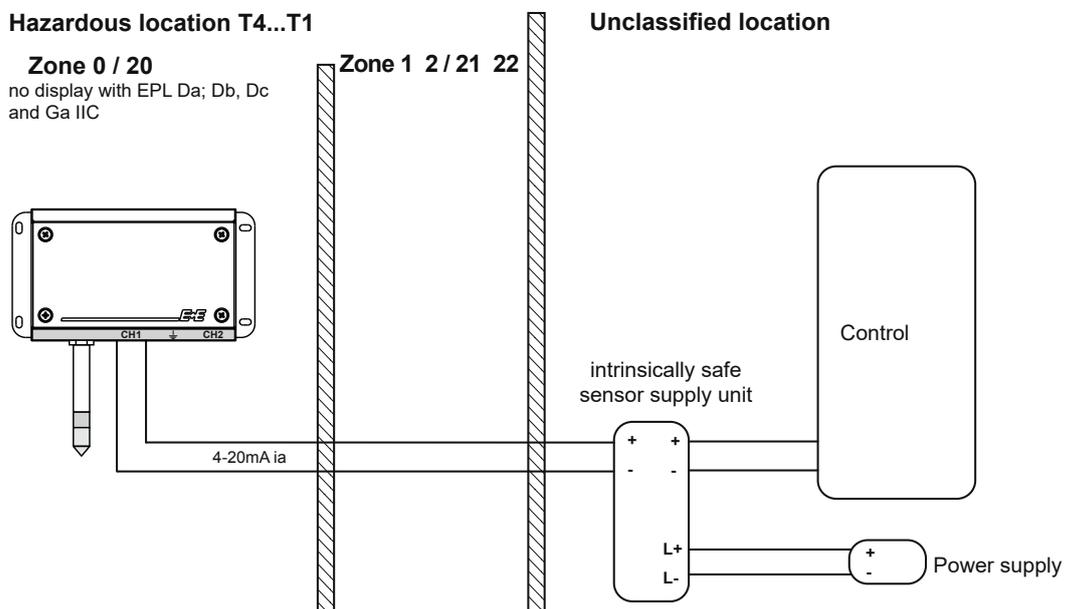


The probe for wall mount is not permitted to be used for Zone bushing.

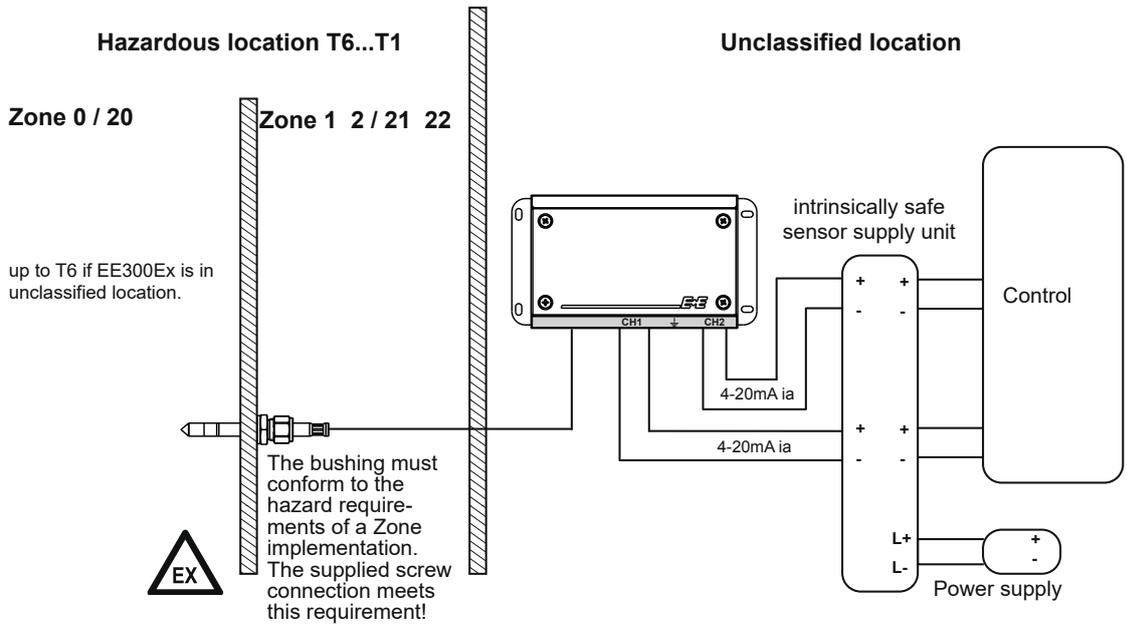


No mounting in Zone 0 and dust Ex for TIIS (Japan certification) order code EX6 allowed.

EE300Ex (wall mount) 1 channel via intrinsically safe power supply device:



EE300Ex (with remote probe) 2 channels via intrinsically safe power supply device:



3.4 Assembly in Categories 2 and 3 (Zone 1 , 2 / 21 , 22)



Only intrinsically safe power supply devices and protective barriers are approved to supply EE300Ex in category 2 and 3.



No display is permitted in the dust hazard area (Group III).

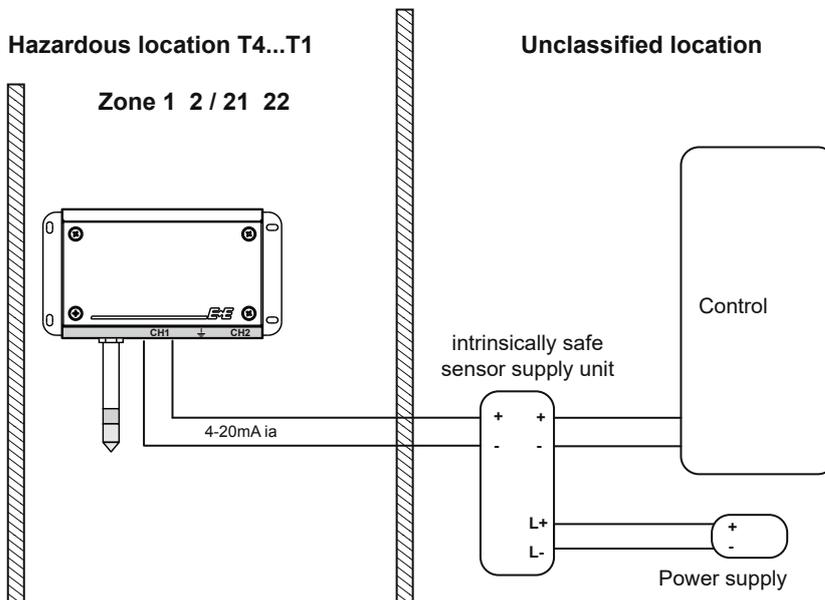


CH1 and CH2 must be galvanically isolated from one another during operation.

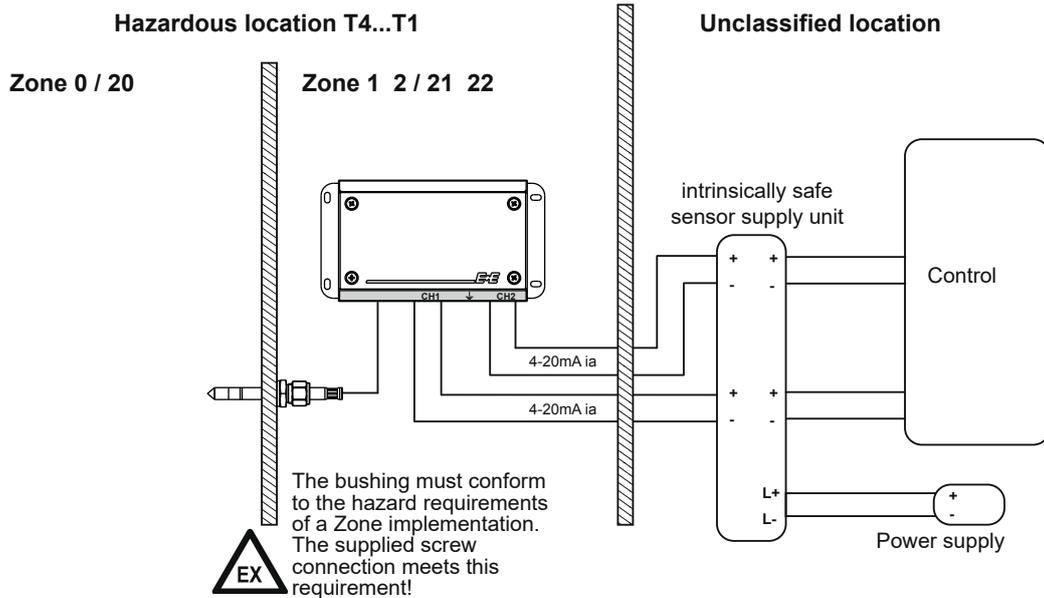


The probe for wall mount is not permitted to be used for Zone bushing.

EE300Ex (wall mount) 1 channel via intrinsically safe power supply device:



EE300Ex (with remote probe) 2 channels via intrinsically safe power supply device:



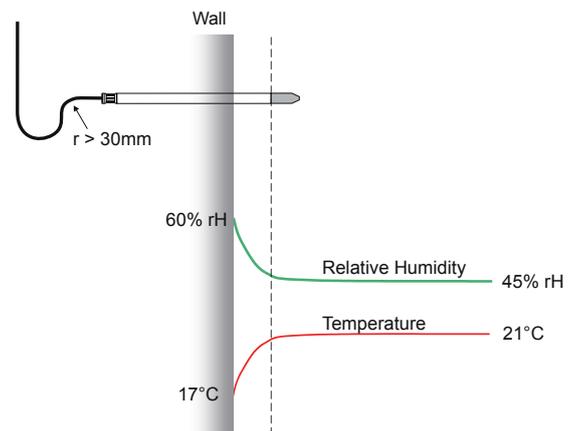
3.5 Probe Mounting



The probe of the EE300EX sensor shall be located at the most representative location for the RH and T of the process to be monitored.

For accurate measurement it is of paramount importance to avoid temperature gradients along the probe.

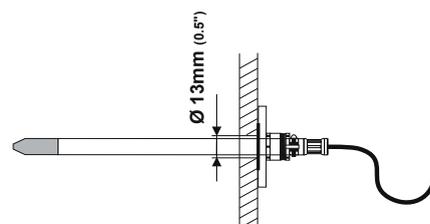
Whenever possible, install the entire probe inside the environment to monitor. If the probe is installed into a wall, then isolate thermally the backend of the probe looking out of the wall.



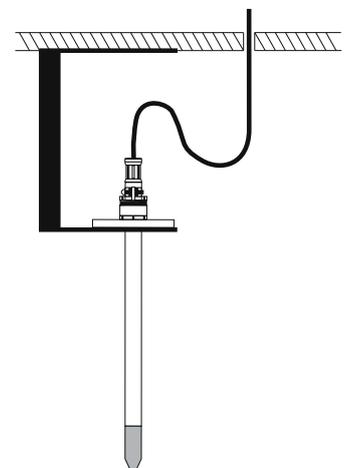
The probe shall be mounted horizontally or vertically, with the tip of the probe pointing downwards.

In applications where condensation is likely to happen:

- The cable shall form a drip loop close to the probe.
- Use the drip water protection (see datasheet accessories, code HA010503) for vertically mounted probe.



Horizontal mounting



Vertical mounting



Ensure appropriate mechanical stability and sealing of the probe mounting taking into account specific influences at the site, such as vibrations, shocks or temperature changes.



The probe and the cabling shall be handled and installed to avoid electrostatic charges. (e.g. metal hose)

Filter caps



The following filter caps offer good protection against electrostatic discharge for explosion group IIB, but are not permitted for use in EPL Ga IIC:

- Membrane filter (order code F2)
- PTFE filter (order code F5)
- Membrane on stainless steel body (order code F10)
- PTFE on stainless steel body (order code F11)
- H₂O₂ filter (order code F12)

The following filter caps are permitted for use in EPL Ga IIC:

- Stainless steel sintered (order code F4)
- Stainless steel grid (order code F9)
- Oil (order code F13)



Filter caps F2, F5, F10, F11 and F12 not allowed for TIIS (Japan certification) order code EX6

3.5.1 Probe Feedthrough with Cut-in Fitting



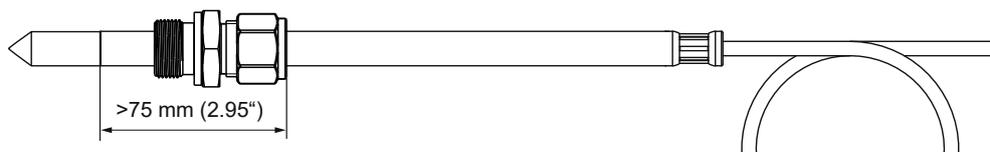
The feedthrough with cut-in fitting (ordering code PA20, PA21, PA22) can be used as Zone bushing. For this, the tightness of its mounting into the Zone separation wall must correspond to IP67.

Once mounted, the cut-in fitting creates a permanent clamping-ring onto the probe.



Safety instructions for pressure-tight feedthrough:

- Do not assemble the probe and tighten the feedthrough if the plant is under pressure.
 - The plant must not be vented by releasing the nut (A).
 - Use appropriate seal on conical probe threads.
 - Never rotate the screw connection body (B) but hold the screw connection body (B) securely and turn the nut (A).
 - Avoid unnecessary disassembly of pipe screw connections.
 - Position the cut in fitting >75 mm (2.95") from the end of the filter cap to the end of the fitting!
- For a probe length of 65 mm a cut in fitting is not possible.

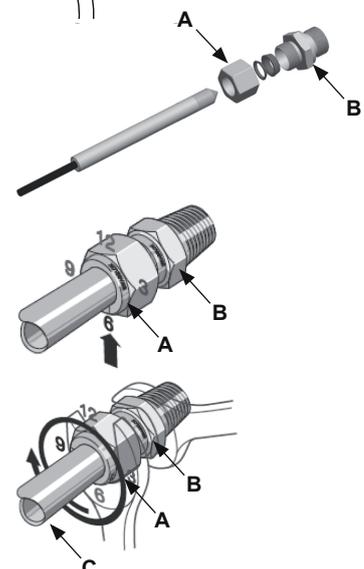


Installation instructions:

- Tighten the nut (A) finger-tight.
- Mark the nut (A) at 6 o'clock position.
- Hold the screw connection body (B) tight and tighten the nut (A) with 1 ¼ turns till 9 o'clock position.

Assembly with high pressure applications and applications with a high security factor:

- Tighten the nut (A) until the probe (C) can no longer be turned by hand and moved axially in the feedthrough.
- Mark the nut (A) at 6 o'clock position.
- Hold the screw connection body (B) tight and tighten the nut (A) with 1 ¼ turns to 9 o'clock position.



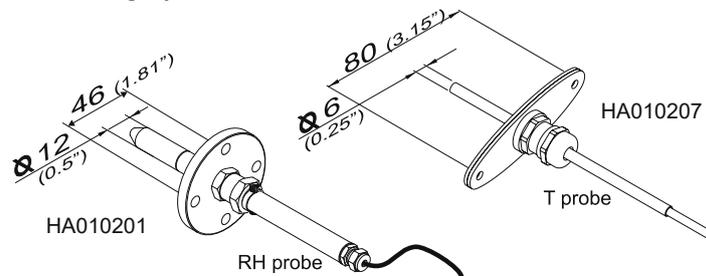
Re-mounting:

- Slide the measurement probe with clamping ring into the fitting as far as it goes.
- Tighten the nut finger-tight, then tighten by approx. a ¼ turn using a spanner.

3.5.2 Mounting Flange



The optional mounting flange (see datasheet accessories) may not be used as Zone bushing. When installed with the mounting flange, the hazard areas on the filter cap side and at the cable outlet side must be of the same category.



3.5.3 Ball Valve and Sliding Fitting

The optional ball valve HA011403 (ATEX certified) allows for the probe to be mounted or removed without interrupting the process to be monitored.



Only ball valve approved for use in explosion hazard areas are permitted.

The two metal sealing rings (see figure) shall be replaced with new ones after each removal of the probe.

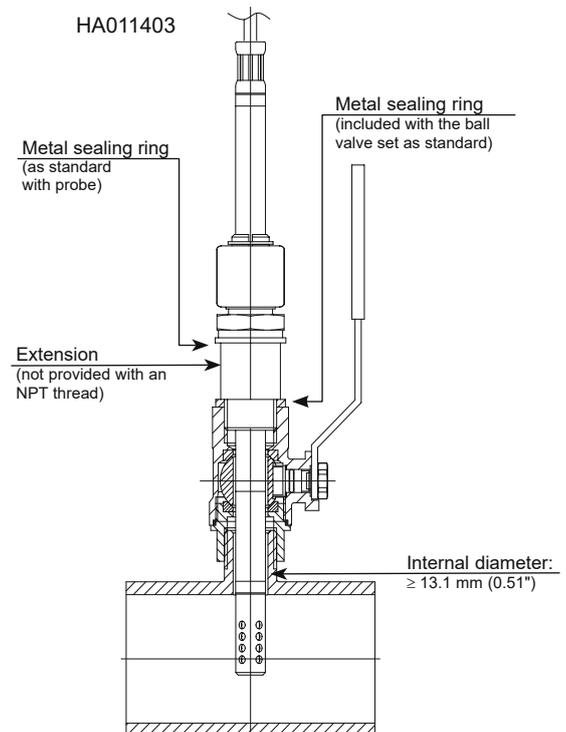
MOUNTING THE PROBE:

The process temperature may not deviate from the mounting temperature by more than ± 40 °C (104 °F). The maximum permitted process pressure during mounting is 10 bar (145 psi).

- Mount the probe onto the ball valve with the ball valve closed.
 - Open the ball valve.
 - Slide the probe through the ball valve into the process to the desired immersion depth. For rather high process pressure a manual pressing tool might be needed for sliding easily the probe into the process.
 - For secure probe installation the closing nut shall be tightened with a torque of 30 Nm. If a torque wrench is not available, turn first the closing nut by hand as tight as possible, then turn another approx. 50° using a suitable open-ended spanner.
- A lower tightening torque means lower clamping force of the clamp sleeve. Consequently there is a risk for the probe being pushed out by the process pressure.



An excessive tightening torque may cause permanent deformation of the clamping sleeve and of the probe. This makes the removal and re-mounting difficult or even impossible.





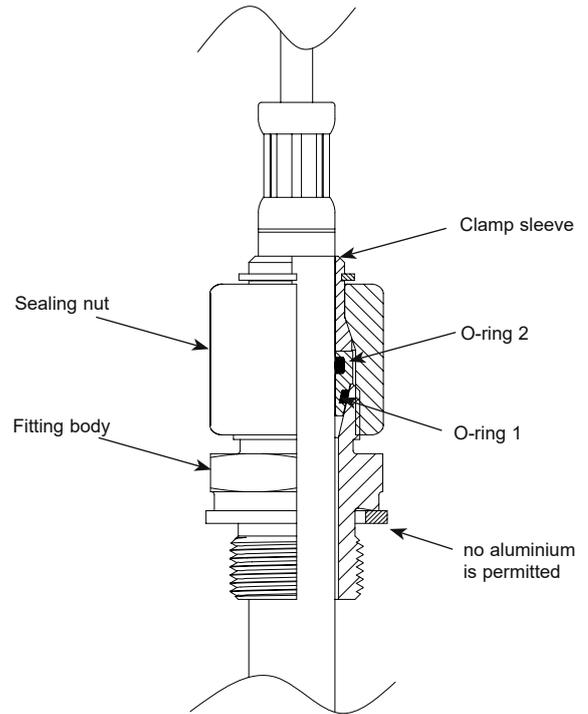
REMOVING THE PROBE:

- Hold the probe firmly in place. While doing so, do not bend the probe cable.
- Release slowly closing-nut using a spanner only until the process pressure pushes out the probe. Do not release completely the closing-nut!
- After the probe has been pushed all the way back, close the ball valve.
- The probe can be now removed from the ball valve.



During mounting and removal, ensure that o-ring 1 is correctly installed.

Replace a damaged o-ring by an original new one, order code HA050308, o-ring type: 13x1.5mm (0.5"x 0.06") - FKM-60.



3.5.4 The Optional Probe Retraction Tool



The operating instructions of the probe retraction tool must be strictly observed.

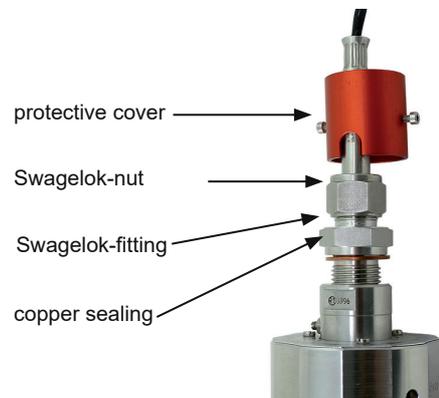
The probe of the EE300EX model T22 can be installed into a pressurized environment up to 250 bar using the sensor retraction tools ZM-WA-025-040-EST or BG-WA-103-045-EST.

The scope of supply of the EE300EX model T22 includes the copper sealing for the Swagelok feedthrough.

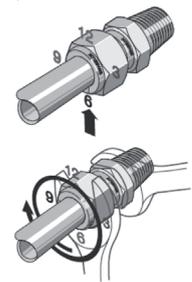


Make sure that the sensor retraction tool is in the "SERVICE" position (see manual of the sensor retraction tool).

- Before installing the sensor, dismount the closing plug 1/2" using a hexagonal 10 mm wrench and "park" it at the thread hole M10 designed for that purpose.
- Insert the probe with the copper sealing, the Swagelok union nut, the Swagelok fitting and protective cover into the probe retraction tool as far as it goes.



- Fasten the Swagelok 1/2" fitting of the sensor retraction tool with appropriate wrench. Do not forget the copper sealing!
- Close the Swagelok union nut with cutting ring finger-tight by hand. Then adjust the probe.
- Use the appropriate wrench to tighten the union nut (A) just firmly enough that the screw connection (B) cannot be moved manually. Mark the nut at the 6 o' clock position.
- Hold the screw connection body (B) tight and tighten the union nuts (A) with 1 1/4 turns to the 9 o' clock position.
- Mounting the protective cover for the Swagelok feedthrough:
 1. Push the protective cover down to the adjusting device. The screws shall point to the flat area.
 2. Tighten the M3 screws.



4 Electrical Connections

4.1 General



It is essential that installation, electrical connection, commissioning, operation and maintenance in explosion hazard areas are only carried out by trained specialist staff authorised to do so by the system operator.



The installation in an explosion hazard area shall comply with EN 60079-14, EN 60079-25 or IEC 60079-14, IEC 60079-25. Repair and maintenance shall be performed according to EN 60079-17 or IEC 60079-17 and EN 60079-19 or IEC 60079-19. All relevant national regulations shall be strictly observed.



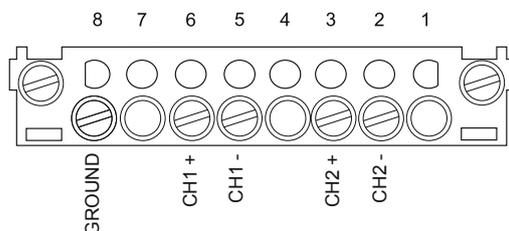
The EE300Ex sensor is a loop powered (2-wire) device, both channels (outputs) are galvanic isolated. **For proper operation, Channel 1 (CH1) must always be connected.** Channel 2 (CH2) may be connected only if necessary.



Cable ends shall be fitted with the appropriate wire-end sleeves. While connected to the terminals, the air gap must be min 2mm (0.08") between the wires and min. 6mm (0.2") between CH1 and CH2.

Do not shorten or extend the probe cable. Changing the length of the probe cable has a strong negative effect onto the measurement performance and may lead to EE300EX failure.

4.2 Terminal Assignment



4.3 Grounding and Potential Equalization



The EE300Ex shall be integrated into the potential equalization to avoid hazards from electrostatic charges. The grounding shall comply with EN60079-14, EN60079-25 or IEC60079-14, IEC60079-25. A remote probe shall also be grounded using a screw connection with a maximum of 1 MΩ in the potential equalization.



The ground conductor or the potential equalization connection must have a cross-section of 4 mm² (0.06 in²) for the external grounding. Stranded wires shall be fitted with suitable wire-end sleeves.

For external grounding one of the two equivalent alternatives is available (see figure below).

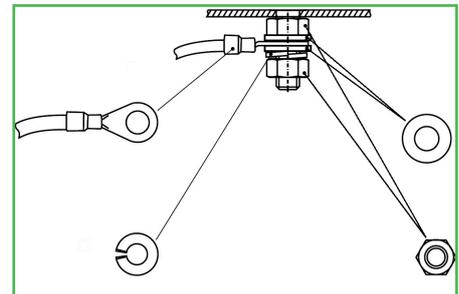


The resistance of the ground connection of the intrinsically safe barrier shall be max. 1 Ohm.

External grounding:

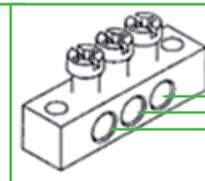
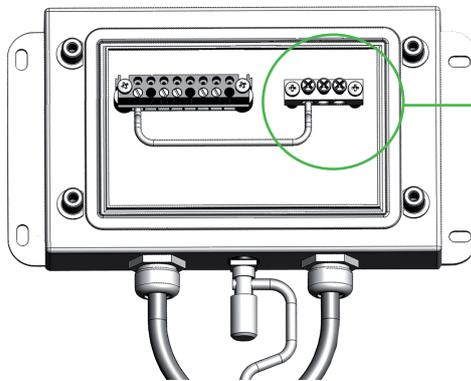


Alternative A:
Cable cross-section
maximum 4mm² (0.06in²)



Alternative B: M4 grounding bolt
The grounding conductor must be equipped with an appropriate ring terminal for M4 mounting!

Internal grounding:



Cable cross-section
maximum 10 mm² (0.2 in²)

4.4 Connection Cable



A shielded cable shall be used. The shield must be grounded only at one end, at the EE300Ex side.



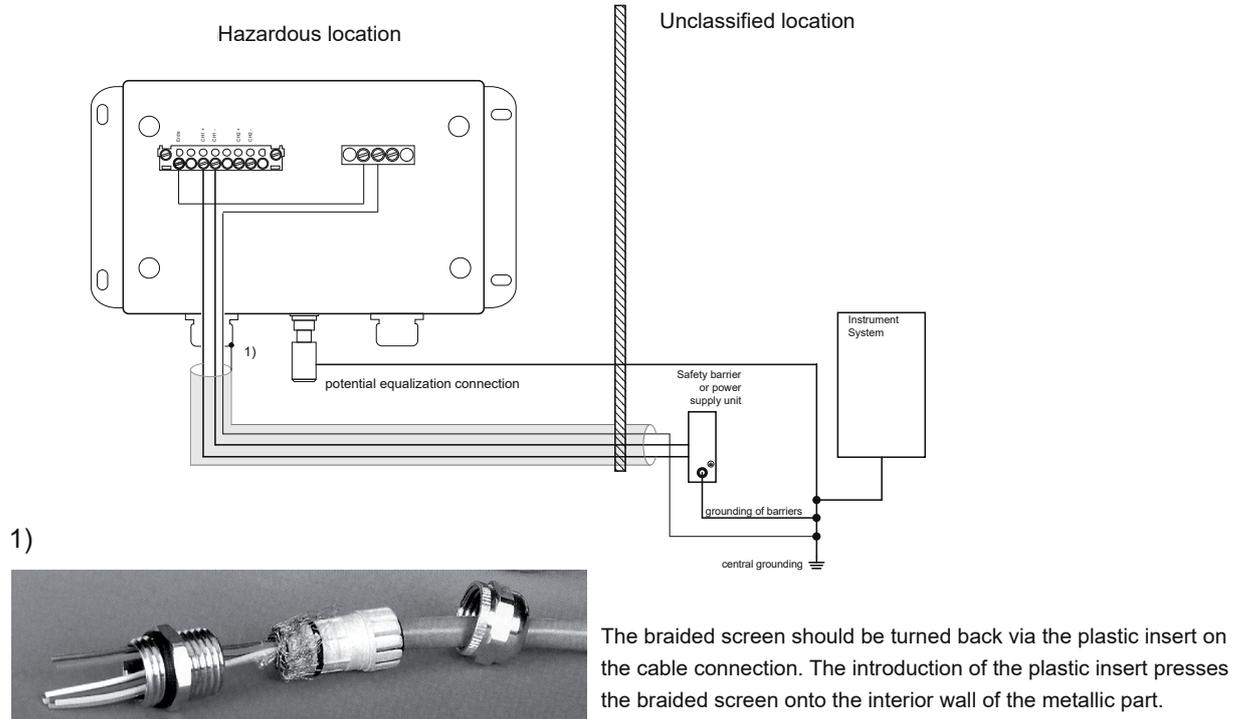
The connection cable shall comply to the following specifications for ATEX, as required by EN60079-14 and EN60079-25:

- Maximum cross-section 1.5 mm² (0.02 in²)
- Single stranded wire diameter ≥ 0.1mm (0.004")
- Test voltage wire-wire ≥ 500 V AC eff.
- Test voltage wire-shield (if a cable with shield is used): ≥ 500 V AC eff.
- Cable inductivity, cable capacity and conductor resistance are to be evaluated during the proof of intrinsic safety.
- Flame resistance acc. to IEC60332-1-2

Example of cable meeting above requirements: ÖLFLEX® EB CY from LAPP KABEL

Additional requirements if both channels (CH1, CH2) are connected with a common cable:

- The test voltage wire-wire ≥ 1000 V AC eff.
- The radial thickness of the insulation ≥ 0.2 mm (0.008").
- The conductor insulation shall withstand 500 V AC eff.



4.5 Calculation of the Maximum Cable Length

Intrinsically safe power supply device STAHL 9160/13-11-11 (order code HA011405)

Technical data for EE300Ex

Supply voltage: $U_{Bin} = 9V + R_L * 0.02A$
 Max. current: $I_{out\ max} = 20mA$

Technical data for STAHL 9160/13-11-11

Nominal operating voltage: $U_N = 24$ V
 Input voltage for sensor: $U_S = 16$ V
 Max. load: $R_L = 600$ Ohm

Example: Calculation of maximum cable length

Cable $0.75mm^2$ ($0.01in^2$): $R_{cable} = 0.0267$ Ω/m
 Load resistor: $R_L = 200$ Ω
 Input voltage for sensor: $V_S = 16$ V
 Min. supply voltage EE300Ex: $V_{Bmin} = 9V + 200\Omega * 0.02A = 13V$

Maximum voltage drop on cable: $V_{cable} = V_S - V_{Bmin} = 16V - 13V = 3V$

Total cable resistance: $R_{cable\ total} = R_{cable} * L_{total} * 2$ (supply and return line)

Transform in accordance with L_{total}

$$V_{drop} = R_{cable\ total} * I_{out\ max} =$$

$$= R_{cable} * L_{total} * 2 * I_{out\ max}$$

$$L_{total} = V_{drop} / (I_{out\ max} * 2 * R_{cable})$$

$$L_{total} = 3V / (0.02A * 2 * 0.0267\Omega/m)$$

$L_{total} = 2800m$ maximum cable length



Caution: This is the maximum length without allowing the intrinsic safety area. Cable capacity and inductivity may reduce the cable length.

4.6 Selecting a Suitable Intrinsically Safe Supply Unit for ATEX Zone Concept

Example for evidence of the intrinsic safety in accordance with EN 60079-14:2008 12.2.5.2, EN 60079-25:2010 13.1. CH1 and CH2 are galvanically isolated. The proof of intrinsic safety shall be performed with appropriate equipment.

Example: Installation in Zone 0 of the EE300Ex without display
Connection cable length: 300 m (984 ft)
Explosion group: IIC
Temperature class: T4
CH1 and CH2 connected by one single cable.

Intrinsically safe power supply device STAHL 9160/13-11-11 (see accessories) (Extract from the EC-Type Examination Certificate)

Certified according to:

II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc (certificate number: DMT 03 ATEX E 010 X)
II (1) D [Ex ia Da] IIIC (certificate number: DMT 03 ATEX E 010 X)

Entity parameters:

$U_0 = 27 \text{ V}$
 $I_0 = 88 \text{ mA}$
 $P_0 = 576 \text{ mW}$
 $C_0 \text{ IIC} = 90 \text{ nF}$
 $C_0 \text{ IIB} = 705 \text{ nF}$
 $L_0 \text{ IIC} = 2.3 \text{ mH}$
 $L_0 \text{ IIB} = 17 \text{ mH}$

Technical data for the connection cable:

Cable type: ÖLFLEX® EB CY from Lapp Kabel
Cable cross-section: 4 x 0.75 mm² (0.06x0.01 in²)
Operating capacity: 110 nF/km
Inductivity: 0.65 mH/km

Cable capacity for 300m (984ft): $CK = 0.3\text{km} * 110\text{nF/km} = 33\text{nF}$

Cable inductivity for 300m (984ft): $LK = 0.3\text{km} * 0.65\text{mH/km} = 0.195\text{mH}$

Technical data for EE300Ex (extract from the EU-Type Examination Certificate):

Certified according to:

⊕ II 1G Ex ia IIC T4 Ga
⊕ II 1D Ex ia IIIC T₂₀₀ 80°C Da

Entity parameters:

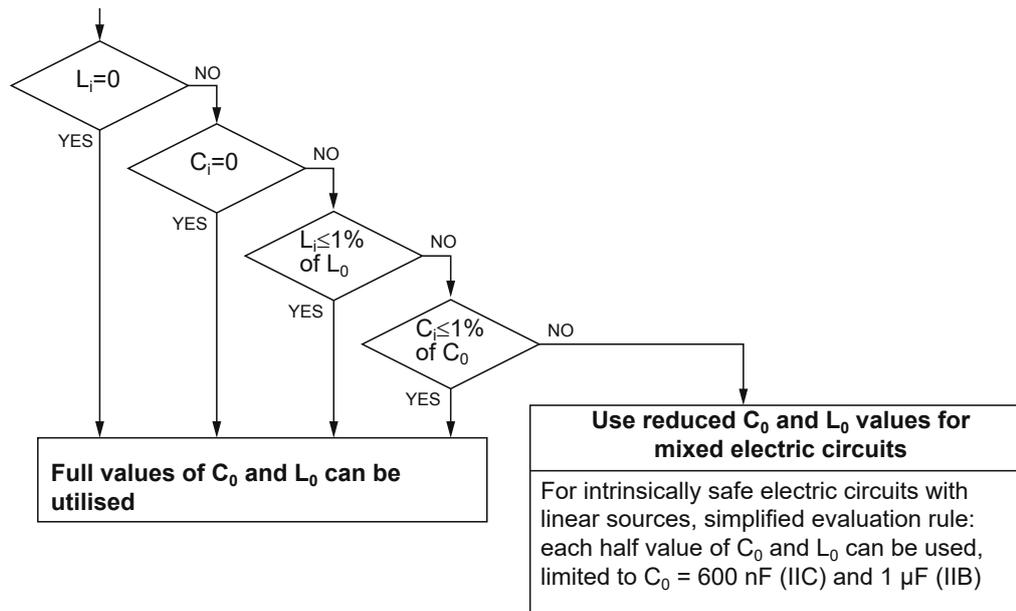
$U_i = 28\text{V}$
 $I_i = 100\text{mA}$
 $P_i = 700\text{mW}$
 $C_i = 2.2\text{nF}$
 $L_i = \text{negligibly small}$

Proof of the intrinsic safety according EN 60079-11:2012 EN 60079-25:2010 (Appendix A)

$U_0 = 27\text{V} \leq U_i = 28\text{V} \rightarrow \text{ok}$
 $I_0 = 88\text{mA} \leq I_i = 100\text{mA} \rightarrow \text{ok}$
 $P_0 = 576\text{mW} \leq P_i = 700\text{mW} \rightarrow \text{ok}$
 $C_0 = 90\text{nF} \geq 2,2\text{nF} + 33\text{nF} \rightarrow \text{ok}$
 $L_0 = 2,3\text{mH} \geq 0\text{mH} + 0,195\text{mH} \rightarrow \text{ok}$

Conclusion: The protection level of the intrinsically safe current circuit is met.

**Proof of the intrinsic safety according EN 60079-11:2012,
EN 60079-25:2010 (Appendix A)**



L_i = negligibly small → no reduced C_0 and L_0 values are required.

4.7 Configuration Adapter

The on-board service interface is dedicated for the EE300EX configuration and for the RH and T adjustment. This is possible by the optional EE-PCA Product Configuration Adapter and HA011068 connection cable. Refer to datasheet EE-PCA and HA011068 user manual.

The EE-PCS configurator software and the drivers are available for download free of charge at <http://www.epluse.com/en/service-support/download-center/>



The configuration or adjustment of EE300Ex may not be performed in the hazard area.



CH1 and CH2 must be disconnected while using the configuration adapter.



When the front section has been removed from the hazard area, e.g. for calibration, the empty bottom section shall be protected against dirt and electrostatic charge with the blind front cover HA011401 (see accessories).

4.8 Calibration of the Current Loop



For the calibration of the current loop in explosion hazard areas only approved multimeters are permitted. During the measurement with these multimeters the requirements of the system description (the proof of intrinsic safety) shall be observed

5 Display (optional)

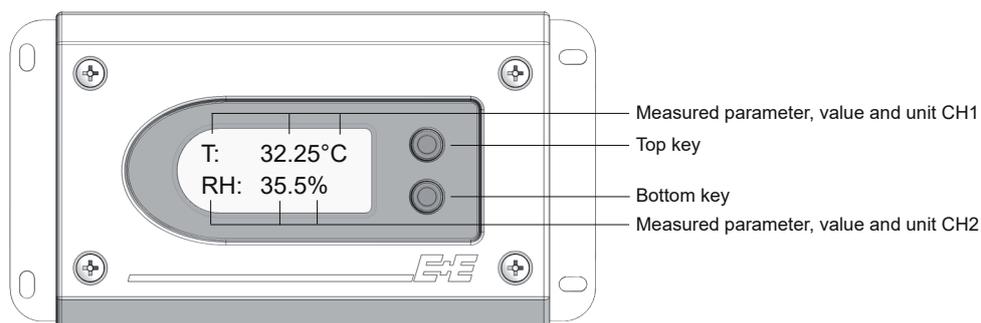


Display is not permitted in the gas hazard area for EPL Ga IIC and in the dust hazard area for IIIA, IIIB and IIIC.

For TIIS (Japan certification) order code EX6 no display in Ga.

The display shows the measured parameter on the outputs CH1 (top row) and CH2 (bottom row), according the ordering code.

The top key change the visualization of the calculated parameter on the top row. The bottom key change the visualization of the calculated parameter on the bottom row. Changing the display visualization do not change the parameter on the output CH1 and CH2.



6 Maintenance



It is essential that operation and maintenance in explosion hazard areas are only performed by trained specialist personnel authorised to do so by the system operator.



Maintenance and repair work in explosion hazard areas must comply with the requirements of EN 60079-17 or IEC 60079-17, EN 60079-19 or IEC 60079-19 and with all the relevant national regulations.

6.1 Filter Cap Replacement

When employed in dusty, polluted environment, the filter cap shall be replaced once in a while with an E+E original one. A polluted filter cap causes longer response time.



When replacing a filter cap, ensure that the sensor is NOT touching the filter cap!

6.2 Cleaning the EE300EX Sensor

6.2.1 Cleaning the Enclosure



Gently wipe the enclosure and the display with a soft damp cloth. Do not use detergents or abrasive means.

6.2.2 Cleaning the Probe

If needed, the sensing head of the probe can be cleaned. For cleaning instructions please see www.epluse.com/ee300ex



When replacing a filter cap, ensure that the sensor is NOT touching the filter cap!

6.3 Configuration, Adjustment and Calibration

Refer to the data sheet EE-PCA Product Configuration Adapter and to the user manual HA011068 connection cable.

Definitions

Adjustment: the specimen is brought in line with the reference

Calibration: the specimen is compared with a reference and its deviation from the reference is documented

6.4 Display Error Messages

Error 1 = RH sensing element damaged

Error 2 = Condensation on the RH sensor element

Error 3 = T sensing element damaged

Error 4 = Short circuit at the T sensing element

7 Technical Data

7.1 EE300Ex-M1 Humidity and Temperature Sensor

Measurands

Relative humidity

Measuring range 0...100 % RH

Accuracy¹⁾

(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

mv = measured value

Temperature dependence electronics, typ. 0.03 % RH/°C

Response time t_{90} < 30 s with stainless steel filter at 20 °C (68 °F)

Temperature

Measuring range

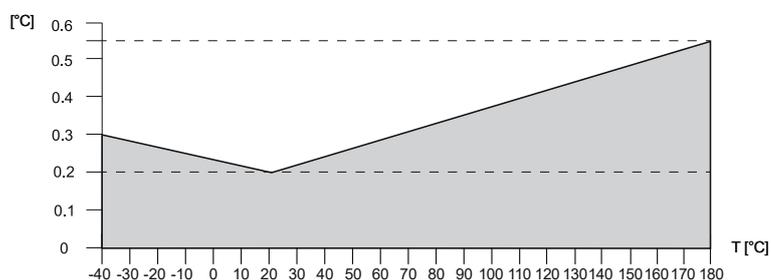
Wall mount: -40...60 °C (-40...140 °F)

Remote probe: -40...180 °C (-40...356 °F)

For TIIS (Japan):

Model T1, T7, T10: -40...60 °C (-40...140 °F)

Accuracy¹⁾



Temperature dependence of electronics, typ. 0.005 °C/°C

Calculated parameters

		from	up to		Units
			wall mount	remote probe	
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)	1 100 (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 (150 000)	2 800 (999 999)	kJ/kg (Btu/lb)
Water activity	aw	0	-	1	1
Water content	X	0	-	100 000	[ppm]

Outputs

Freely selectable and scalable outputs

2 x 4-20 mA (2-wire) galvanically isolated
Output 1 must be connected!

$$R_L = (V_{cc} - 9V) / 20mA$$

General

Supply voltage

$$V_{cc, min} = (9 + R_L * 0.02) V DC \quad V_{cc, max} = 28 V DC$$

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

according measuring range

Electronics without display -40...60 °C (-40...140 °F)

Electronics with display -20...60 °C (-4...140 °F)

Storage temperature range

Electronics and probe -20...60 °C (22...140 °F)

Electromagnetic compatibility

EN 61326-1 EN 61326-2-3

Industrial Environment

Material

Enclosure

stainless steel 1.4404

Probe cable

PTFE

Probe (without filter)

stainless steel 1.4404



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).

7.2 EE300Ex-M3 Temperature Sensor

Measurand

Temperature

Temperature sensor

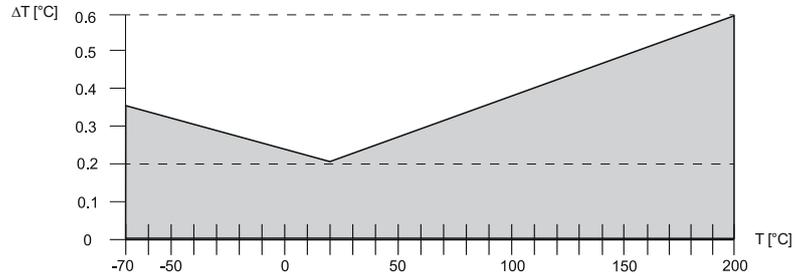
Pt1000 (Tolerance class A, DIN EN 60751)

Measuring range

Wall mount: -40...60 °C (-40...140 °F)

Remote probe: -70...200 °C (-94...392 °F)

Accuracy¹⁾



Temperature dependence of electronics, typ.

0.005 °C/°C

Outputs

Scalable analogue output

4-20 mA (2-wire)

$R_L = (V_{CC} - 9V) / 20mA$

General

Supply voltage

$V_{CC \text{ min}} = (9 + R_L * 0.02) \text{ V DC}$

$V_{CC \text{ max}} = 28 \text{ V DC}$ $R_L = \text{load resistor}$

Current consumption

Max. 20 mA

Temperature range

Probe

according measuring range

Electronics

-40...60 °C (-40...140 °F)

Electronics with display

-20...60 °C (-4...140 °F)

Storage temperature range

Electronics and probe

-20...60 °C (22...140 °F)

Material

Enclosure

stainless steel 1.4404

Probe cable

PTFE

Probe

stainless steel 1.4541

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)

Electromagnetic compatibility according

EN 61326-1 EN 61326-2-3

Industrial Environment



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).

8 ATEX Certificate



Product Service

(1) **EU-Type Examination Certificate**
TRANSLATION

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

TPS 13 ATEX 38892 003 X *Issue 02*



(4) Equipment: Humidity / Temperature Sensor
Type: EE300Ex with connection cable HA011068

(5) Manufacturer: E+E Elektronik GmbH
(6) Address: Langwiesen 7
4209 ENGERWITZDORF
AUSTRIA

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) TÜV SÜD Product Service GmbH, notified body No. 0123 in accordance with Article 17 of the Council Directive 2014/34/EU of the European Parliament and of the Council dated 26 February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II of the Directive. The examination and test results are recorded in the confidential reports 713215990.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018
EN 60079-11:2012

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and the construction of the specified equipment in accordance with Directive 2014/34/EU. Further requirements of this Directive apply to the manufacturer and supply of this equipment.

(12) The marking of the equipment shall include the following:

Model without display: II 1G Ex ia IIC T4 Ga II 1D Ex ia IIIC T₂₀₀ 80 °C Da

Model with display: II 2G Ex ia IIC T4 Gb II 1G Ex ia IIB T4 Ga

Remote probe: II 1G Ex ia IIC T6...T1 Ga II 1D Ex ia IIIC T₂₀₀ 80 °C...220 °C Da

Certification body
Ridlerstrasse 65, 80339 Munich

Munich, 2021-08-04

digitally signed by U. Jacobs on 2021-08-04

.....
Dipl.-Ing. Ulrich Jacobs

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EU-Type Examination Certificate without signature shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by TÜV SÜD Product Service GmbH.
In case of dispute, the German text shall prevail.

The document is internally administrated under the following number: EX5A 038892 0010 Rev.01

TÜV SÜD Product Service GmbH • Zertifizierstelle • Ridlerstraße 65 • 80339 München • Deutschland



Product Service

Schedule

- (13)
- (14) **EU-Type Examination Certificate TPS 13 ATEX 38892 003 X Issue 02**
- (15) Description of equipment:

The intrinsically safe devices EE300Ex-M1 (for the measurement of relative humidity (RH) and temperature (T)) and EE300Ex-M3 (temperature measurement only) are dedicated for the use in hazardous gas areas up to zone 0 and hazardous dust areas up to zone 20. With the EE300Ex-M1, the physical values dew point temperature (Td), frost point temperature (Tf), etc. can also be determined. Devices of this series can be operated as wall mount with fixed probe or with a remote probe, connected with a fixed cable.

The Humidity / Temperature Sensor EE300Ex may only be supplied by an associated apparatus with intrinsically safe connectors. The intrinsically safe power supply and data output is carried out on an isolated 2-wire 4..20 mA interface. The device contains two galvanic isolated 2-wire channels, whereas channel 2 can only be operated together with channel 1.

Outside the hazardous area the configuration and adjustment of the EE300Ex can be performed with the associated HA011068 connection cable, a configuration device and a PC.

Technical data:

Humidity / Temperature Sensor EE300Ex	
Input voltage (Ui)	28 V
Input power (Pi)	700 mW (per channel, with linear source)
Input current (Ii)	100 mA
Input capacitance (Ci)	2,2 nF
Input inductance (Li)	negligible small
Ambient temperature electronics	$-40\text{ °C} \leq T_{\text{amb}} \leq +60\text{ °C}$
Ambient temperature of combined humidity and temperature probe	$-40\text{ °C} \leq T_{\text{amb}} \leq +180\text{ °C}$
Ambient temperature of temperature probe	$-70\text{ °C} \leq T_{\text{amb}} \leq +200\text{ °C}$
Protection class	IP65

Connection cable HA011068	
Maximum voltage (Um)	250 VAC
Supply voltage	5 VDC (USB)
Communication	USB or RS232
Ambient temperature	$-40\text{ °C} \leq T_{\text{amb}} \leq +40\text{ °C}$
Protection class	IP20

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Product Service

Application temperature of the probes:

Specification of the temperature class "TKG" for use in gas explosion hazardous areas and the temperature "TKD" for use in dust explosion hazardous areas depending on the ambient temperature "T_{amb}" with respect to the temperature and humidity probe.

TKG	TKD	Humidity and Temperature Probe	TKD	Temperature Probe
T6	80 °C	-40 °C ≤ T _{amb} ≤ +60 °C	80 °C	-70 °C ≤ T _{amb} ≤ +60 °C
T5	95 °C	-40 °C ≤ T _{amb} ≤ +75 °C	95 °C	-70 °C ≤ T _{amb} ≤ +75 °C
T4	130 °C	-40 °C ≤ T _{amb} ≤ +110 °C	130 °C	-70 °C ≤ T _{amb} ≤ +110 °C
T3	195 °C	-40 °C ≤ T _{amb} ≤ +175 °C	195 °C	-70 °C ≤ T _{amb} ≤ +175 °C
T2	200 °C	-40 °C ≤ T _{amb} ≤ +180 °C	220 °C	-70 °C ≤ T _{amb} ≤ +200 °C
T1	200 °C	-40 °C ≤ T _{amb} ≤ +180 °C	220 °C	-70 °C ≤ T _{amb} ≤ +200 °C

Models:

Model	
EE300Ex-M1: Measurement of relative humidity (RH) and temperature (T) EE300Ex-M3: Temperature measurement only	
T1 Wall mount with fixed probe	T7, T9, T10, T15, T22, T24 Remote probe with fixed cable The code number after the T stands for the probe type.
	
D0: without display D1: with display	D0: without display D1: with display
<i>Type of connection (measuring channels):</i> E13: Conduit Adapter (metal) E32: M12-Plug (plastic) E2, E15, E17, E18, E19, E20, E21, E22: cable gland (metal)	<i>Type of connection (measuring channels):</i> E13: Conduit Adapter (metal) E32: M12-Plug (plastic) E2, E15, E17, E18, E19, E20, E21, E22: cable gland (metal)
K0	Kx: cable length [m]: 0,2 m to 10 m
Lx: probe length [mm]: 50 mm / 70 mm	Lx: probe length [mm]: 65 mm to 1000 mm

(16) Test report: 713215990

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Product Service

(17) Special conditions for safe use:

- In dust explosive areas (IIIA, IIIB, IIIC) zone 20 and in gas explosive areas (IIC) with zone 0 the models with display and the models with M12 connections must not be used.
- The plastic filter caps must not be used in gas explosive areas of group IIC in zone 0.
- The sensor element must be covered with one of the provided filter caps.
- The sensor pipe of the remote probe is not electrically conductively connected with the housing of the main unit and must therefore be grounded separately. In addition, in potentially explosive areas of zone 0, the cable to the remote sensor must be installed in a metallic and earthed conduit.
- The configuration and adjustment of the EE300Ex is only permitted with the associated HA011068 connection cable outside the hazardous area. When the HA011068 is connected to the EE300Ex, CH1 and CH2 must not be connected.
- In case of optional use of the second measuring channel, both channels must be galvanically isolated from each other.

(18) Essential health and safety requirements:

met by standards

According to article 41 of Directive 2014/34/EU, EC-type examination certificates which have been issued according to Directive 94/9/EC prior to the date of coming into force of Directive 2014/34/EU (April 20, 2016) may be considered as if they have been issued already in compliance with Directive 2014/34/EU. By permission of the European Commission supplements to such EC-type examination certificates and new issues of such certificates may continue to hold the original certificate number issued before April 20, 2016.

This EU-type examination certificate according to Directive 2014/34/EU is a new issue of the EC-type examination certificate according to Directive 94/9/EC dated from 2013-03-05, including the 1st supplement dated from 2014-04-16, Issue 01 dated from 2019-09-30 and today's additional changes. Details are recorded in the confidential report 713215990.

9 EU Declaration of Conformity



EU - DECLARATION OF CONFORMITY

(According to ISO/IEC 17050-1)

Product(s) Type	From Version:	Measure:	Output signal:
EE300Ex-M1yyy EE300Ex-M3yyy yyy order code	201107_1 201108_1 201115_1	humidity / dewpoint / water activity / temperature	4-20mA



CE 0123

E+E ELEKTRONIK Ges.m.b.H
Langwiesen7
4209 Engerwitzdorf / AUSTRIA

EU-TYPE-EXAMINATION CERTIFICATE:

TPS 13 ATEX 38892 003 X

EE300Ex without display: II 1G Ex ia IIC T4 Ga II 1D Ex ia IIIC T₂₀₀ 80°C Da
 EE300Ex with display: II 2G Ex ia IIC T4 Gb II 1G Ex ia IIB T4 Ga
 EE300Ex remote probe: II 1G Ex ia IIC T6...T1 Ga II 1D Ex ia IIIC T₂₀₀ 80°C...220°C Da

The EU-Type-Examination was issued by TÜV SÜD Product Service GmbH (notified body No 0123), Ridlerstraße 65, 80339 München / Germany.

We declare under our sole responsibility that these products (see product table above) correspond to the following regulations and their subsequent modifications:

Directive Ref.	Directive area
2014/30/EU	Electromagnetic compatibility
2014/34/EU	Equipment and protective systems in potentially explosive atmospheres
2011/65/EU and 2015/863/EU	RoHS

The products conform with the following standards or standardized documents:

Standard	Year of ratification	Standard	Year of ratification
EN IEC 60079-0	2018	EN 61326-1	2013
EN 60079-11	2012	EN 61326-2-3	2013
		EN IEC 63000	2018

Designed for use in industrial environment.
 Affixing of the CE marking (for the first time): 2013

Test Report: Conformity_EE300Ex_05.docx
 Modification: Standard and Ex marking update


 DI Timelthaler Wolfgang
 (business manager)

Engerwitzdorf, August 10th, 2021


 Birklbauer Martin
 (Ex-authorized person)

File: Declaration of conformity EE300Ex_06.docx

10 IECEx Certification of Conformity - COC

for more information see <http://www.iecex.com/>
or our website <http://www.epluse.com/ee300ex>

11 Certificates China, Korea and Japan

For more information please contact the E+E sales support.



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