

EE310 UL Listed

High-End Humidity and Temperature Sensor for Industrial Applications

The UL listed EE310 is optimized for best reliability in industrial applications up to 180 °C (356 °F) and 20 bar (290 psi). In addition to highly accurate measurement of the relative humidity (RH) and temperature (T), the device calculates all other humidity related parameters.

Measurement Performance

The EE310 employs high-end E+E humidity sensing elements manufactured in state-of-the-art thin film technology, which are the prerequisite for outstanding measurement accuracy.

Long-Term Stability

The E+E proprietary coating protects the sensing elements against corrosive and electrically conductive pollution, which leads to outstanding long-term stability even in harsh environment. With the appropriate choice of filter cap, the EE310 tackles even challenging industrial applications.

Versatility

The EE310 is available for wall or duct mount as well as with remote probe. It features an UL Type 4 polycarbonate enclosure which facilitates installation and maintenance. The enclosure can accommodate a 100...240 V AC supply unit or various interface modules.

Outputs

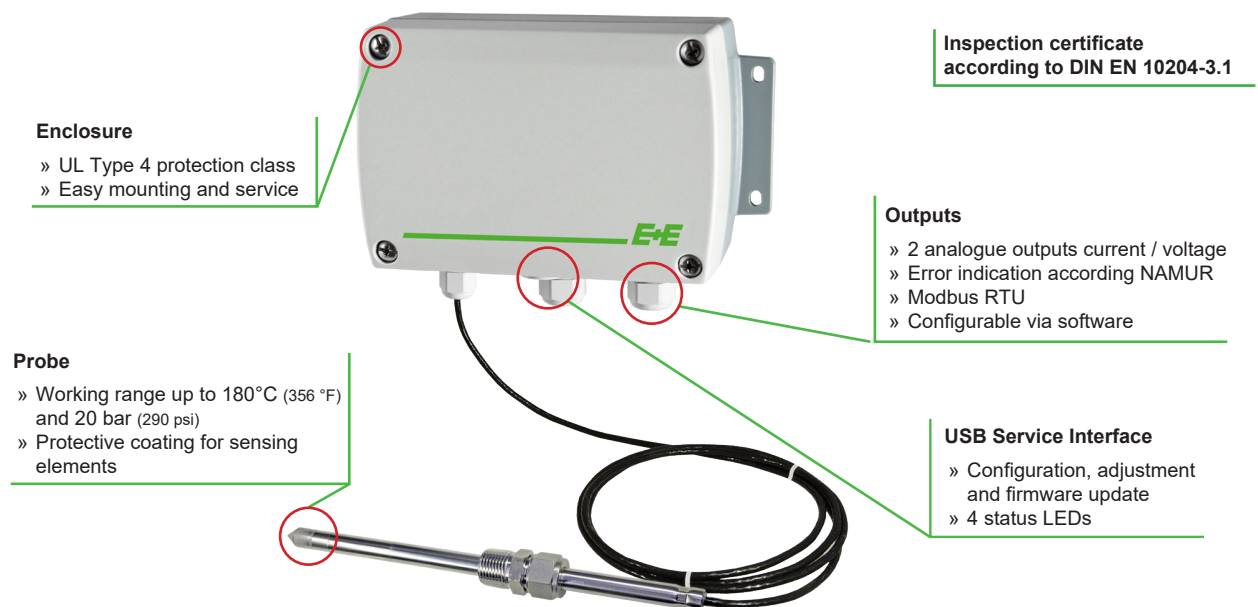
The measured data is available on two analogue outputs and on the RS485 interface with Modbus RTU protocol.

Configurable and Adjustable

The configuration and the RH and T adjustment of the EE310 can be performed using the free EE-PCS Product Configuration Software via the USB interface.



Features



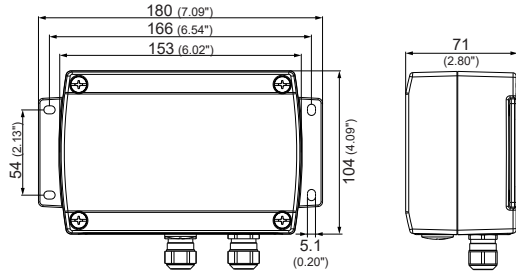
Protective sensor coating (option C1)

The E+E proprietary sensor coating is a protective layer applied to the sensing elements, their leads and soldering points. The coating substantially extends sensor lifetime and ensures optimal measurement performance in corrosive environment (salts, off-shore applications). Additionally, it improves the sensors' long term stability in dusty, dirty or oily applications by preventing stray impedance caused by deposits on the active sensor surface or on the electrical connections.

Dimensions

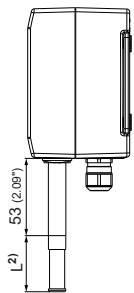
Values in mm (inch)

ENCLOSURE

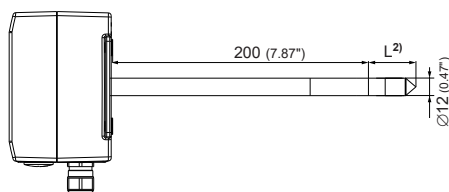


PROBES

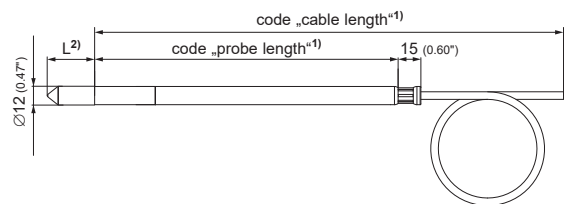
T1: Wall mount



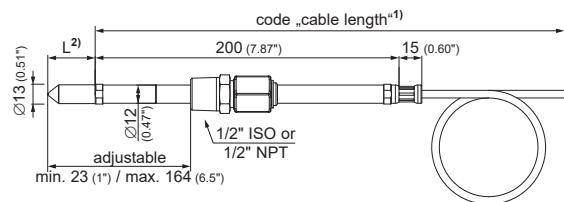
T2: Duct mount



T5: Remote probe up to 180 °C (356 °F)



T10: Pressure tight probe up to 20 bar (300 psi)



- 1) Refer to ordering guide
 2) L = filter length; refer to data sheet "Accessories"

Technical Data

Measurands

Relative humidity (RH)

Working range 0...100 %RH

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

-15...40 °C (5...104 °F) RH ≤90 % ± (1.3 + 0.3 % * mv) %RH

-15...40 °C (5...104 °F) RH >90 % ± 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 of electronics, typ. ± 0.01 %RH/°C (0.0055 %RH / °F)

Response time < 15 s with metal grid filter at 20 °C (68 °F) / t₉₀

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).

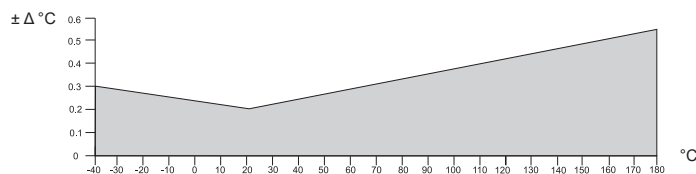
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Temperature (T)

Working range sensing probe

T1, wall: -40... 60 °C (-40...140 °F)
T2, duct: -40... 80 °C (-40...176 °F)
T5, remote: -40... 180 °C (-40...356 °F)
T10, pressure tight: -40... 180 °C (-40...356 °F)

Accuracy



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

Calculated parameters

	from		up to			unit
			EE310-T1	EE310-T2	EE310-T5,T10	
Dew point temperature	Td	-40 (-40)	60 (140)	80 (176)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	0 (32)	0 (32)	°C (°F)
Wet bulb temperature	Tw	0 (32)	60 (140)	80 (176)	100 (212)	°C (°F)
Water vapour partial pressure	e	0 (0)	200 (3)	500 (7.5)	1100 (15)	mbar (psi)
Mixing ratio	r	0 (0)	425 (2900)	999 (9999)	999 (9999)	g/kg (gr/lb)
Absolute humidity	dv	0 (0)	150 (60)	300 (120)	700 (300)	g/m³ (gr/ft³)
Specific enthalpy	h	0 (0)	400 (180)	1000 (450)	2800 (1250)	kJ/kg (BTU/lb)

Outputs

Two analogue outputs
freely selectable and scalable
0 - 1 / 5 / 10 V -1 mA < I_L < 1 mA
4 - 20 mA 3-wire R_L < 500 Ω
0 - 20 mA 3 wire R_L < 500 Ω

Digital interface / protocol (option J3)
Factory settings
Supported baud rates
RS485 / Modbus RTU (EE310-UL = 1 unit load)
9600 Baud, parity even, 1 stop bit, Modbus address 231
9 600, 19 200, 38 400, 57 600 and 76 800

General

Power supply	Input voltage range	Power requirements	Conductor temperature rating
	8...35 V DC (LPS)	max. 2 W ¹⁾	min. 75 °C (167 °F)
	Indoor use: 12...30 V AC, 50/60 Hz (Class 2 supply)	max. 4 VA ¹⁾	min. 75 °C (167 °F)
	Outdoor use: 12...16 V AC, 50/60 Hz (Class 2 supply)		
	100...240 V AC, 50/60 Hz ¹⁾	max. 5 VA ¹⁾	min. 75 °C (167 °F)

¹⁾ including 2 voltage or current outputs

Pressure range for pressure tight probe	0.01...20 bar (0.15...300 psi)		
Probe material	Stainless steel 1.4404 / AISI 316L		
Enclosure material	Polycarbonate, UL94 V-0 approved		
Protection rating	IP65 ²⁾ , UL Type 4		
Electrical connection	Screw terminals max. 1.5 mm ² (AWG 16)		
Working and storage temperature range of electronics	-40...60 °C (-40...140 °F)		
Working range remote sensing probe cable	-40...150 °C (-40...302 °F)		
Electromagnetic compatibility	EN 61326-1	EN 61326-2-3	Industrial Environment ICES-003 ClassA
Compliance	United States: UL Listed, CCN QUXX, Under UL 61010-1, Process Control Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A Canada: UL Listed, CCN QUXX7, Under CSA C22.2 No. 61010-1, Signal Equipment; Industry Canada Compliant, ICES-003		



1) Degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).
2) IP65 not evaluated by UL.

Ordering Guide

		EE310-AP1				
		T1	T2	T5	T10	
Hardware configuration	Type	Wall mount				
		Duct mount				
		Remote probe up to 180 °C (356 °F)				
		Pressure tight probe up to 20 bar (300 psi)				
	Filter	Stainless steel sintered	no code	no code	no code	no code
		PTFE	F5	F5	F5	
		Stainless steel - metal grid	F9	F9	F9	F9
	Cable length (incl. probe length)	2 m (6.6 ft)			no code	no code
		5 m (16.4 ft)			K5	K5
		10 m (32.8 ft)			K10	K10
20 m (65.6 ft)				K20	K20	
Probe length	65 mm (2.55")			L65		
	200 mm (7.87")			no code	no code	
	400 mm (15.75")			L400	L400	
Process connection	1/2" ISO thread				PA23	
	1/2" NPT thread				PA25	
Electrical connection	Standard ¹⁾	no code				
	1 plug for power supply and outputs ²⁾	E4				
	2 plugs for power supply / outputs and for Modbus RTU (requires option J3) ²⁾	E6				
Optional features	RS485 module - Modbus RTU	J3				
	Sensor coating	C1				
	Integrated power supply 100...240 V AC, 50/60 Hz for NFPA79 applications ³⁾	AM3				
Setup - analogue outputs	Output 1	Relative humidity RH [%]	no code			
		Other measurand (xx see measurand code below)	MAxx			
	Output signal 1 ⁴⁾	0 - 1 V	GA1			
		0 - 5 V	GA2			
		0 - 10 V	GA3			
		0 - 20 mA	GA5			
		4 - 20 mA	GA6			
	Scaling 1 low	0	no code			
		Value	SALValue			
	Scaling 1 high	100	no code			
		Value	SAHValue			
	Output 2	Temperature T [°C]	no code			
		Temperature T [°F]	MB2			
		Other measurand (xx see measurand code below)	MBxx			
Output signal 2 ⁴⁾	0 - 1 V	GB1				
	0 - 5 V	GB2				
	0 - 10 V	GB3				
	0 - 20 mA	GB5				
	4 - 20 mA	GB6				
Scaling 2 low	Value	SBLValue				
Scaling 2 high	Value	SBHValue				

1) Standard = 2 x M16 cable glands, except for AM3 option: 2 plugs for power supply and outputs

2) For indoor use only

3) With electrical connection standard only (no other plug options possible) and for NFPA79 applications only, NFPA = National Fire Protection Association

4) Both analogue outputs shall be either voltage or current

Measurand Code

For Output 1 and 2 in the Ordering Guide



Please note: no mix of SI/US units allowed

		MAxx / MBxx
Relative humidity	%	10
Temperature	°C	1
	°F	2
Dew point Td	°C	52
	°F	53
Frost point Tf	°C	65
	°F	66
Mixing ratio r	g/kg	60
	gr/lb	61

		MAxx / MBxx
Absolute humidity dv	g/m ³	56
	gr/ft ³	57
Wet bulb temperature Tw	°C	54
	°F	55
Water vapour partial pressure e	mbar	50
	psi	51
Specific enthalpy h	kJ/kg	62
	BTU/lb	64

Order Example

EE310-AP1T5E6J3C1GA3GB3SBL-40SBH180

Approval:	AP1	UL listing cULus QUYX.E500367
Type:	T5	Remote probe up to 180 °C (356 °F)
Filter:	no code	Stainless steel sintered filter
Cable length:	no code	2 m (6.6")
Probe length:	no code	200 mm (7.87")
Electrical connection:	E6	2 plugs for power supply / outputs and for Modbus RTU
Optional features:	J3	RS485 module - Modbus RTU
	C1	Sensor coating
Output 1:	no code	Relative humidity %
Output Signal 1:	GA3	0 - 10 V
Scaling 1 low:	no code	0
Scaling 1 high:	no code	100
Output 2:	no code	Temperature T [°C]
Output Signal 2:	GB3	0 - 10 V
Scaling 2 low:	SBL-40	-40
Scaling 2 high:	SBH180	180

Accessories

(for further information, see data sheet "Accessories")

Mounting flange stainless steel	HA010201
Drip water protection	HA010503
Bracket for installation onto mounting rails ¹⁾	HA010203
Mounting bracket for remote probe	HA010211
Humidity calibration kit	see data sheet „Humidity calibration kit“
Stainless steel wall mounting clip Ø 12 mm (0.5")	HA010225

1) Two pieces are necessary for each EE310.