EE310

High-End Humidity and Temperature Sensor for Industrial Applications

The 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.

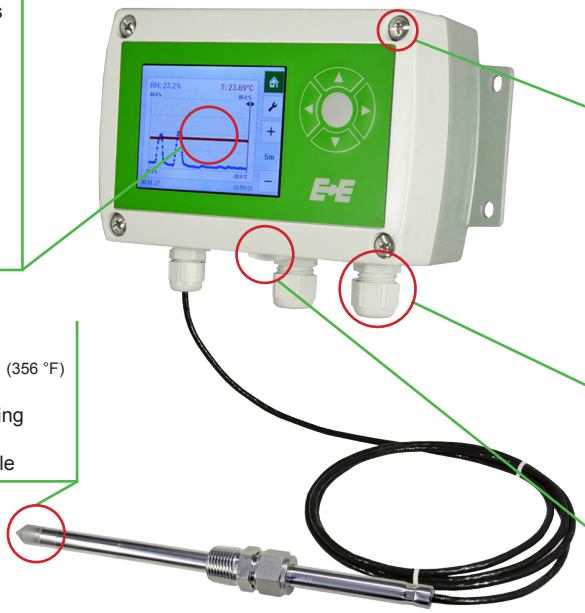
Versatility
The EE310 is available for wall or duct mount as well as with remote probe. It features an IP65 / NEMA 4 polycarbonate or stainless steel enclosure which facilitates installation and maintenance. The enclosure can accommodate a 100…240 V AC supply unit or various interface modules.

Display and Outputs
The measured data is available on two analogue outputs, on the RS485 (Modbus RTU) or Ethernet-PoE (Modbus TCP) interface and on the alarm (relay) outputs.
The TFT colour display shows simultaneously up to four measurands and offers extensive setup and diagnosis features. The data logging function saves up to 20000 measured values for each physical quantity. The logged data can be displayed graphically directly on the device or easily downloaded over the USB interface.

Configurable and Adjustable
The configuration and the RH and T adjustment of the EE310 can be performed either using the display and the push buttons or with the free EE-PCS Product Configuration Software via the USB interface.

Features

3.5“ TFT Colour Display
- » shows up to 4 measurands simultaneously
- » layout and measurands freely selectable
- » data logger for 20.000 values per measurand
- » logged data shown graphically
- » diagnosis functions
- » intuitive device setup with push buttons



Enclosure
- » IP65 / NEMA 4 protection class
- » polycarbonate or stainless steel
- » easy mounting and service

Outputs
- » 2 analogue outputs current / voltage
- » error indication according NAMUR
- » Modbus RTU / Modbus TCP
- » 2 alarm outputs
- » configurable via display or software

Probe
- » working range up to 180°C (356 °F) and 20 bar (290 psi)
- » protective coating for sensing elements
- » pluggable versions available

USB Service Interface
- » configuration, adjustment and firmware update
- » download logged data
- » 4 status LEDs

Inspection certificate
- » According DIN EN 10204 - 3.1

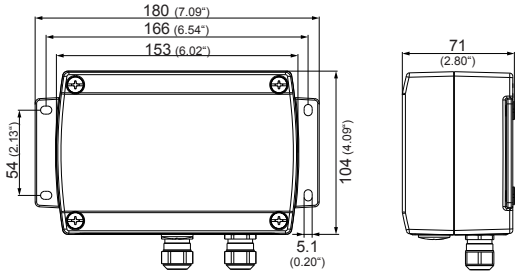
Protective sensor coating (option C1)

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

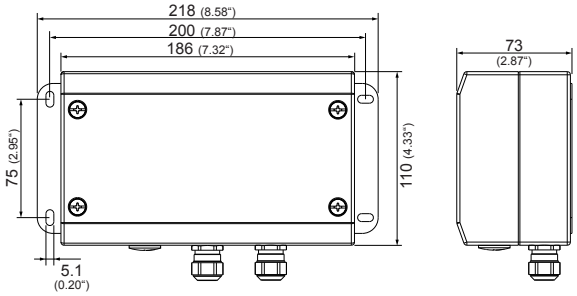
Dimensions in mm (inch)

ENCLOSURES

Polycarbonate

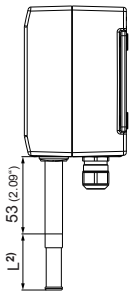


Stainless steel

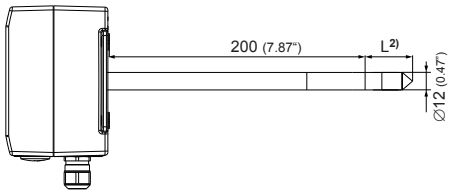


PROBES

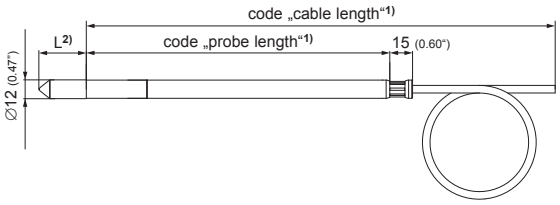
T1: Wall mount



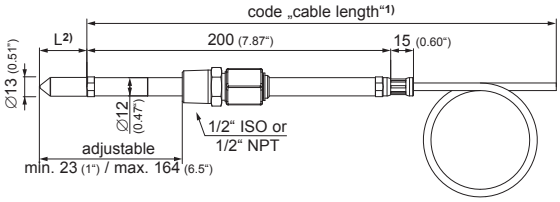
T2: Duct mount



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

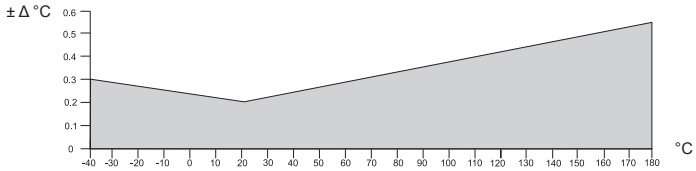
Relative humidity (RH)

Working range	0...100 % RH	
Accuracy[1] (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	*mv = measured value*
-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 of electronics	typ. ± 0.01 % RH/°C (0.0055 %RH / °F)	
Response time	< 15 s with metal grid filter at 20 °C (68 °F) / t_{90}	

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[1)]



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

Calculated parameters

		from		up to EE310-T1		up to EE310-T2		up to EE310-T5,T10		unit	
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/f[3)])
Specific enthalpy	h	0	(0)	400	(50000)	1000	(375000)	2800	(999999)	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 Ohm
	0 - 20 mA 3 wire	R_L < 500 Ohm
Digital interface / protocol	option J3	RS485 / Modbus RTU, max. 32 unit load devices on one bus (EE310 = 1 unit load; factory settings: 9600 bps, parity even, stop bit 1 / slave-ID 231)
	option J4	Ethernet-PoE with Modbus TCP

General

Power supply class III (EU) / class 2 (NA)	8...35 V DC 12...30 V AC 100...240 V AC, 50/60 Hz with option AM3 [2)]
Current consumption at 24 V DC/AC (typ.)	15 mA / 40 mA_{rms} for 2 voltage outputs 35 mA / 100 mA_{rms} for 2 current outputs 50 mA / 150 mA_{rms} additional for display 30mA / 90 mA_{rms} additional for Ethernet
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-V0 approved or stainless steel 1.4404 / AISI 316 L
Protection class	IP65 / NEMA 4
Cable glands for polycarbonate enclosure	M16 x 1.5, for cable Ø 3 - 7 mm (0.12 - 0.28”)
Cable glands for metal enclosure	M16 x 1.5, for cable Ø 4.5 - 10 mm (0.18 - 0.39”)
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)
Working and storage temperature range of electronics	-40...60 °C (-40...140 °F) without display -20...50 °C (-4...122 °F) with display
Electromagnetic compatibility	EN61326-1 EN61326-2-3 ICES-003 ClassA Industrial Environment FCC Part15 ClassA
Two alarm outputs [2)]	changeover contact 250 V AC / 6 A 28 V DC / 6 A
System requirements for EE-PCS software	Windows XP or higher; USB port

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 all models with an airflow > 0.0 m/s, except for Models T1 with an airflow > 0.2 m/s.
2) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).

Ordering Guide

			EE310			
Hardware configuration	Type	wall mount	T1			
		duct mount		T2		
		remote probe up to 180 °C (356 °F)			T5	
		pressure tight probe up to 20 bar (300 psi)				T10
	Enclosure	polycarbonate	no code	no code	no code	no code
		stainless steel	HS2		HS2	HS2
	Filter	plastic - metal grid (up to 120 °C / 248 °F)	F3	F3		
		stainless steel sintered	no code	no code	no code	no code
		PTFE	F5	F5	F5	
		stainless steel - metal grid (up to 180 °C / 356 °F)	F9	F9	F9	F9
		H_2O_2	F12	F12	F12	
	Cable length (incl. probe length)	0.5 m (1.64 ft)			K0.5	
		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	cable glands	no code	no code	no code	no code
		1 plug for power supply and outputs	E4	E4	E4	E4
		1 cable gland / 1 plug for Modbus RTU (requires option J3)	E5	E5	E5	E5
		2 plugs for power supply / outputs and for Modbus RTU (requires option J3)	E6	E6	E6	E6
		3 plugs for power supply / outputs and Modbus RTU (requires option J3) 1)	E12	E12	E12	E12
	Optional features	3.5" TFT display with integrated data logger	D2	D2	D2	D2
		RS485 module - Modbus RTU	J3	J3	J3	J3
		Ethernet module - Modbus TCP 1) 2)		J4	J4	J4
		pluggable probe 1)			PC4	PC4
		sensor coating	C1	C1	C1	C1
		alarm outputs with cable glands 2)	AM2	AM2	AM2	AM2
		integrated power supply 100...240 V AC, 50/60 Hz 2) 3)	AM3	AM3	AM3	AM3
Setup - analogue outputs	Output 1	relative humidity RH [%]	no code			
		other measurand (xx see measurand code below)	MA*xx*			
	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	SAL*value*			
	Scaling 1 high	100	no code			
		value	SAH*value*			
	Output 2	temperature T [°C]	no code			
		temperature T [°F]	MB2			
		other measurand (xx see measurand code below)	MB*xx*			
	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	SBL*value*			
	Scaling 2 high	value	SBH*value*			

1) Only with polycarbonate enclosure.
2) Combination of alarm output (AM2), Ethernet module (J4) and integrated power supply (AM3) is not possible.
3) Integrated power supply includes 2 plugs for power supply and outputs, other plug options are not possible.
4) Both analogue outputs shall be either voltage or current.

Measurand Code for output 1 and 2 in the ordering guide

		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/m³	56
	gr/ft³	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-T5D2J3C1GA3GB3SBL-40SBH180

Type:	T5	remote probe up to 180 °C (356 °F)
Enclosure:	no code	polycarbonate
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:	no code	cable glands
Optional features:	D2	3.5“ TFT display with integrated data logger
	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 (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) For polycarbonate enclosure only. Two pieces are necessary for each EE310.

Castel Maggiore (BO) 40013
Via Lirone 60/i

e-mail: info@eurotecsrl.com
Tel: +39 051/6321595
Website: www.eurotecsrl.com

C.F.: 04103780377
P.I.: 01596581205