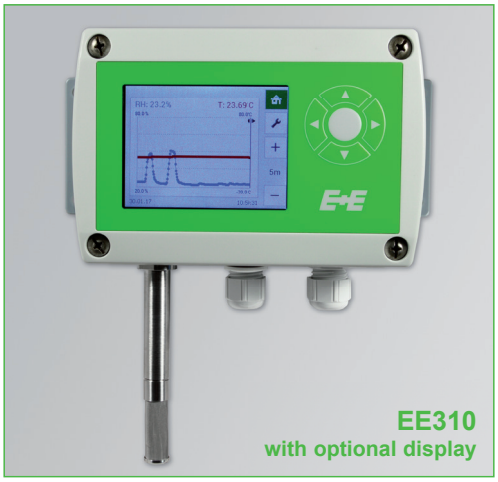
EE310

High-End Humidity and Temperature Transmitter for Demanding Process Control

EE310 is optimized for reliable measurement in demanding industrial applications. In addition to highly accurate measurement of relative humidity (RH) and temperature (T), the transmitter also calculates parameters such as dew point, absolute humidity and mixing ratio.
Various models are available including wall, duct and remote probe. The remote probe can be used up to 180 °C (356 °F) and the pressure tight probe up to 20 bar (290 psi). The design of the rugged polycarbonate enclosure facilitates easy mounting and maintenance. The measured values are available on two analogue outputs and the Modbus RTU digital interface. The state of the art TFT colour display shows up to four measurands simultaneously and offers extensive error diagnostics. The integrated data logging function saves all measured and calculated values to the internal memory. The data can be displayed as graph directly on the device or easily downloaded via USB interface.
The E+E proprietary coating protects the sensor elements against corrosive and electrically conductive pollution.
The outputs can be freely configured and an adjustment performed directly via display or with the free EE-PCS software using the USB service interface.

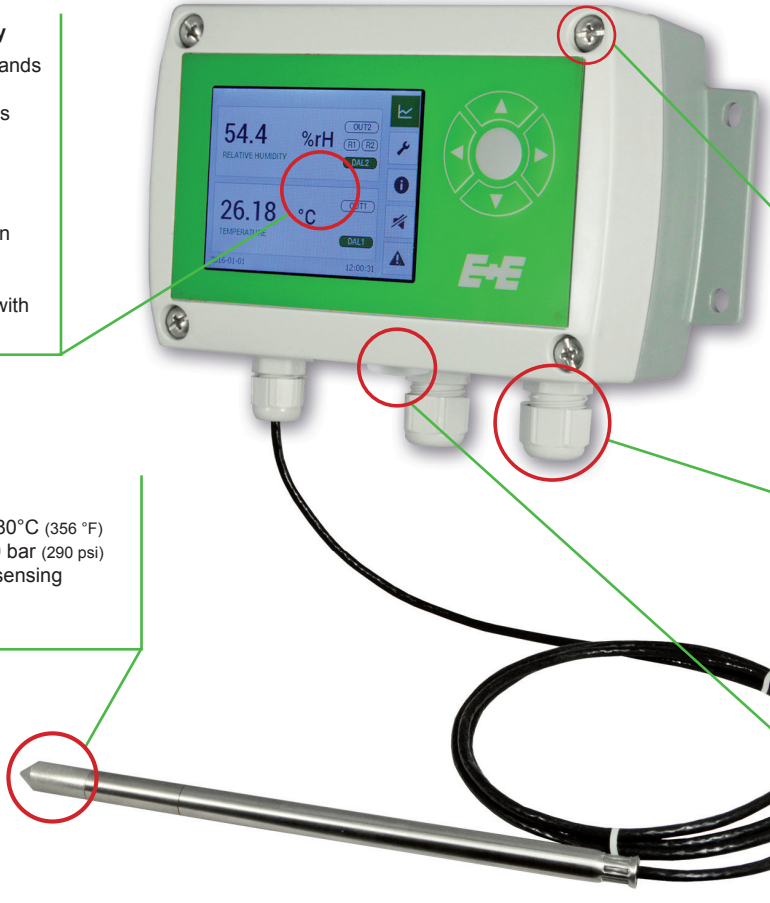

EE310
with optional display

Typical applications

- industrial process monitoring and control
- dryers and humidifiers
- clean rooms
- food and pharmaceutical industry
- climate and test chambers

Features

3.5“ TFT Colour Display
» shows up to 4 measurands simultaneously
» layout and measurands freely selectable
» integrated data logger for 20.000 values per measurand
» logged values shown in graph
» error diagnostics
» intuitive device setup with push buttons



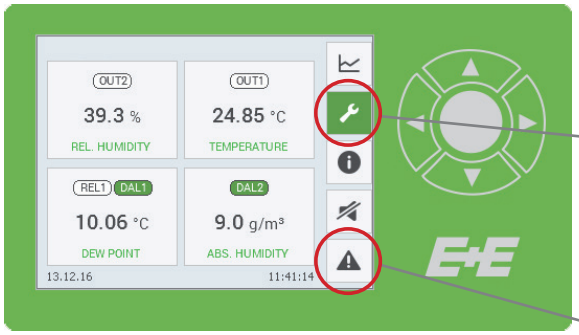
Enclosure
» easy mounting
» two part housing allows easy unit replacement
» IP65 protection class
» material UL94-V0 approved
» screws secured in cover

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

Probe
» working range up to 180°C (356 °F)
» pressure tight up to 20 bar (290 psi)
» protective coating for sensing elements
» pluggable probe

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

TFT colour display with integrated data logger (option D2)



Settings

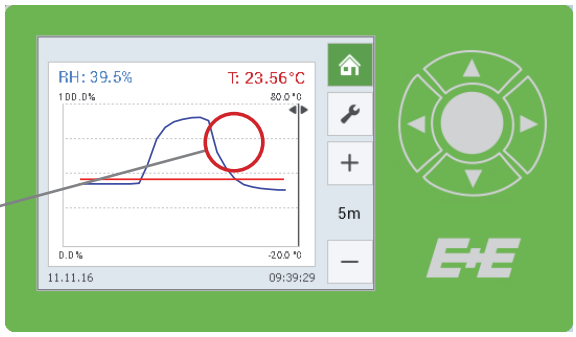
» analogue, digital and alarm outputs setup
» one and two point adjustment for RH and T
» probe replacement (for pluggable probe)
» password protection for all relevant settings

Error Diagnostics

» error self-diagnosis
» error description
» auditive and visual error warnings

Data logger

» 20.000 values saved per measurand
» selectable sampling rates
» view recorded data as graph
» download data via USB port and EE-PCS software



Protective sensor coating (option C1)

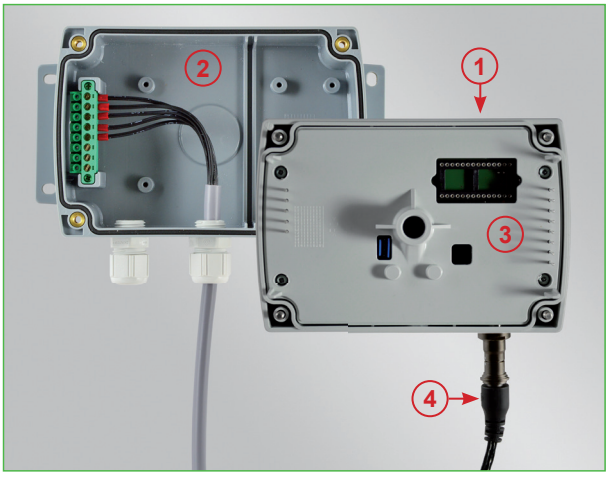
The E+E proprietary sensor coating is a protective layer applied to the active surface and leads of the sensing elements. The coating substantially extends the lifetime and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). Additionally, it improves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

Modular Housing / Pluggable Probe (option PC4)

The upper part of the transmitter **(1),** which accommodates the electronics and the probe, can be plugged off for service or adjustment and can be replaced within seconds. This allows for the bottom part **(2)** to remain mounted and with intact cabling.

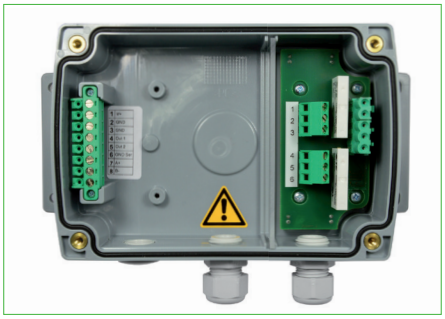
A polycarbonate cover **(3)** on the inside of the housing protects the electronics during installation or service.

The remote probe models are also available with a pluggable probe **(4)** which can be easily exchanged by a push-pull plug. It is ideal for installation of long probe cables and in applications that might require periodical probe replacements.



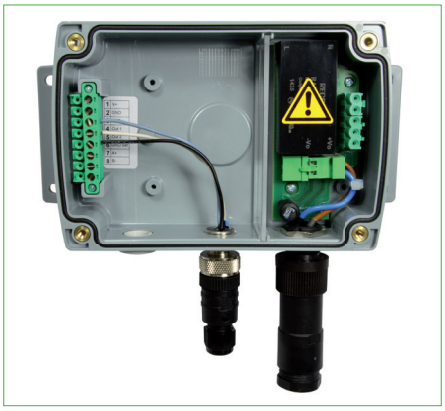
Alarm outputs (option AM2)

This optional module features two freely configurable relay outputs for control purposes. Various operation modes are available including hysteresis, window and error indication. When error indication is selected, a fault in the humidity or temperature measurement will trigger the alarm output. The measurands at the outputs as well as the thresholds and hysteresis can be set using the EE-PCS software or directly on the device via display and push buttons.



Integrated Power Supply Module (option AM3)

The module allows the device to be powered with 100…240 V AC (50/60 Hz).

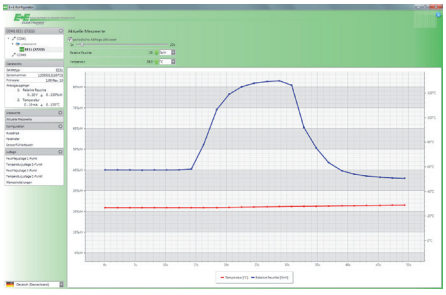


E+E Product Configuration Software

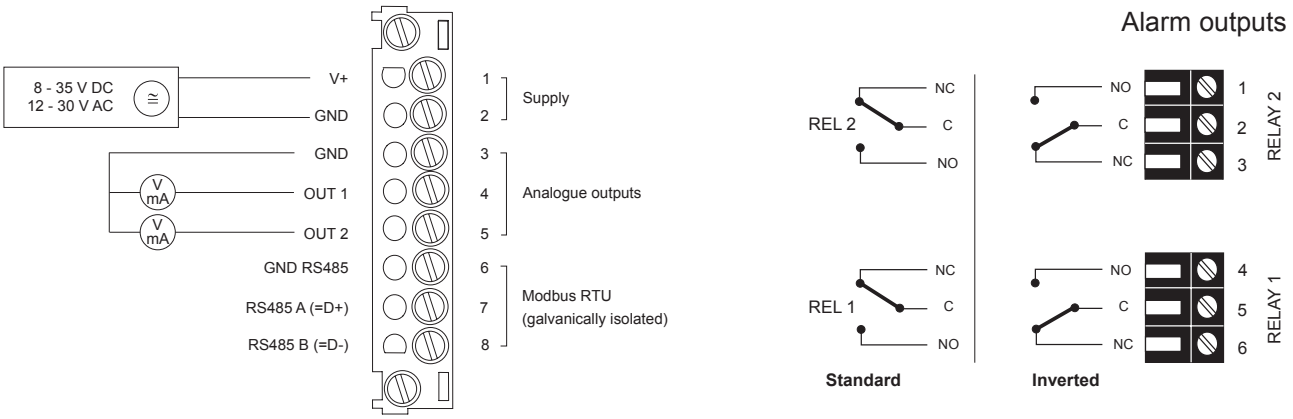
EE-PCS is an intuitive software that allows the user to perform:

- flexible, easy and fast setup of the analogue and alarm outputs
- 1 or 2 point adjustment of humidity and temperature
- replacement of the pluggable sensing probe
- Modbus RTU communication setup
- setup of the display layout
- download logged data
- view error diagnosis information

EE-PCS is available free of charge at: *http://www.epluse.com/configurator*

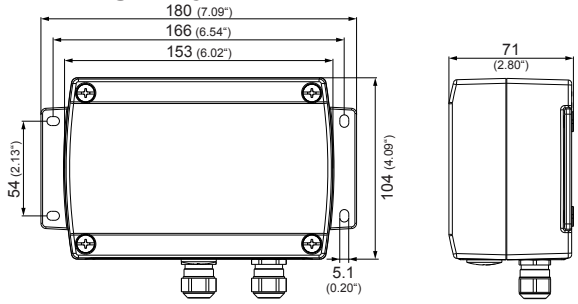


Connection diagram



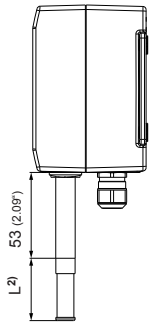
Dimensions (mm/inch)

Housing (polycarbonate):

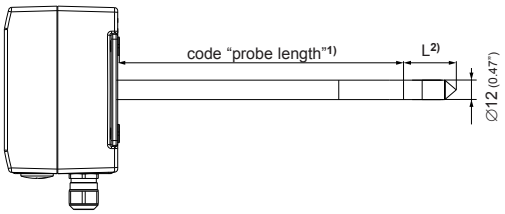


Models:

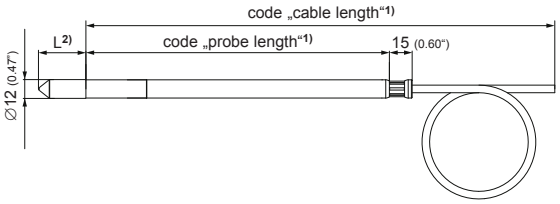
T1: Wall mounting



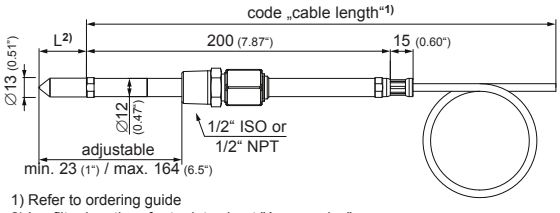
T2: Duct mounting



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



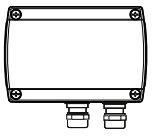
T10: Pressure tight probe up to 20 bar (300 psi)



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

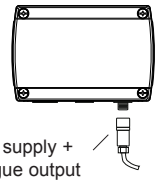
Electrical connection

standard

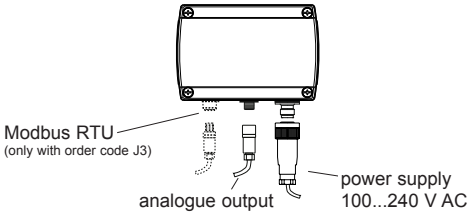


2x M16x1.5

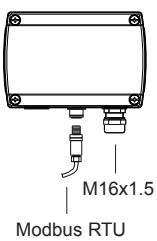
option E4



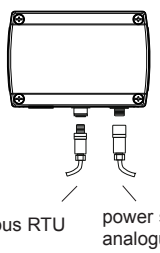
option AM3



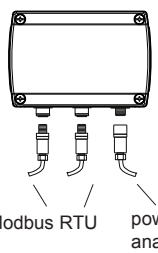
option E5



option E6



option E12



Mating plugs included in the scope of supply

Technical data

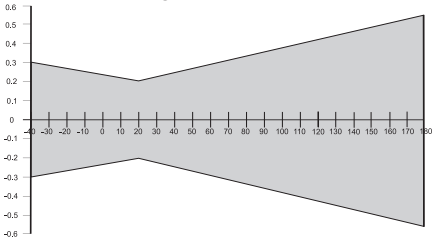
Measured values

Relative humidity (RH)

Sensor	E+E HC1000-400
Working range[1)]	0...100 % RH
Accuracy[2)] (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
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}

mv = measured value

Temperature (T)

Sensor	Pt1000 (Tolerance class A, DIN EN 60751)	
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	

Outputs

Two analogue outputs	0 - 1 / 5 / 10 V		-1 mA < I_L < 1 mA
freely selectable and scalable	4 - 20 mA	3-wire	R_L < 500 Ohm
	0 - 20 mA	3 wire	R_L < 500 Ohm
Digital interface	RS485 with Modbus RTU, up to 32 devices in one bus		

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 [3)]		
Current consumption - 2x voltage output	for 24 V DC/AC:	typ. 40 mA	
- 2x current output		typ. 80 mA	
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		
Protection class	IP65		
Cable gland	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	-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
Alarm outputs (2 relays) [3)]	250 V AC / 6 A		
	28 V DC / 6 A		
System requirements for EE-PCS software	Windows XP or higher; USB port		

CE

1) Refer to the working range humidity sensor on next page.
2) 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).
3) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).

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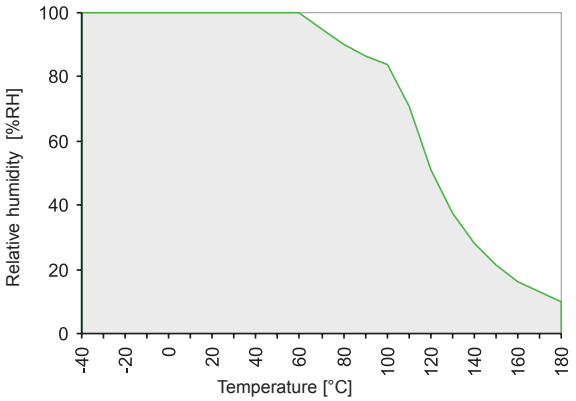
Working range humidity sensor



The graph shows the allowed measurement range for the humidity sensor.

Operating beyond this range does not damage the sensor, nevertheless the specified measurement accuracy cannot be guaranteed.

Measurement range[1)]

		from		up to						unit	
				EE310-T1		***EE310-T2***		***EE310-T5,T10***			
Humidity	RH	0		100		100		100		% RH	
Temperature	T	-40	(-40)	60	(140)	80	(176)	180	(356)	°C	(°F)
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/f³)
Specific enthalpy	h	0	(0)	400	(50000)	1000	(375000)	2800	(999999)	kJ/kg	(Btu/lb)

1) Output scaling is freely selectable and can be easily changed via display or with the EE-PCS software.
Refer to accuracies of calculated values (www.epluse.com/humiditymeasurement).

Scope of supply

	Included in versions
EE310 according to ordering guide	all versions
Operation Manual English*	all versions
Inspection certificate according to DIN EN 10204 – 3.1	all versions
Mating plug for integrated power supply	AM3
Mating plug RKC 5/7	AM3 / E4 / E6 / E12
Mating plug RSC 5/7 (2 pcs. for option E12)	E5 / E6 / E12

*) Other languages can be downloaded at www.epluse.com/EE310

Accessories / Replacement Parts (see data sheet "Accessories")

- Filter caps	HA0101***xx***
- Mounting flange stainless steel	HA010201
- Drip water protection	HA010503
- RS485 kit	HA010605
- Bracket for installation onto mounting rails[1)]	HA010203
- Replacement probes[2)]	refer to device manual
- Replacement humidity sensor	FE09
- Replacement humidity sensor with coating	FE09-HC01
- Humidity calibration kit	see data sheet „Humidity calibration kit“

1) Note: 2 pieces necessary per housing.
2) Only for devices with pluggable probe option PC4.

Ordering Guide

			EE310			
	Type		**T1** wall mounting	**T2** duct mounting	**T5** remote probe up to 180 ° C (356 °F)	**T10** pressure tight probe up to 20 bar (300 psi)
Hardware Configuration	**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	
		H_2O_2	F12	F12	F12	
	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
	Probe length	65 mm (2.55")			L65	
		200 mm (7.87")		no code	no code	no code
		400 mm (15.75")		L400	L400	
	Process connection	1/2" ISO thread				PA23
		1/2" NPT thread				PA25
	Electrical connection[1]	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	E5	E5	E5	E5
		2 plugs for power supply / outputs and for Modbus RTU	E6	E6	E6	E6
		3 plugs for power supply / outputs and Modbus RTU	E12	E12	E12	E12
	Optional features	TFT colour display with integrated data logger[2]	D2	D2	D2	D2
		Modbus RTU [3]	J3	J3	J3	J3
		pluggable probe			PC4	PC4
		E+E sensor coating	C1	C1	C1	C1
		alarm outputs [4] [5]	AM2	AM2	AM2	AM2
		integrated power supply 100...240 V AC, 50/60 Hz [5]	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[6]	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[6]	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*			

Measurand Code

		Mx
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

		Mx
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

1) Plug options E5 / E6 / E12 only in combination with Modbus RTU output, option J3.
2) Factory setup: the display shows the measurands selected for output 1 and output 2. Default language English, other languages selectable in display menu.
3) Factory settings: bau drate 9600, parity even, stop bit 1 / slave-ID 231 (16 bit integer).
4) Alarm output only available with cable glands (other plug options are not possible).
5) Combination of alarm output and integrated power supply is not possible. Integrated power supply includes 2 plugs for power supply and outputs (other plug options are not possible).
6) Both analogue outputs shall be either voltage or current.

Order Example

EE310-T5D2J3C1GA3GB3SBL-40SBH180

Type:	T5	remote probe for T 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:	no code	cable glands
Optional features:	D2	TFT colour display with integrated data logger
	J3	Modbus RTU
	C1	E+E 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 1:	GB3	0-10 V
Scaling 2 low:	SBL-40	-40
Scaling 2 high:	SBH180	180

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