



Operation manual

EE310

Humidity/Temperature Transmitter

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USA

FCC notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CANADA

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1 General

This manual is included in the scope of supply and serves to ensure proper handling and optimum performance of the instrument. The manual shall be read before putting the device into operation. The manual is relevant for all staff involved in transport, setup, operation, maintenance and repair. The manual may not be used for the purpose of competition and shall also not be forwarded to third parties. Copies for personal use are allowed. All contents, technical data and illustrations contained in the manual are based on information available at the time of publication.

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.

1.2 Safety instructions

1.2.1. General

Excessive mechanical stress and inappropriate usage may lead to failures and shall be avoided. The sensors inside the sensing head (the tip of the sensing probe) are an Electro Static Discharge (ESD) sensitive components and shall be handled as such.

Do not touch the sensing elements inside the sensing head. The replacement of the filter cap shall be done with utmost care not to touch the sensors.

Installation, electrical connection, maintenance and commissioning shall be performed by qualified staff only.

The devices are designed for the operation with class III supply (EU) and class 2 supply (NA).

1.2.2. Alarm module with voltages >50 V (option AM2)

The optional alarm module is isolated from the low-voltage side of EE310 by a special partition; this must remain fitted at all times in the bottom part of the enclosure.

The EE310 enclosure must be tightly closed during operation. An open enclosure corresponds to IP00 and exposes components carrying dangerous voltage. Any work (maintenance for instance) on the device may be performed by qualified staff only.

1.2.3. Integrated power supply (option AM3)

The EE310 enclosure must be tightly closed during operation. An open enclosure corresponds to IP00 and exposes components carrying dangerous voltage. Any work (maintenance for instance) on the device may be performed by qualified staff only.

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.

2 Product Description

EE310 is optimised 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 Product Configuration Software using the USB service interface.

2.1 Product design

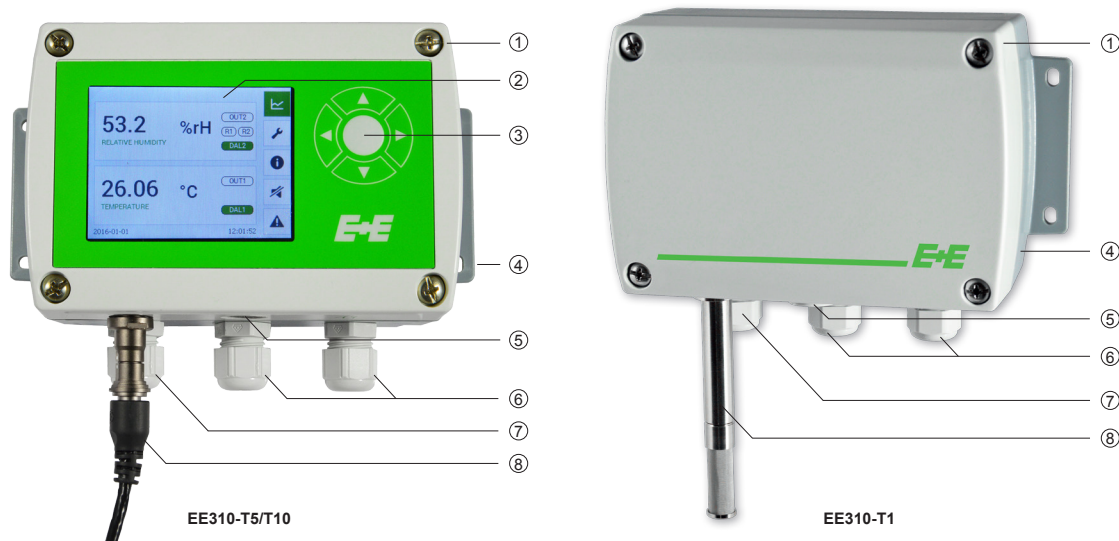


Fig. 1 Product design

- ① Upper enclosure part with electronic / display* and probe cable
- ② 3.5" TFT colour display*
- ③ 5 push-buttons for configuration menu
- ④ Bottom part with electrical connection, alarm* + supply module* and mounting holes
- ⑤ Micro USB service interface
- ⑥ Standard cable glands / connectors*
- ⑦ Additional cable gland / connector*
- ⑧ Probe / cable gland / connector*

* optional

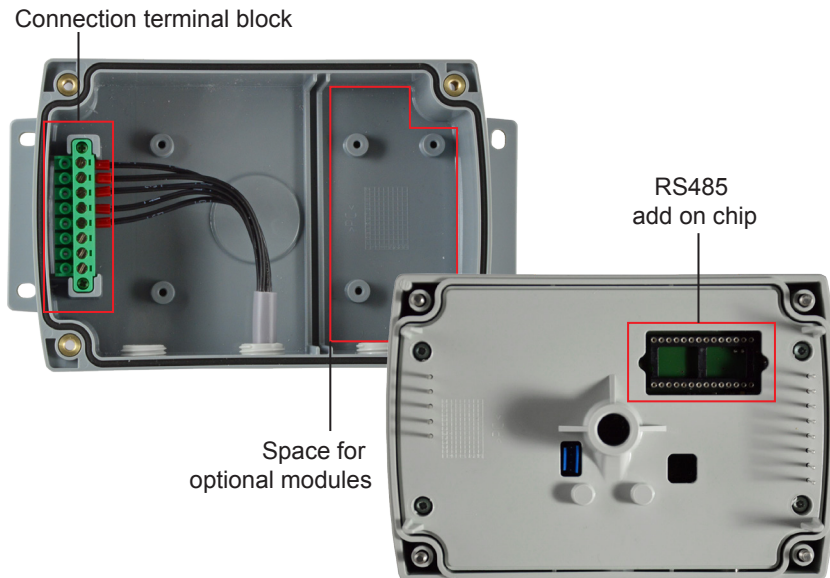
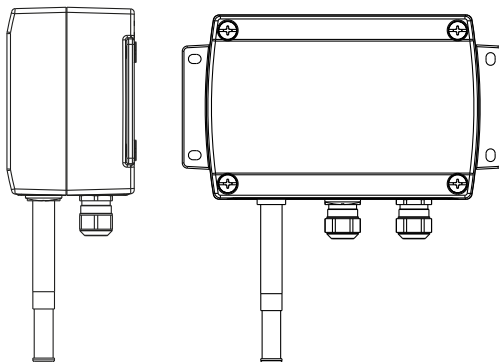


Fig. 2 Modular enclosure

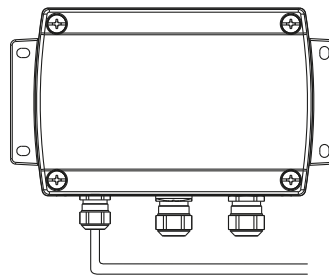
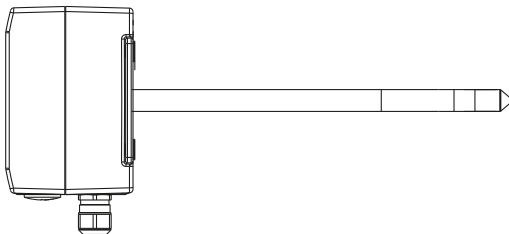
2.2 Models

EE310 is available for wall or duct mount as well as with various remote probes. The remote probes can be employed up to 180 °C (356 °F) and 20 bar (300 psi).

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)

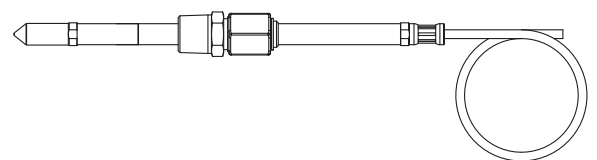


Fig. 3 EE310 models

3 Installation

3.1 Mechanical installation

3.1.1 Standard mounting of the enclosure

- Drill the mounting holes according to the mounting template below.
- Mount the bottom part of the enclosure with 4 screws (screw diameter < 4.2 mm (0.2"), not included in the scope of supply).

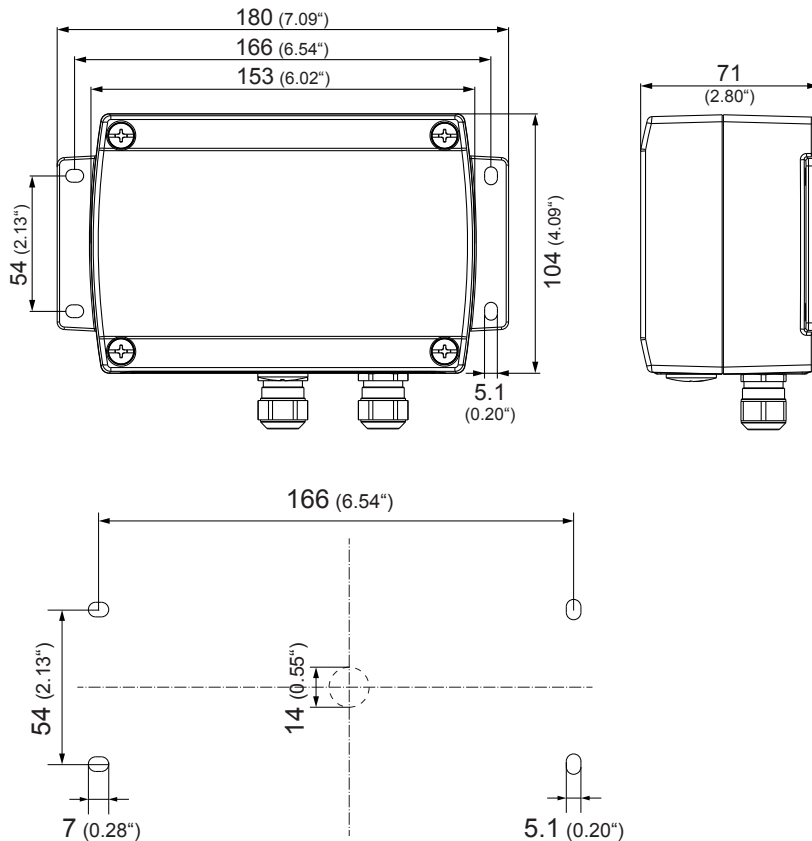


Fig. 4 Dimensions and mounting template of polycarbonate enclosure in mm (inch)

3.1.2 DIN rail mounting of the enclosure

- Mount the two DIN rail brackets (to be ordered separately, see chapter 8 *Replacement parts / Accessories*) onto the back side of the enclosure.
- Snap in the enclosure onto the DIN rail

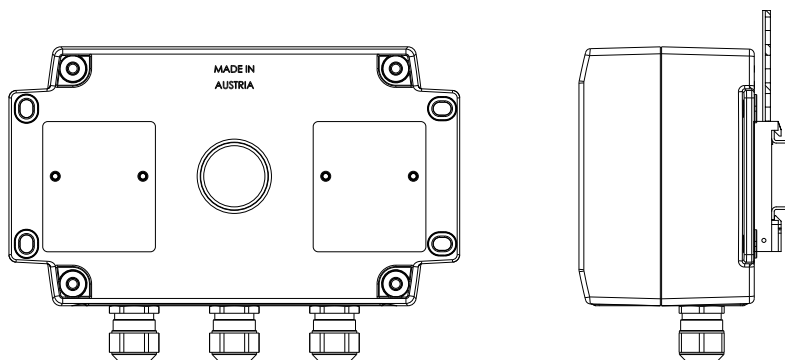


Fig. 5 DIN rail installation

3.2 Electrical connection



The electrical installation of the EE310 shall be performed by qualified personnel only. Observe all applicable national and international requirements for the installation of electrical devices as well as for power supply according to EN 61140, class III (EU) and class 2 supply (North America).

3.2.1 Standard connection

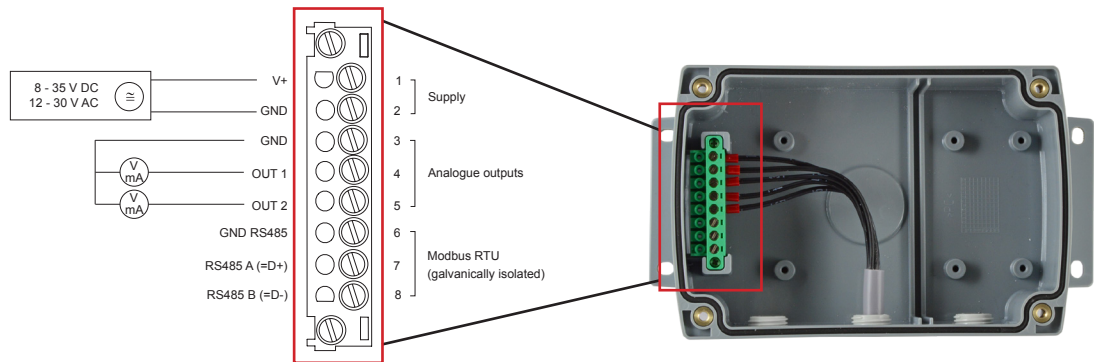


Fig. 6 Electrical connection

Analogue outputs

Both analogue outputs shall be configured to either voltage or current. Measurands, analogue range and scaling are freely selectable. All settings can be performed via display and push buttons or using the EE-PCS Product Configuration Software.

Error indication

The analogue outputs feature an error indication function according to NAMUR NE43. In the case of an error the output signal will freeze at 21 mA or 11 V respectively.



Note

By default the error indication is disabled.

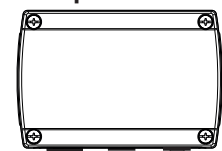
When changing one of the analogue outputs from current to voltage and vice versa, the second output will change automatically as well. The output scaling changes automatically if it is out of physical range (i.e. 20 mA will be changed to 10 V instead of 20 V).



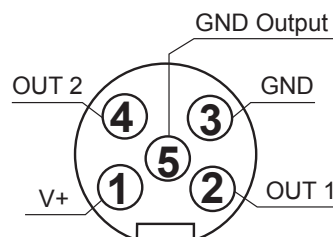
Check output scale after changing between voltage and current output.

3.2.2 Plug options

Option E4



power supply +
analogue output



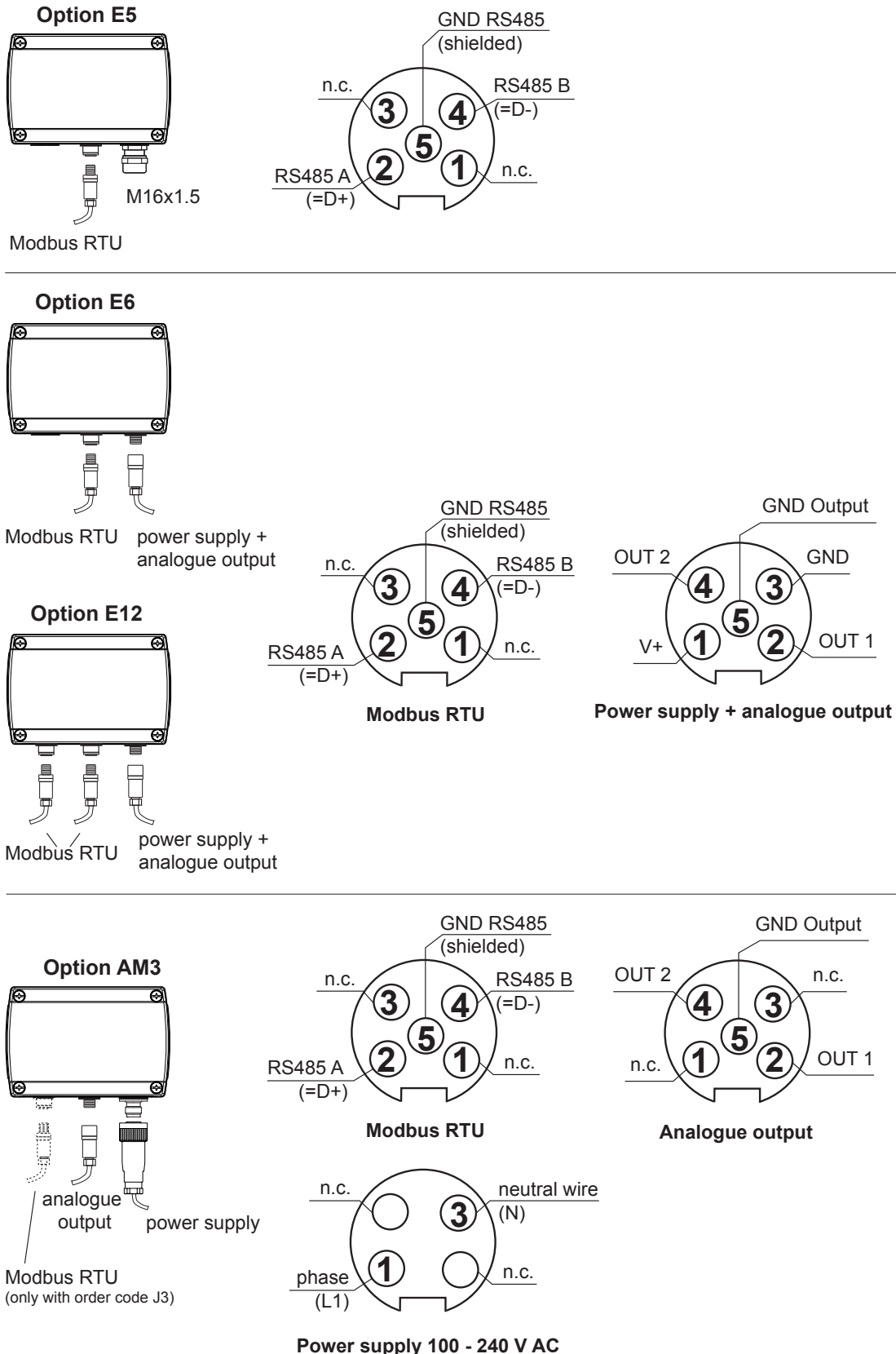


Fig. 7 Plug options for EE310 (front connector view)



External diameter of the supply cable for option AM3 and power supply + analogue output (E4 / E6 / E12): 10-12 mm (0.39-0.47").

Maximum wire cross section for connecting cable: 1.5 mm² (AWG 16) .

The AM3 option includes a 1.25 A fuse on the 100-240 V side. This fuse may not be replaced by the user, but only by the E+E Service. National regulations for installation shall be observed.

External diameter of the cable for Modbus RTU female plug: 4 - 6 mm (0.16 - 0.24").

Maximal wire cross section for connecting cable: 0.5 mm² (AWG 21).

3.3 Probe mounting

3.3.1 T1: Wall mounting

EE310-T1 are wall mount transmitters.

For mounting template of polycarbonate enclosure see chapter 3.1 *Mechanical installation / Fig. 4 Dimensions and mounting template of polycarbonate enclosure in mm (inch).*

T working range: -40...+60 °C (-40...140 °F)
 -20...+50 °C (-4...122 °F) (with display)



The transmitter shall be mounted with the probe pointing downwards!

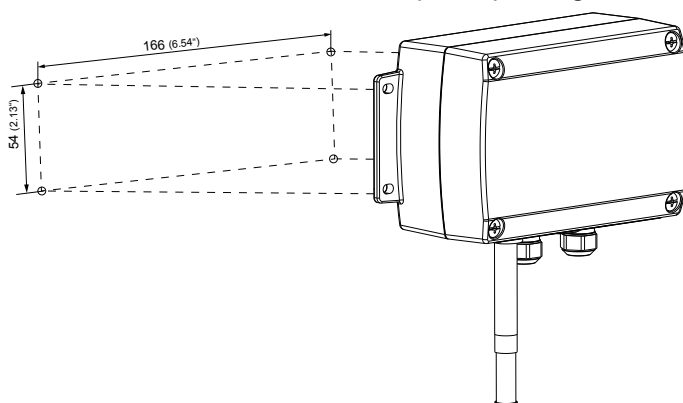


Fig. 8 *Mounting of model EE310-T1*

3.3.2 T2: Duct mounting

EE310-T2 are duct mount transmitters.

For mounting template of polycarbonate enclosure see chapter 3.1 *Mechanical installation / Fig. 4 Dimensions and mounting template of polycarbonate enclosure in mm (inch).*

T working range probe: -40...+80 °C (-40...176 °F)
 electronics -40...+60 °C (-40...140 °F)
 -20...+50 °C (-4...122 °F) (with display)



The probe shall be horizontal or point downwards.

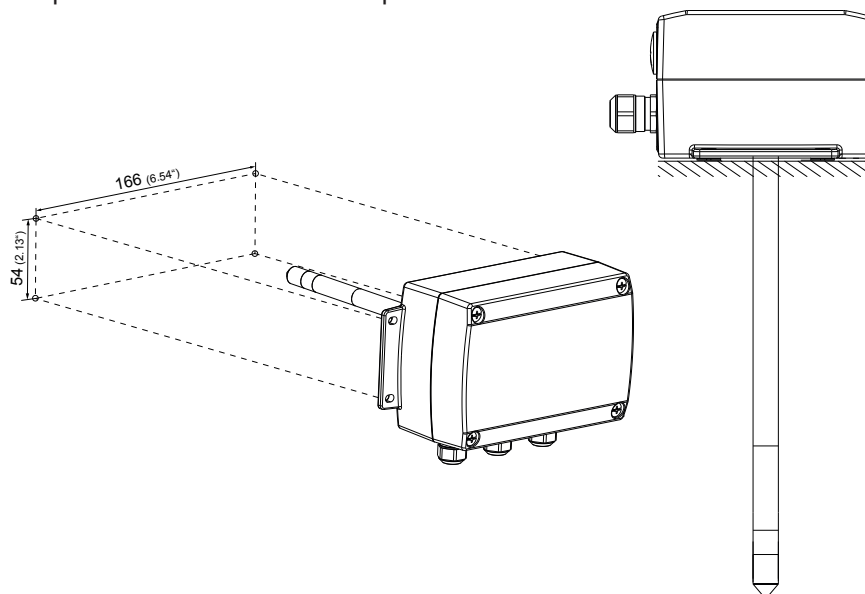


Fig. 9 *Mounting of model EE310-T2*

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

EE310-T5 are transmitters with remote probe.

For mounting template of polycarbonate enclosure see chapter 3.1 *Mechanical installation / Fig. 4 Dimensions and mounting template of polycarbonate enclosure in mm (inch)*.

T working range probe: -40...+180 °C (-40...176 °F)
 electronics: -40...+60 °C (-40...140 °F)
 -20...+50 °C (-4...122 °F) (with display)

Mounting the remote sensing probe of EE310-T5

For mounting the probe into a separation wall use the stainless steel mounting flange (see chapter 8 *Replacement parts / Accessories*). The immersion depth is adjustable. The probe shall be horizontal.



In case of mounting into a separation wall, it is of paramount importance for accurate measurement to avoid T gradients along the probe. In case of large T difference between the two sides of the separation wall, it is highly recommended to insert the probe completely (up to the cable outlet) into the wall. Should this not be possible, place a thermal isolation layer on the part of the probe outside the wall (on the cable side).

The stainless steel mounting flange is not appropriate for pressure tight mounting. For pressure tight requirements use EE310-T10.

For probe hanging onto its cable from the ceiling in applications where condensation is likely to happen it is important to avoid condense water getting from the cable to the probe and into the sensing head. For this use the drip water protection.

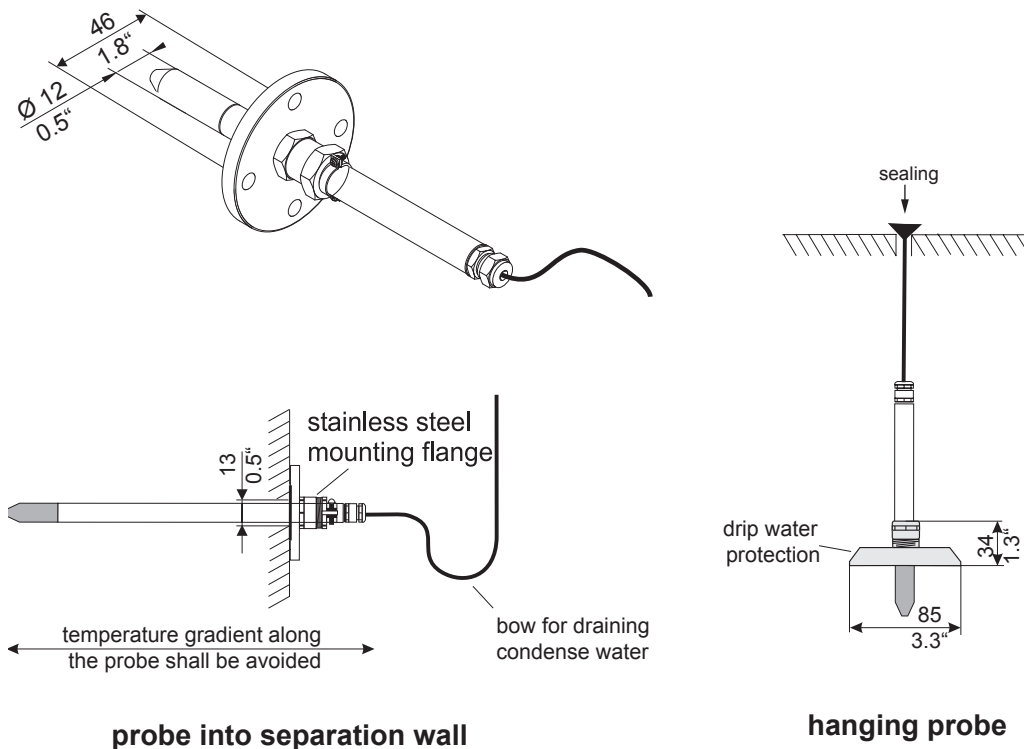


Fig. 10 Mounting the remote probe of EE310-T5

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

EE310-T10 are transmitters with pressure tight remote probe.
Process pressure range 0.01...20 bar (0.15...300 psi).

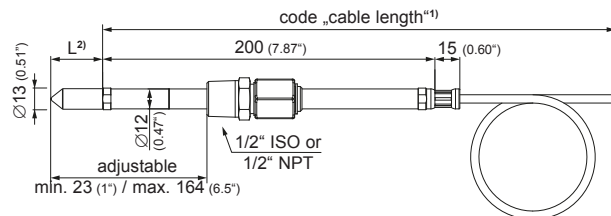
For mounting template of polycarbonate enclosure see chapter 3.1 *Mechanical installation / Fig. 4 Dimensions and mounting template of polycarbonate enclosure in mm (inch).*

T working range probe: -40...+180 °C (-40...356 °F)
electronics: -40...+60 °C (-40...140 °F)
 -20...+50 °C (-4...122 °F) (with display)



The probe shall be mounted horizontally or vertically pointing downwards.

For accurate measurement it is of paramount importance to avoid T gradients along the probe. In case of large T difference between the front and the back of the probe, it is highly recommended to insert the probe completely into the process. Should this not be possible, place a thermal isolation layer on the part of the probe outside the process (on the cable side).



1) Refer to ordering guide

2) L = filter length; refer to data sheet „Accessories“

Fig. 11 EE310-T10 probe



General safety instructions for installation

The installation, commissioning and operation of the EE310-T10 may be performed by qualified staff only. Special attention shall be paid to the correct installation of the probe into the process. In case of inappropriate installation there is the risk for the probe to be suddenly expelled due to the pressure in the process.

Bending over the sensing probe should be avoided under any circumstances!

Make sure that the surface of the probe is not damaged during installation. A damaged probe surface may lead to damaged seals and consequently to leakage and pressure loss.

Installation of the probe directly in the process (see Fig. 12 Installation of the EE310-T10 probe directly into the process)

For direct probe installation into a duct stop valves shall be provided on both sides of the probe insert. This allows the sensor probe to be easily removed for maintenance and calibration.

For direct installation into a pressure chamber make sure that the pressure in the chamber and the ambient pressure are equal before removing the probe. The temperature during probe installation may deviate by max. ± 40 °C (± 72 °F) from the regular temperature during normal operation.



Replace the metal sealing ring (see Fig. 12 Installation of the EE310-T10 probe directly into the process) by a new one every time before re-installing the probe.

Probe installation steps

- Close both valves.
- Place the sensor probe into the probe insert and adjust the immersion depth.
- Tighten the lock nut with a torque of 30 Nm.
- Open the valves.



Observe strictly the tightening torque.

A torque lower than 30 Nm results in a smaller retention force of the clamping sleeve. This leads the risk of sudden expulsion of the sensing probe due to the pressure. A torque higher than 30 Nm may lead to permanent deformation of the clamping sleeve and the sensing probe. This would make the removal and re-installation of the probe difficult or even impossible.

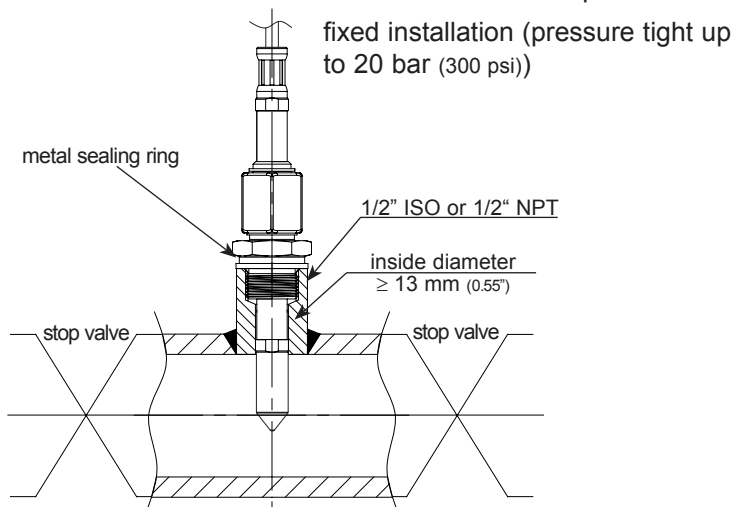


Fig. 12 Installation of the EE310-T10 probe directly into the process

3.4 Installation of the probe with ball valve set

The ball valve set allows for installation and removal of the probe without process interruption. For mounting into a duct, the ball valve shall be installed perpendicular to the flow direction.



The two metal sealing rings (see Fig. 13 Installation of the probe by utilizing the ball valve set) shall be replaced every time prior to re-installing the probe.

The temperature during probe installation may deviate by max. ± 40 °C (± 72 °F) from the regular temperature during normal operation.

Installation of the probe (see Fig. 13 Installation of the probe by utilizing the ball valve set):

- Install the probe into the ball valve while the ball valve is closed.
- Open the ball valve.
- Slide the probe through the ball valve to the desired immersion depth. Depending on the process pressure additional tools may be necessary for pushing the probe into the process. Make sure not to damage the probe and the cable.
- Tighten the lock nut with a torque of 30 Nm.



Observe strictly the tightening torque. A torque lower than 30 Nm results a smaller retention force of the clamping sleeve. This leads the risk of sudden expulsion of the sensing probe due to the pressure. A torque higher than 30 Nm may lead to permanent deformation of the clamping sleeve and the sensing probe. This would make the removal and re-installation of the probe difficult or even impossible.

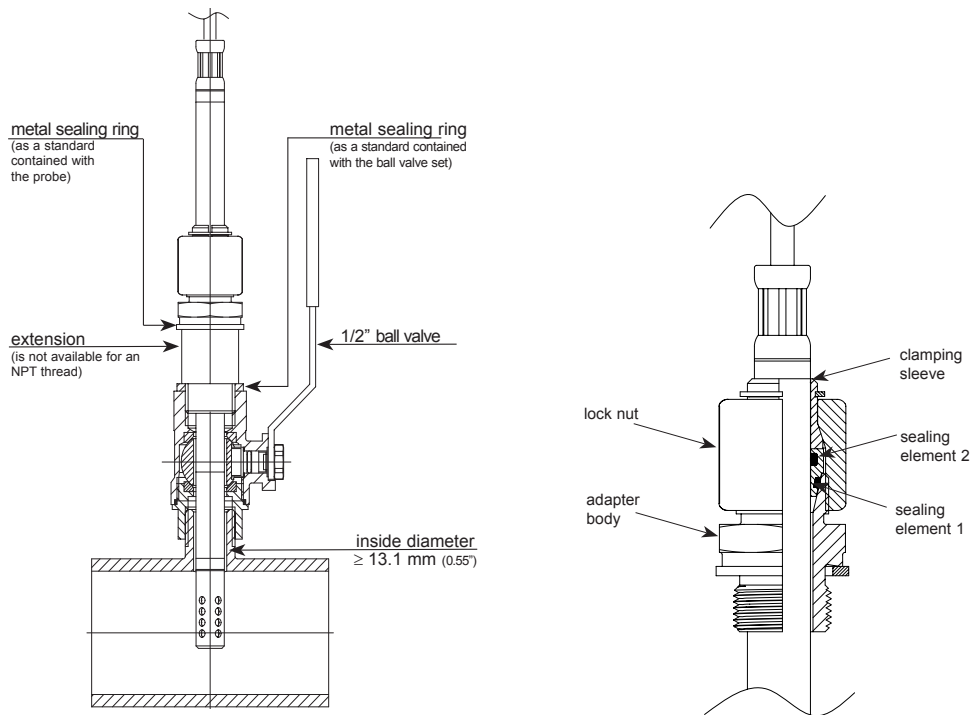


Fig. 13 Installation of the probe by utilizing the ball valve set

Removing the probe

- Hold firmly the probe to avoid it being suddenly expelled when releasing the lock nut. May sure nut to bend and damage the probe cable.
- Loosen slowly the lock nut with a spanner (spanner width 24) only till the probe is pushed out by the overpressure in the process. Do not completely loosen the lock nut, but only as much as necessary for the probe to slide.
- After the probe has been pushed out of the process up to the stop, close the ball valve.
- Remove the probe from the ball valve.



Observe the correct positioning of the sealing element 1 before reinstalling the probe.

4 Optional modules

4.1 Alarm module (option AM2)

The module offers two freely configurable relay outputs for alarm or control purposes.

Max. switch load: 250 V AC / 6 A 28 V DC / 6 A
 Min. switch load: 12 V / 100 mA

No overcurrent and short circuit protection.
 Both relays shall be connected to either high or low voltage.

Various operation modes are available including hysteresis, window and error indication.

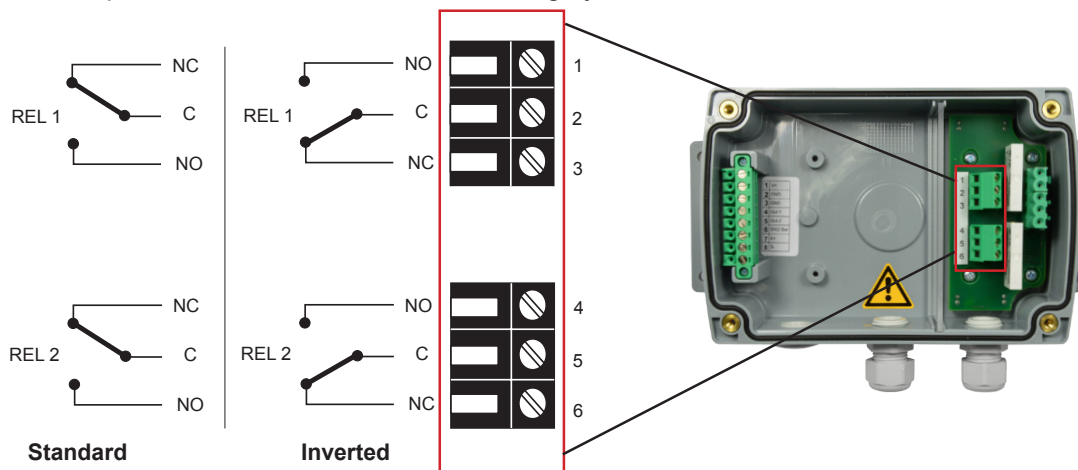


Fig. 14 Alarm module (option AM2)



When error indication mode is selected, various errors will trigger the alarm output. An alarm output in this operation mode is used for error indication only.

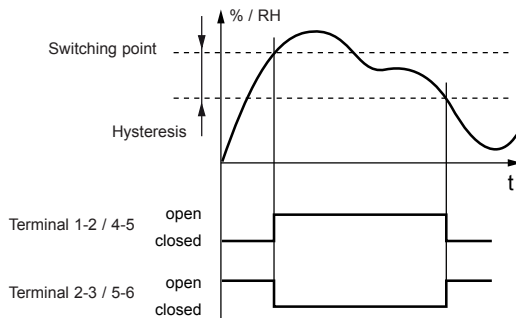


Fig. 15 Example hysteresis mode

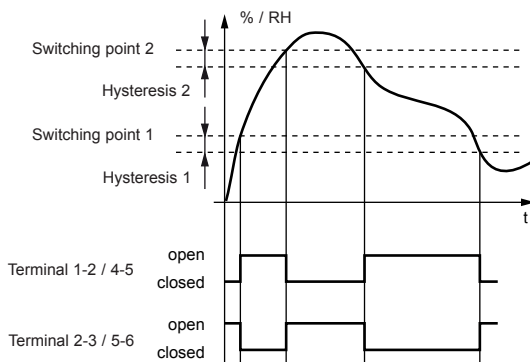


Fig. 16 Example window mode

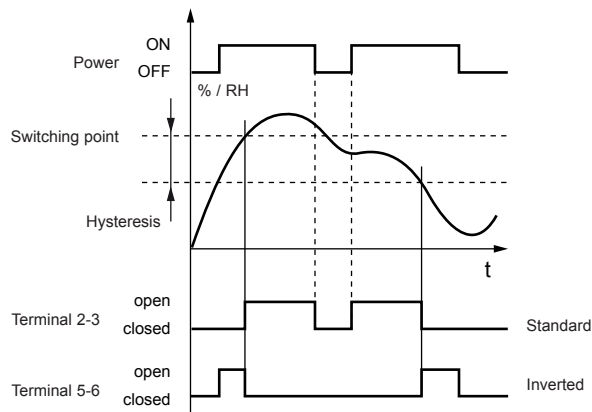
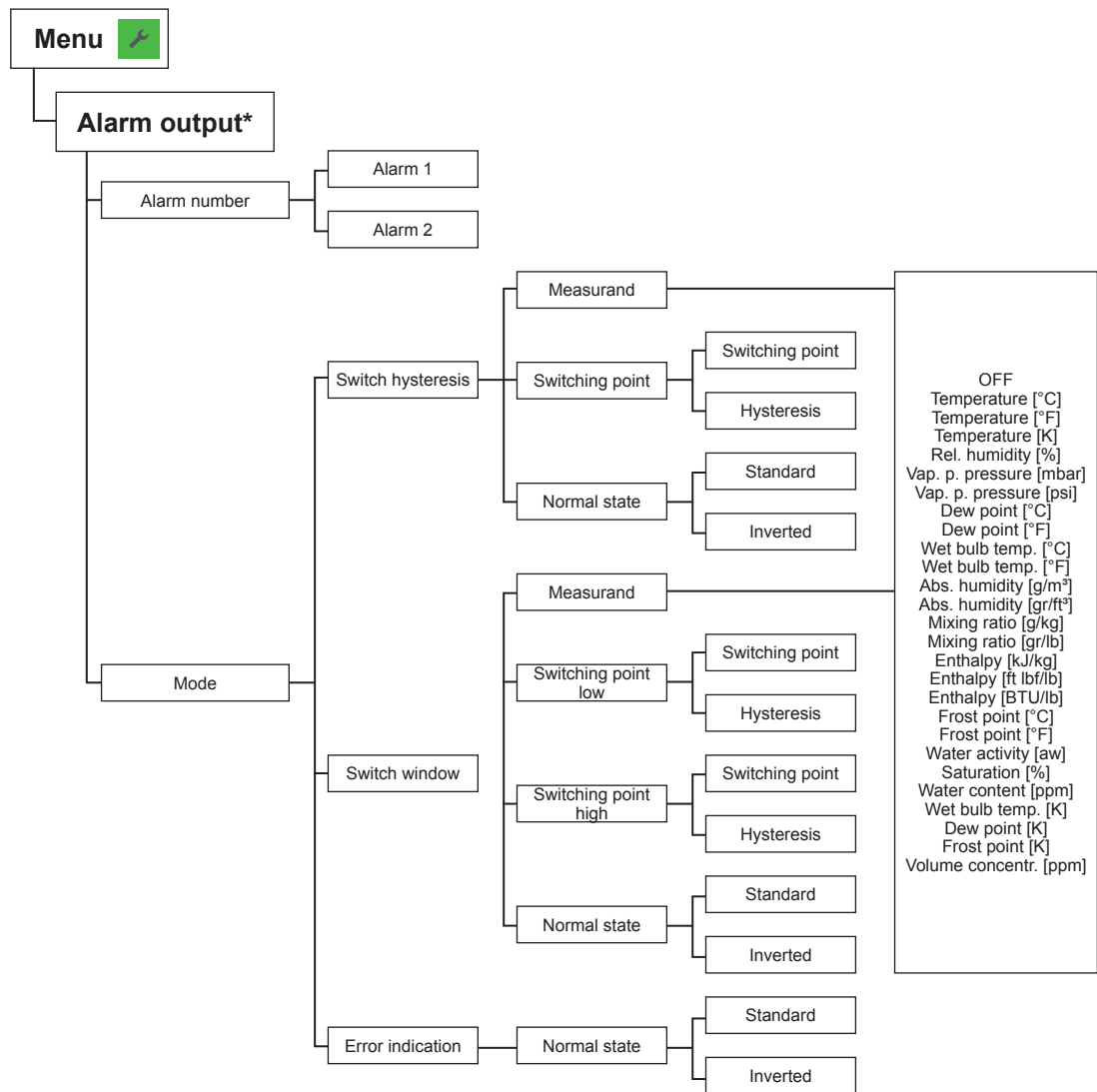


Fig. 17 Example of alarm in case of power supply failure using inverted alarm outputs.

The measurands at the outputs as well as switching points, hysteresis and the default state (standard / inverted) can be set via EE-PCS Product Configuration Software or using the display and the push buttons.



* Menu only available with connected alarm module during EE310 start-up

4.2 Power supply module (option AM3)

This module allows the EE310 to be powered with 100...240 V AC (50/60 Hz), 2 V A.



Fig. 18 Power supply module (option AM3)

Plug connections for option AM3 see chapter 3.2.2 Plug options.

The AM3 option includes a 1.25 A fuse on the 100-240 V side. This fuse may not be replaced by the user, but only by the E+E Service. National regulations for installation shall be observed.

4.3 Modbus RTU module (option J3)

Up to 32 EE310 transmitters with Modbus RTU interface can be connected in a RS-485 bus system.

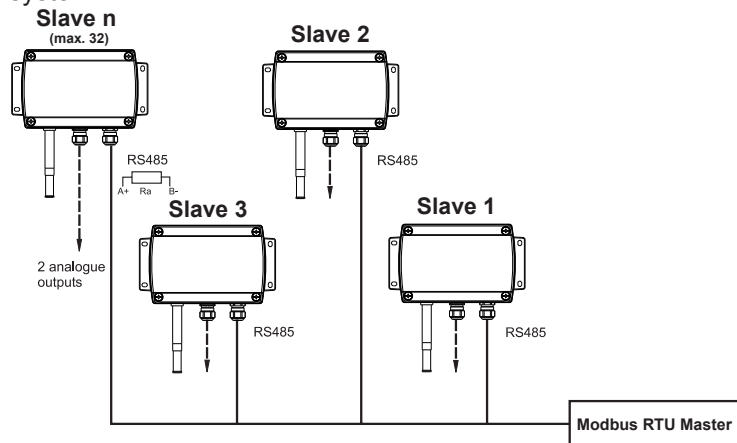
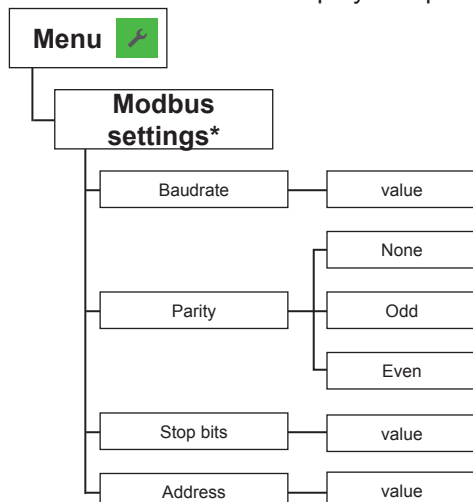


Fig. 19 Two wire RS485 network



Both ends of the network shall be terminated with a resistor $R_a=120\ \Omega$.

The setup of the Modbus RTU communication can be performed via EE-PCS Product Configuration Software or via display and push buttons.



* Menu only available with connected Modbus RTU module during EE310 start-up.

Data transmission

	Factory settings	Selectable values
Baud rate	9600	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800
Data bits	8	8
Parity	EVEN	None, odd, even
Stop bits	1	1 or 2
Slave address	231	1...247



The recommended setting for multiple devices in a Modbus RTU network is 9600 8 Even 1.

Modbus Map

Register [DEC]	Protocol address [HEX]	Measured value	Unit	Type
Read registers: function code 0x03 / 0x04				
31021	3FC	Relative humidity	%	32-bit float
31003	3EA	Temperature	°C	32-bit float
31005	3EC	Temperature	°F	32-bit float
31105	450	Dew point temperature	°C	32-bit float
31107	452	Dew point temperature	°F	32-bit float
31131	46A	Frost point / Dew point temperature	°C	32-bit float
31133	46C	Frost point / Dew point temperature	°F	32-bit float
31113	458	Absolute humidity	g/m ³	32-bit float
31115	45A	Absolute humidity	gr/ft ³	32-bit float
31121	460	Mixing ratio	g/kg	32-bit float
31123	462	Mixing ratio	gr/lb	32-bit float
31109	454	Wet bulb temperature	°C	32-bit float
31111	456	Wet bulb temperature	°F	32-bit float
31125	464	Specific enthalpy	kJ/kg	32-bit float
31129	468	Specific enthalpy	BTU/lb	32-bit float
31127	466	Specific enthalpy	ft lbf/lb	32-bit float
31101	44C	Water vapour partial pressure	mbar	32-bit float
31103	44E	Water vapour partial pressure	psi	32-bit float
31151	47E	Volume concentration	ppm	32-bit float
35001	1388	Air pressure	mbar	32-bit float
Write registers: function code 0x06 for 16-bit and 0x10 (decimal: 16) for 32-bit				
0001	0	Slave-ID	/	16-bit integer
5001	1388	Air pressure	mbar	32-bit float

4.4 Pluggable probe (option PC4)

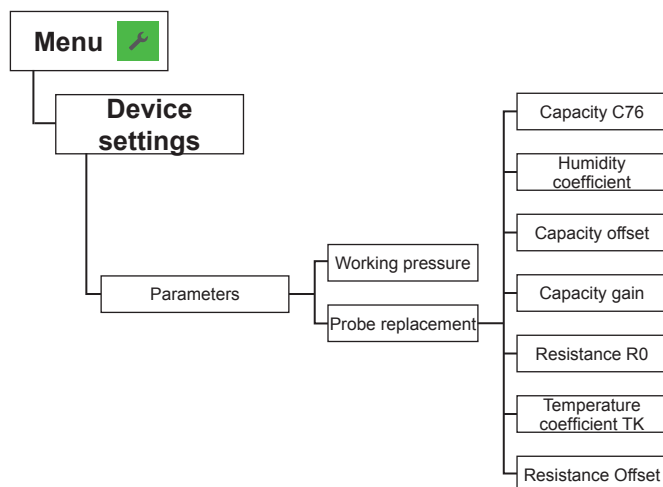
EE310-T5 and EE310-T10 transmitters are optionally available with pluggable sensing probe, which is attached to the EE310 enclosure by a push-pull plug. If the probe or the probe cable gets damaged it is possible to easily replace the probe without humidity and temperature adjustment. The replacement probe (see order information below) is supplied with a set of 7 individual parameters.



Fig. 20 Pluggable probe

Probe replacement procedure

- Plug off the damaged probe
- Plug on the new probe
- Update the 7 parameters with EE-PCS Product Configuration Software or via display and push buttons.



Note: When replacing the probe, the factory calibration loses its validity. A calibration to verify accuracy is recommended but not mandatory.

Order information for replacement probe

Type		PE310	
		T5	T10
Filter	stainless steel sintered	F4	F4
	PTFE	F5	
	H ₂ O ₂	F12	
	stainless steel - metal grid (up to 180 °C / 356 °F)	F9	F9
Cable length (incl. probe length)	2 m (6.6 ft)	K2	K2
	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")	L200	L200
	400 mm (15.75")	L400	L400
Process connection	1/2" ISO thread		PA23
	1/2" NPT thread		PA25
Optional features	E+E sensor coating	C1	C1

Tab. 1 Ordering code for replacement probe

5 Operation

5.1 Configuration interface

The transmitter can be used for configuration or calibration via the micro USB configuration interface. An additional supply is not necessary. After the USB cable is connected, the transmitter is initialised and the configuration is loaded. The green status LED flashes and indicates proper operation of the electronics.



Fig. 21 Remove the blind cover and plug in the USB cable

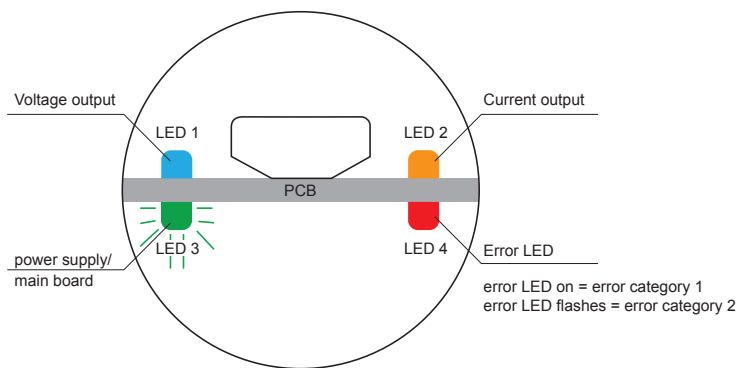


Fig. 22 Status LEDs are located at the USB port

5.2 3.5" TFT Colour Display (optional)

The EE310 display includes a data logger and push buttons for full configuration of the device. Upon start-up of an EE310 with display, the data logger and the configuration menu will be initialised during the first 5 seconds.

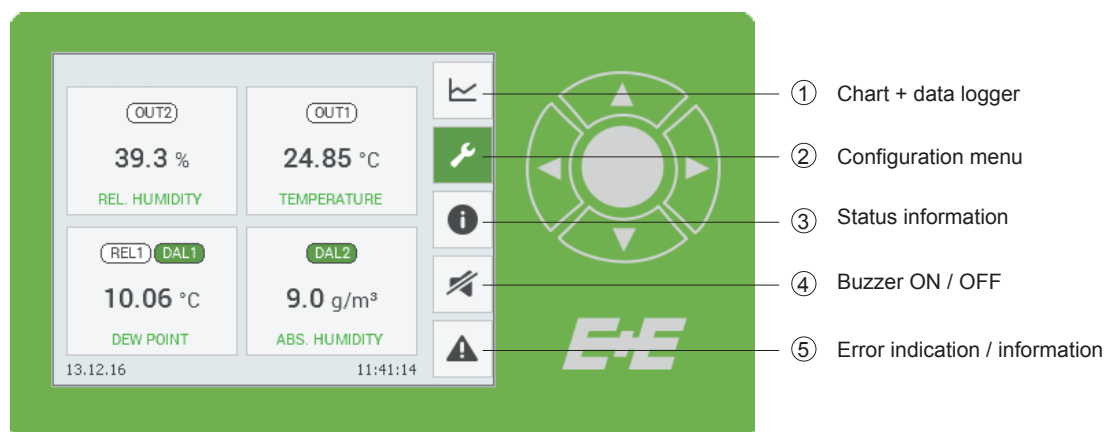


Fig. 23 Display with push buttons

5.3 Chart + Data logger

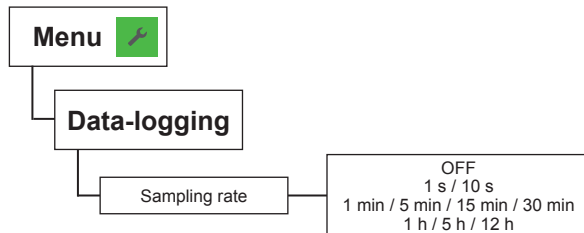
The TFT display with the integrated data logging function saves all measured and calculated values to the internal memory. The data logger has a real time clock (UTC time) with a battery back-up.



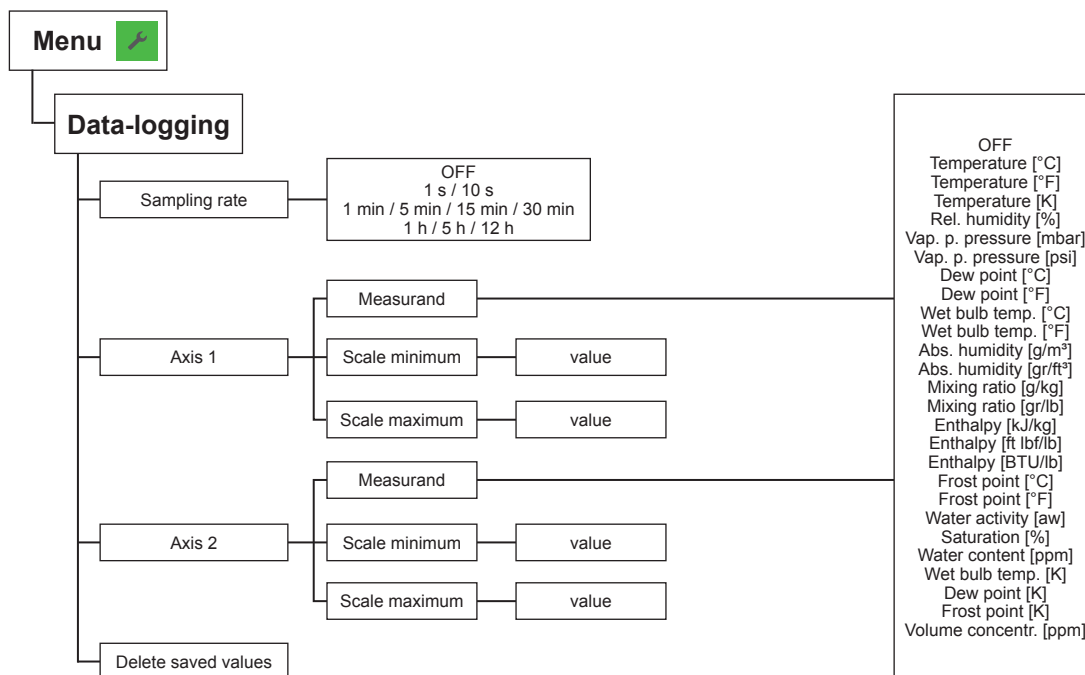
Changing the UTC time erases all stored data.

The data logger can save 20.000 values for each measurand. The logging interval is to be set by the user from 1 second to 12 hours.

The data logger setup can be performed via display and push buttons.



The data logger menu is also used to select the logged data to be shown as a graph as well as for scaling the graph.



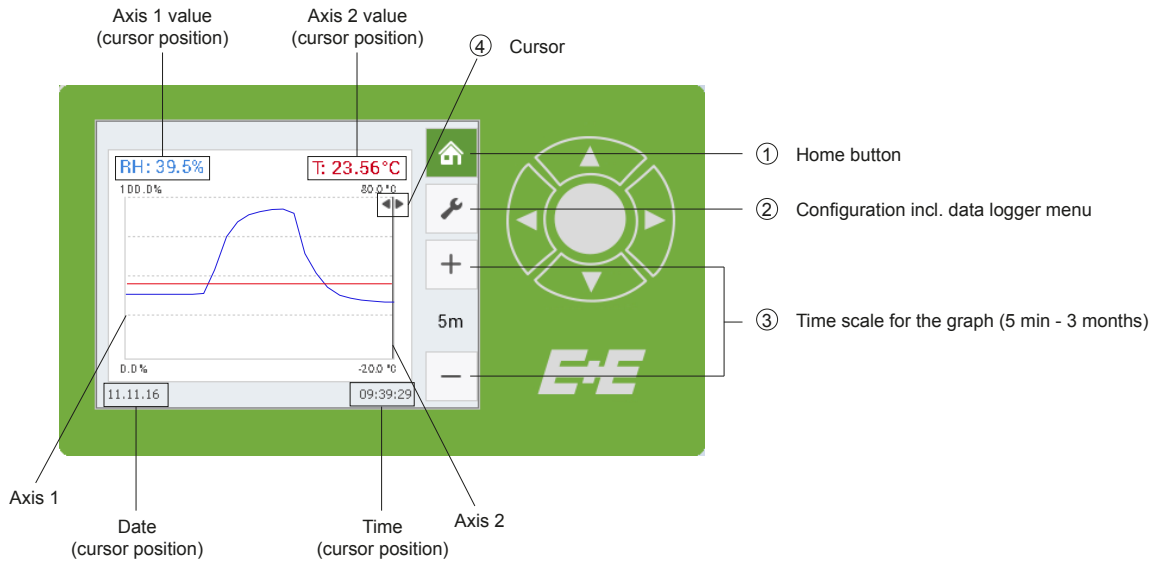


Fig. 24 Data logging

Each point in the graph represents a logged value. The points are connected by a linear interpolation.

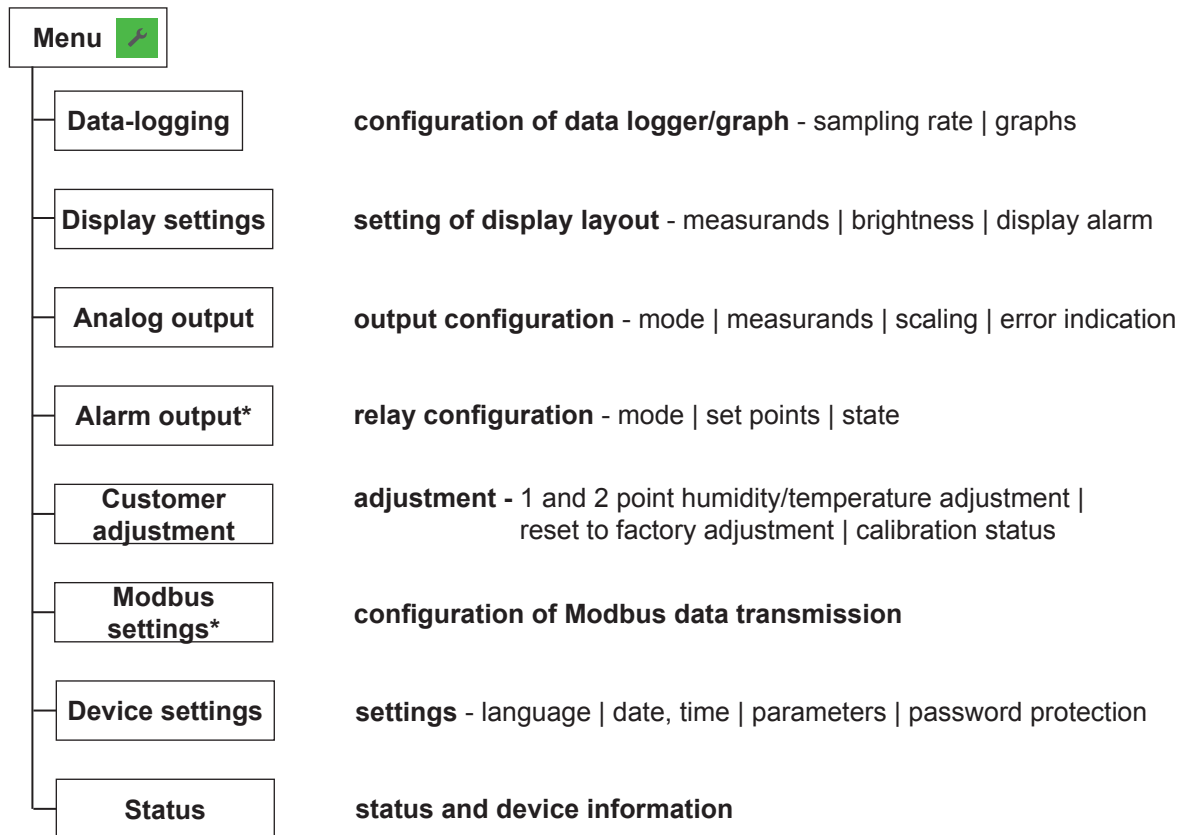


The data logging continues even when the data memory is full; new data is stored while the oldest data is deleted (first in first out memory). The last 20.000 logged values are available in the internal memory.

The logged data can be downloaded with EE-PCS Product Configuration Software as .csv file by choosing the measurands and the time period.

5.4 Configuration Menu

Detailed information to the configuration menu see chapter 10 Appendix.



* Menu only available with connected corresponding modules.

5.5 Status information

The status information shows all actual EE310 settings.

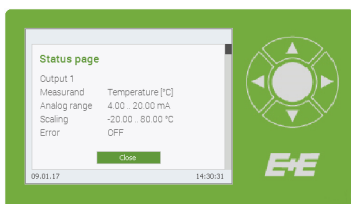


Fig. 25 Status information

5.6 Buzzer ON / OFF



5.7 Error indication

When an error occurs, the error indication shows the error code.

6 Maintenance

6.1 Self diagnosis and error messages

6.1.1 Error messages via display

Error description	Error code (display)	Error category	Recommended action
Voltage out short circuit - output 1 only*	1.1	1	Check wiring of outputs
Voltage out short circuit - output 2 only*	1.2		
Voltage out short circuit - both outputs*	1.3		
Current loop open - output 1 only	2.1		Check wiring of outputs
Current loop open - output 2 only	2.2		
Current loop open - both outputs	2.3		
RH sensor dirty	3.x	2	Cleaning sensor
Hardware error	5.x		Return the faulty unit to E+E for service
	6.x		
	8.x		
Temperature measurement failure	7.x		
Humidity measurement failure	9.x		
	10.x		

* not available with 0 - 1 V output

Tab. 2 Overview of error codes

Error category 1 = non-critical error, can be solved by the user

- The display blinks and the buzzer beeps every 10 seconds.
- The red status LED flashes.

Error category 2 = critical error, return the device to E+E for service

- The display blinks and the buzzer beeps continuously.
- The red status LED lights continuously.

6.1.2 Error messages via LEDs

Four status LEDs placed on both sides of a PCB are located close to the USB service interface, under a blind cover.

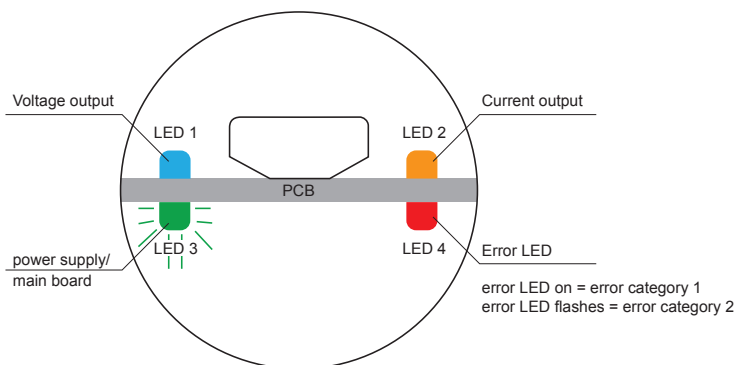


Fig. 26 Status LEDs

LED 1 (blue): analogue output is set to voltage.

LED 2 (orange): analogue output is set to current.

LED 3 (flashing green): supply voltage applied (microprocessor is active).

LED 4 (red): constant lit: error category 1
flashes: error category 2

6.1.3 Solving typical problems

Error description	Likely causes and solutions
Display shows incorrect values	Error during re-adjustment of the transmitter. → Reset to factory calibration and repeat the adjustment routine.
	Filter soiled → Replace filter
	Output configured incorrectly → check configuration
Long response time	Filter soiled → Replace filter
	Inappropriate filter type → Contact E+E representative for advice.
High humidity values - red LED blinks	Water in sensing head → Investigate the cause for water / condensation. Contact E+E representative for advice.
	Inappropriate filter type
	→ Contact E+E representative for advice.

Tab. 3 Self diagnosis

6.2 Cleaning the sensing head / filter replacement

In case of dusty, oily and 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 of the device.
- If needed, the sensing head can be cleaned. For cleaning instructions please see www.epluse.com/EE310.

6.3 Sensor replacement

A damaged capacitive humidity sensing element can be replaced by the user against an E+E replacement sensor, see chapter 8 *Replacement parts / Accessories*.

Sensor replacement procedure:

- Switch off supply voltage.
- Remove the filter cap from the tip of the probe with utmost care not to touch the sensors.
- Solder off the damaged humidity sensing element.
- Shorten the leads of the replacement sensor from 10 mm / 0.39" to 6 mm / 0.24".
- Solder in the new humidity sensor, the active side shall face the temperature sensor.
- Screw on a new filter cap with utmost care not to touch the sensors.
- Perform a 2 point humidity adjustment of the EE310 with the EE-PCS Product Configuration Software or with the display and push buttons.



- When replacing the humidity sensor element the factory calibration is not any longer valid.
- The humidity sensor element is an Electro Static Discharge (ESD) sensitive components and shall be handled as such.
- Hold the humidity sensor element only by the leads. Never touch the active surface of the sensor.



The replacement of the humidity sensor element may be performed by qualified staff only. Since the performance of the instrument after the sensor exchange depends on the overall accuracy of the adjustment procedure, it is strongly recommended to return the device to E+E for sensor replacement.

6.4 RH / T adjustment and calibration

Humidity calibration and adjustment

Depending on the application and the requirements of certain industries, there might arise the need for periodical humidity calibration (comparison with a reference) or adjustment (bringing the device in line with a reference).

Calibration and adjustment at E+E Elektronik

Calibration and/or adjustment can be performed in the E+E Elektronik calibration laboratory. For information on the E+E capabilities in ISO or accredited calibration please see www.eplusecal.com.

Calibration and adjustment by the user

Depending on the level of accuracy required, the humidity reference can be:

- Humidity Calibrator (e.g. Humor 20), please see www.epluse.com/humor20.
- Handheld device (e.g. Omniport30), please see www.epluse.com/omniport30.
- Humidity calibration Kit (e.g. E+E Humidity Standards), please see www.epluse.com/EE310.

Perform 1 or 2 point adjustment via EE-PCS Product Configuration Software or via display (details see below).

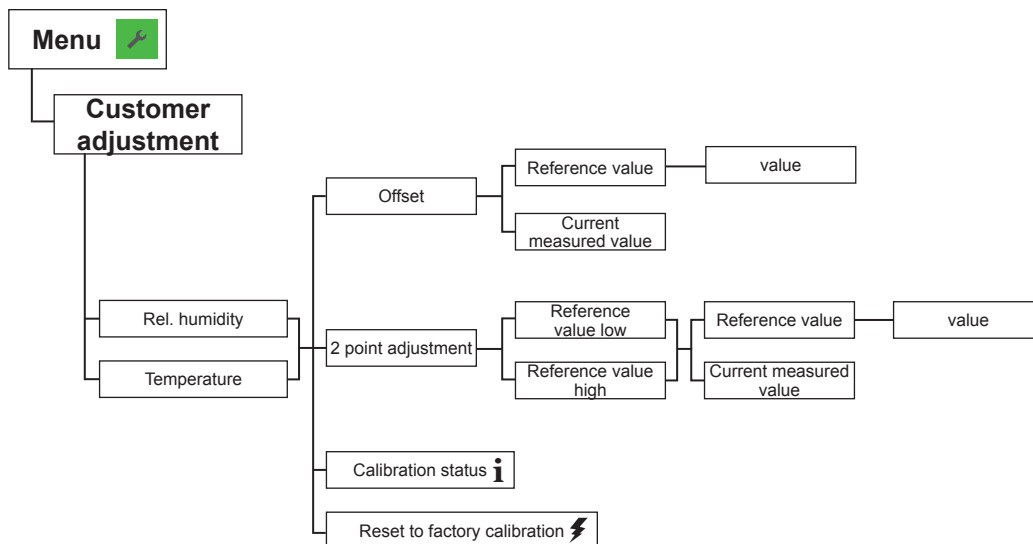


Fig. 27 Adjustment menu

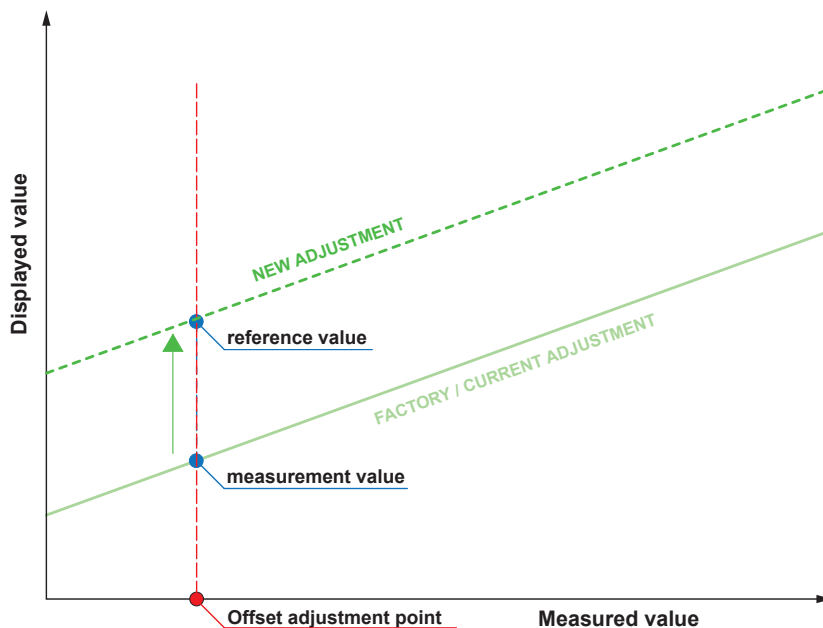


Fig. 28 Offset adjustment

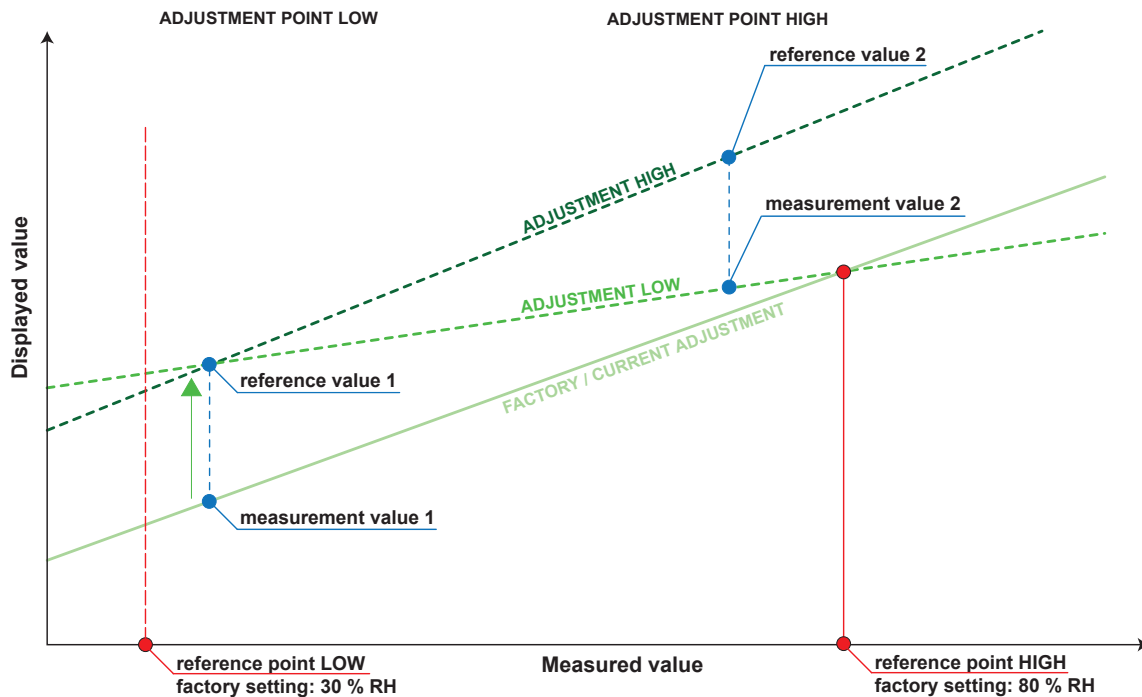


Fig. 29 2 point adjustment procedure

7 Scope of supply

	Included in versions
EE3100 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 / E7 / E12
Mating plug RSC 5/7 (2 pcs. for option E12)	E5 / E7 / E12

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

Tab. 4 Scope of supply

8 Replacement parts / Accessories

see data sheet “Accessories”

Description

- Filter caps
- Mounting flange stainless steel
- Drip water protection
- RS485 kit
- Bracket for installation onto mounting rails¹⁾
- Replacement probes²⁾
- Replacement humidity sensor
- Replacement humidity sensor with coating
- Humidity calibration kit

Order code

- HA0101xx
- HA010201
- HA010503
- HA010605
- HA010203
- see 4.4 Pluggable probe (option PC4)
- FE09
- FE09-HC01
- see data sheet „Humidity calibration kit“

1) 2 pieces necessary per enclosure.

2) Only for devices with pluggable probe option PC4.

9 Technical data

Measured values

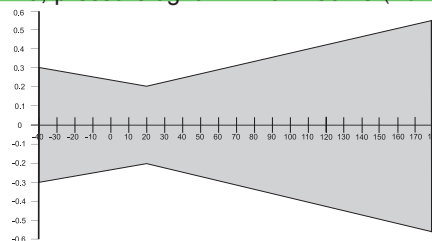
Relative humidity (RH)

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	<i>mv = measured value</i>	
-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)

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 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	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 24V 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 mm ² (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		



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).

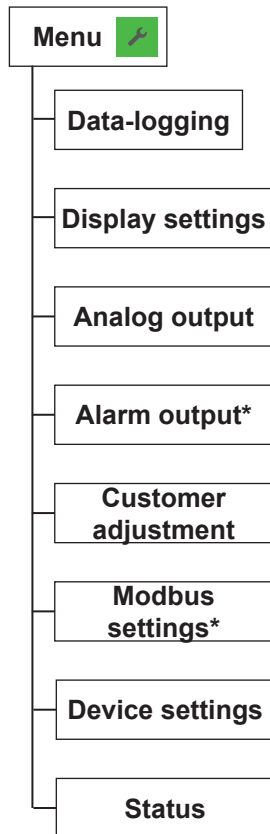
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

3) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).

10 Appendix

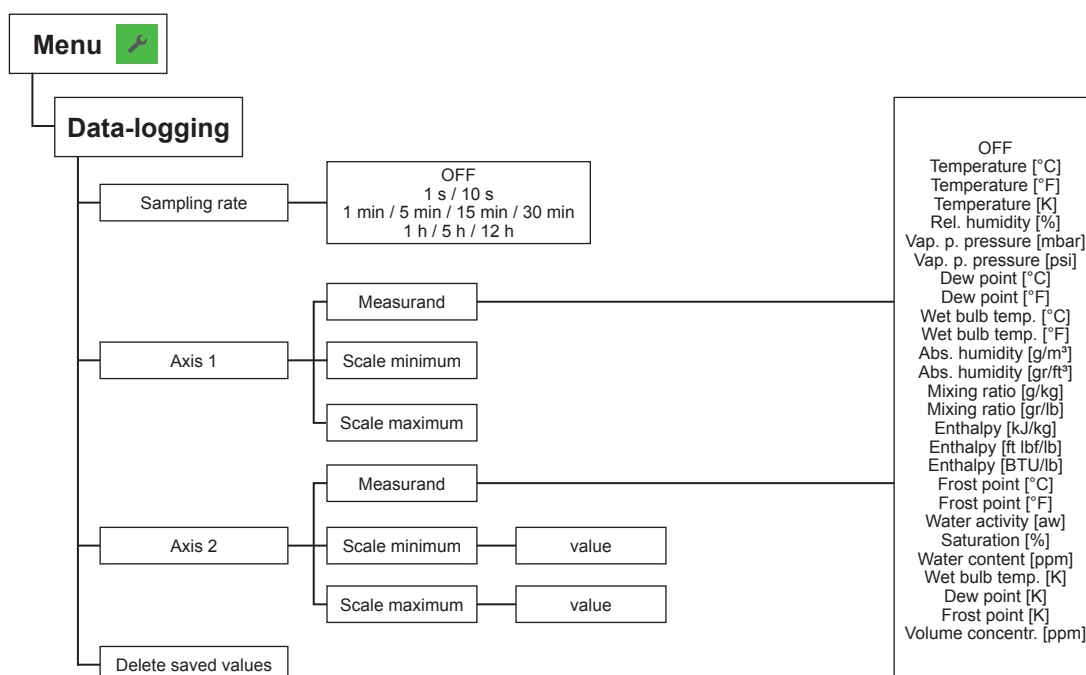
10.1 Appendix A

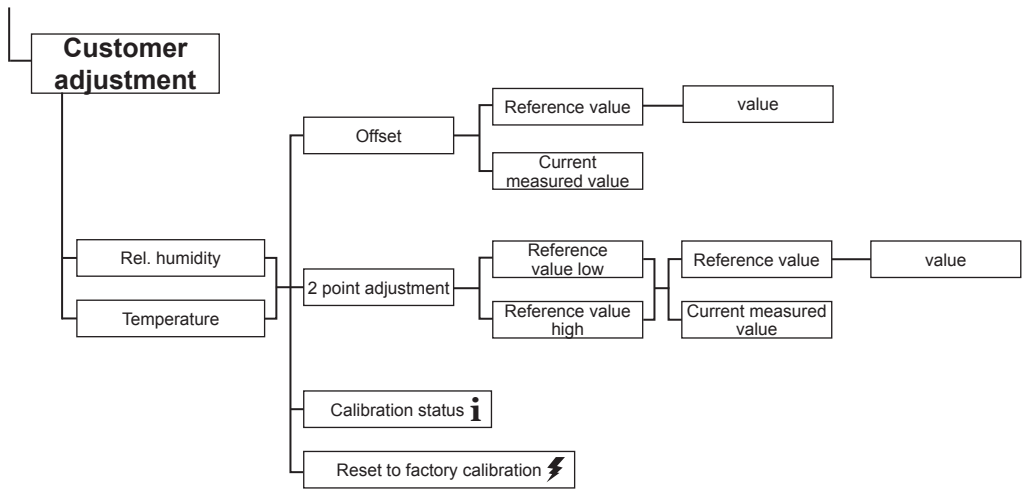
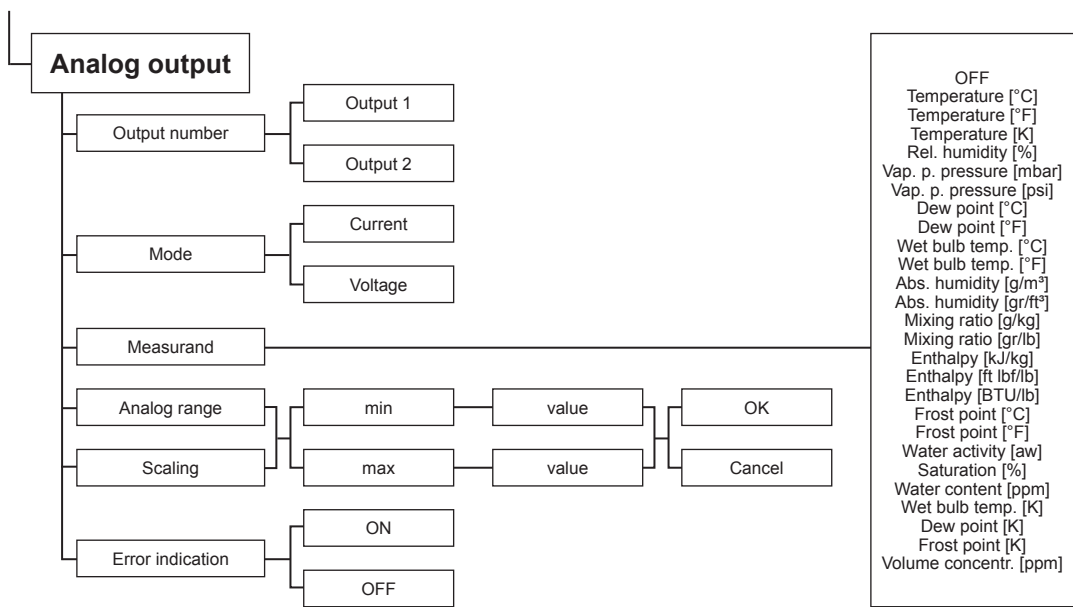
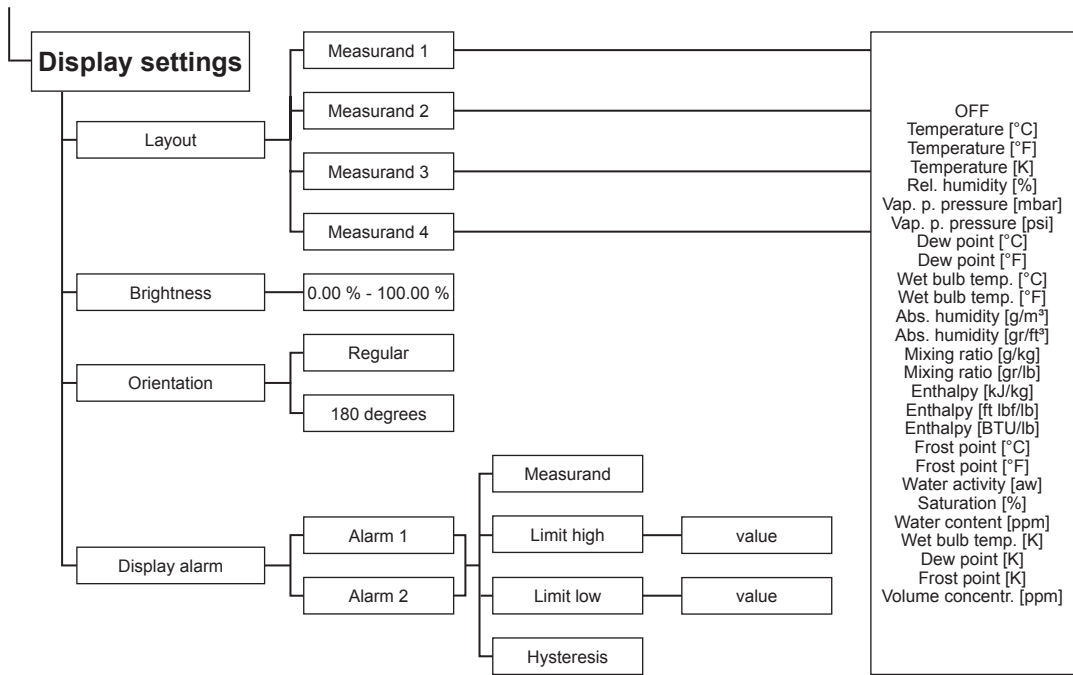
Overview

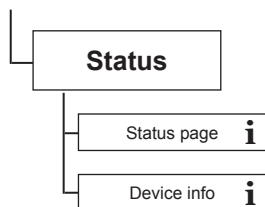
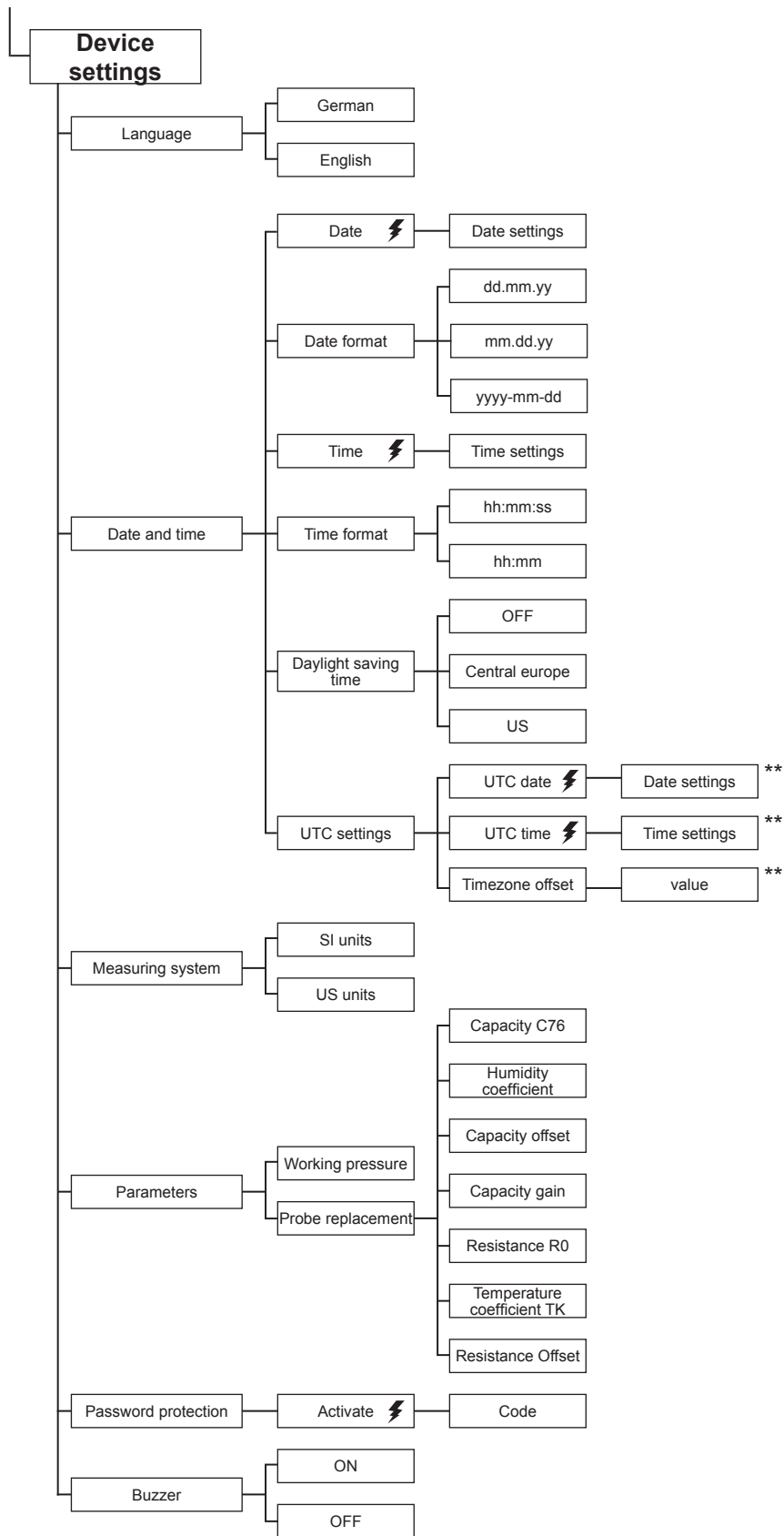


* Menu only available with connected modules.

Detailed information







Optional menu (only available with plugged in modules during the start up procedure)

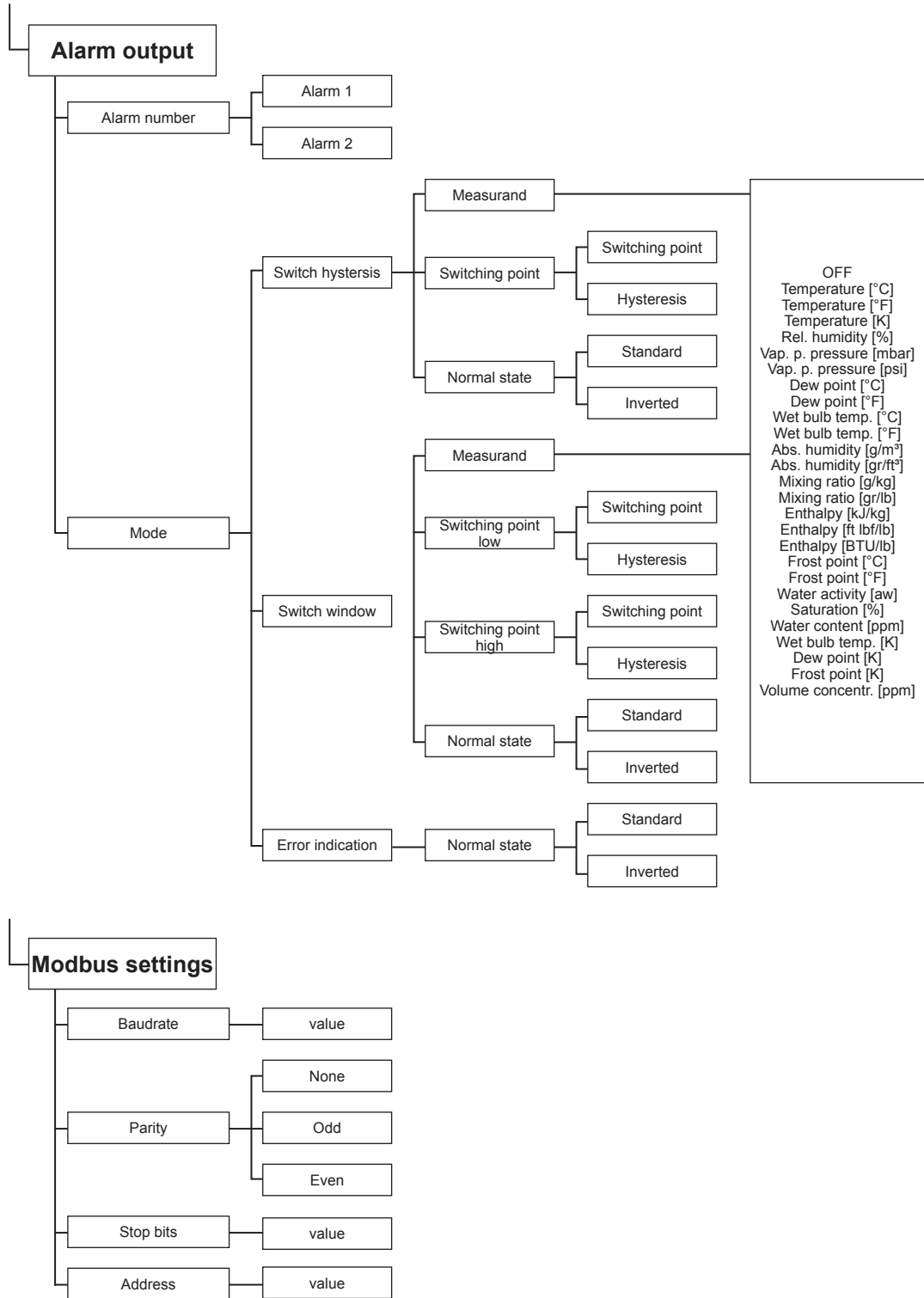


Fig. 30 Configuration menu

A series of 28 horizontal dotted lines spanning the width of the page, intended for handwritten notes or entries.



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