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User Manual EE310

High-End Humidity and Temperature Sensor for Industrial Applications

Modbus

www.epluse.com

Content

1 General Information

This user manual is intended to ensure 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. E+E Elektronik Ges.m.b.H. accepts no liability for any warranty or liability claims arising from this publication or improper handling of the product(s) described.

All information, technical data and diagrams included in this document are based on the information available at the time of writing. The document may contain technical inaccuracies and typographical errors. The contents will be revised on a regular basis and changes will be implemented in subsequent versions. The product(s) described and the contents of this document may be changed or improved at any time without prior notice.

PLEASE NOTE

Find this document and further product information on our website at www.epluse.com/ee310.

1.1 Explanation of Warning Notices and Symbols

Safety precautions

Precautionary statements warn of hazards in handling the device and provide information on their prevention. The safety instruction labeling is classified by hazard severity and is divided into the following groups:

DANGER

Danger indicates hazards for persons. If the safety instruction marked in this way is not followed, the hazard will verly likely result in severe injury or death.

WARNING

Warning indicates hazards for persons. If the safety instruction marked in this way is not followed, there is a risk of injury or death.

CAUTION

Caution indicates hazards for persons. If the safety instruction marked in this way is not followed, minor or moderate injuries may occur.

NOTICE

Notice signals danger to objects or data. If the notice is not observed, damage to property or data may occur.

Informative notes

Informative notes provide important information that is characterised by its relevance.

INFO

The information symbol indicates tips on handling the device or provides additional information on it. This information is useful to achieve optimum performance of the device.

The title field may deviate from “INFO” depending on the context. For instance, it may also read “PLEASE NOTE”.

1.2 Safety Instructions

1.2.1. General Safety Instructions

NOTICE

Improper handling of the device may result in its damage.

- The EE310 enclosure, the sensing probe and the sensing module shall not be exposed to unnecessary mechanical stress.
- Do not apply the supply voltage to the RS485 data lines.
- The EE310 electronics are sensitive to electrostatic discharge (ESD). Take appropriate protective measures when touching it.
- When replacing the filter cap make sure not to touch the sensing elements.
- The device must be operated with the filter cap on at all times.
- For sensor cleaning and filter cap replacement please refer to “Cleaning Instructions” at www.epluse.com.
- Installation, electrical connection, maintenance and commissioning shall be performed by qualified personnel only.
- The devices are designed for the operation with class III supply (EU) and class 2 supply (NA).
- The power supply must be switched off before opening the enclosure.
- Use the EE310 only as intended and observe all technical specifications.
- Disconnect the existing Ethernet connection before opening the enclosure!

1.2.2. Intended Use

EE310 is optimised for reliable measurement in demanding industrial applications. In addition to highly accurate measurement of relative humidity (RH) and temperature (T), the sensor also calculates parameters such as dew point, absolute humidity and mixing ratio. Various models are available including wall, duct and remote probe. Remote probe models can be used from -80 °C (-112 °F) up to 180 °C (356 °F) and the pressure-tight probe up to 20 bar (300 psi). Please refer to chapter 9 Technical Data for the working ranges of the probes.

⚠ WARNING

Non-compliance with the product documentation may cause safety risks for people and the entire measurement installation.

The manufacturer is not liable for any damage caused by improper handling, installation and maintenance of the device.

- This device is not appropriate for safety, emergency stop or other critical applications where device malfunction or failure could cause injury to human beings.
- The device may not be manipulated with tools other than specifically described in this manual.

NOTICE

Failure to follow the instructions in this user manual may lead to measurement inaccuracy and device failures.

- The EE310 may only be operated under the conditions described in this user manual and within the specification included in chapter 9 Technical Data.
- Any unauthorised product modifications will invalidate all warranty claims. Modifications may only be carried out with express authorisation of E+E Elektronik Ges.m.b.H.!

1.2.3. Alarm Module with Voltages >50V (Option AM2)

⚠ WARNING

Notice signals danger to objects or data. If the avoidance instructions are not observed, damage to property or data may occur.

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

1.2.4. Integrated power supply 100 - 240 V AC (Option AM3)

⚠ WARNING

Notice signals danger to objects or data. If the avoidance instructions are not observed, damage to property or data may occur.

- 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.

1.2.5. Mounting, Start-up and Operation

The EE310 has been produced under state of the art manufacturing conditions, has been thoroughly tested and has left the factory after fulfilling all safety criteria. The manufacturer has taken all precautions to ensure safe operation of the device. The device shall be set up and installed in a way that does not impair its safe use. All applicable local and international safety guidelines for safe installation and operation of the device have to be observed. This user manual contains information and warnings that must be observed in order to ensure safe operation.

PLEASE NOTE

The manufacturer or his authorised agent can 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 damage caused by non-compliance with the applicable regulations, operating instructions or the specified operating conditions. Any consequential damage is excluded from liability.

⚠ WARNING

Non-compliance with the product documentation may result in accidents, personal injury or property damage.

- Mounting, installation, commissioning, start-up, operation and maintenance of the device may only be carried out by qualified staff. Such staff must be authorised by the operator of the facility to carry out the mentioned activities.
- The qualified staff must have read and understood this user manual and must follow the instructions contained within. The manufacturer accepts no responsibility for non-compliance with instructions, recommendations and warnings.
- All process and electrical connections must be thoroughly checked by authorised staff before commissioning the device.
- Do not install or start-up a device suspected to be faulty. Mark it clearly as faulty and remove it from the process.
- Service operations other than described in this user manual may only be performed by the manufacturer. A faulty device may only be investigated and possibly repaired by qualified, trained and authorised staff. If the fault cannot be fixed, the device shall be removed from the process.

1.3 Environmental Aspects

PLEASE NOTE

Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with all relevant environmental protection requirements. Please observe local regulations for the disposal of the device.

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. Otherwise, the device may be damaged by electrostatic discharge when touching exposed sensitive components.

2 Scope of Supply

Items included	Version
EE310 High-End Humidity and Temperature Sensor for Industrial Applications	All versions
User manual	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
Mating plug HPP V4 RJ45 Cat5	J4

Tab. 1 Items included in the scope of supply

3 Product Description

3.1 Product Design

EE310-T5 / T10

EE310-T1

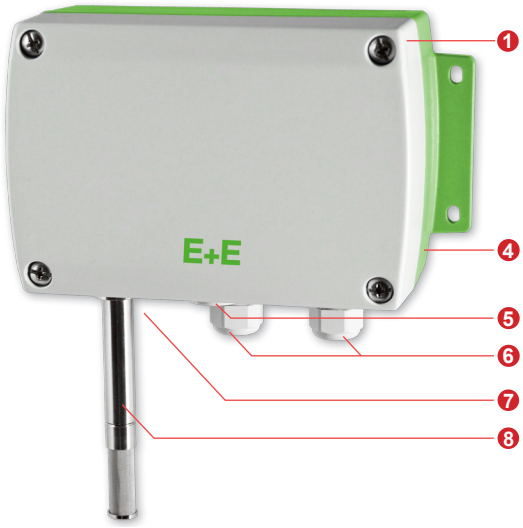


Fig. 1 EE310 product design

No.	Function
1	Sensor module with electronic / display*) and probe cable
2	3.5" TFT colour display*)
3	5 push-buttons for configuration menu
4	Base module 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

Tab. 2 Parts of the EE310

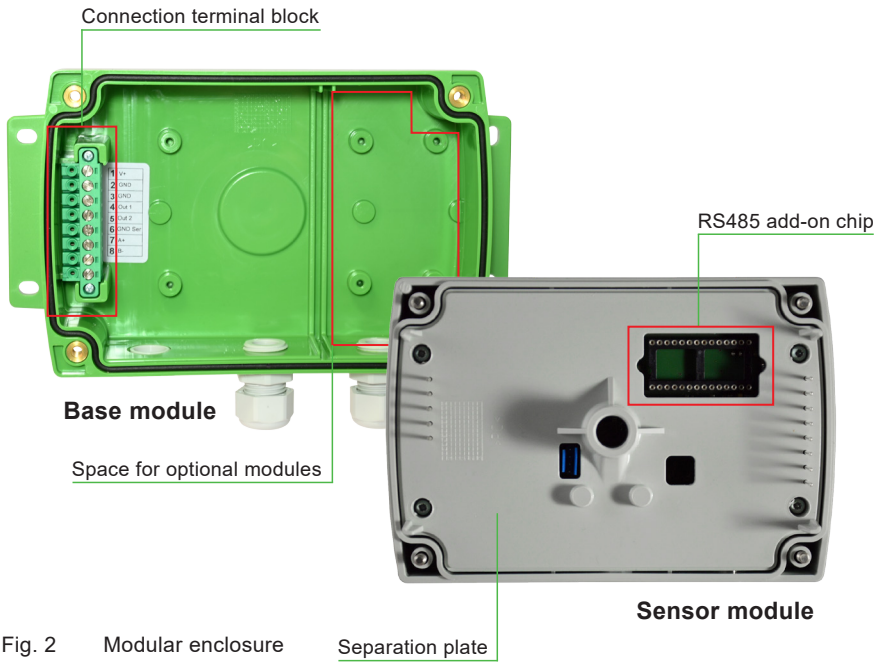


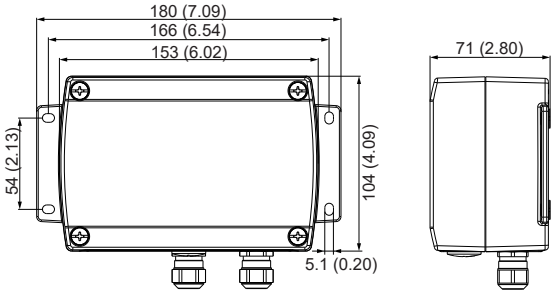
Fig. 2 Modular enclosure

3.2 Dimensions

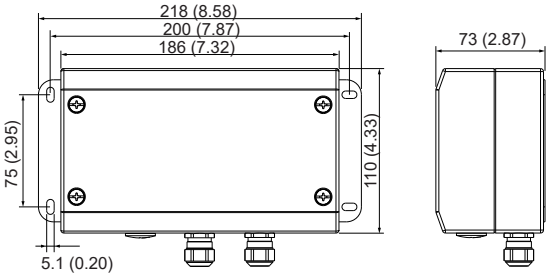
Values in mm (inch)

Enclosure

Polycarbonate

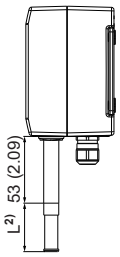


Stainless steel

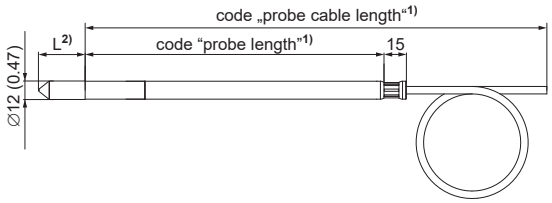


Types

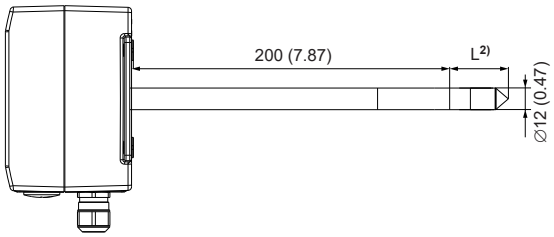
T1: Wall mount



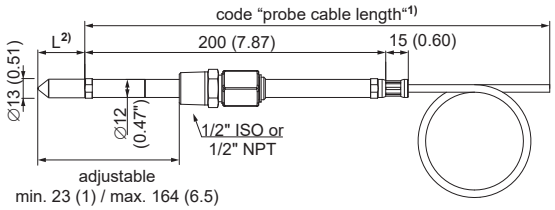
T5: Remote probe up to 180 °C (356 °F)



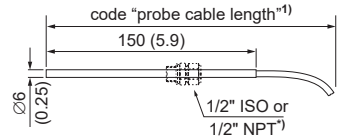
T2: Duct mount



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



T24: T only remote probe (M3)



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

*) Not included in the scope of supply:

1/2" ISO ∅ 6 mm	HA011104
1/2" NPT ∅ 6 mm	HA011105

4 Mounting and Installation

4.1 Mechanical Installation

4.1.1. Mounting of the Enclosure

- Drill the mounting holes according to the corresponding mounting pattern below.
- Mount the base module of the enclosure with 4 screws (screw diameter < 4.2 mm (0.2"), not included in the scope of supply). Values in mm (inch).

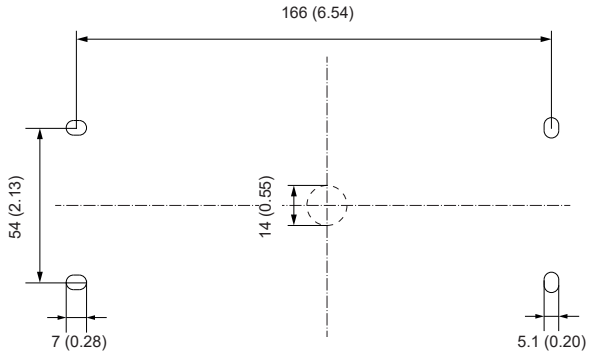


Fig. 3 Drilling pattern of polycarbonate enclosure

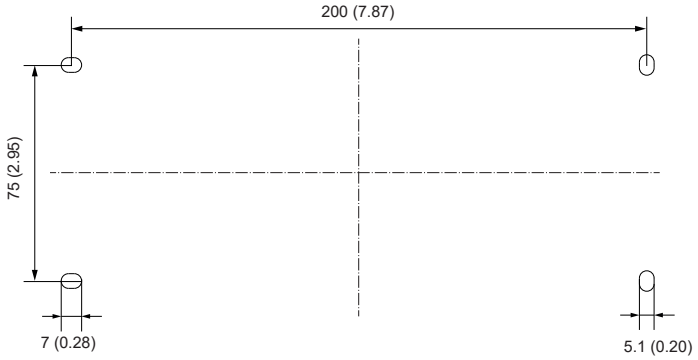


Fig. 4 Drilling pattern of stainless steel enclosure

4.1.2. DIN Rail Mounting of the Polycarbonate Enclosure

- Mount the two DIN rail brackets onto the base module.
  (to be ordered separately, refer to chapter 8 Spare Parts and Accessories)
- Snap in the enclosure onto the DIN rail.

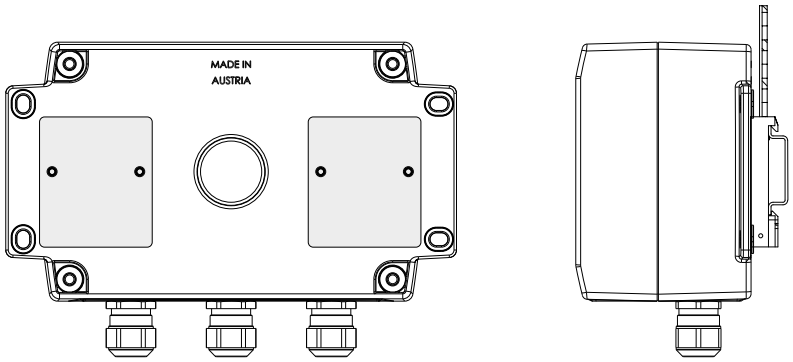


Fig. 5 DIN rail installation

4.2 Electrical Connection

⚠ WARNING

Incorrect installation, wiring or power supply may cause overheating and result in personal injury or property damage.

Cables must not be under voltage during electrical installation and connection or disconnection, especially at terminal connections on circuit boards. For correct cabling, always observe the presented wiring diagram for the product version used.

The manufacturer cannot be held responsible for personal injury or damage to property caused by incorrect handling, installation, wiring, power supply or maintenance of the device.

⚠ WARNING

For EE310 with alarm module (option AM2) or integrated power supply 100 - 240 V AC (option AM3), the metal enclosure must be grounded during operation.

NOTICE

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).

Connection Diagram

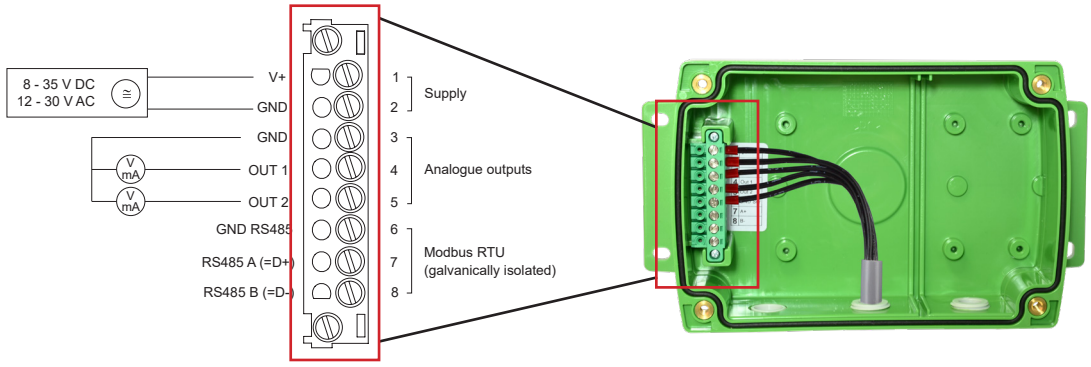


Fig. 6 Electrical connection

Analogue outputs

Both analogue outputs shall be configured to either voltage or current. Measurands, analogue output range and scaling are freely selectable. All settings can be performed via display and push-buttons or using the PCS10 Product Configuration Software, refer to chapter 6.1 Configuration Interface.

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.

PLEASE NOTE

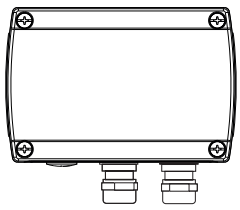
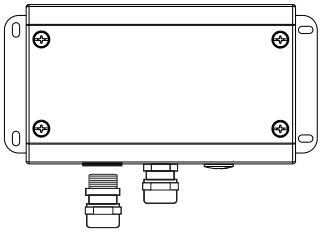
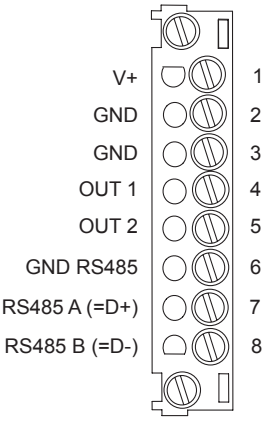
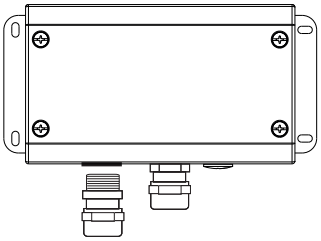
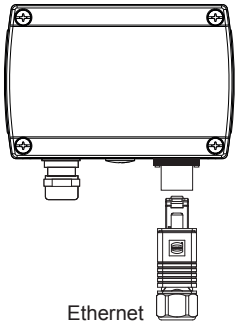
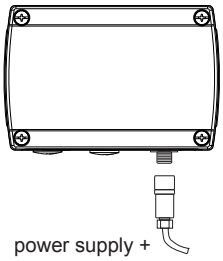
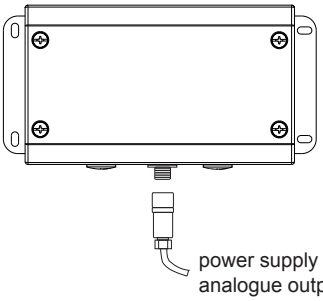
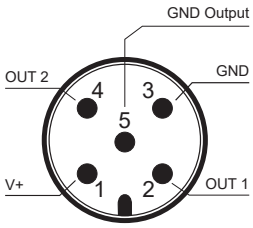
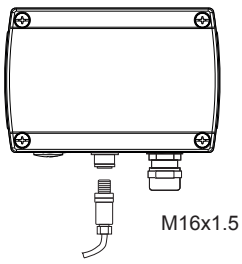
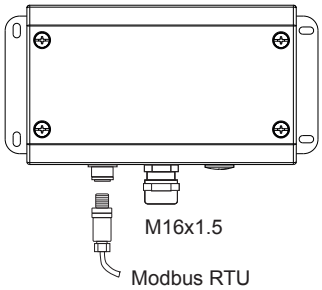
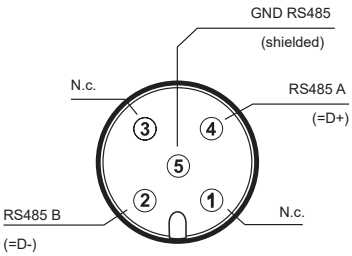
The error indication is disabled by default.

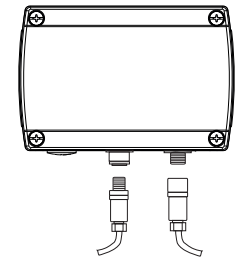
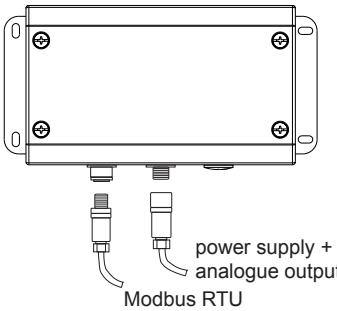
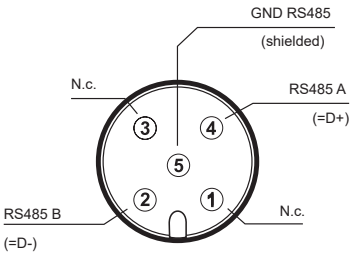
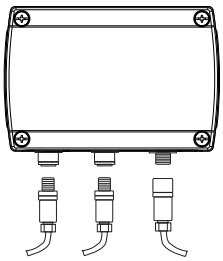
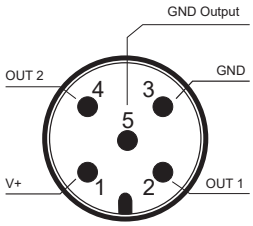
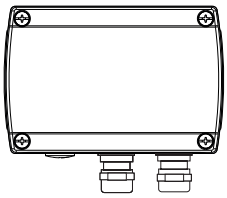
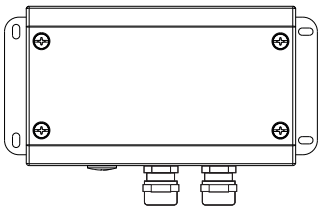
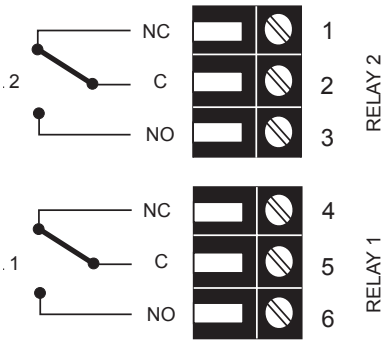
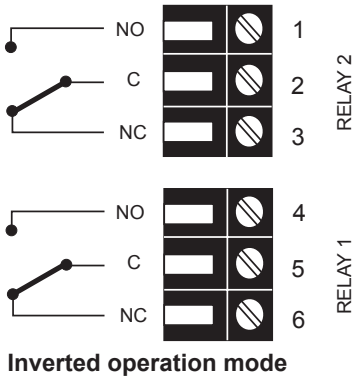
When changing one of the analogue outputs from current to voltage and vice versa, the second output will change automatically as well. The output scaling changes automatically if it is out of physical range (i.e. 20 mA will be changed to 10 V instead of 20 V).

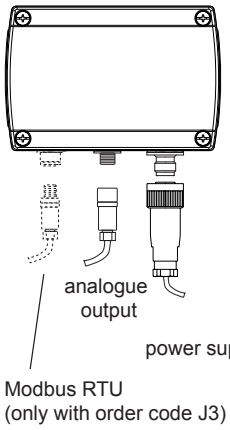
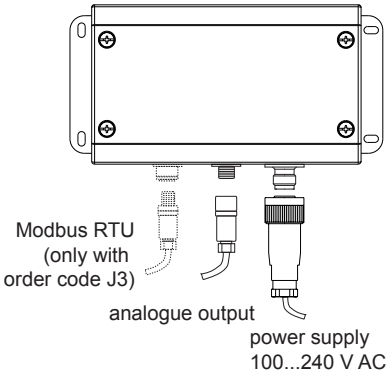
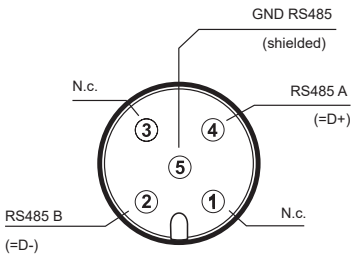
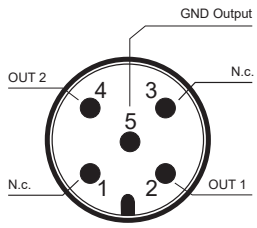
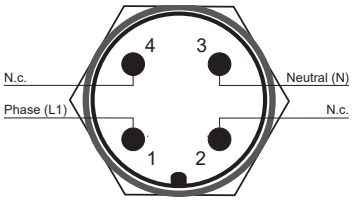
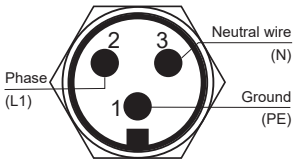
PLEASE NOTE

Check output scale after changing between voltage and current output.

4.2.1. Electrical Connection and Wiring

Option	Polycarbonate Enclosure	Stainless Steel Enclosure	Pin Assignment
Cable glands	 2x M16x1.5	 1 x M16x1.5 mounted 1 x M16x1.5 enclosed	
E15		 1 x M20x1.5 mounted 1 x M20x1.5 enclosed	
J4	 Ethernet Modbus TCP		
E4	 power supply + analogue output	 power supply + analogue output	 **Supply and analogue Output** M12 plug front view
E5	 M16x1.5 Modbus RTU	 M16x1.5 Modbus RTU	 M12 socket front view

Option	Polycarbonate Enclosure	Stainless Steel Enclosure	Pin Assignment
E6			 **Modbus RTU** M12 socket front view
E12			 **Power supply + analogue output** M12 plug front view
AM2			 **Standard operation mode**
			 **Inverted operation mode**

Option	Polycarbonate Enclosure	Stainless Steel Enclosure	Pin Assignment
AM3			 **Modbus RTU** M12 socket front view  **Analogue output** M12 plug front view  **Power supply 100 - 240 V AC** Plug, 4 poles front view  **Power supply 100 - 240 V AC for stainless steel enclosure** Plug, 3 poles front view

Tab. 3 Options for electrical connections and wiring

NOTICE

External diameter of the supply cable for option AM3: 10...12 mm (0.39...0.47").
Maximum wire cross section for AM3 connecting cable: 1.5 mm^2 (AWG 16) .

External diameter of the cable for Modbus RTU and analogue output female plug: 4...6 mm (0.16...0.24").
Maximal wire cross section for connecting cable: 0.5 mm^2 (AWG 21).

4.3 Mounting (Wall / Duct Version)

EE310-T1

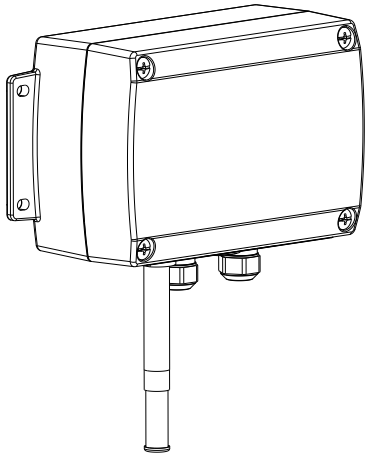


Fig. 7 Mounting of model EE310-T1. The probe shall point downwards.

EE310-T2

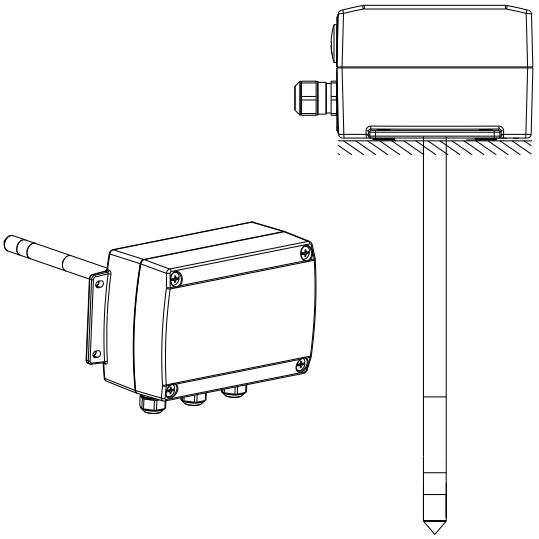


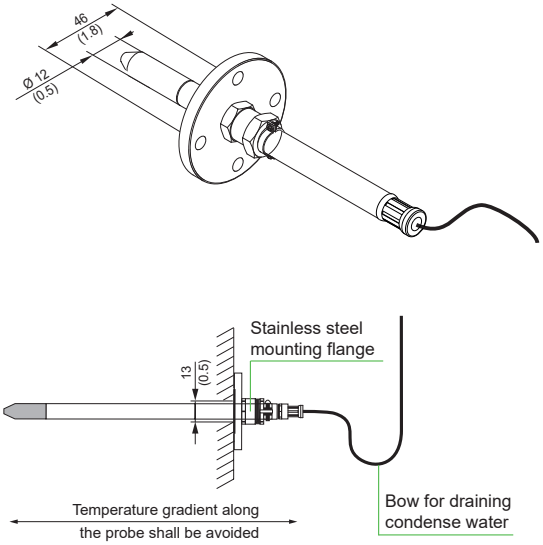
Fig. 8 Mounting of model EE310-T2. The probe shall be mounted horizontally or vertically pointing downwards.

4.4 Mounting Remote Sensing Probe of EE310-T5

For mounting the probe into a separation wall use the stainless steel mounting flange. The immersion depth is adjustable. The probe shall be mounted horizontally.

Values in mm (inch)

Probe into seperation wall



Hanging probe

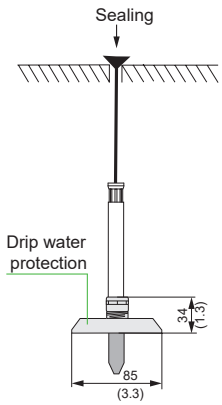


Fig. 9 Mounting the remote probe of EE310-T5

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).

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

For probe hanging on 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 purpose, use the drip water protection (refe8 Spare Parts and Accessories).

4.5 Mounting Pressure-Tight Probe of EE310-T10

⚠ WARNING

General safety instructions for pressure-tight 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 expulsed 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.

The probe is rated with leakage rate B according to EN12266-1.

4.5.1. Installation of the Probe Directly in the Process

NOTICE

For direct probe installation shut-off valves shall be placed on both sides of the probe insert (refer to Fig. 10 Installation of the EE310-T10 probe directly into the process). 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 (refer to Fig. 10) by a new one every time before re-installing the probe.

Probe installation steps

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

⚠ WARNING

Strictly observe 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.

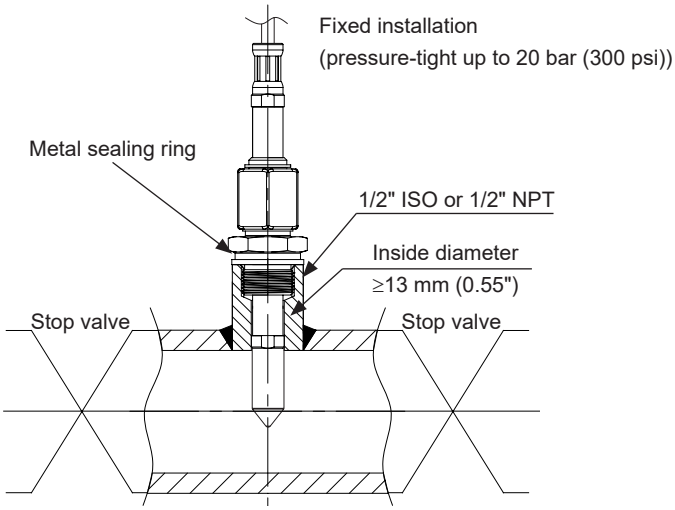


Fig. 10 Installation of the EE310-T10 probe directly into the process

4.5.2. Installation of the Probe with Ball Valve Set

The ball valve set allows the probe to be installed and removed without interrupting the process.
When mounting into a duct, the ball valve shall be installed perpendicular to the flow direction.

NOTICE

The two metal sealing rings (refer to Tab. 11 EE310 FLOAT32 measured data registers) 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 in normal operation.

Installation of the probe (refeFig. 11 Installation of the probe by utilizing the ball valve set)

1. Install the probe into the ball valve while the ball valve is closed.
2. Open the ball valve.
3. 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. Take care not to damage the probe and the cable.
4. Tighten the lock nut with a torque of 30 Nm.

⚠ WARNING

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.

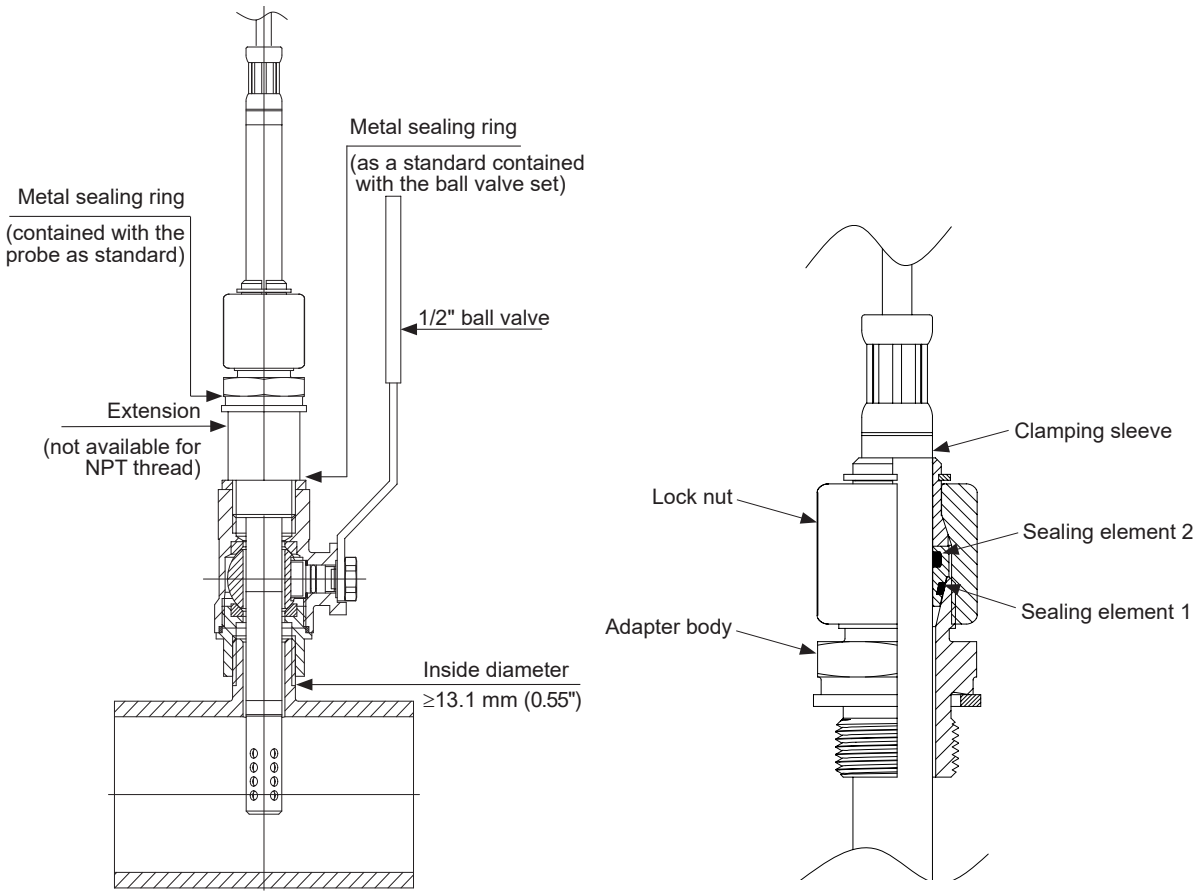


Fig. 11 Installation of the probe by utilizing the ball valve set

Removing the probe

1. Hold the probe firmly to avoid it being suddenly expulsed when releasing the lock. Do not bend damage the probe cable.
2. 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 loosen the lock nut completely, but only enough to allow the probe to slide.
3. After the probe has been pushed out of the process up to the stop, close the ball valve.
4. Remove the probe from the ball valve.

NOTICE

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

4.6 Mounting the T24 T Only, Remote Probe

The sensing probe shall be mounted horizontally or vertically, pointing downwards whenever possible. For best measuring results make sure that the whole probe body is inserted to your process media. The T24 T only, remote probe is capable for the use within the following working ranges:

Working Range	
T Working range sensing probe	-80...+180 °C (-112...+356 °F)
Pressure range	0.01...20 bar (0.15...300 psi)

Tab. 4 T24 working ranges

Mounting with flange

A mounting flange for the Ø6 mm (1/4") T probe is available as an accessory.

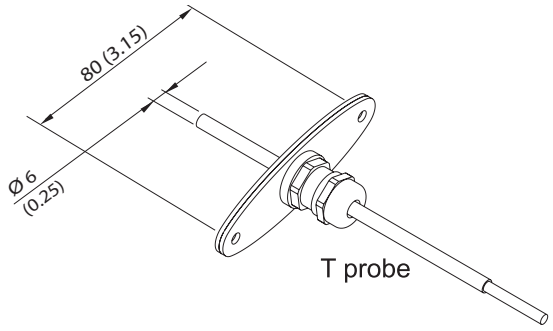


Fig. 12 Flange for T probe Ø6 mm (1/4"), HA010207

Pressure-tight mounting

The screw connections for pressure-tight installation up to 20 bar (300 psi) are available as accessories.

Screw Connections	
1/2" ISO	HA011104
1/2" NPT	HA011105

Tab. 5 Screw connections

⚠ WARNING

General safety instructions for pressure-tight installation

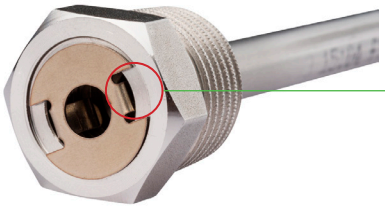
The installation, commissioning and operation of the EE310-T24 in pressure-tight applications may be performed by qualified staff only. Special attention shall be paid to the correct installation of the probe into the process. In case of inappropriate installation there is the risk for the probe to be suddenly expulsed 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.

Mounting with immersion well

The innovative stainless steel immersion well is mainly dedicated for measurement in liquids and allows for fast and safe replacement of the T24 T only, remote probe.



Innovative mounting spring

- For securing the probe inside the well
- No fastening screw, no tools required

Fig. 13 Immersion well for EE310-T24 T only, remote probe

Immersion Well Data	
Pressure rating	25 bar (363 psi), stainless steel
Max. flow speed	9 m/s (1 771 ft/min)

Tab. 6 Data for immersion well

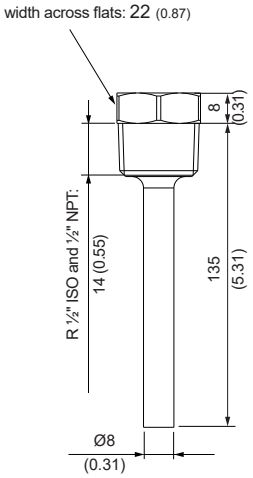


Fig. 14 Immersion well dimensions in mm (inch)

The immersion well can also be used with a cable gland instead of the mounting spring.

Fig. 15 Handling of the immersion well

Procedure:

1. The spring inside the well must be removed and replaced by a standard M12x1.5 cable gland (not included in the scope of supply).
2. Insert the sensor and fix it by fastening the cable gland.

NOTICE

Observe the operating temperature range of the cable gland to match the process parameters.

5 Optional Modules

5.1 Alarm Module (Option AM2)

The module offers two freely configurable relay outputs for alarm or control purposes. Various operation modes are available including switch hysteresis, switch window and error indication. The error modes can be configured independently from each other. The measurands at the outputs as well as switching points, hysteresis and the normal state (standard / inverted) can be set via PCS10 Product Configuration Software or using the push-buttons (refer to chapter 11.3 Optional Menus, Fig. 46 Alarm output).

Switch Hysteresis Mode

The switching behavior is determined by entering a switching point and an associated hysteresis value.

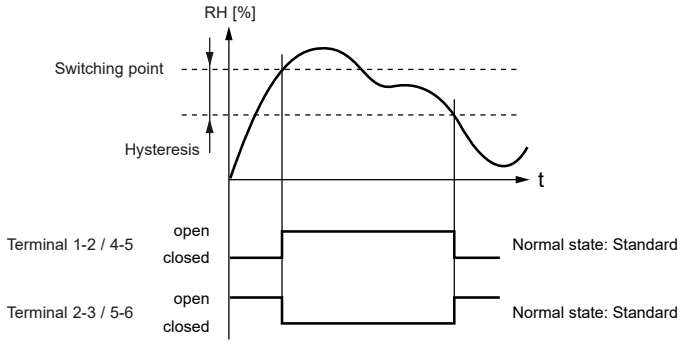


Fig. 16 Example hysteresis mode on both alarm outputs using normal state standard

Additionally, detected errors are signaled at the alarm output.

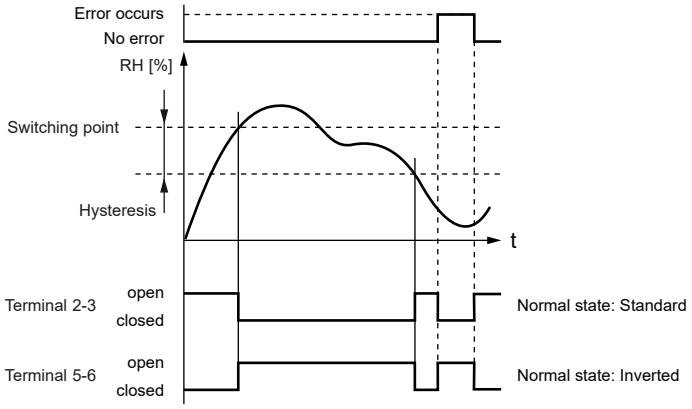


Fig. 17 Example of hysteresis mode with error occurring.

Switch Window Mode

The switching behavior is determined by entering two switching points and two associated hysteresis values.

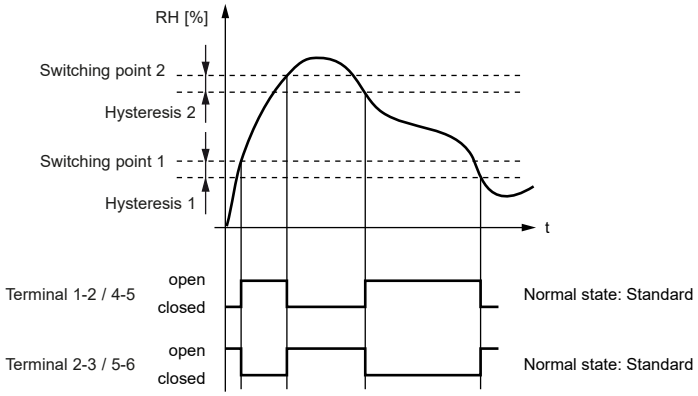


Fig. 18 Example window mode on both alarm outputs using normal state standard

Additionally, detected errors are signaled at the alarm output.

Error Indication Mode

When error indication mode is selected, various errors will trigger the alarm output.

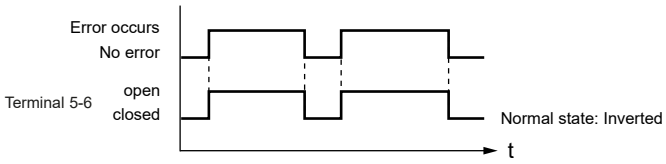


Fig. 19 Example of error mode on relay 1 using normal state inverted.

PLEASE NOTE

An alarm output in this operation mode is used for error indication only (no combination with switching points possible).

Electrical Connection and Switch Load

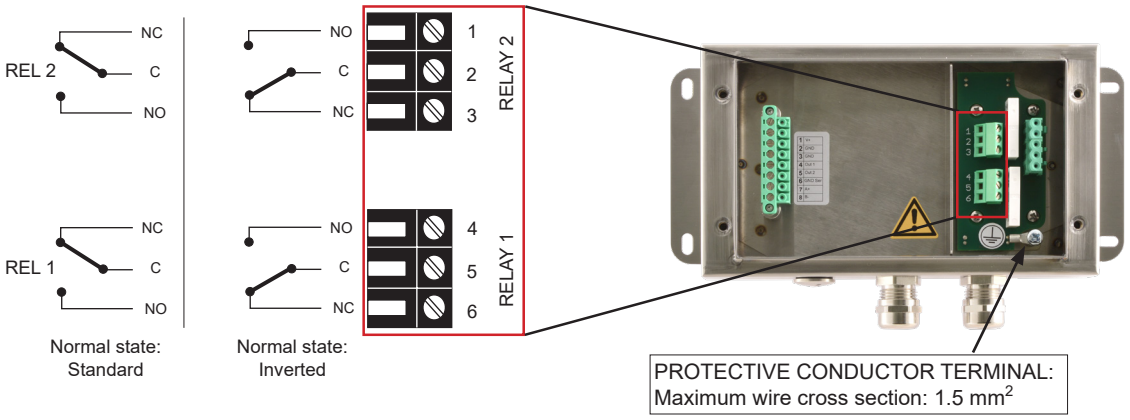


Fig. 20 Alarm module (option AM2)

⚠ WARNING

The metal enclosure must be grounded during operation. National regulations for installation must be observed!

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

Tab. 7 Maximum and minimum switch loads

⚠ WARNING

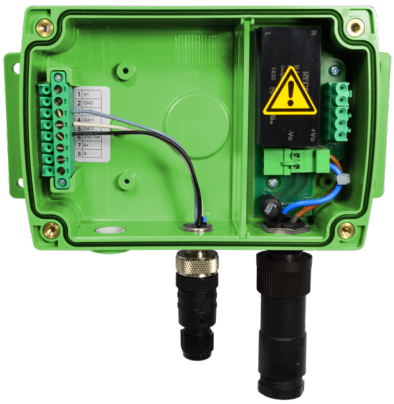
No overcurrent and short circuit protection. Both relays shall be connected to either high oder low voltage.

5.2 Integrated Power Supply 100 - 240 V AC (Option AM3)

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

Enclosure

Polycarbonate



Stainless steel

Fig. 21 Power supply module (option AM3)

Pin assignment of the plug connection: please refer to chapter

⚠ WARNING

The AM3 option includes a 1.25 A fuse on the 100 - 240 V side. This fuse may not be replaced by the user, only by the E+E after sales service.

The protection of the supply cable against excess current and short-circuit must be designated to a wire cross section of 0.8 mm^2 (AWG 18) (6 A fuse).

The metal enclosure must be grounded during operation.

All national regulations for installation shall be observed!

5.3 RS485 Module - Modbus RTU (Option J3)

The device represents a unit load of 1, i.e. up to 32 EE310 sensors with Modbus RTU interface can be connected in an RS485 bus system.

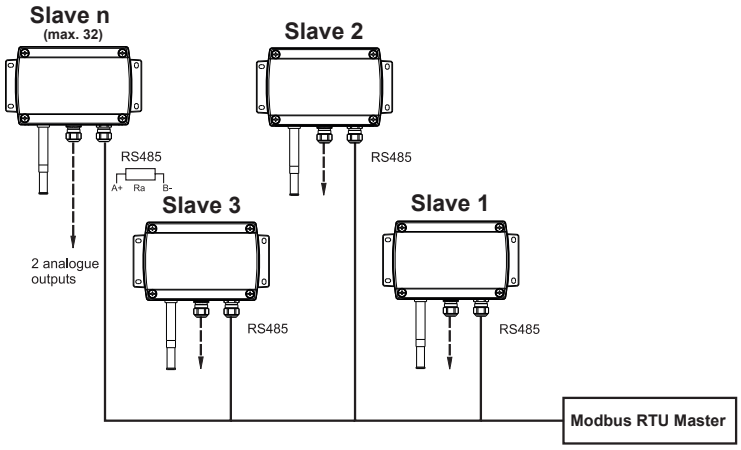


Fig. 22 2-wire RS485 bus

PLEASE NOTE

Both ends of the bus shall be terminated with a resistor R_a=120 Ω.

The setup of the Modbus RTU communication can be performed via PCS10 Product Configuration Software or via display and push-buttons (refer to chapter 11 Appendix, Fig. 47 Modbus settings).

Modbus RTU Protocol Settings

	Factory settings	Selectable values (via PCS10)
Baud rate	9600	300, 600, 1 200, 2 400, 4 800, 9 600, 19 200, 38 400, 57 600, 76 800
Data bits	8	8
Parity	Even	None, odd, even
Stop bits	1	1 or 2
Modbus address	231	1…247

Tab. 8 Modbus RTU Protocol Settings

PLEASE NOTE

The recommended settings for multiple devices in a Modbus RTU network are 9600, 8, Even, 1.

Device address, baud rate, parity and stop bits can be set via:

- EE-PCS Product Configuration Software.
  The EE-PCS10 can be downloaded free of charge from www.epluse.com/pcs10.
- Modbus protocol in the register 1 (0x00) and 2 (0x01).
  Refer to Application Note Modbus AN0103 (available at www.epluse.com/ee310).

The serial number as ASCII-code is located in read-only registers 1 - 8 (0x00 - 0x07).
The firmware version is located in register 9 (0x08) (bit 15...8 = major release; bit 7...0 = minor release).
The sensor name as ASCII-code is located in read-only registers 10 - 17 (0x09 - 0x11).

NOTICE

When reading information that spans multiple registers, it is always necessary to read all registers, even if the desired information requires less.

NOTICE

To obtain the correct floating point values, both registers have to be read within the same read cycle. The measured value can change between two Modbus requests, exponent and mantissa may get inconsistent then.

INFO

The Modbus function codes mentioned throughout this document shall be used as described in the MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3, chapter 6:
www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

Communication settings (INT16)

Parameter	Register number[1] [Dec]	Register address[2] [Hex]	Size[3]
Write register: function code 0x06			
Modbus address[4]	1	00	1
Modbus protocol settings[4]	2	01	1

Device information (INT16)

Parameter	Register number[1] [Dec]	Register address[2] [Hex]	Size[3]
Read register: function code 0x03 / 0x04			
Serial number (as ASCII)	1	00	8
Firmware version	9	08	1
Sensor name	10	09	8

1) Register number (decimal) starts from 1.
2) Register address (hexadecimal) starts from 0.
3) Number of registers
4) For Modbus address and protocol settings refer to Application Note Modbus AN0103 (available at www.epluse.com/ee310).

Tab. 9 EE310 registers for device setup

For highest accuracy of RH related calculated quantities, the barometric pressure at the operating point can be used for compensation. For this purpose, the "Air pressure" register is available which may be written via Modbus command or with PCS10.

FLOAT32

Parameter	Register number[1] [DEC]	Register address[2] [HEX]	Unit
Write register: function code 0x10			
Air pressure	5001	1388	mbar

1) Register number (decimal) starts from 1.
2) Register address (hexadecimal) starts from 0.

Tab. 10 EE310 air pressure register

5.4 Modbus Register Map

The measured data is saved as a 32 bit floating point values (data type FLOAT32).

FLOAT32

Parameter	Unit	Register number[1] [DEC]	Register address[2] [HEX]
Read register: function code 0x03 / 0x04			
Relative humidity	%	1021	3FC
Temperature	°C	1003	3EA
	°F	1005	3EC
Dew point temperature	°C	1105	450
	°F	1107	452
Frost point / Dew point temperature	°C	1131	46A
	°F	1133	46C
Absolute humidity	g/m^3	1113	458
	gr/ft^3	1115	45A
Mixing ratio	g/kg	1121	460
	gr/lb	1123	462
Wet bulb temperature	°C	1109	454
	°F	1111	456
Specific enthalpy	kJ/kg	1125	464
	BTU/lb	1129	468
	ft lbf/lb	1127	466
Water vapour partial pressure	mbar	1101	44C
	psi	1103	44E
Volume concentration	ppm	1151	47E

1) Register number (decimal) starts from 1.
2) Register address (hexadecimal) starts from 0.

Tab. 11 EE310 FLOAT32 measured data registers

5.5 Modbus RTU Example

The EE310's Modbus address is 231 [E7 in HEX].

Please refer to

- MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3, chapter 6: www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf
- E+E Application Note Modbus AN0103 (available at www.epluse.com/ee310)

Read the temperature (FLOAT32) T = 26.953624 °C from the register 0x3EA:

Master (e.g. PLC) → **EE310**

Request [Hex]:

Modbus address	Function code	Starting address Hi	Starting address Lo	Qty. of registers Hi	Qty. of registers Lo	CRC	
E7	03	03	EA	00	02	F3	BD

Response [Hex]:

Modbus address	Function code	Byte count	Register 1 value Hi	Register 1 value Lo	Register 2 value Hi	Register 2 value Lo	CRC	
E7	03	04	A1	06	41	D7	CE	0E

Tab. 12 Example temperature query

Decoding of floating point values:

Floating point values are stored according to IEEE754. The byte pairs 1, 2 and 3, 4 are transformed as follows (numbers taken from T reading Modbus request/response example above):

Modbus response [Hex]			
Register 1 Hi	Register 1 Lo	Register 2 Hi	Register 2 Lo
A1	06	41	D7
MMMMMMMM	MMMMMMMM	SEEEEEEE	EMMMMMMM

Tab. 13 Modbus response

IEEE754			
Register 2 Hi	Register 2 Lo	Register 1 Hi	Register 1 Lo
41	D7	A1	06
0100 0001	1101 0111	1010 0001	0000 0110
SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
Decimal value: 26.953624725341796875			

Tab. 14 Data representation according to IEEE754

5.6 Ethernet Module - Modbus TCP (Option J4)

The Ethernet module features power over Ethernet (PoE) and RJ45 connector with IP65 protection rating.

PLEASE NOTE

The Ethernet connection shall be disconnected before opening the enclosure.

5.6.1. Available TCP and UDP Ports

Modbus TCP (Port 502)

Refer to “Modbus TCP/IP implementation guide” available at
www.modbus.org/docs/Modbus_Messaging_Implementation_Guide_V1_0b.pdf.

The unit identifier of the MBAP header is not used and can be any value from 0 to 255.

HTTP-Webserver (Port 80)

For a quick communication check enter the desired IP in a web browser and connect with the EE310 Ethernet Module’s Webserver.

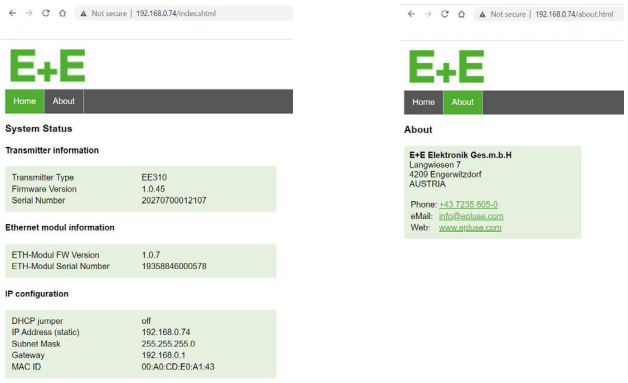


Fig. 23 Image from the E+E net web interface

Alternatively, send an ICMP echo request (“ping”) to check correct communication settings.

UDP (Port 5234)

Backwards compatible communication protocol with EE31 device series. Communication via Ethernet takes place by means of UDP packets, which transport a command or a command response in EE31 protocol format as payload data. Refer to “Ethernet - communication protocol” available at www.epluse.com/en/service-support/download-center.

5.6.2. IPv4 Settings

Factory setting	
IP Address	192.168.0.64
Subnet Mask	255.255.255.0
Gateway	192.168.0.1
DNS	192.168.0.1

Tab. 15 IPv4 settings

DHCP options can be set with jumper on the PCB.
Factory setting: DHCP disabled (static IP). Please refer to Fig. 24 below.

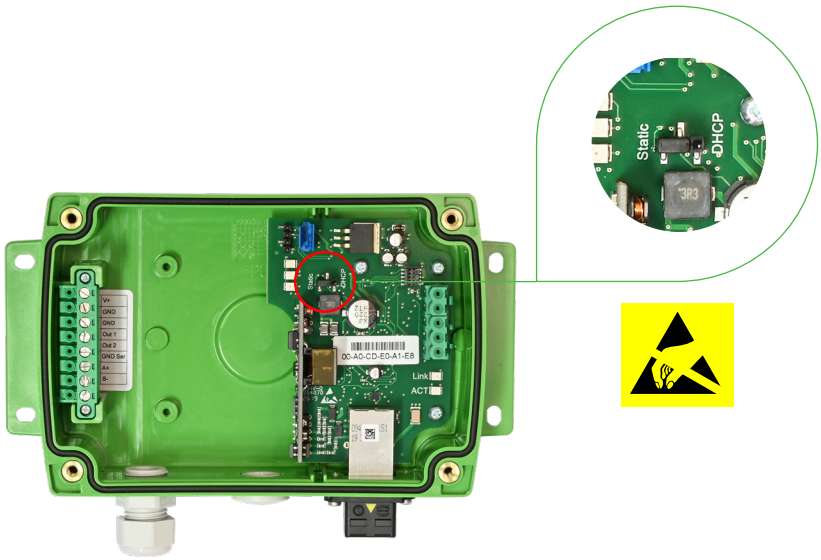


Fig. 24 Ethernet Module - DHCP setting

The setup of the Modbus TCP communication can be performed via PCS10 Product Configuration Software or via display and push-buttons (refe11 Appendix, Fig. 48 IP settings).

Changing the IP address via PCS10 or the display is only possible if the DHCP jumper is set to “Static”. Otherwise the IP settings are read-only.

NOTICE

Supported Ethernet standard: 802.3i/u/x and af. IPv6 is not supported.

5.6.3. Retrofit with Ethernet Module

The EE310 can be retrofitted with an Ethernet module. Before retrofitting, please make sure that the EE310 firmware is updated to the latest version by using the PCS10 Product Configuration Software.

- Firmware for sensor: V 1.0.22 or higher
- Firmware for display: V 1.0.9 or higher

Description	Order Code
Ethernet module for remote probe type T5 and T10	HA010606
Ethernet module for duct mount type T2	HA010607

Tab. 16 Accessories order code

Due to strong self-heating effects, the Ethernet interface is only recommended with the types T2, T5 and T10 (duct mount and remote probe). Wall mount applications with Ethernet interface shall be realized with type T5 and 2 m probe cable by fixing the probe onto the wall with the wall mounting clip HA010211.

5.7 Pluggable Probe (Option PC4)

EE310-T5 and EE310-T10 sensors 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 (refer to 8 Spare Parts and Accessories) is supplied with a set of 7 individual parameters.

PLEASE NOTE

When using two or more devices at the same time, do not mix up the sensors. The serial number of the connected sensor can be read by scanning the barcode on the basic unit.

Fig. 25 Pluggable probe

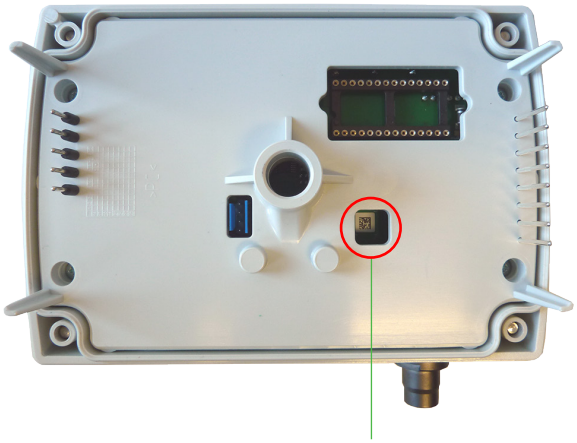


Fig. 26 Rear view of sensor module

Probe replacement procedure

1. Plug off the damaged probe
2. Plug on the new probe
3. Update the 7 parameters with PCS10 Product Configuration Software or via display and push-buttons (refer to chapter 11 Appendix, Fig. 44 Device settings).

PLEASE NOTE

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

6 Setup and Configuration

The EE310 is ready to use and does not require any further configuration. The factory setup of EE310 corresponds to the specified order code. Please refer to the datasheet at www.epluse.com/ee310.

This chapter describes the configuration possibilites with the PCS10 Product Configuration Software.

6.1 Configuration Interface

Factory setup can be changed by using a USB-A to micro USB-C cable and the PCS10 Product Configuration Software. The EE310 is powered by the PC via the USB interface, no additional power supply shall be applied.

The scaling of the analogue outputs, the settings of the alarm module, the digital settings can be changed and a T and RH adjustment can be performed.

It is also possible to enable or disable the NAMUR error indication (factory setting: disabled).

The PCS10 offers a convenient graphical user interface for the temperature sensors.

NOTICE

Data integrity might not be provided during firmware download.

Ensure that the device is only powered by the USB interface during firmware update, otherwise the update may fail.

To use the software for performing adjustments and changes in settings, please proceed as follows:

1. Download the PCS10 Product Configuration Software from www.epluse.com/pcs10 and install it on the PC.
2. Connect the EE310 to the PC using the Modbus configuration adapter.
3. Start the PCS10 software.
4. Follow the instructions on the PCS10 opening page to scan the ports and to identify the connected device.
5. Click on the desired setup or adjustment mode from the main PCS10 menu on the left. Follow the PCS10 online instructions that are displayed when clicking on the “Tutorial” button.
6. Upload changes to the sensor by pressing the “Sync” button.

Fig. 27 USB serial interface

Fig. 28 Plugged USB cable and LED indication

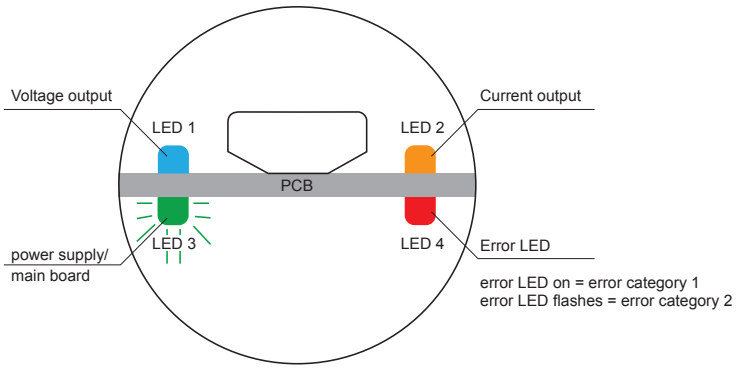


Fig. 29 Status LEDs are located at the USB port

6.2 3.5" TFT Colour Display

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 initialized during the first 5 seconds.

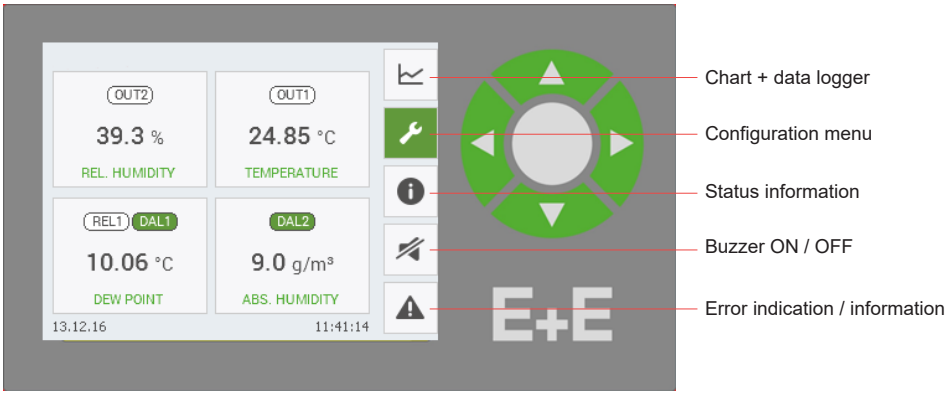


Fig. 30 Display with push-buttons

6.3 Chart and 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.

NOTICE

Changing the UTC time erases all stored data.

The data logger can save 20 000 values for each measurand. The logging interval is user configurable from 1 second to 12 hours. The data logger menu is also used to select the data points that make up the graph and for scaling, refer to chapter 11 Appendix, Fig. 40 Data logging.

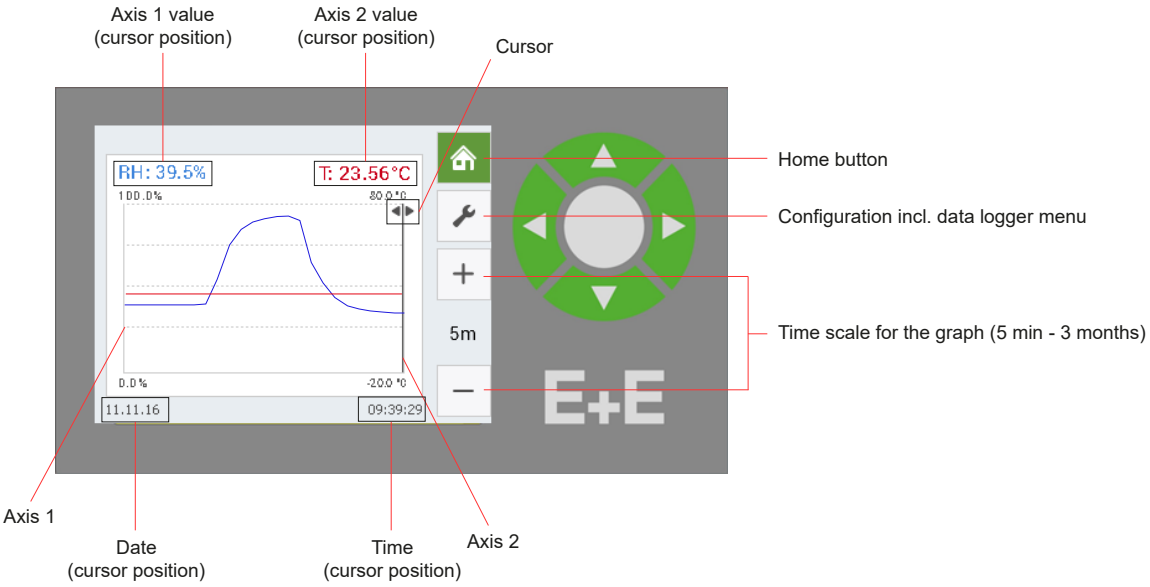


Fig. 31 Data logging

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

Fig. 32 Logging graph

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 latest 20 000 logged values are available in the internal memory.

The logged data can be downloaded with PCS10 Product Configuration Software as **.csv file** by choosing the measurands and the time period.

6.4 Configuration Menu

Detailed information to the configuration menu (refer to chapter 11 Appendix).

Menu	
Data logging	**Configuration of the data logger/graph** - sampling rate | graphs
Display settings	**Setting of display layout** - measurands | brightness | display alarm
Analog output	**Output configuration** - mode | measurands | scaling | error indication
Alarm output*	**Relay configuration** - mode | set points | state
Customer adjustment	**Adjustment -** 1 and 2 point humidity/temperature adjustment | reset to factory adjustment | calibration status
Modbus settings*	**Configuration of Modbus RTU data transmission**
IP settings*	**Configuration of Ethernet Module**
Device settings	**Settings** - language | date, time | parameters | password protection
Status	**Status and device information**

* Menu only available with the corresponding optional modules.

Fig. 33 Configuration Menu

6.5 Status Information

The status information shows all actual EE310 settings.

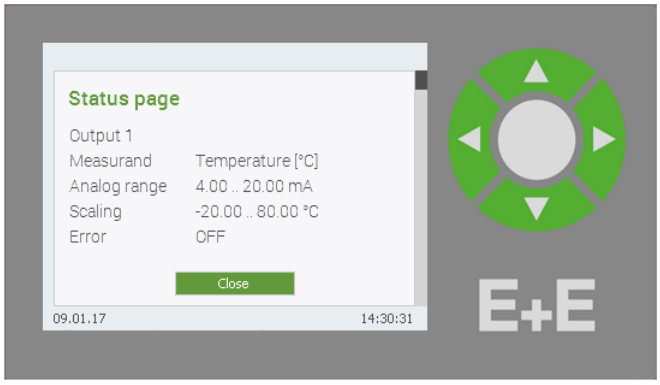


Fig. 34 Status information

6.6 Buzzer ON / OFF

Icon	Function
	Buzzer ON
	Buzzer OFF

Tab. 17 Explanation of the icons

6.7 Error Indication

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

7 Maintenance and Service

7.1 Self Diagnosis and Error Messages

7.1.1. Error Messages via Display

Error Description	Error Code (Display)	Error Category	Recommended Action
Voltage out short circuit - output 1 only*	1.1	1	Check the wiring of the 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 the wiring of the outputs
Current loop open - output 2 only	2.2		
Current loop open - both outputs	2.3		
RH sensor polluted	3.x		Clean the sensor
Hardware error	5.x	2	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. 18 Overview of error codes

Error Category	Description
1	**Non-critical error**, can be solved by the user. ▪ The display blinks and the buzzer beeps every 10 seconds. ▪ The red status LED lights continuously.
2	**Critical error**, return the device to E+E for service. ▪ The display blinks and the buzzer beeps continuously. ▪ The red status LED flashes.

Tab. 19 Explanation of the error category

7.1.2. 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.

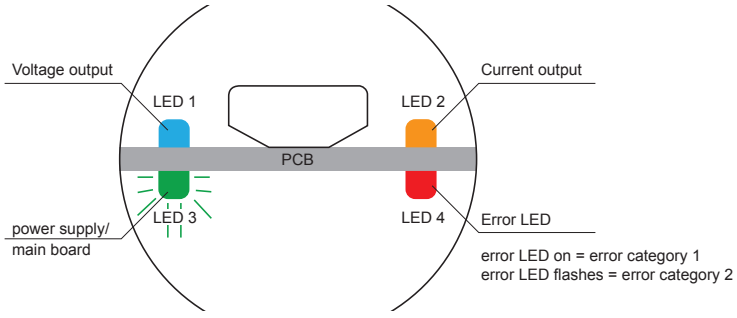


Fig. 35 Status LEDs

LED (Color)	Description
1 (blue)	Analogue output one set to voltage.
2 (orange)	Analogue output one set to current.
3 (flashing green)	Supply voltage applied (microprocessor is active).
4 (red) **permanently lit** **flashes**	Error category 1 Error category 2

Tab. 20 Explanation of the LED colours

7.1.3. Solving Typical Problems

Error description	Likely causes and solutions
Display shows incorrect values	Error during re-adjustment of the sensor. → Reset to factory calibration and repeat the adjustment routine.
	Filter polluted. → Replace filter
	Output configured incorrectly → Check configuration
Long response time	Filter polluted → 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. 21 Self diagnosis

7.2 Cleaning the Sensing Head and 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 refer to www.epluse.com/ee310.

7.3 RH and T Calibration and Adjustment

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 refer to 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 refer to www.epluse.com/humor20.
- Handheld Device (e.g. Omniport30), please refer to www.epluse.com/omniport40.
- Humidity Calibration Kit (e.g. E+E Humidity Standards), please refer to www.epluse.com/ee310.

Perform 1 or 2 point adjustment via PCS10 Product Configuration Software or via display (see below).

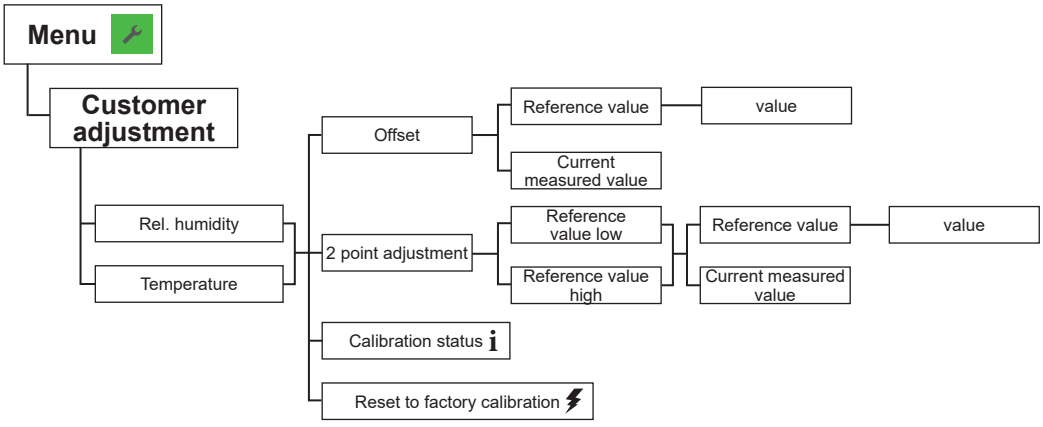


Fig. 36 Adjustment menu

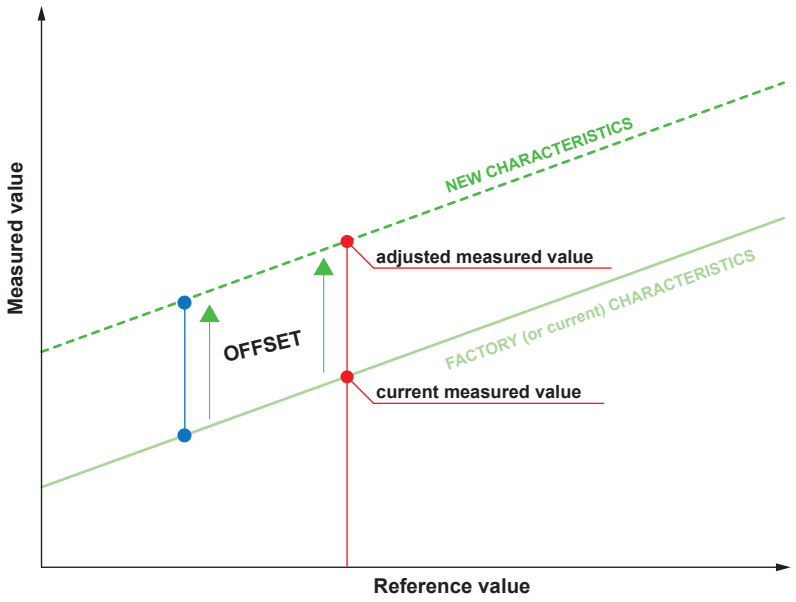


Fig. 37 Offset adjustment

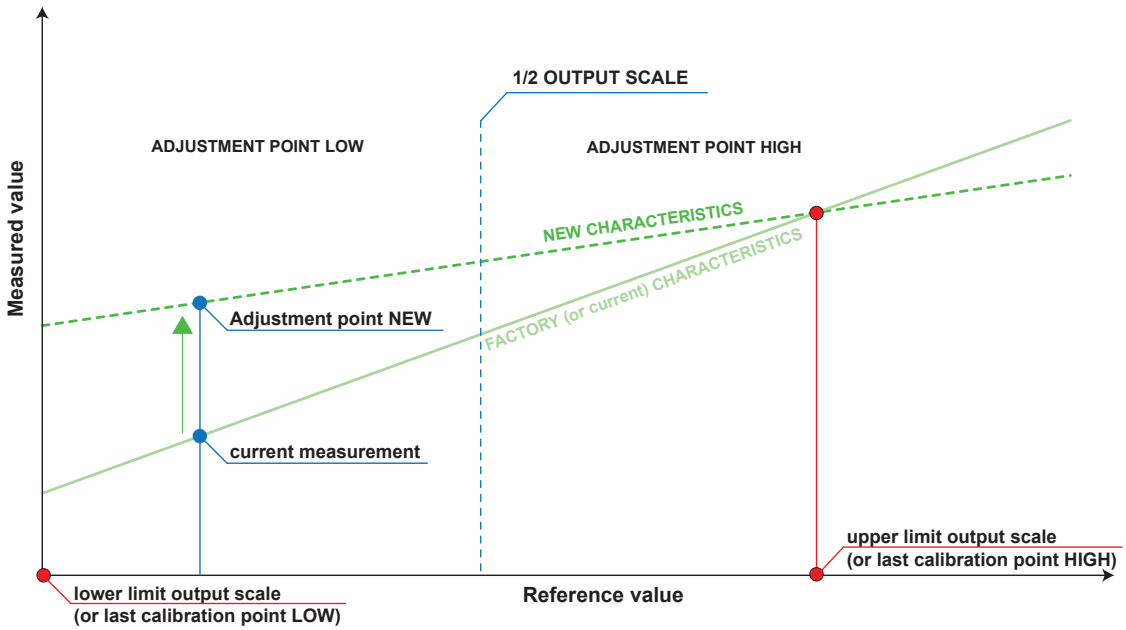


Fig. 38 2-point adjustment procedure

8 Spare Parts and Accessories

For further information please refer to the Accessories datasheet.

Description	Code
PCS10 Product Configuration Software (Free download: www.epluse.com/pcs10)	**PCS10**
Filter caps	**HA0101xx**
Stainless steel mounting flange Ø12 mm (0.47")	**HA010201**
Drip water protection	**HA010503**
RS485 kit for retrofitting	**HA010605**
Ethernet retrofit module for polycarbonate enclosure	**HA010606 for remote probe type T5, T10**
Bracket for DIN rail mounting[1)]	**HA010203**
Wall mounting clip Ø12 mm (0.47")	**HA010211**
Replacement probes[2)]	**Refer to chapter 5.7 Pluggable Probe (Option PC4)**
Humidity calibration kit	**Refer to datasheet** Humidity Calibration Kit

1) For polycarbonate enclosure only. Two pieces are necessary for each EE310
2) Only for devices with pluggable probe option PC4.

Ordering code for replacement probe

	Feature	Description	Code	
Hardware Configuration			**PE310-**	
	Type	Remote probe up to 180 °C (356 °F)	**T5**	
		Pressure-tight probe up to 20 bar (300 psi)		**T10**
	Filter	Stainless steel sintered	**F4**	**F4**
		PTFE (Polytetrafluoroethylene)	**F5**	
		Catalytic for H_2O_2 sterilisation	**F12**	
		Stainless steel - metal grid (up to 180 °C / 356 °F)	**F9**	
	Probe cable length	2 m (6.6 ft)	**K2**	
		5 m (16.4 ft)	**K5**	
		10 m (32.8 ft)	**K10**	
	Probe length	65 mm (2.55")	**L65**	
		200 mm (7.84")	**L200**	
		400 mm (15.75")	**L400**	
	Process connection	G 1/2" ISO - sliding fitting, Ø13 mm (0.51")		**PA23**
		1/2" NPT - sliding fitting, Ø13 mm (0.51")		**PA25**
	Optional features	E+E proprietary coating		**C1**

9 Technical Data

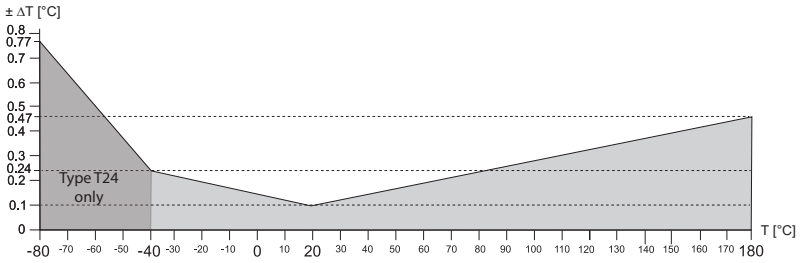
Measurands

Relative Humidity (RH)

Measuring range	0...100 %RH
Accuracy[1], incl. hysteresis, non-linearity and repeatability	
-15...+40 °C (5...104 °F) RH ≤90 %	±(0.95 + 0.0013 * mv) %RH
-15...+40 °C (5...104 °F) RH >90 %	±1.8 %RH
-25...+70 °C (-13...+158 °F)	±(1.05 + 0.0084 * mv) %RH
-40...+180 °C (-40...+356 °F)	±(1.15 + 0.013 * mv) %RH mv = measured value
Factory calibration uncertainty[2] 0...90 %RH	±(0.7 + 0.003 * mv) %RH
90...100 %RH	±1 %RH mv = measured value
Temperature dependency of electronics, typ.	±0.01 % RH / °C (0.0056 %RH / °F)
Response time t_{90} with metal grid filter at 20 °C (68 °F)	<15 s

1) Defined against E+E calibration reference.
2) Defined at 23 °C with an coverage factor k=2, corresponding to a confidence level of 95 %.

Temperature (T)

Measuring range	
T1, wall mount	-40...+60 °C (-40...+140 °F)
T2, duct mount	-40...+80 °C (-40...+176 °F)
T5, remote probe	-40...+180 °C (-40...+356 °F)
T10, pressure-tight probe	-40...+180 °C (-40...+356 °F)
T24, T only remote probe	-80...+180 °C (-112...+356 °F)
Accuracy[1]	
Factory calibration uncertainty[2] @ 23 °C (73 °F)	±0.1 °C
Temperature dependence of electronics, typ.	±0.001 °C / °C

1) Defined against E+E calibration reference. For type T1, the accuracy data is valid only for air speed higher than 0.2 m/s.
2) Defined at 23 °C with an coverage factor of k=2, corresponding to a confidence level of 95 %.

Calculated Quantities

		from		up to						unit	
				EE310-T1		**EE310-T2**		**EE310-T5, T10**			
Dew point temperature[1]	Td	-40	(-40)	60	(140)	80	(176)	100	(212)	°C	(°F)
Frost point temperature[2]	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/m^3	(gr/ft^3)
Specific enthalpy	h	0	(0)	400	(180)	1000	(450)	2800	(1250)	kJ/kg	(BTU/lb)

1) Td accuracy according to RH and T uncertainties, please use the E+E Humidity Calculator for details.
2) Equals Td above 0 °C (32 °F).

Outputs

Analogue

Two freely selectable and scalable analogue outputs	0 - 1 / 5 / 10 V -1 mA < I_L < 1 mA I_L = load current 0 - 20 mA / 4 - 20 mA (3-wire) R_L < 500 Ω R_L = load resistance Both outputs have the same electrical quantity (voltage, current)
Accuracy @ 23 °C (68 °F)	±0.05 % FS FS = full scale (20 mA, 10 V)
Temperature dependency[1)]	±0.005 % FS/°C FS = full scale (20 mA, 10 V)

1) Deviating from 23 °C (68 °F), defined at 12 mA or 5 V, respectively.

Digital

Digital interface **Option J3** **Protocol** **Factory settings** **Supported Baud rates** **Measured data types**	RS485 (EE310 = 1 unit load) Modbus RTU 9 600 Baud, parity even, 1 stop bit, Modbus address 231 9 600, 19 200, 38 400, 57 600 and 76 800 FLOAT32 and INT16
Digital interface **Option J4** **Protocol**	Ethernet-PoE Modbus TCP

General

Power supply class III USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	8 - 35 V DC 12 - 30 V AC 100 - 240 V AC, 50/60 Hz mit Option AM3[1)]
Current consumption, (typ.) @ 24 V DC / AC **2 voltage outputs** **2 current outputs** **with display additionally** **with Ethernet additionally**	 15 mA / 40 mA_{rms} 35 mA / 100 mA_{rms} 50 mA / 150 mA_{rms} 30 mA / 90 mA_{rms}
Electrical connection	Screw terminals max. 1.5 mm^2 (AWG 16)
Cable glands **for polycarbonate enclosure** **for metal enclosure**	 M16x1.5, for cable Ø3...7 mm (0.12...0.28") M16x1.5, for cable Ø4.5...10 mm (0.18...0.39")
Pressure range for pressure-tight probe	0.01...20 bar (0.15...300 psi)
Temperature range **Operation** **Storage**	 -40...+60 °C (-40...+140 °F) without display -20...+50 °C (-4...+122 °F) with display
Probe **Material** **Protection rating,** probe body	 Stainless steel 1.4404 / AISI 316L IP65
Enclosure **Material** **Protection rating**	 Polycarbonate, UL94 V-0 approved or Stainless steel 1.4404 / AISI 316 L IP65 / NEMA 4X
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial Environment FCC Part15 ClassA ICES-003 ClassA
Conformity	CE UKCA
Configuration software	E+E PCS10 Product Configuration Software Free download from www.epluse.com/pcs10

1) Degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).

Accuracy of E+E Humidity and Temperature Sensors

The measurement accuracy depends both on the performance of the measuring instrument and on the correct installation in the application.

For best accuracy, every E+E RH and T sensor is multipoint factory adjusted and calibrated in a highly stable RH / T reactor. Using a high-precision dew point mirror as reference, the overall uncertainty of the factory calibration U_{cal} is minimal.

The total measurement uncertainty U_{total} for E+E sensors is calculated in accordance with EA-4/02 (European Accreditation, Evaluation of the Measurement Uncertainty in Calibration) and with GUM (Guide to the Expression of Uncertainty in Measurement) as follows:

$$U_{total} = k \bullet \sqrt{\left(\frac{U_{cal}}{2}\right)^2 + \left(\frac{u_{accuracy}}{\sqrt{3}}\right)^2}$$

U_{total} .....total accuracy incl. factory calibration
U_{cal}.....the uncertainty of the factory calibration
$u_{accuracy}$...the accuracy of the measurement device
k.....coverage factor k=2, corresponding to a confidence level of 95 %.

For external calibrations, U_{total} is to be used as the evaluation criterion. The calculation does not include effects due to long-term drift or chemical exposure.

As National Metrological Institute (NMI) / Designated Institute (DI) responsible for maintaining National Standards in Austria, E+E Elektronik represents the highest level in calibration. For further details, please refer to www.eplusecal.com.

10 Conformity

10.1 Declarations of Conformity

E+E Elektronik Ges.m.b.H. hereby declares that the product complies with the respective regulations listed below:

CE European directives and standards.

and

UKCA UK statutory instruments and designated standards.

Please refer to the product page at www.epluse.com/ee310 for the Declarations of Conformity.

10.2 Electromagnetic Compatibility

EMC for industrial environment.
The sensor is a group 1 device and corresponds to class A.

⚠ WARNING

This device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.

10.3 FCC Part 15 Compliance Statement

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.

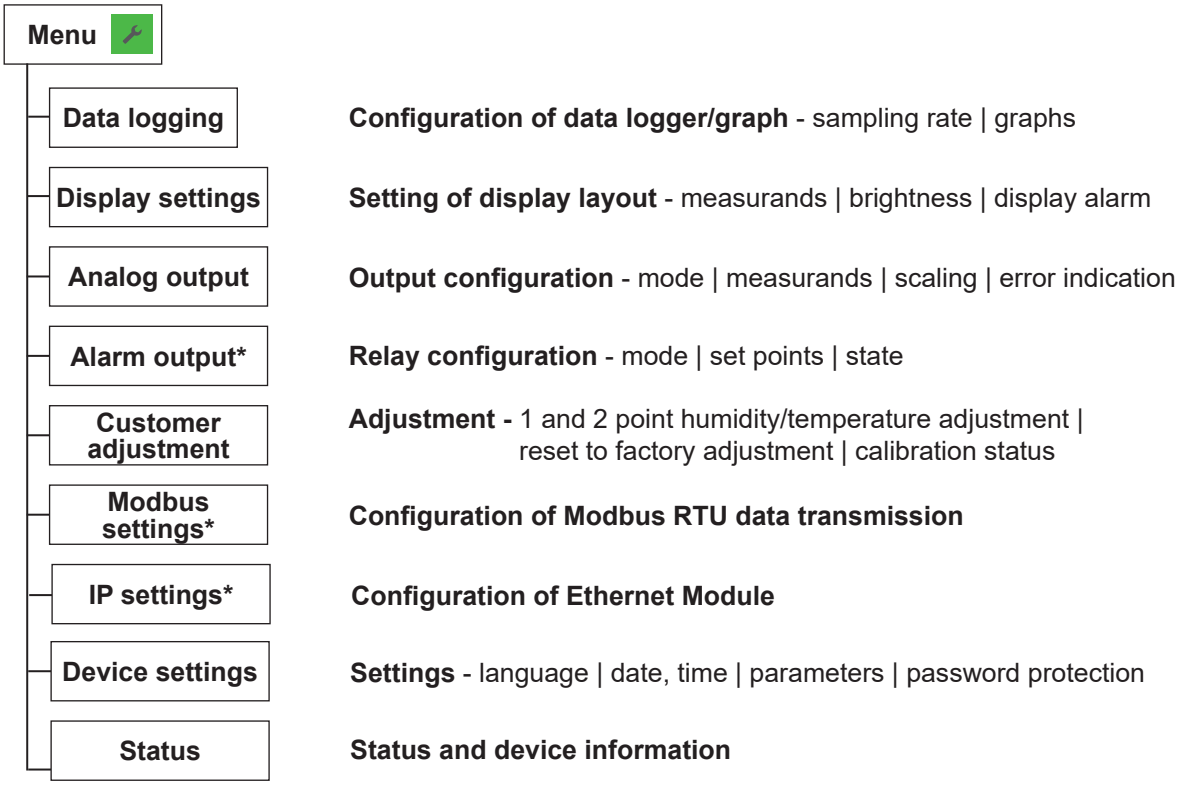
10.4 ICES-003 Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003, Issue 5.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

11 Appendix

11.1 Overview



* Menu only available with the corresponding optional module.

Fig. 39 Menu overview

11.2 Detailed Information

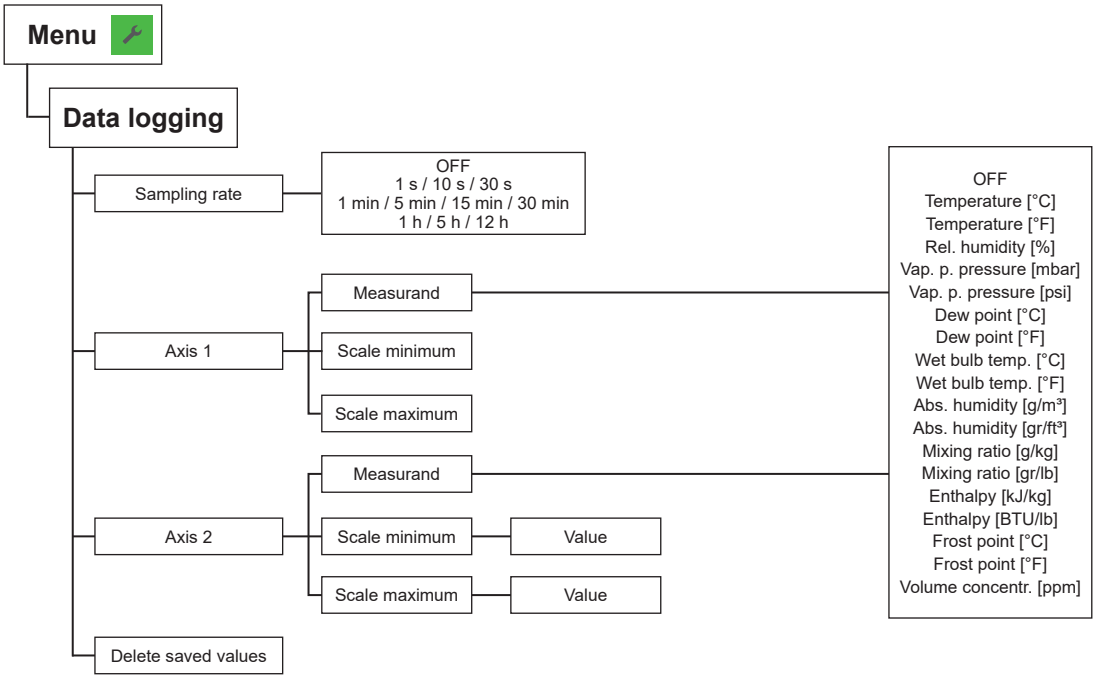


Fig. 40 Data logging

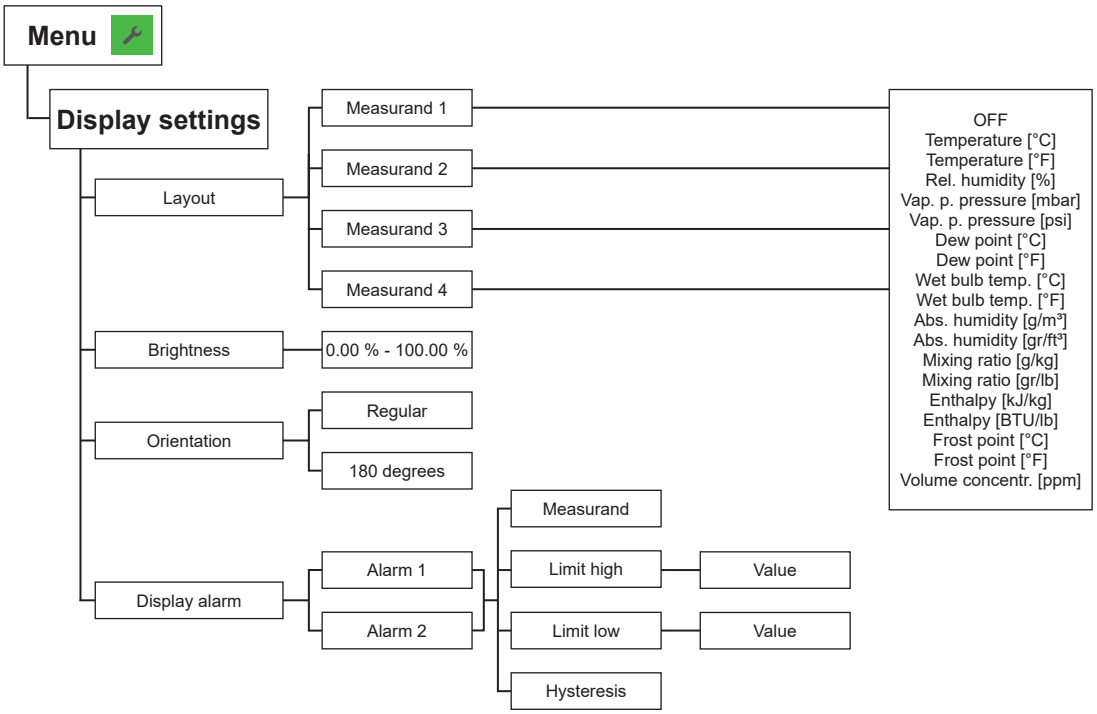


Fig. 41 Display settings

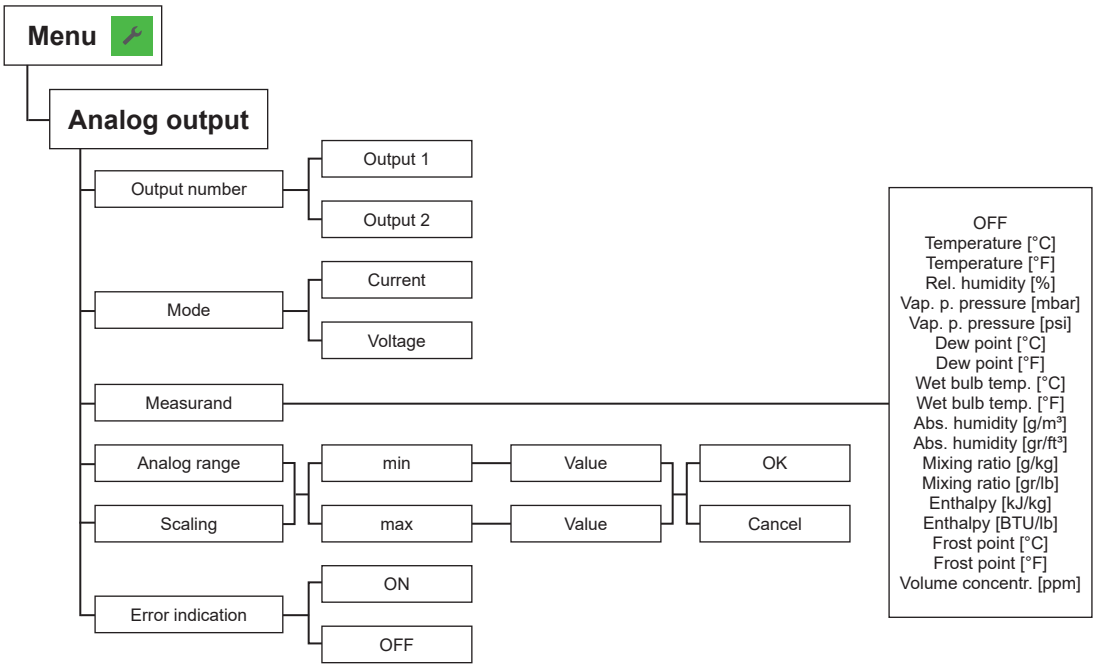


Fig. 42 Analogue output

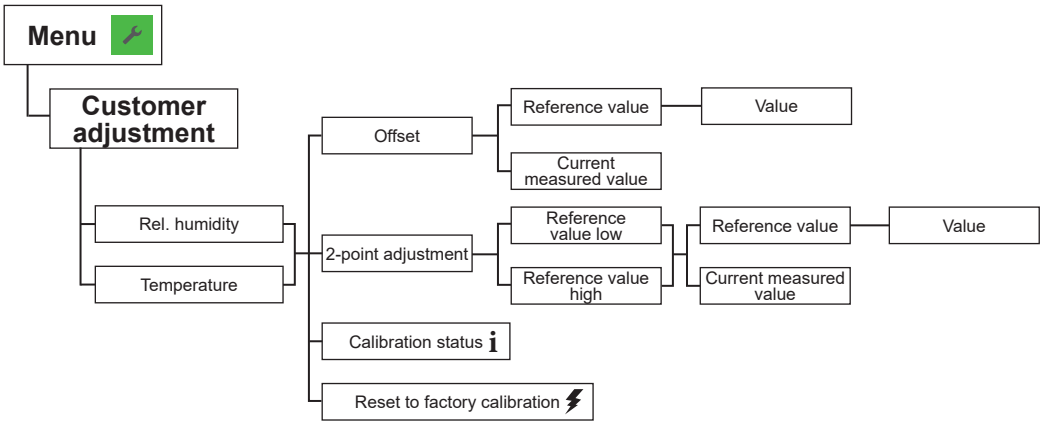


Fig. 43 Customer adjustment

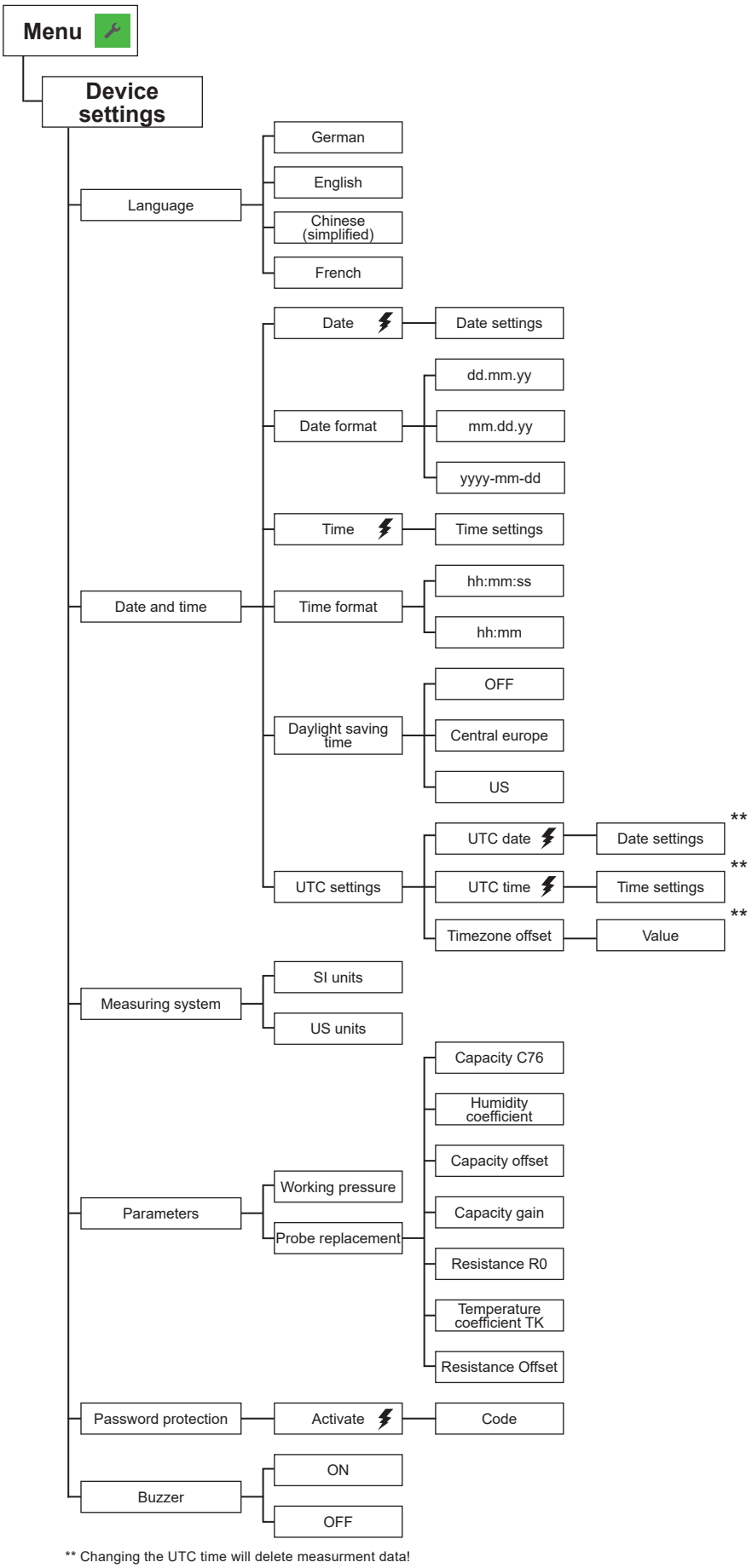


Fig. 44 Device settings

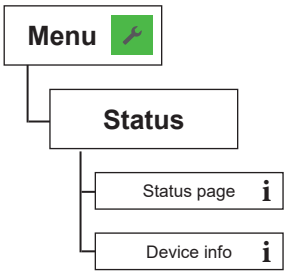
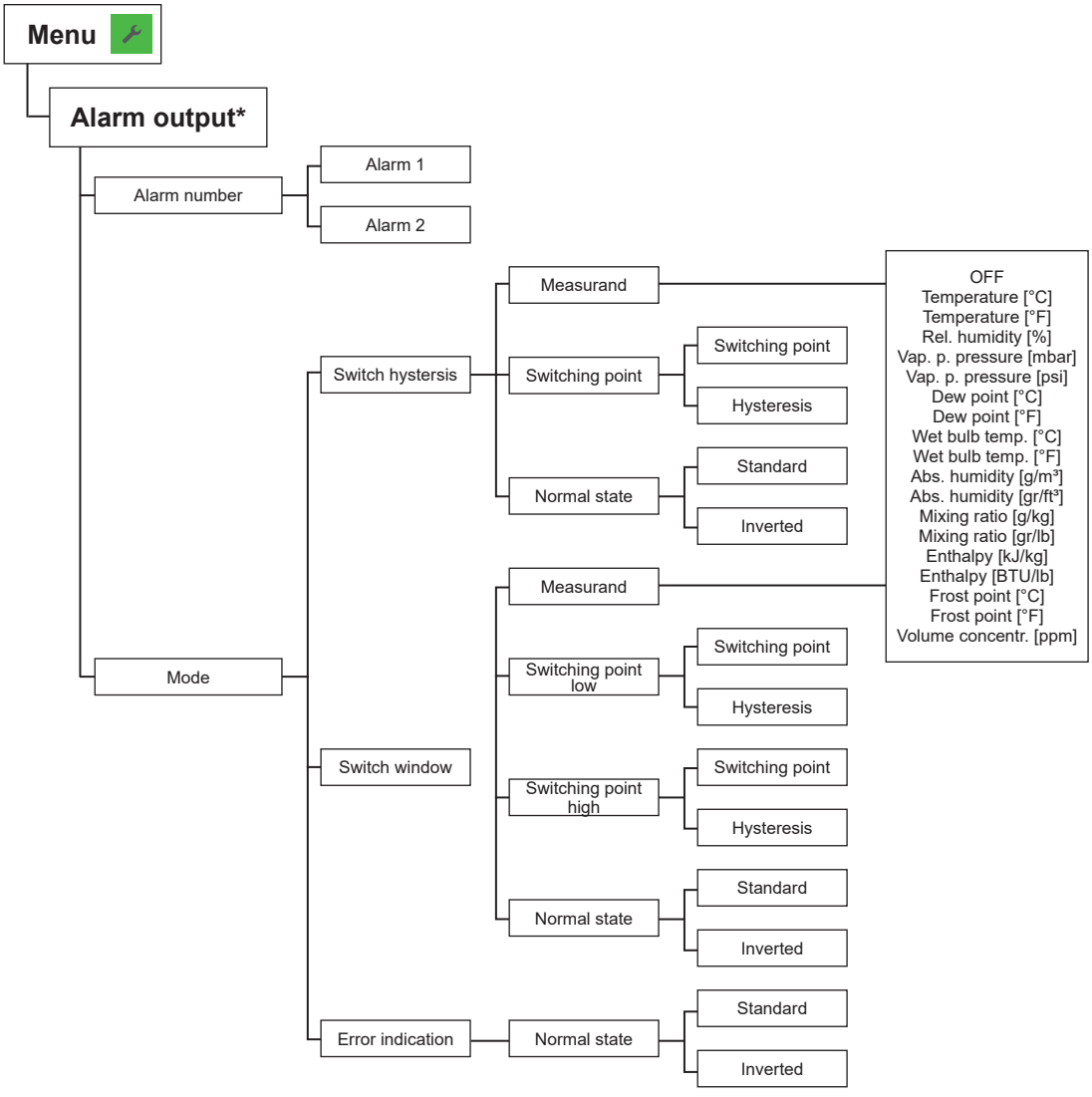


Fig. 45 Status

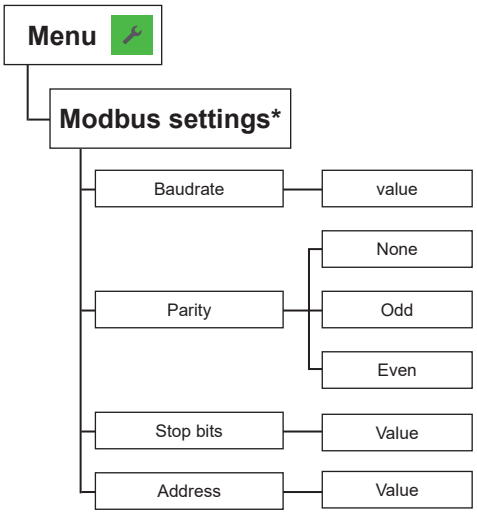
11.3 Optional Menus

Each of these menus is only available if the according module is plugged in during the start up procedure.



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

Fig. 46 Alarm output



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

Fig. 47 Modbus settings

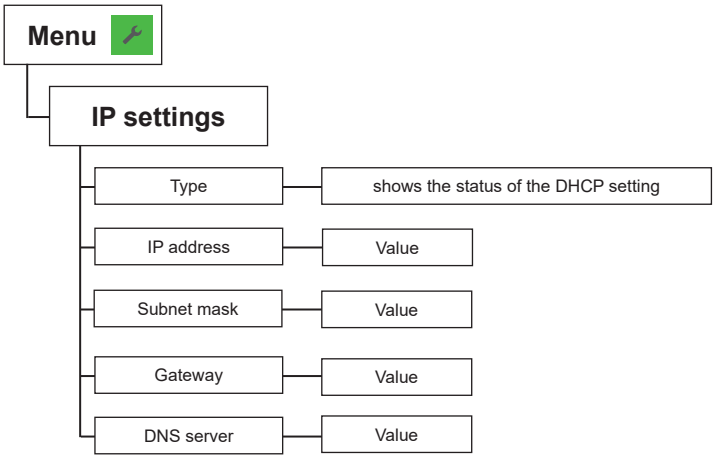


Fig. 48 IP settings

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