Series EE36

TRANSMITTER FOR
MOISTURE CONTENT IN OIL

MANUAL

Hardware and Software

YOUR PARTNER IN SENSOR TECHNOLOGY

E+E ELEKTRONIK® Ges.m.b.H.

BA_EE36_09_e // technical data are subject to change // 302294

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The document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described products can be improved and changed at any time without prior notice.

USA
FCC notice:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution:
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

CANADIAN
ICES-003 notification:

This Device B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

TABLE OF CONTENTS

HARDWARE

CONFIGURATION SOFTWARE

1. GENERAL

The manual is a part of the scope of supply and serves to ensure proper handling and optimum functioning of the instrument. For this reason, the manual must be read before start-up.
In addition, the manual is for all personnel who require knowledge concerning transport, setup, operation, maintenance and repair.

The manual must not be used for the purpose of competition without a written consent from E+E Elektronik® and must also not be forwarded to third parties.
Copies for personal use are permitted.
All information, technical data and illustrations contained in these instructions are based on information available at the time of publication.

1.1 Symbol assertion

This symbol indicates a safety instruction.
These safety instructions should always be followed carefully.
By not following these instructions injuries of persons or material damage could happen.
Therefore E+E Elektronik® does not accept liability.

This symbol indicates a note.
These notes should be observed to achieve optimum functioning of the equipment.

1.2 Safety instructions

General Safety Instructions

- Excessive mechanical loads and incorrect usage should always be avoided.
- Take care when unscrewing the filter cap as the sensor element could be damaged.
- The sensor is an Electro Static Discharge sensitive component (ESD). When touching the sensor element, ESD protective measures should be followed.
- Grip sensors only at the lead wires.
- Installation, electrical connection, maintenance and commissioning should be performed by qualified personnel only.

Safety instructions for use of the alarm module with voltages >50V

- To insulate the optional alarm module from the low-voltage side of the transmitter, the partition provided for this purpose must be fitted in the lower section.
- During operation of the instrument the modular housing must be completely closed.
- The protection class of an opened housing corresponds to IP00 and direct contact with components carrying dangerous voltages is therefore possible. In general, work on live components should be avoided and when absolutely necessary, should be performed by qualified personnel only.

Safety instructions for use of the integrated power supply (option V01)

- During operation of the instrument the modular housing must be completely closed.
- The protection class of an opened housing corresponds to IP00. In general, work on live components should be avoided and when absolutely necessary, should be performed by qualified personnel only.

1.3 Environmental aspects

Equipment from E+E Elektronik® is developed with due consideration to all resultant environmental issues. When you dispose the equipment you should avoid environmental pollution.
For disposal of the transmitter the individual components must be sorted with care. The housing consists of recyclable polycarbonate or metal (aluminium, Al Si 9 Cu 3). The electronics must be collected as electronic scrap and disposed of according to the regulations in force.

2. PRODUCT DESCRIPTION

E+E Transmitter Series EE36 are specially designed for the measurement of water content in oil.
The measured and the calculated values are available on two free scaleable and configurable analogue outputs. In addition, an optional relay output can be used for alarms and process control.

The modular housing enables a user-friendly operation and a quick replacement of the sensor unit for service purposes.

The construction of the transmitter makes field and local loop calibration an easy task.

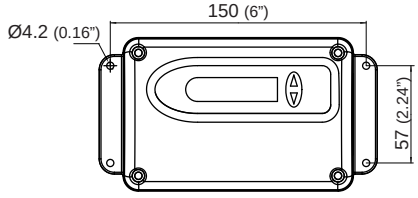
GL-Approval:
The series EE36 is certified in accordance with the regulations of the “Germanischen Lloyd (GL)” and therefore can be utilized in the maritime field as well.
From the certification exepted are the polycarbonate housing and the integrated power supply (option V01).

3. INSTALLATION

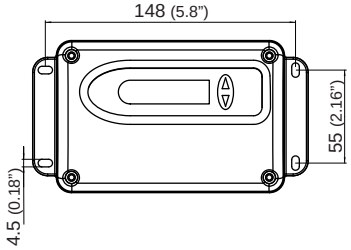
3.1 Installation of the housing

The necessary dimensions for the mounting holes can be found in the drawings below.

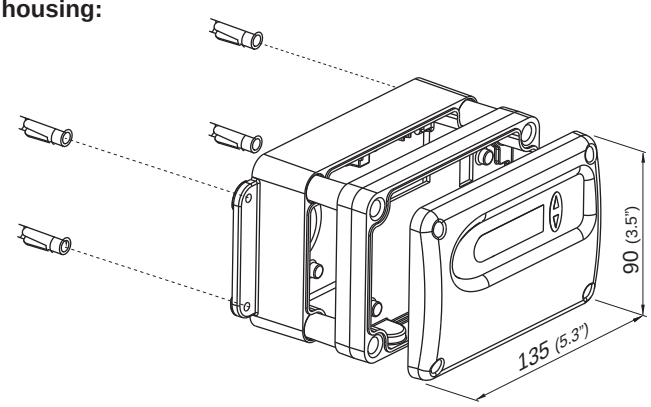
Drilling with round hole:



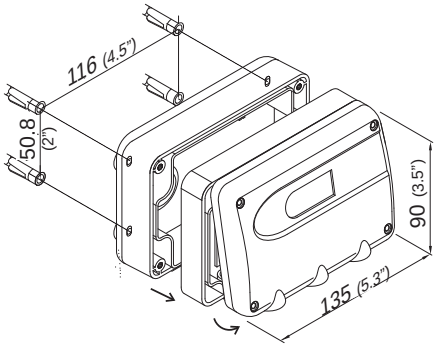
Drilling with long hole:



metal housing:



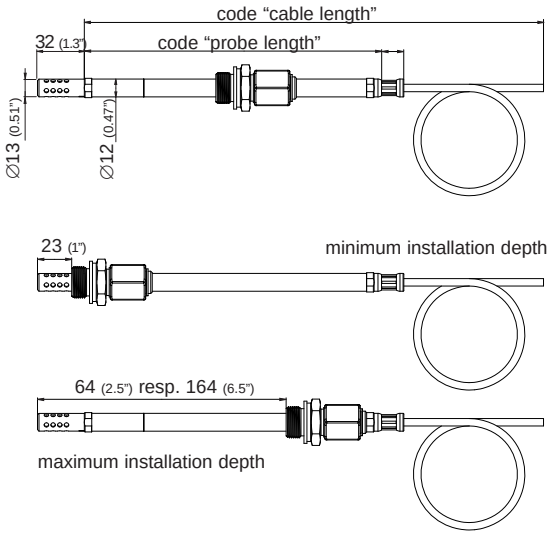
polycarbonate housing:



3.2 Installation of the probe

Select a location with environmental conditions that permit an optimal measurement of the process. The measuring medium (e.g.: oil) shall be as clean as possible i.e. without contamination.

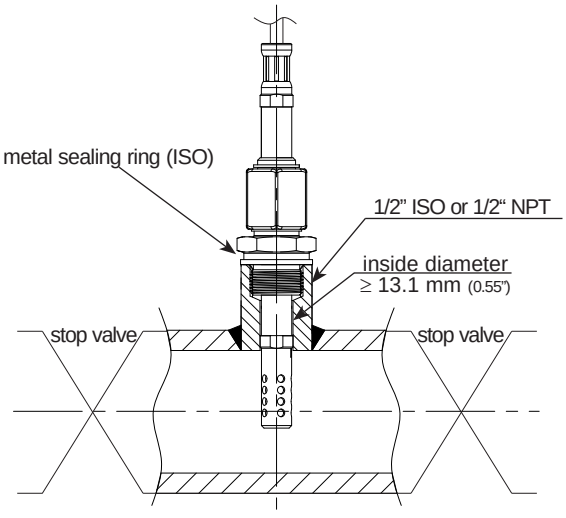
The probe cable (connection between sensing probe and basic device) must not be shortened or extended.
A correct function of the transmitter is only guaranteed with the original probe cable.



3.2.1 General safety instructions for installation

Because the sensing probe can be exposed to very high pressures in the measurement environment, there is the risk of sudden, unintentional expulsion of the probe during or after improper installation. Therefore, special precautions should be taken when working on the sensing probe or in its vicinity. Bending over the sensing probe should be avoided under any circumstances!

During the installation of the sensor probe, make sure that the surface of the sensing probe is not damaged! Damaging the probe could lead to damaged seals (consequence: leakage and pressure loss) and to problems during removal (jamming).



3.2.2 Installation of the probe directly in the process

For direct probe installation, a stop valve should be provided on both sides of the probe insert. This allows the sensor probe to be removed for maintenance and calibration without any problems.

If the sensor probe is installed in a pressure chamber, make sure that the pressure in the chamber and the ambient pressure are in equilibrium before you remove the probe.

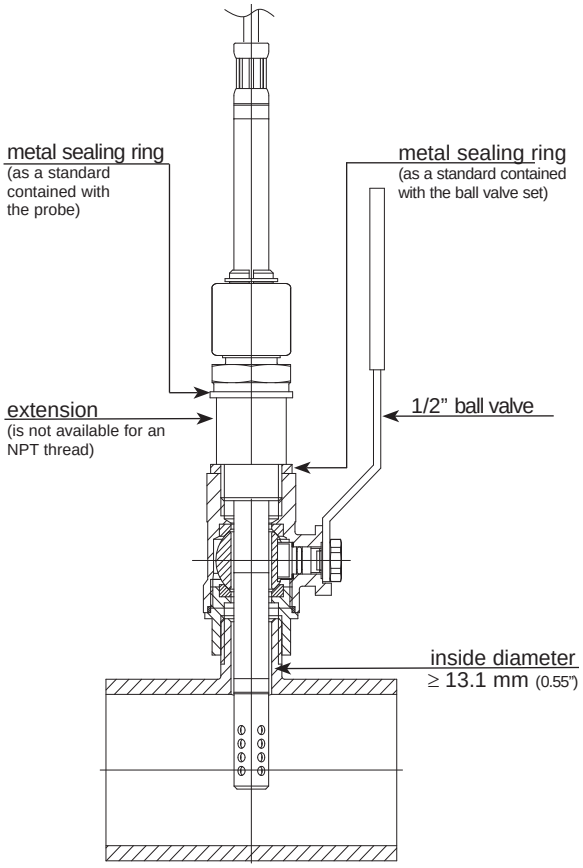
INSTALLATION OF THE PROBE:

The temperature during installation may not vary more than ±40°C (±72°F) from the operating temperature.

1st step:
Install the probe with the stop valves closed.

2nd step:
Insert the sensor probe into the process.

3rd step:
To ensure a secure installation of the probe, the lock nut must be tightened to a defined torque of 30 Nm.
If no torque-spanner is available tighten the lock nut by hand as far as possible. Continue to turn with an open-ended spanner ~50°.



3.2.3 Installation of the probe by utilizing the ball valve set

The ball valve set allows for the removal of the probe without interrupting the process.

Install the balve valve perpendicular to the direction of flow.

The pressure of the process must be less than 10 bar (145psi).

The two metal sealing rings (see figure) should be replaced every time prior to re-installing the probe.

INSTALLATION OF THE PROBE:

The temperature during installation may not vary more than ±40°C (±72°F) from the operating temperature.

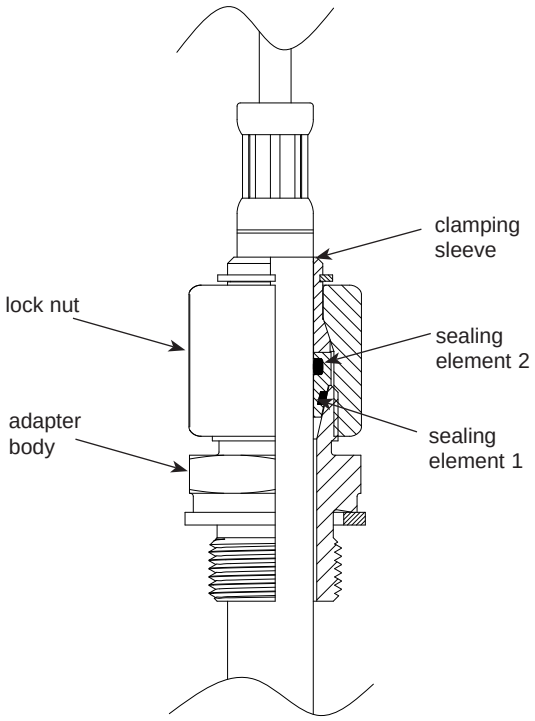
1st step:
Install the probe with the ball valve closed.

2nd step:
Open the ball valve.

3rd step:
Insert the sensor probe through the ball valve into the process. A manual pressing tool is recommended at high pressure.

4th step:
To ensure a secure installation of the probe, the lock nut must be tightened to a defined torque of 30 Nm.
If no torque-spanner is available tighten the lock nut by hand as far as possible. Continue to turn with an open-ended spanner ~50°.

A too low torque results in a smaller tension force (fixing force) on the clamping sleeve. There is the risk of injury due to sudden expulsion of the sensing probe.
A too high torque can lead to permanent deformation of the clamping sleeve and the sensing probe. This can make the removal and re-installation difficult or impossible.



REMOVING OF THE PROBE:

1st step:
Firmly hold sensing probe. (Attention: do not bend connection cable)

2nd step:
Slowly loosen the lock nut with a spanner (spanner width 24) until the expulsion force acts on the probe.

In the installed state, never completely remove the lock nut, only unscrew it as much as necessary!

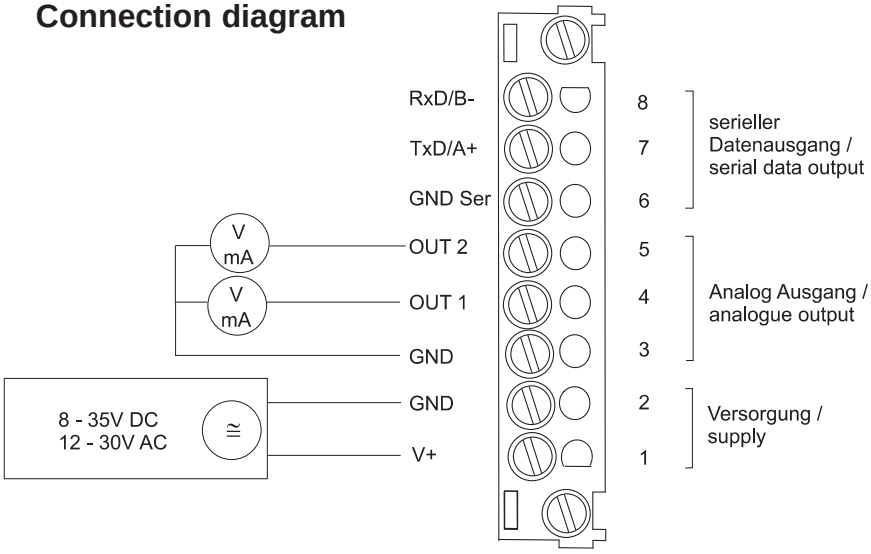
3rd step:
After the sensor head has been pulled out of the process up to the stop, close the ball valve.

4th step:
Probe can now be completely removed.

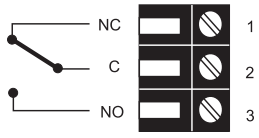
Pay attention to the sealing element 1 while mounting or removing the probe.
This sealing element has to be put in a proper form.

4. ELECTRICAL CONNECTIONS

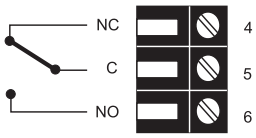
4.1 Connection diagram



4.2 Alarm module connection diagram / Option



Rel 1



Rel 2

4.3 Connection configuration of bottom part of the housing with plug connections / 8...35V DC; 12...30V AC (option C03/C06/C07)

Plug for supply and analogue output
(front view)

Euro Standard

Description:	Connection assignment:
V+	5
GND	4
GND	3
OUT1	2
OUT2	1

Plug for RS232 connection
(front view)

Euro Standard

Description:	Connection assignment:
GND-Ser	5
Rxd/B-	3
Txd/A+	1
not assigned	2,4

The cable should be connected according to the number stamped in the plug as shown in the above drawings!

4.4 Connection configuration interface cable RS232 / Option

Cable:	Description:
yellow	GND
brown	TXD
white	RXD

4.5 Connection configuration of bottom part of the housing with integrated power supply / 100...240V AC (option V01)

plug for RS232 and analogue output
(front view)

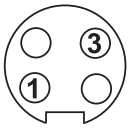
Euro-Standard

Description:	Connection assignment:
RxD / B-	5
TxD / A+	4
GND	3
OUT1	2
OUT2	1

plug for 100-240V metal housing
(front view)

Description:	Connection assignment:
grounding	PE
phase (L1)	1
neutral wire (N)	3

plug for 100-240V polycarbonate housing
(front view)



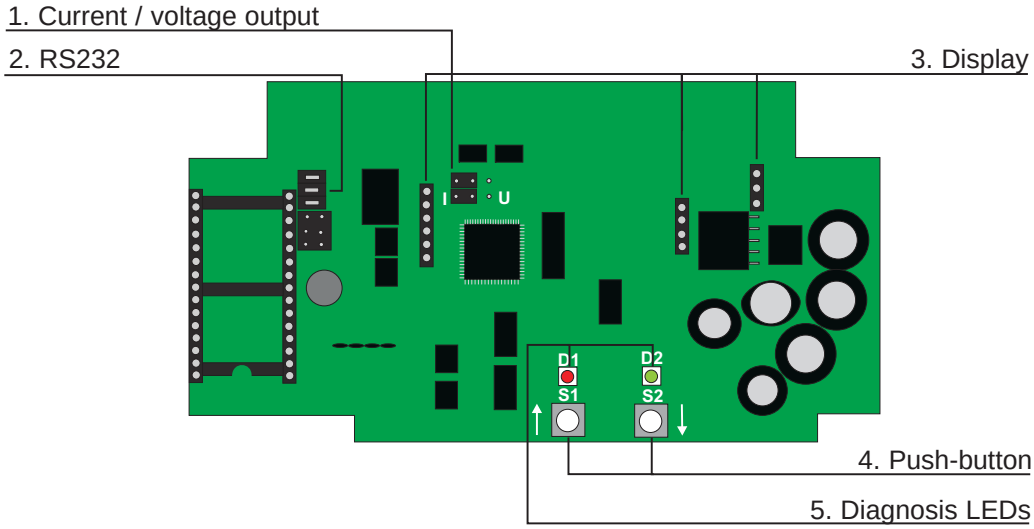
Description:	Connection assignment:
phase (L1)	1
neutral wire (N)	3

External diameter of supply cable: 10-12mm (0.39-0.47")
Maximum wire cross section: 1,5mm² (AWG 16)
The protection of the supply cable against excess current and short-circuit shall be in accordance with national and local codes.
Bottom and centrepiece of the housing shall be grounded!

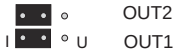
5. OPERATING COMPONENTS

5.1 Circuit board

After removal of the housing cover, the following operating components on the circuit board may be accessed for adaptation of the transmitter to the desired configuration.



1. Current / voltage output: If the device is switched from current to voltage output using the configuration software the two jumpers must be located as follows:

for current signals: 

for voltage signals: 

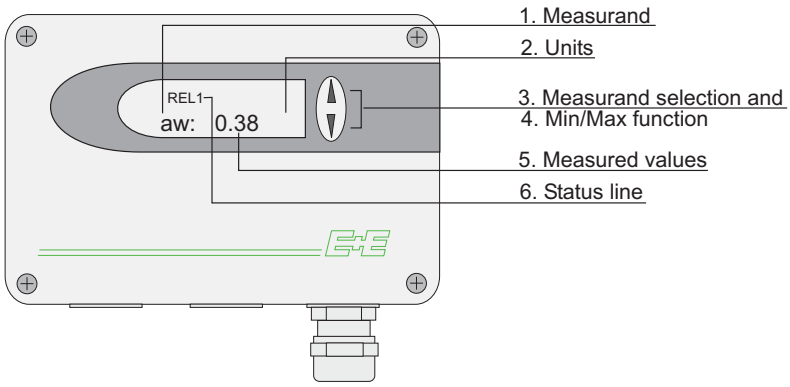
2. RS232: Serial interface for configuration of the EE36.

3. Display: pin connector for optional display.

4. Push-Buttons for calibration purposes: see Hardware, chapter 7 "Humidity/Temperature calibration"

5. Diagnosis LEDs: see Harware, chapter 7 "Humidity/Temperature calibration,"
and Hardware, chapter 8.3 "Self diagnosis and error messages"

5.2 Display module / Option

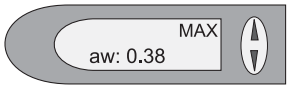


1. MEASURAND: **2. UNITS:** **3. MEASURAND SELECTION:**

SI		SI	US	
T	Temperature	°C	°F	Press the Δ or ∇ button to select the desired measurand
aw	Water activity			
x	Water content	ppm	ppm	

4. MIN / MAX FUNCTION:

Transmitters of the EE36 series can display the highest and lowest measured value measured since the last reset.

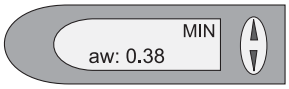


Highest measured value:

1. Select the desired measurand.
2. To display the maximum value of the selected measurand, press the Δ button for at least five seconds.

3.1. To reset the instrument to its normal operating status, press the Δ button once again for five seconds.

3.2. If both buttons are pressed for at least five seconds while the maximum value is displayed → the "MAX" symbol disappears → the maximum value will be deleted (Reset).



Lowest measured value:

1. Select the desired measurand.
2. To display the minimum value of the selected quantity, press the ∇ button for at least five seconds.

3.1. To reset the instrument to its normal operating status, press the ∇ button once again for five seconds.

3.2. If both buttons are pressed for at least five seconds while the minimum value is displayed → the "MIN" symbol disappears → the minimum value will be deleted (Reset).

5. MEASURED VALUES:

The dominant value of the appropriate quantity is displayed in this field. For the factory configuration, the measured values may fall between the measurement ranges shown below.

		from	up to	unit
Water activity	aw	0	1	
Temperature	T	-40 (-40°F)	180 (356°F)	°C (°F)
Water content	x	0	100000	ppm

The measurement ranges indicated above can be set to individual requirements using the configuration software (see software manual; chapter 5 "Index - Index Cards").

6. STATUS LINE:

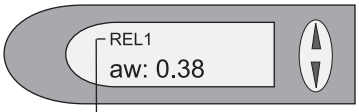
- MIN; MAX: see point "MIN/MAX Function"
- CALIB LOW; CALIB HIGH: indicates the low or high humidity/temperature calibration point.
- REL1 / REL2: Status Relay
- "ERROR 01....04": see Hardware, chapter 8.3 “Self-diagnosis and error messages”

6. ALARM MODULE / OPTION

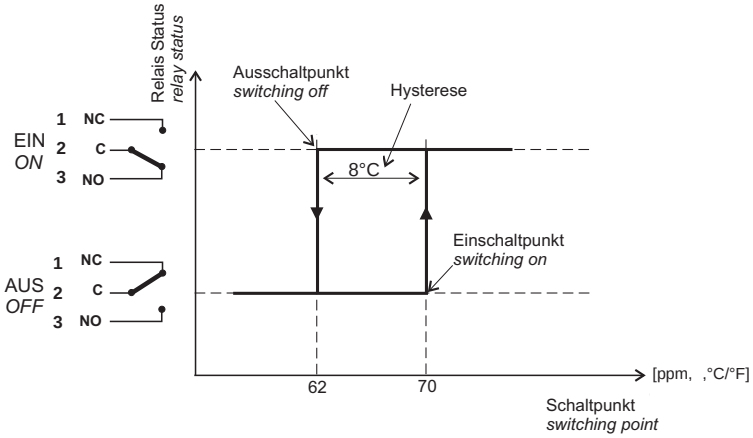
The optional alarm module can be used for alarm and basic control functions. This module can be configured using the configuration software supplied. The user thus has the option of setting the measurand to be monitored (aw, x, T) and the threshold hysteresis for each relay. (For the procedure, see the Configuration Sofware, chapter 5.2 “Relay”)

max. switched voltage / max. switched current:	250 VAC / 6A
	28 VDC / 6A
Minimum load:	>100mA / 12V

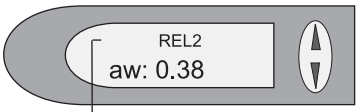
Switching relay 1:



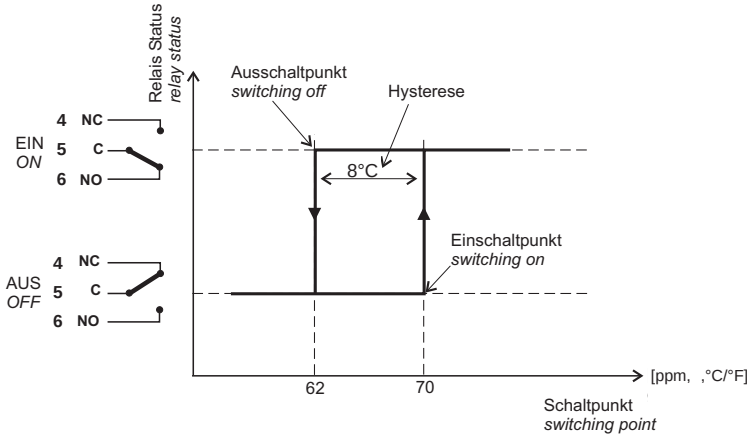
If relay 1 has tripped (ON), then REL1 is displayed.



Switching relay 2:



If relay 2 has tripped (ON), then REL2 is displayed.



7. HUMIDITY/TEMPERATURE CALIBRATION

The EE36 transmitter series can be calibrated in two ways:

- 1-point humidity/temperature calibration: quick and simple calibration on a defined humidity/ temperature point (working point).
- 2-point humidity/temperature calibration: simple calibration for accurate measuring results over the whole humidity/temperature working range.

- To reach a temperature balance it is recommended to keep the transmitter and the reference chamber (e.g. HUMOR 20,...) for minimum 4 hours in the same room.
- During stabilisation period and calibration procedure it is important to keep the temperature constant in the reference climate chamber.
- For calibration the humidity sensor probe must be stabilised at least 20 minutes in the reference chamber.
- Replace a dirty filter cap before calibration!
- A reduction of the stabilisation time can be achieved by cleaning the probe with n-Hexan resp. n-Heptan. Sway the probe carefully in the solvent then drip off and after that exhaust the air around the probe >0.5h.
  Attention: Other solvents than above mentioned can corrode the humidity sensor!

7.1 2-point humidity calibration

For accurate adjustment over the whole working range a two point calibration is recommended.

- Start calibration at the low humidity calibration point!
- The humidity difference between the two points should be > 30%RH
- Low humidity point < high humidity point
- 2-point calibration may be performed directly on the circuit board or using the configuration software supplied (for more details, see Configuration Software, chapter 5.4 ”Calibration”)

2-point humidity calibration procedure on the circuit board:

low calibration point:

1. Insert the sensor probe into the reference humidity 1 (low calibration point) and stabilise for at least 20 minutes.

D2 green
S2

2. BUTTON S2: Pressing the button for 5 seconds starts the procedure for the calibration mode RH. The calibration mode is indicated by the lit LED "D2" on the circuit board.

D2 green
S2 “CALIB LOW”

3. BUTTON S2: Pressing the button for 5 seconds starts the procedure for the low calibration point. The calibration mode is indicated by the lit LED "D2" and the symbol "CALIB LOW" will appear on the optional LC display.

D1 red D2 green
S1 S2

4. BUTTON S1 (up) and **S2 (down)**: Pressing one of the two buttons will adjust the measuring value in steps of 0.1% up or down to the reference value. The actual measuring value is indicated on the display or can be measured with the analogue output. As soon as the measured value is changed, "D1" flashes resp. disappears when pressing alternating S1 resp. S2.

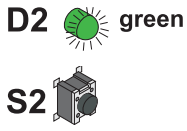
D2 flashing green
S1

5. BUTTON S1 (store): Pressing the button for 5 seconds stores the calibration value and the procedure is ended. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" will disappear from the optional LC display.
BUTTON S2 (cancel): Pressing the button for 5 seconds the calibration procedure will be ended without storing the calibration values. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" will disappear from the optional LC display.

D2 flashing green
S2

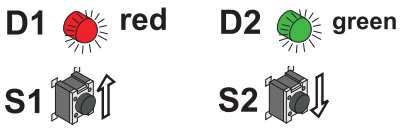
high calibration point:

6. Insert the sensor probe into the reference humidity 2 (high calibration point) and stabilise for at least 20 minutes.

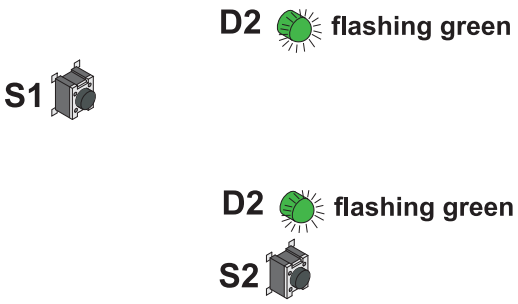


7. BUTTON S2: Pressing the button for 5 seconds starts the procedure for the calibration mode RH. The calibration mode is indicated by the lit LED "D2" on the circuit board.

8. BUTTON S1: Pressing the button for 5 seconds starts the procedure for the high calibration point. The calibration mode is indicated by the lit LED "D2" and the symbol "CALIB HIGH" will appear on the optional LC display.



9. BUTTON S1 (up) and **S2 (down)**: Pressing one of the two buttons will adjust the measuring value in steps of 0.1% up or down to the reference value. The actual measuring value is indicated on the display or can be measured with the analogue output. As soon as the measured value is changed, "D1" flashes resp. disappears when pressing alternating S1 resp. S2.



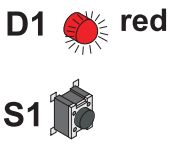
10. BUTTON S1 (store): Pressing the button for 5 seconds stores the calibration value and the procedure is ended. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB HIGH" will disappear from the optional LC display.
BUTTON S2 (cancel): Pressing the button for 5 seconds the calibration procedure will be ended without storing the calibration values. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB HIGH" will disappear from the optional LC display.

7.2 2-point temperature calibration

- Start calibration at the low calibration point!
- The temperature difference between the two points should be at least 30 degC (86°F)!
- Low temperature point < high temperature point
- Attention: A 2-point temperature calibration is not supported by the configuration software and must therefore be done directly on the circuit board!
  (see the following procedure)

2-point temperature calibration procedure on the circuit board:

low calibration point:

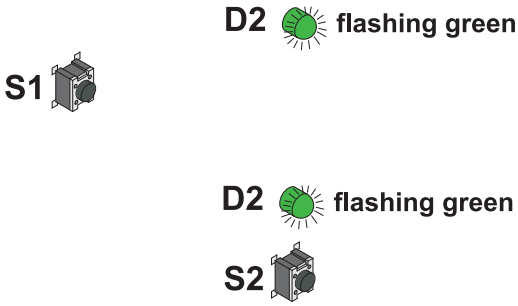


1. Insert the sensor probe into the reference temperature 1 (low calibration point) and stabilise for at least 20 minutes.

2. BUTTON S1: Pressing the button for 5 seconds starts the procedure for the calibration mode temperature. The calibration mode is indicated by the lit LED "D1" on the circuit board.

3. BUTTON S2: Pressing the button for 5 seconds starts the procedure for the low calibration point. The calibration mode is indicated by the symbol "CALIB LOW" on the optional LC display.

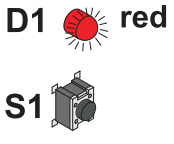
4. BUTTON S1 (up) and **S2 (down):** Pressing one of the two buttons will adjust the measuring value in steps of 0.1 degC up or down to the reference value. The actual measuring value is indicated on the display or can be measured with the analogue output. As soon as the measured value is changed, "D1" flashes resp. disappears when pressing alternating S1 resp. S2.



5. BUTTON S1 (store): Pressing the button for 5 seconds stores the calibration value and the procedure is ended. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" will disappear from the optional LC display.
BUTTON S2 (cancel): Pressing the button for 5 seconds the calibration procedure will be ended without storing the calibration values. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" will disappear from the optional LC display.

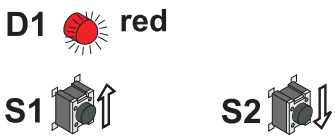
high calibration point:

6. Insert the sensor probe into the reference temperature 2 (high calibration point) and stabilise for at least 20 minutes.

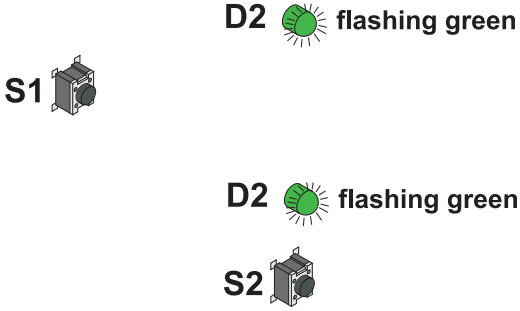


7. BUTTON S1: Pressing the button for 5 seconds starts the procedure for the calibration mode temperature. The calibration mode is indicated by the lit LED "D1" on the circuit board.

8. BUTTON S1: Pressing the button for 5 seconds starts the procedure for the high calibration point. The calibration mode is indicated by the symbol "CALIB HIGH" on the optional LC display.



9. BUTTON S1 (up) and **S2 (down):** Pressing one of the two buttons will adjust the measuring value in steps of 0.1 degC up or down to the reference value. The actual measuring value is indicated on the display or can be measured with the analogue output. As soon as the measured value is changed, "D1" flashes resp. disappears when pressing alternating S1 resp. S2.



10. BUTTON S1 (store): Pressing the button for 5 seconds stores the calibration value and the procedure is ended. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB HIGH" will disappear from the optional LC display.
BUTTON S2 (cancel): Pressing the button for 5 seconds the calibration procedure will be ended without storing the calibration values. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB HIGH" will disappear from the optional LC display.

7.3 1-point humidity calibration

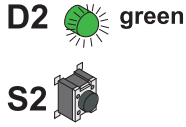
When the working range is limited to a certain more narrow range, a calibration at one humidity point is sufficient.

- In accordance with the working range, either the high or low calibration point should be selected. (CP > or < 50% RH)

- This calibration causes an extra inaccuracy for the rest of the working range.

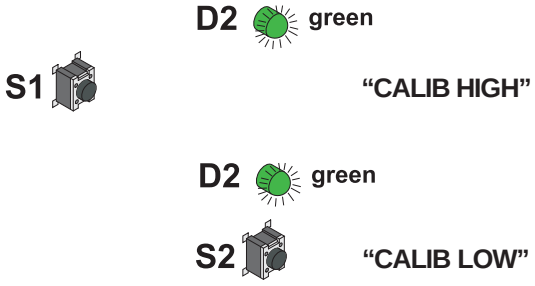
- The 1-point humidity calibration may be done directly on the circuit board or using the configuration software supplied. (for more details, see the Configuration Software, chapter 5.4 “1-point humidity calibration”)

1-point humidity calibration procedure on the circuit board:

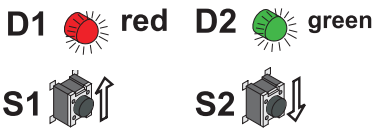


1. Insert the sensor probe into the reference humidity (calibration point) and stabilise for at least 20 minutes.

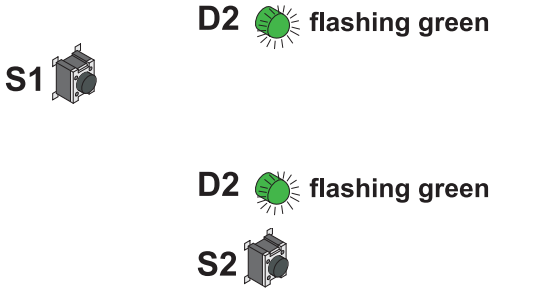
2. BUTTON S2: Pressing the button for 5 seconds starts the procedure for the calibration mode RH. The calibration mode is indicated by the lit LED "D2" on the circuit board.



3. BUTTON S1: Pressing the button for 5 seconds starts the procedure. The calibration mode is indicated by the lit LED "D2" and the symbol "CALIB HIGH" will appear on the optional LC display (CP ≥ 50% RH).
or
BUTTON S2: Pressing the button for 5 seconds starts the procedure. The calibration mode is indicated by the lit LED "D2" and the symbol "CALIB LOW" will appear on the optional LCD (CP < 50% RH).



4. BUTTON S1 (up) and **S2 (down)**: Pressing one of the two buttons will adjust the measuring value in steps of 0.1% up or down to the reference value. The actual measuring value is indicated on the display or can be measured with the analogue output.



5. BUTTON S1 (store): Pressing the button for 5 seconds stores the calibration value and the procedure is ended. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" or "CALIB HIGH" will disappear from the optional LC display.
BUTTON S2 (cancel): Pressing the button for 5 seconds the calibration procedure will be ended without storing the calibration values. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" or "CALIB HIGH" will disappear from the optional LC display.

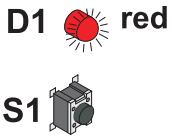
7.4 1-point temperature calibration

When the working range is limited to a certain more narrow range, a calibration at one temperature point is sufficient.

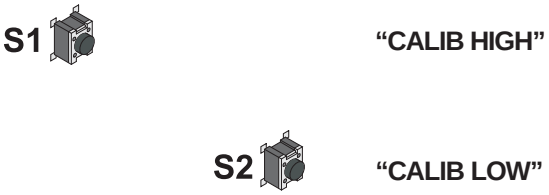
- In accordance with the working range, either the high or low calibration point should be selected. (CP ≥ or < 45 degC / 113°F)
- This calibration causes an extra inaccuracy for the rest of the working range.
- The 1-point temperature calibration may be performed directly on the circuit board or using the configuration software supplied. (for more details, see Configuration Software, chapter 5.4 “1-point temperature calibration”)

1-point temperature calibration procedure on the circuit board:

1. Insert the sensor probe into the reference temperature (calibration point) and stabilise for at least 20 minutes.

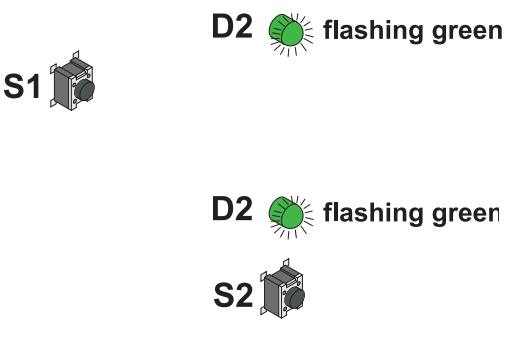


2. BUTTON S1: Pressing the button for 5 seconds starts the procedure for the calibration mode temperature. The calibration mode is indicated by the lit LED "D1" on the circuit board



3. BUTTON S1: Pressing the button for 5 seconds starts the procedure. The calibration mode is indicated by the symbol "CALIB HIGH" on the optional LC display (CP ≥ 45 degC / 113°F).
or
BUTTON S2: Pressing the button for 5 seconds starts the procedure. The calibration mode is indicated by the symbol "CALIB LOW" on the optional LC display (CP < 45 degC / 113°F).

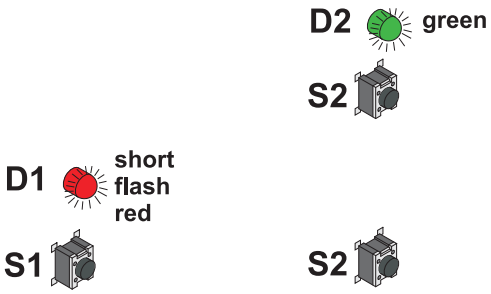
4. BUTTON S1 (up) and **S2 (down)**: Pressing one of the two buttons will adjust the measuring value in steps of 0.1 degC up or down to the reference value. The actual measuring value is indicated on the display or can be measured with the analogue output.



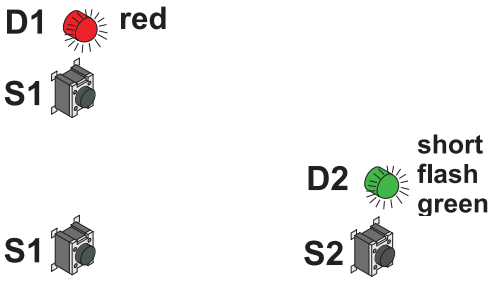
5. BUTTON S1 (store): Pressing the button for 5 seconds stores the calibration value and the procedure is ended. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" or "CALIB HIGH" will disappear from the optional LC display.
BUTTON S2 (cancel): Pressing the button for 5 seconds the calibration procedure will be ended without storing the calibration values. LED "D2" flashes to indicate exiting of the calibration mode and the symbol "CALIB LOW" or "CALIB HIGH" will disappear from the optional LC display.

7.5 Resetting the customer calibration to the factory calibration on the circuit board:

1. RH + T RESET: BUTTON S1 and S2: In neutral mode pressing buttons S1 and S2 simultaneously for 10 seconds customer calibration settings are reset to factory calibration.
A short flash of the LED "D1" indicates the reset.
or



2. RH RESET: BUTTON S2: Pressing the button for 5 seconds starts the procedure for the calibration mode RH. Pressing buttons S1 and S2 simultanously for 10 seconds customer calibration settings are reset to factory calibration.
A short flash of the LED "D1" indicates the reset.
or



3. Temp. RESET: BUTTON S1: Pressing the button for 5 seconds starts the procedure for the calibration mode T. Pressing buttons S1 and S2 simultanously for 10 seconds customer calibration settings are reset to factory calibration.
A short flash of the LED "D2" indicates the reset.

8. MAINTENANCE

8.1 Sensor cleaning

Cleaning of humidity and temperature sensors from oil residue:

1) Remove filter cap carefully, do not touch the sensors
2) Emerge the measuring head in N-HEPTAN and swirl for approx. 30 seconds
3) Remove excess liquid and allow to air dry for approx. 30 minutes
4) Screw on filter cap carefully

Cleaning of the measuring head is recommended before emerging in other oil and before a calibration.

8.2 Sensor replacement

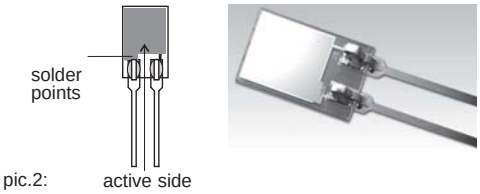
Under certain circumstances, the capacitive humidity sensor element can get damaged. To avoid the costly return of the entire transmitter to the manufacturer it is possible to replace the sensor.

Note:
– This will invalidate the factory calibration.
– The sensor elements should be touched by the lead wires only. (use tweezers!)

8.2.1 Sensor replacement of pluggable sensors

1) Switch off supply voltage.
2) Loose the fixing of the filter cap with an appropriate tool (see pic.1).
3) Unscrew the filter cap carefully.
4) Pull out the humidity sensor element.
5) Put in the new humidity sensor, the active side has to face the inside (see pic.2).
6) Screw the filter cap on again (in case of pollution replace it by a new filter cap).
7) Press in the fixing of the filter cap.
8) Establish connection to PC (RS232).
9) Switch on the supply voltage.
10) Start configuration software on PC.
11) For further instructions, see Configuration software, chapter 5.3 "Sensor/Probe replacement".

pic.1: loosen the fixing

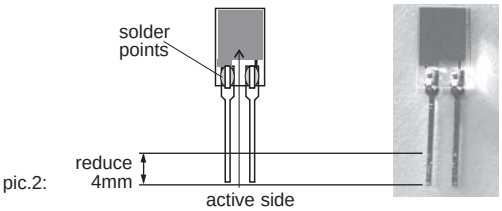


pic.2:

8.2.2 Sensor replacement of soldered sensors

1) Switch off supply voltage.
2) Loose the fixing of the filter cap with an appropriate tool (see pic.1).
3) Unscrew the filter cap carefully.
4) Desolder the humidity sensor element.
5) Shorten the sensor legs of the replacement sensor with a side cutter at 4mm (0.16") (from 10mm / 0.39" to 6mm / 0.24"), see pic.2.
6) Solder in the new humidity sensor, the active side has to face the inside (see pic.2)
7) Screw the filter cap on again (in case of pollution replace it by a new filter cap).
8) Press in the fixing of the filter cap.
9) Establish connection to PC (RS232).
10) Switch on the supply voltage.
11) Start configuration software on PC.
12) For further instructions, see Configuration software, chapter 5.3 "Sensor/Probe replacement".

pic.1: loosen the fixing



pic.2:

8.3 Sensor probe replacement / optional

Transmitters of the EE36 series are available with an optional remote sensor probe that can be plugged into the middle section of the housing. If the sensor probe is damaged (damage to the cable, mechanical destruction of the sensor probe) it is possible to replace the probe.

Note:
This will invalidate the factory calibration.

<u>Sensor probe replacement procedure:</u>
1) Switch off supply voltage.
2) Remove damaged sensor probe.
3) Plug replacement probe onto middle section of the housing.
4) Establish connection to PC (RS232).
5) Switch on power supply voltage.
6) Start configuration software on PC.
7) For further instructions, see Configuration software, chapter 5.3 "Sensor/Probe replacement"

8.4 Fuse replacement

If the green LED on the PCB is not flashing with the supply voltage switched on, check the fuse and replace if required.

Fuse secondary:	250mA / T UL248-14
Nominal voltage:	250V
Replacement types:	
Series: MSTU 250	Manufacturer: Schurter
	Order No.: 0034.7109 / Series: 374
Manufacturer: Littelfuse	Order No.: 374 0250

8.5 Self diagnostics and error messages

Self diagnostics via LEDs on the circuit board:

- **Green LED**

flashing ⇒ Supply voltage applied / Microprocessor is active

- **Red LED**

constantly lit ⇒ Humidity sensor element damaged
flashing ⇒ Humidity sensor element accruing moisture (condensation!)

Self diagnostics via display (where available):

Error 1 ⇒ Humidity sensor element damaged
Error 2 ⇒ Humidity sensor element moistened (condensation!)
Error 3 ⇒ Temperature sensor element damaged
Error 4 ⇒ Temperature input short circuit

Definitions:

- **Error**

possible cause
⇒ *Measures / Help*

- **Display shows incorrect values**

Error during re-adjustment of the transmitter
⇒ *Reset to factory calibration and repeat the calibration routine*

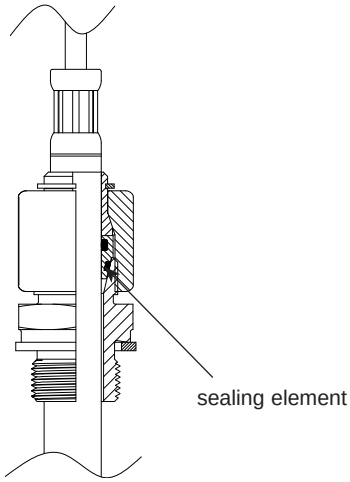
Filter soiled
⇒ *Replace filter*

Sensor defective
⇒ *Replace sensor*

Output configured incorrectly
⇒ *PC - Software*

- **Transmitter failure**

no supply voltage
⇒ *Check wiring and supply voltage*
⇒ *only green LED is illuminated continuously* ⇒ *Electronics defect*
⇒ contact the manufacturer



8.6 Replacement of sealing element

Because of repeated installations and various other circumstances the sealing element can get damaged. The customer can do a replacement of this sealing element (refer to drawing).

9. REPLACEMENT PARTS / ACCESSORIES

Description	Order Code
- Stainless steel filter	HA010110
- Display and housing cover in metal	D05M
- Display and housing cover in polycarbonate	D05P
- Replacement probe	
- for EE36 with 2m cable	HA010902
- for EE36 with 5m cable	HA010905
- for EE36 with 10m cable	HA010910
- Mounting rail bracket	HA010203
- Sealing element	HA050308

Description	Order Code
- Replacement sensor	
- Humidity sensor with sensor data	FE10
- Temperature sensor with sensor data	TE38
- Interface cable for circuit board	HA010304
- Interface cable for plug C06, C07	HA010311
- Ball valve set 1/2" ISO	HA050101
- Ball valve set 1/2" NPT	HA050104
- Double nibble G1/2" to G3/4"	HA011107
- Enlargement G1/2" to G3/4"	HA011106

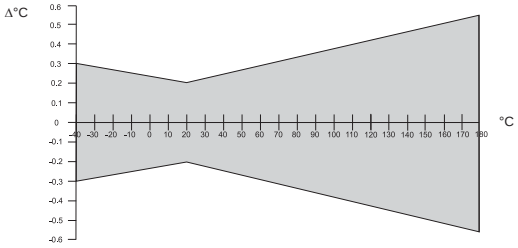
10. TECHNICAL DATA

Measuring values

Water activity

Water activity sensor[1]		HC1000-400
Measuring range[1]		0...1 a_w
Accuracy*) (including hysteresis, non-linearity and repeatability, traceable to intern. standards, administrated by NIST, PTB, BEV...)		
-15...40°C (5...104°F)	≤0.9 a_w	± (0.013 + 0.3%*mv) a_w
-15...40°C (5...104°F)	>0.9 a_w	± 0.023 a_w
-25...70°C (-13...158°F)		± (0.014 + 1%*mv) a_w
-40...180°C (-40...356°F)		± (0.015 + 1.5%*mv) a_w
Temperature dependence of electronics		typ. ± 0.0001 [1/°C] (typ. ± 5.6 * 10^{-5} [1/°F])
Temperature dependence of sensing probe		typ. ± (0.00002 + 0.0002 x a_w) x ΔT [°C] ΔT = T - 20°C
Response time with stainless steel filter at 20°C / t_{90}		typ. 10min in still oil

Temperature

Temperatur sensor element	Pt1000 (tolerance class A, DIN EN 60751)
Working range sensing probe	-40...180°C (-40...356°F)
Accuracy	
Temperature dependence of electronics	typ. ± 0.005°C/°C

Outputs[2]

Two freely selectable and scaleable analogue outputs	0 - 5V	-1mA < I_L < 1mA
	0 - 10V	-1mA < I_L < 1mA
	4 - 20mA	R_L < 500 Ohm
	0 - 20mA	R_L < 500 Ohm

Adjustable measurement range[2]

		from	up to	units
Water activity	a_w	0	1	
Temperature	T	-40 (-40)	180 (356)	°C (°F)
Water content[3]	x	0	100 000	ppm

General

Supply voltage	8...35V DC 12...30V AC (optional 100...240V AC, 50/60Hz)
Current consumption - 2x voltage output	for 24V DC/AC: typ. 40mA
- 2x current output	typ. 80mA
Pressure range sensing pobe	0.01...20bar (0.15...300psi)
System requirements for software	WINDOWS 2000 or later; serial interface
Serial interface for configuration[4]	RS232C
Housing / Protection class	PC or Al Si 9 Cu 3 / IP65; Nema 4
Cable gland	M16 x 1.5 cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	screw terminals up to max. 1.5mm² (AWG 16)
Sensor protection	stainless steel filter
Operating temperature range of electronics	-40...60°C (-40...140°F)
Working and storage temperature range	
Housing with display	-20...50°C (-4...122°F)
Storage temperature	-40...60°C (-40...140°F)
Electromagnetic compatibility according to	EN61326-1 EN61326-2-3 ICES-003 ClassB Industrial Environment FCC Part15 ClassB
GL-Certification[5]	Environmental Category D

Options

Display	graphical LCD (128x32 pixels), with integrated push-buttons for selecting parameters and MIN/MAX function
Alarm outputs	2 x 1 switch contact: 250V AC / 6A and 28V DC / 6A threshold + hysteresis can be adjusted with configuration software
Switching parameters (freely selectable)	a_w Water activity T Temperature x Water content

1) refer to the working range of the humidity sensor. 2) can be easily changed by software 3) ppm output is valid in the range 0...100°C (32...212°F)
4) no data output 5) not for polycarbonate housing or integrated power supply (V01)
*) 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).

CONFIGURATION SOFTWARE

LIMITED LIABILITY

E+E Elektronik® is not liable for any damages or consequential damages (for example, but not restricted to loss of earnings, interruption of business, loss of information and data or any other pecuniary damages), that result from the installation, usage and also impossibility of usage of a software product from E+E Elektronik® and supportservices possibly associated with it or non-performance of support.

1. GENERAL INFORMATION

The configuration software was developed by E+E Elektronik® Ges.m.b.H to allow fast and easy configuration of individual transmitters.

This software tool is included in the scope of supply.
System requirements: MS WINDOWS 98® or higher; RS232 serial interface

2. INSTALLATION

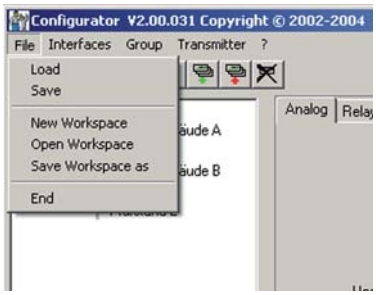
Insert the CD-ROM supplied with the transmitter into the PC and open the set-up application. Follow the instructions of the dialogue menus to set the desired language and all other parameters for installation. At the end of the routine, the software is installed and the Readme file or the program will be automatically opened.

Note:
Before any reinstallment or upgrade the older version must first be uninstalled (the User will be notified during the installation routine and the process will be interrupted automatically).

To remove the previous version, open the software folder in the system control panel. All of the programs installed on your system are located here. Uninstall the EE36 Configurator by clicking on the appropriate button and then reinstall or upgrade.

3. ICONS ON THE TOOL BAR

3.1 File



Load: Loads a file with a saved transmitter configuration.

Save: Saves the current transmitter configuration in a file.

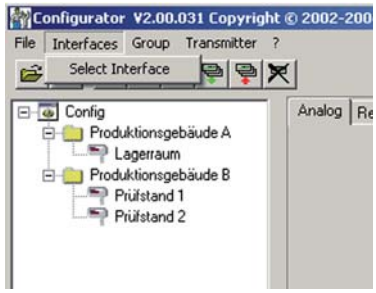
New Workspace: Opens a file for a new tree.

Open Workspace: Opens existing trees.

Save Workspace: Saves the current trees in an archive file.

Note:
The functions "Save Workspace" and "Open Workspace" apply to the tree structure only, not to the configurations of individual transmitters!

3.2 Interfaces

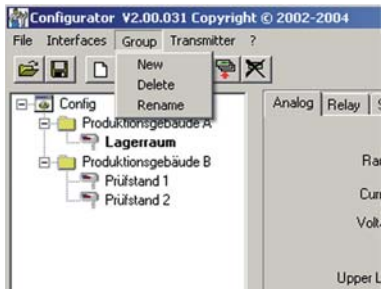


Select: Selects the serial interface (COM port) for communication with the transmitters. Following functions are available:

use / do not use: Marked COM ports are greyed out and deactivated for the configuration software (e.g. COM for integrated Notebook Modem).

Note:
A disabled interface (shaded = do not use), can be enabled by clicking on the "use" button.

3.3 Group



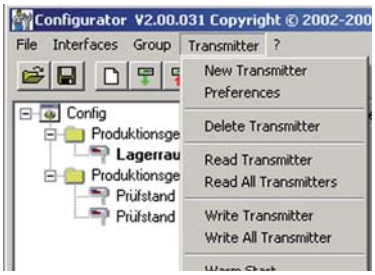
The icon "Group" provides the option of combining transmitters in groups.
A group may consist of transmitters used in the same application, for instance assigned to a building.

New: Creates a group or adds another group into an existing structure.

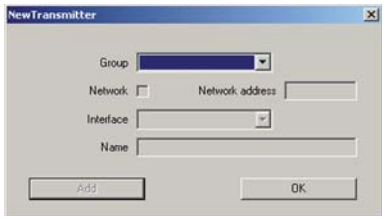
Delete: Deletes groups within a tree.

Rename: Changes the name of a transmitter group.

3.4 Transmitter



New transmitter:



A new transmitter is created in the tree.
This procedure requires the input of a number of parameters:

Group: Assigns a transmitter to a group.

Network: This function is not available for the EE36 series.

Interface: Selects the interface for connecting the transmitter to the network.
(For information on how to set up a COM port, see Configuration Software, chapter 3.2 “Interfaces”).

Network address: This function is not available for the EE36 series.

Name: Assigns a meaningful name related to the transmitter. This name is displayed in the tree under the relevant group (e.g.: Clean Room).

Preferences: Displays the preferences for all transmitters that have been set-up. The preferences may also be changed here.

Delete transmitter: Deletes from the tree structure the selected transmitters, or the selected groups.

Read: Reads and displays the configuration parameters of the selected transmitter.

Read All: This function is not available for the EE36 series.

Write: Writes the current configuration to the selected transmitter.

Write All: This function is not available for the EE36 series.

Warm Start: Resets and restarts the microprocessor of the selected transmitter.

3.5 ? - Information

Version: Displays the version number of the EE36 software currently installed and the contact information for E+E Elektronik.

4. ICON LIST

"Load File" (see Configuration Software, chapter 3.1 File)

"Save File" (see Configuration Software, chapter 3.1 File)

"New Transmitter" (see Configuration Software, chapter 3.4 Transmitter)

"Read Transmitter" (see Configuration Software, chapter 3.4 Transmitter)

"Save Transmitter" (see Configuration Software, chapter 3.4 Transmitter)

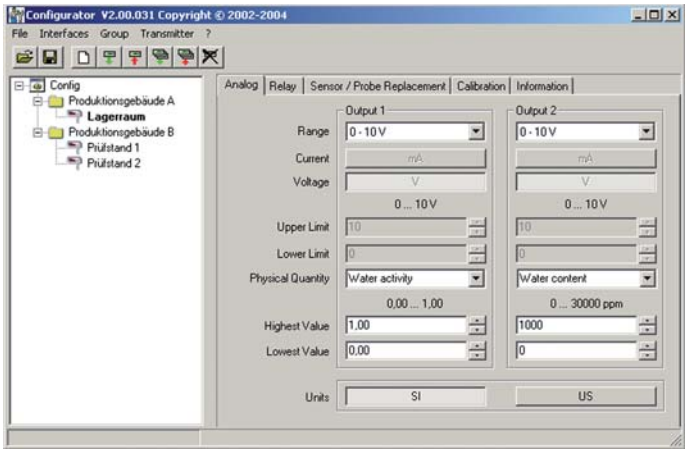
This function is not available for the EE36 series.

This function is not available for the EE36 series.

"Delete Transmitter" (see Configuration Software, chapter 3.4 Transmitter)

5. INDEX - INDEX CARDS

5.1 Analogue



For the configuration of both analogue outputs.

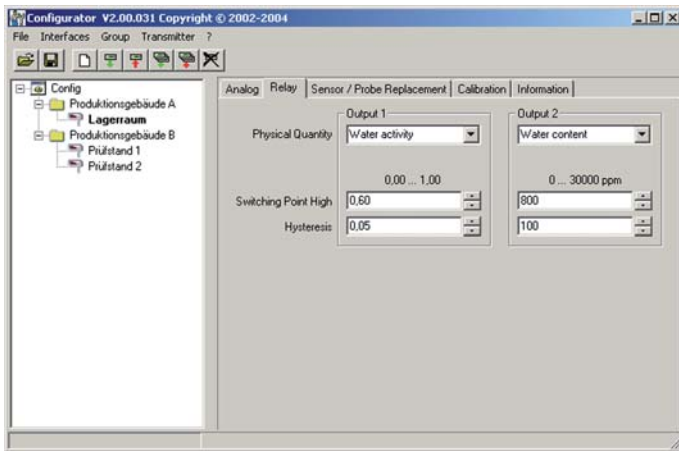
Range: Using the drop-down input field, select either a standardized output signal (0-5V, 0-10V, 0-20mA, 4-20mA) or a user-defined current/voltage output range (upper and lower limits may be selected as required between the limits indicated).

Physical Quantity: Selects the output physical quantities.

Highest / Lowest Limit: Sets the desired scaling of the output. The limits must fall within the operating range indicated above.

Units: Selects between SI or US units.

5.2 Relay

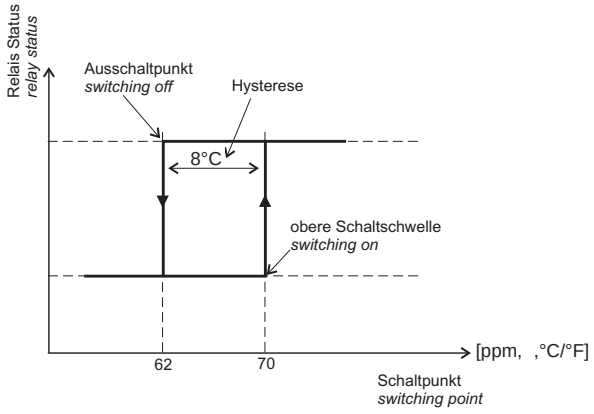


Used to set both optional alarm outputs.

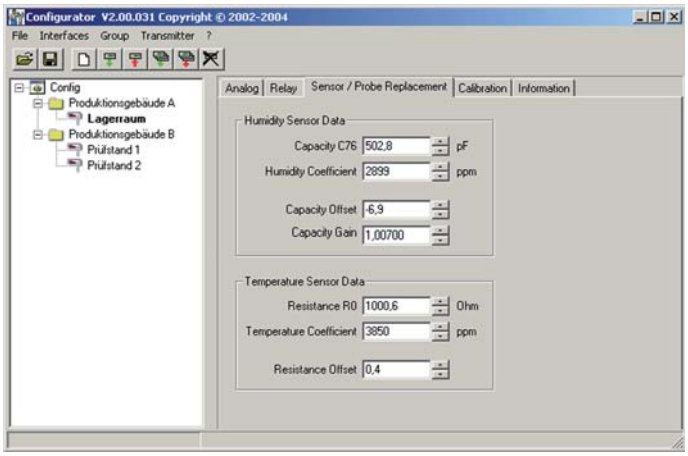
Physical Quantity: Selects the physical quantity for each alarm output.

Switching Point High: Sets the high switching point.

Hysteresis: Sets the switching hysteresis that should be maintained each time the signal falls below the upper switching limit.



5.3 Sensor / Probe Replacement



In case of sensor or probe replacement, the characteristic values for this sensor/probe must be saved in the transmitter to ensure the transmitter will operate within the specified accuracy range.

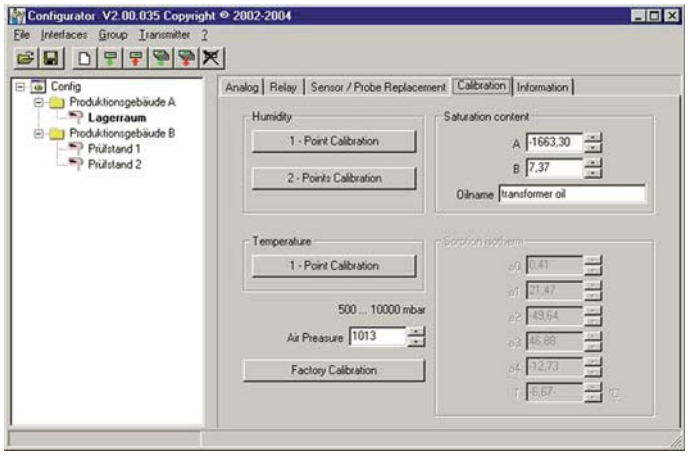
Replacement - Humidity Sensor:

1) Open the configuration of the selected transmitter by clicking on the button "Read Transmitter".
2) Replace the humidity sensor by a new one (see Hardware, chapter 8.1 Sensor Replacement).
3) Enter the nominal capacity C76 and the humidity coefficient in the corresponding input fields.
4) Save the settings by clicking on the button "Save Transmitter".

Replacement - Probe:

1) Open the configuration of the selected transmitter by clicking on the button "Read Transmitter."
2) Replace the probe by a new one (see Hardware, chapter 8.2 Probe Replacement).
3) Enter the nominal capacity C76, the humidity coefficient, the offset, the gain, the resistor R0, the temperature coeffcients, and the resistor offset in the corresponding input fields.
4) Save the settings by clicking on the button "Save Transmitter."

5.4 Calibration



Saturation content:
Enter the parameter A and B for calculation of the water content x [ppm].

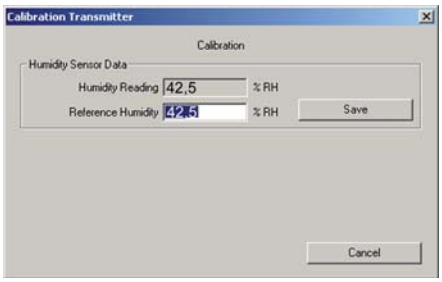
In addition to the manual calibration procedure on the circuit board (see Hardware, chapter 7. “Humidity/Temperature Calibration”), new calibrations can be performed using the EE36 software.

Note: A 2-point calibration for temperature is only possible on the circuit board and is not supported by the software.

Note: A reduction of the stabilisation time can be achieved by cleaning the probe with n-Hexan resp. n-Heptan. Sway the probe carefully in the solvent then drip off and after that exhaust the air around the probe >0.5h.
Attention: Other solvents than above mentioned can corrode the humidity sensor!

1-point calibration **Humidity**: Fast and easy calibration for accurate measurement results at a defined working point (humidity point).

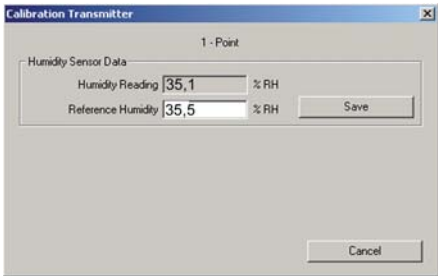
For calibration procedure see Hardware, chapter 7. “Humidity/Temperature Calibration”



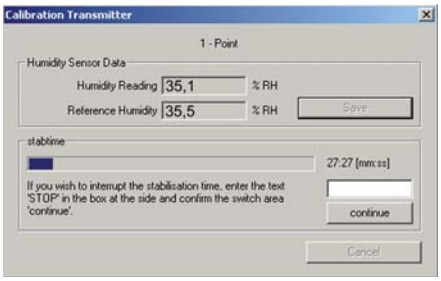
1) Stabilise the probe of the desired humidity for min. 30 minutes.
2) Click on the Humidity "1-point calibration" button. The measured values will now appear in both input fields.
3) Replace the value in the input field "Humidity Reading" with the reference humidity (value of the saline solution or display of HUMOR 20).
4) By clicking on "Save", the humidity reading for the transmitter will be adjusted to the reference humidity.

2-point calibration **Humidity**: Calibration for accurate results over the entire measurement range.

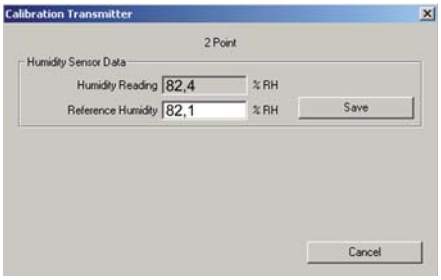
For calibration procedure, see Hardware, chapter 7. “Humidity/Temperature Calibration”.



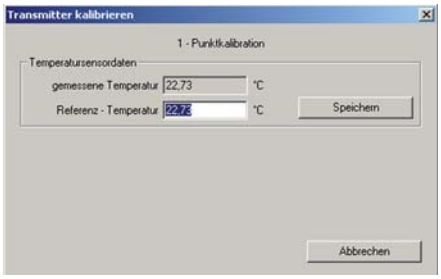
1) Place the probe at the reference humidity (lower point).
2) Click on the Humidity 2-Point Calibration button.
   (In a separate window, the measured values will appear in both input fields)
3) Replace the value in the input field "Humidity Reading" with the reference humidity. (Value of the saline solution or display of HUMOR 20)
4) By clicking on "Save", the humidity reading of the transmitter will be adjusted to the reference humidity. Now the 30-minute stabilisation period starts.



5) Place the probe at the reference humidity (high point).
6) Before continuing wait till the 30-minute stabilisation period is over.
7) Replace the value in the input field "Humidity Reading" with the reference humidity. (Value of the saline solution or display of HUMOR 20)
8) By clicking on "Save", the humidity reading of the transmitter will be adjusted to the reference humidity.
9) The process is complete when the message "Two-point calibration successful" appears.

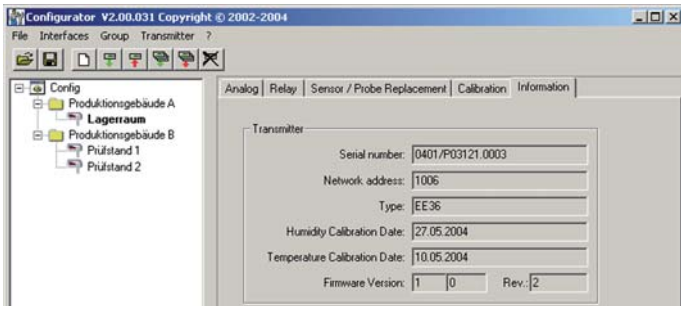


1-point calibration **Temperature**: If the working range is limited to a narrow temperature range, one-point calibration will be sufficient within this working range.



1) Place the probe at the reference temperature and allow stabilisation for approx. 30 minutes.
2) Click on the Temperature 1-Point Calibration button.
   The measured value will appear in both input fields. (see additional window)
3) Replace the value in the input field "Temperature Reading" with the reference temperature.
4) By clicking on "Save", the temperature reading of the transmitter will be adjusted to the reference temperature.
5) The process is complete when the message "Calibration Successful" appears.

5.5 Information



Here you will find information on the selected transmitter.

Serial number: Used to track the manufacturing data of the transmitter.

Network address: Each transmitter is assigned a unique network address at the factory for precise identification.

Note:
This identification number is also issued for transmitters of the EE36 series, although transmitters of this series are not network compatible.

Type: Name of the transmitter series.

Humidity Calibration Date: Provides information on the date of the last humidity calibration, but only if the configuration software was used.

Note:
Calibrations performed directly on the circuit board are not recorded!

Temperature Calibration Date: Provides information on the date of the last temperature calibration, but only if the configuration software was used

Note:
Calibrations performed directly on the circuit board are not recorded!

Firmware / Version: Provides information on the software version implemented in the transmitter (internal).

6. OVERVIEW

6.1 How to set-up a new transmitter?

Menu "File" --> "New Workspace"
Assign a name to the file and select the location to save the file

Menu "Group" --> "New Group"
Assign and add a name, then click on "Finish"

Menu " Transmitter" --> "New Transmitter" or Button "New Transmitter"
Select the group for the transmitter using the pull-down menu "Group."
Specify the COM port (serial interface) of the PC / Notebook in the pull-down menu "Interface".
Enter the name for the transmitter in the "Name" field.
Complete the "New Transmitter" process by clicking on the button "Add".

6.2 How to read the configuration of a transmitter?

The current configuration of the selected transmitter can be read by clicking on the button "Read Transmitter" or by selecting "Transmitter" **-->** "Read Transmitter."
If the configuration is already loaded, the configuration data in the Index- index cards can be modified.

6.3 How to save the configuration in a transmitter?

A modified configuration in the Index - index cards can be saved to the selected transmitter by clicking on the button "Save Transmitter" or by selecting "Transmitter" **-->** "Save Transmitter."

7. GL - APPROVAL CERTIFICATE

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	**75 132 - 09 HH**
Company	**E+E Elektronik Ges.m.b.H.** **Langwiesen 7** **4209 Engerwitzdorf, AUSTRIA**
Product Description	**Transmitter for Moisture Content in Oil**
Type	**EE36 Series**
Environmental Category	**D, EMC2**
Technical Data / Range of Application	**E+E Transmitter Series EE36 are specially designed for the measurement of water content in oil.** **Measuring values** **Water activity: Water activity sensor: HC1000-400** **Measuring range: 0 ... 1 aw** **Temperature: Temperature sensor element: Pt1000** **Working range sensor probe: -40 ... +180°C** **Outputs: 2 freely selectable and scaleable analogue outputs:** **0 ... 5V, 0 ... 10V, 4 ... 20mA, 0 ... 20mA** **Adjustable measurement range** **Water activity aw: 0 ... 1** **Temperature: -40 ... +180°C** **Water content: 0 ... 100000ppm** **Pressure range sensing probe: 0.01 ... 20bar** **Cable between sensor probe and terminal box: Type SILIFLON M5BA-(E5+E5BA5)** **Housing material terminal box / Protection class: AlSi9Cu3 / IP65**
Test Standard	**Guidelines for the Performance of Type Approvals, Chapter 2, Edition 2003**
Documents	**Test reports: Prüfprotokoll EE36-GL (version 1.1), EMVC 2008-11-01 (30.11.08) + 2009-04-17 (20.04.09), File 01 to 04_Burst (07.04.09), File 01 to 03_Surge (07.04.09), File 01 to 05_Immunity-Enclosure port (06.04.09), Prüflaboratorium Bonn TR8000-186-001, -002, -003 (17.08.04)**
Remarks	**The indications in the Manual Hardware and Software for the installation of the device are to be observed.**
Valid until	**2014-07-22**

Page 1 of 2

File No. I.D.15

Type Approval Symbol GL

Hamburg, 2009-09-15

i.V.

Jürgen Wittburg

i.A. P.

Klaus-Peter Schröder

Germanischer Lloyd

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. **75 132 - 09 HH**

Further Technical Data / Range of Application

Hardware Configuration
EE36 - x x xx x xxxx xxx xx xxx xxx xxx
[1] [2] [3] [4] [5] [6] [7] [8] [9] [10]

[1] Housing: M = metal housing
[2] Type: E = pressure tight up to 20bar
[3] Cable length: 50 = 0.5m, 01 = 1m, 02 = 2m, 05 = 5m, 10 = 10m, 20 = 20m
[4] Probe length: 2 = 65mm, 3 = 100mm, 5 = 200mm, 6 = 400mm
[5] Pressure-tight feedthrough: HA03 = 1/2" male thread, HA07 = 1/2" NPT thread
[6] Interface: without Interface, N = RS485 Interface
[7] Display: without display, D05 = with display
[8] Alarm output: without relay, SW = with relay
[9] Plug: cable thread, C03 = 1 plug for power supply and analogue output, C06 = 1 cable thread / 1 plug for RS232, C07 = 2 plugs for power supply / analogue outputs and RS485 Interface
[10] Sensing probe: fixed, P01 = interchangeable
[11] Supply voltage: 8 ... 35V DC / 12 ... 30V AC

Firmware version: V1.014
Software version configurator: V2.07.001
Software requirement class 2

Further documents
Data sheet EE36 Series (v2.1), Manual Hardware and Software Series EE36 BA_EE36_08_x,
GL-Baumusterprüfung EE36-GL version 1.2, GL-Fühlerkabelprüfungen EE36-GL version 1.0,
Electrical and mechanical drawings acc. to submitted files, order documents for assembly board EE29/31

Valid until **2014-07-22**

Page **2 of 2**

File No. **I.D.15**

Type Approval Symbol (GL) (GL)

Hamburg, 2009-09-15

Germanischer Lloyd

i.V. Jürgen Wittburg

i.A. P. Schröder Klaus-Peter Schröder

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

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