



Series EE29/EE31



**HUMIDITY/TEMPERATURE
TRANSMITTER**

MANUAL

Hardware and Software

YOUR PARTNER IN SENSOR TECHNOLOGY



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Ges.m.b.H.

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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.

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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.



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. The electronics must be collected as electronic scrap and disposed of according to the regulations in force.

2. PRODUCT DESCRIPTION

Humidity/temperature transmitters of the EE29/EE31 series provide multifunctionality, highest accuracy and simple installation and maintenance. The modular housing enables a user-friendly operation and a fast replacement of the sensor unit for service purposes.

By selecting a suitable housing version the EE29/EE31 series can be used for the entire range of humidity measurement applications:

EE29/EE31

- Model A for wall mounting.
- Model B for duct mounting.
- Model D with remote sensing probe for measurements from -40 to 180degC (-40...356°F).
- Model E with remote sensing probe for pressure-tight applications up to 15 bar (218psi)
- Model F for wall mounting with rear cable outlet.

Various options extend the large number of applications.

The construction of the transmitter enables field calibration and local loop calibration in a simple way.

3. INSTALLATION

Mounting of the housing

1. Drill the mounting holes according to the drilling template.
For installation on mounting rails use a special installation set (see Hardware, chapter 10 "Replacement parts / Accessories")
2. The bottom part of the housing is mounted with 4 screws (not supplied), e.g.: 4.5x30mm
3. Connection of the transmitter (see Hardware, chapter 4 "Electrical connections")
4. Mounting of the middle part and cover with 4 screws (included in the scope of supply)

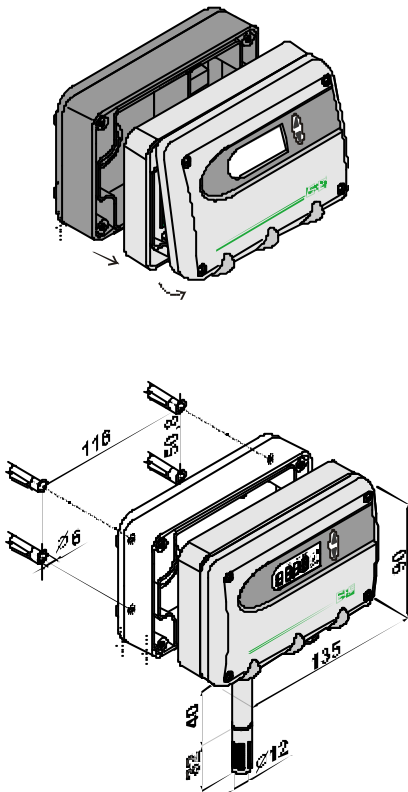
3.1 Mounting of model A (Wall mounting)

Transmitters of the EE29/31-xAx series are designed for wall mounting.

Working range: -40...60 degC (-40...140°F)
with display: -20...50degC (-4...122°F)



The transmitter must be mounted with the sensor probe pointing downwards!



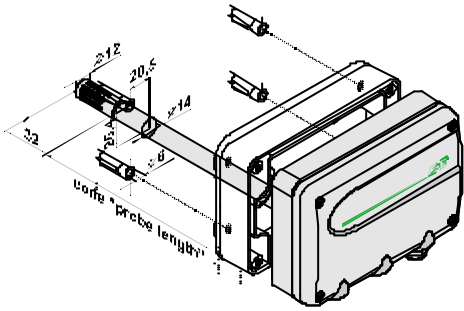
3.2 Mounting of model B (Duct mounting)

Transmitters of the EE29/31-xBx series are designed for duct mounting.

Working range: -40...80degC (-40...176°F)
with display: -20...50degC (-4...122°F)



The sensor probe must point horizontal or downwards in the duct channel.



3.3 Mounting of model D (Remote sensing probe)

Transmitters of the EE29/31-xDx series are transmitters with remote sensing probes for measurements in the extended temperature range.

Working range of sensor probe: -40...180degC (-40...356°F)
Working range of electronics: -40...60degC (-40...140°F)
with display: -20...50degC (-4...122°F)

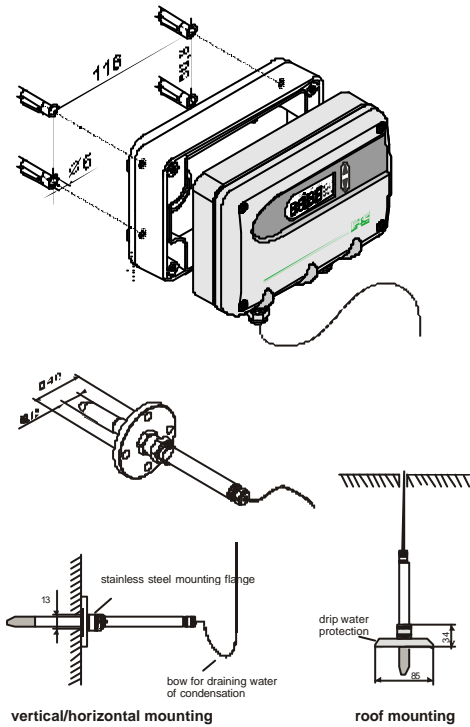
Mounting of the remote sensing probe (Series D):

Using the stainless steel mounting flange (refer to accessories) it is possible to mount the probe on the outer wall of the measuring chamber. The depth of immersion is adjustable.

For roof installations use the drip water protection (refer to accessories) to protect the sensor head and elements against condensed water.



The sensor probe must be mounted horizontally or vertically, pointing downwards. When possible, a drip sheet should be fitted for each mounting.



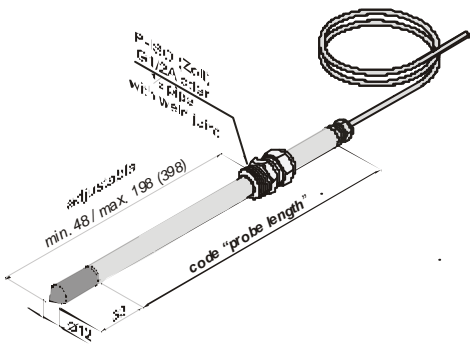
3.4 Mounting of model E (with pressure-tight sensor)

Transmitters of the EE29/31-xEx series are transmitters with remote, pressure-tight sensor probes that are suitable for applications at pressures between 0.01...15 bar (0.15...218psi).

Working range temperature: -40...180degC (-40...356°F)
pressure: 0.01...15 bar (0.15...218psi)
Working range of electronics: -40...60degC (-40...140°F)
with display: -20...50degC (-4...122°F)



The sensor probe must be mounted horizontally or vertically pointing downwards. Where possible, a drip sheet should be fitted for each mounting.



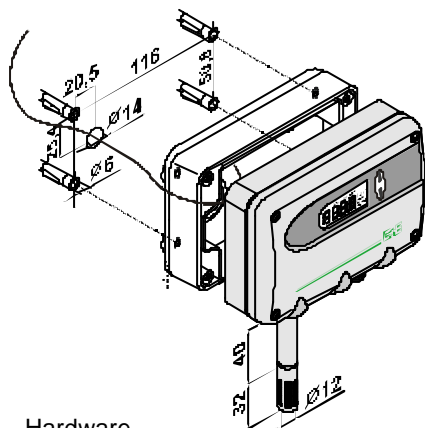
3.5 Mounting of model F (Wall mounting with rear cable outlet)

Transmitters of the EE29/31-xFx series are designed for wall mounting. Cable entry is from the rear side (e.g.: clean-room applications...).

Working range: -40...60 degC (-40...140°F)
with display: -20...50degC (-4...122°F)



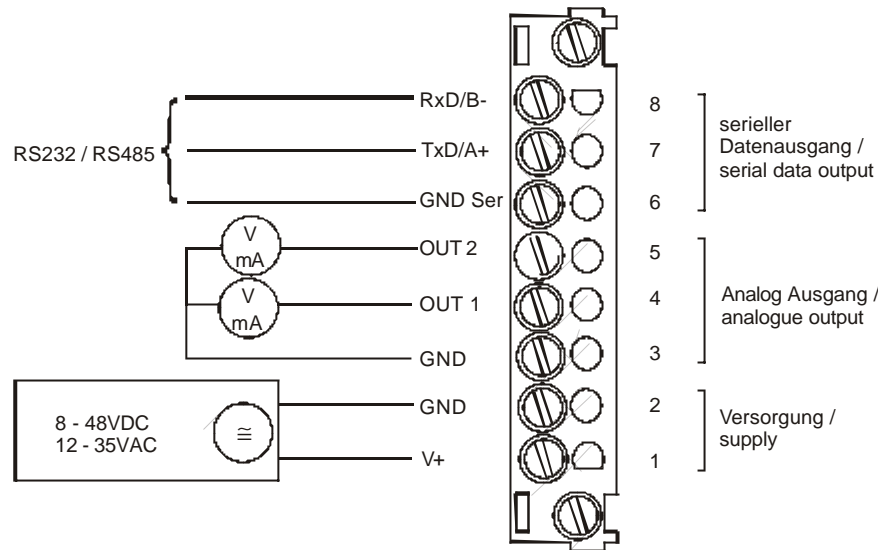
The transmitter must be mounted with the sensor probe pointing downwards!



Hardware

4. ELECTRICAL CONNECTIONS

4.1 Connection diagram EE29/31



4.2 Alarm module connection diagram / Option



4.3 Connection configuration EE29/31 with plug connections / Option

Plug for supply and analogue output
(front view)



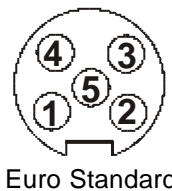
Description:

V+
GND
GND
OUT1
OUT2

Connection assignment:

5
4
3
2
1

Plug for RS232 resp. RS484- connection
(front view)



Description :

GND-Ser
Rxd/B-
Txd/A+
not assigned

Connection assignment:

5
3
1
2.4

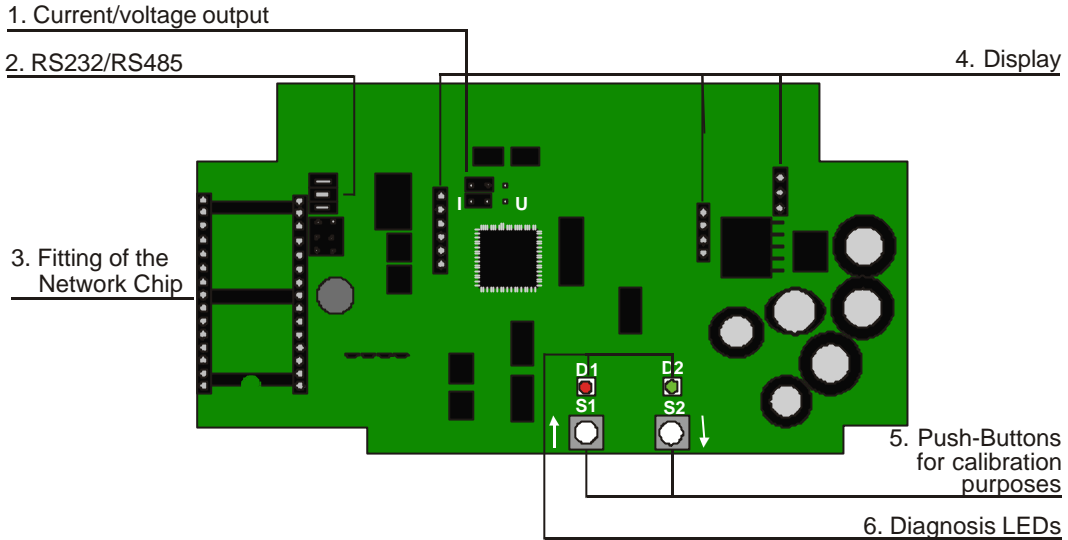


The cable should be connected according to the number stamped in the plug as shown in the above drawings!

5. OPERATING COMPONENTS

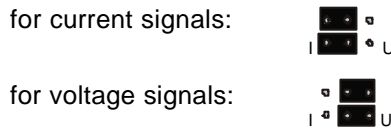
5.1 Circuit board

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:

When the device will be switched from current to voltage output signals using the configuration software supplied, then two jumpers must also be positioned as follows.



2. RS232/RS485:

For the transition from RS232 to RS485 (network operation) these jumpers must be removed.

3. Fitting of the network chip:



For refitting to RS485, an IC must be used (available as an option). The notch on the chip must match the receiver slot!

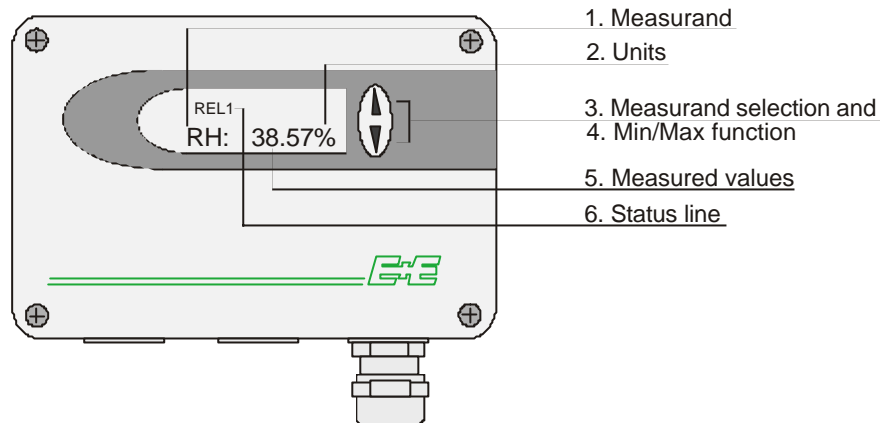
4. Display:

These pinboards are determined for connecting the display module.

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

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

5.2 Display module / Option:



1. MEASURAND:

2. UNITS:

3. MEASURAND SELECTION:

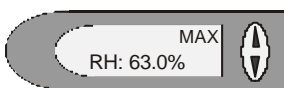
SI		SI	US	
RH	Rel. humidity	%	%	EE29
T	Temperature	degC	°F	
h	Enthalpy	kJ/kg	ftlb/lb	EE31
r	Mixture ratio	g/kg	gr/lb	
dv	Absolute humidity	g/m ³	gr/ft	
Tw	Wet-bulb temperature	degC	°F	
Td	Dew-point temperature	degC	°F	
e	Water vapour partial pres.	mbar	psi	

Press the Δ or ▽ button to select the desired physical quantity.

4. MIN / MAX FUNCTION:

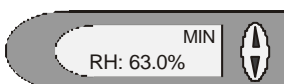
Transmitters of the EE29/31 series can display the highest and lowest measured value measured since the last reset.

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			units
			EE31-A,F	EE31-B	EE31-D,E	
Humidity	RH	0	100	100	100	% RH
Temperature	T	-40 (-40)	60 (140)	80 (176)	180 (356)	degC (°F)
Dew-point temperature	Td	-80 (-112)	60 (140)	80 (176)	100 (212)	degC (°F)
Frost-point temperature	Tf	-80 (-112)	0 (32)	0 (32)	0 (32)	degC (°F)
Wet-bulb temperature	Tw	0 (32)	60 (140)	80 (176)	100 (212)	degC (°F)
Water vapour partial pressure	e	0 (0)	200 (3)	500 (7.5)	1100 (15)	mbar (psi)
Mixture 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/f ³)
Specific enthalpy	h	0 (0)	400 (50000)	1000 (375000)	2800 (999999)	kJ/kg (lbf/lb)

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

6. STATUS LINE:

- MIN; MAX: see Point "MIN/MAX Function", see Hardware, chapter 5.2 "Display module"
- 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 (optional)

The optional alarm module can be used for alarm and error issues and other simple 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 (RH, T, Td,...) and the threshold hysteresis for each relay. (For the procedure, see the Configuration software, chapter 5.2 "Relay")

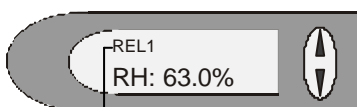
max. switched voltage / max. switched current: 250 VAC / 6A

28 VDC / 6A

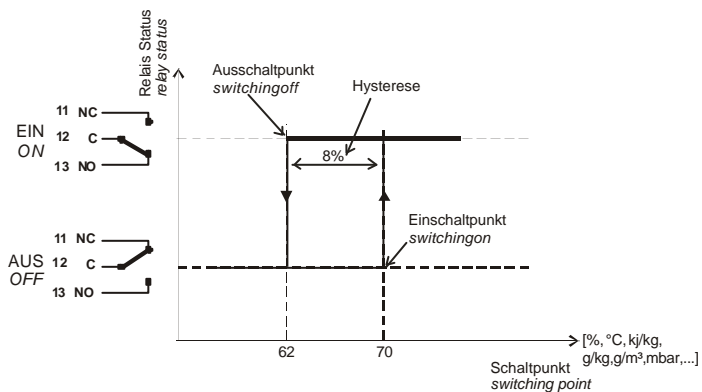
Minimum load:

>100mA / 12V

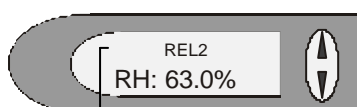
Switching relay 1:



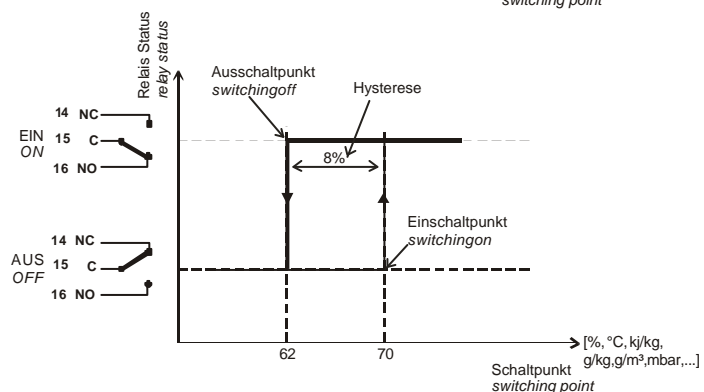
If relay 1 has tripped (ON), then REL1 is displayed.



Switching relay 2:



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



7. HUMIDITY/TEMPERATURE CALIBRATION

The EE29/31 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 into the reference chamber.
- Replace a used dirty filter cap before calibration!

7.1 2-point humidity calibration

For accurate adjustment over the whole working range or in case of sensor exchanges 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
- Two point calibration may be performed directly on the circuit board, or for convenience, 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



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



"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 LCD display.

D1  red



D2  green



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" is flashing.



D2  flashing green

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 LCD display.

D2  flashing green



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 LCD display.

high calibration point:

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

D2  green

S2 

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.

S1 

D2  green

"CALIB HIGH"

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 LCD display.

D1  red

D2  green

S1 

S2 

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" is flashing.

S1 

D2  flashing green

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 LCD display.

D2  flashing green

S2 

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 LCD 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!
- Low temperature point < high temperature point
- Attention: A two 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:

D1  red

S1 

S2 

“CALIB LOW”

D1  red

S1 

S2 

S1 

D2  flashing green

D2  flashing green

S2 

high calibration point:

D1  red

S1 

S1 

“CALIB HIGH”

D1  red

S1 

S2 

D2  flashing green

S1 

D2  flashing green

S2 

1. Insert the sensor probe into the reference temperature 1 (low calibration point) and stabilise for at least 10 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 LCD 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" is flashing.

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 LCD 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 LCD display.

6. Insert the sensor probe into the reference temperature 2 (high calibration point) and stabilise for at least 10 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 LCD 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" is flashing.

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 LCD 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 LCD 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 absolutely 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 one point humidity calibration may be done directly on the circuit board, or for convenience, using the configuration software supplied. (for more details, see the Configuration software, 5.4 "Calibration" / 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 LCD 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 LCD 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 LCD display.

D2  green



D2  green

"CALIB HIGH"



D2  green

S2  "CALIB LOW"

D1  red

D2  green



D2  flashing green



D2  flashing green



7.4 1-point temperature calibration on the circuit board

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



- In accordance with the working range, either the high or low calibration point should be selected. ($CP \geq$ or $< 45 \text{ degC}$)
- This calibration causes an extra inaccuracy for the rest of the working range.
- The one point temperature calibration may be performed directly on the circuit board, or for convenience, using the configuration software supplied. (for more details, see "Software" manual, 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 30 minutes.

D1  red

S1 

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

S1 

"CALIB HIGH"

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 LCD display ($CP \geq 45 \text{ degC}$).

or

S2 

"CALIB LOW"

BUTTON S2: Pressing the button for 5 seconds starts the procedure. The calibration mode is indicated by the symbol "CALIB LOW" on the optional LCD display ($CP \geq 45 \text{ degC}$).

D1  red

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 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.

S1 

D2  flashing green

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 LCD display.

D2  flashing green

S2 

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 LCD display.

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

D1  short flash red



D2  flashing green



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

D2  green



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

D1  short flash red



D1  red



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

D2  short flash green



8. MAINTENANCE

8.1 Sensor replacement



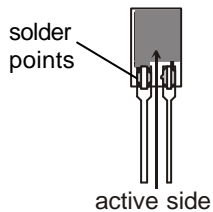
Under several circumstances, the capacitive humidity sensor element can get damaged. To avoid the costly return of the entire transmitter to the manufacturer, easy replacement of the sensor without re-adjustment is possible.

Comments:

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

Sensor replacement procedure:

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



8.2 Sensor probe replacement / optional

Transmitters of the EE29/31-xDx and xEx series are available with an optional remote sensor probe that can be plugged into the middle section of the housing. If the sensor probe gets damaged (damage to the cable, mechanical destruction of the sensor probe) it is possible to replace the probe without re-adjustment.

Note:

- This will invalidate the factory calibration.



Sensor probe replacement procedure:

- 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"

8.3 Self diagnosis and error messages:

Self diagnosis 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 moist (condensation!)

Self diagnosis 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:



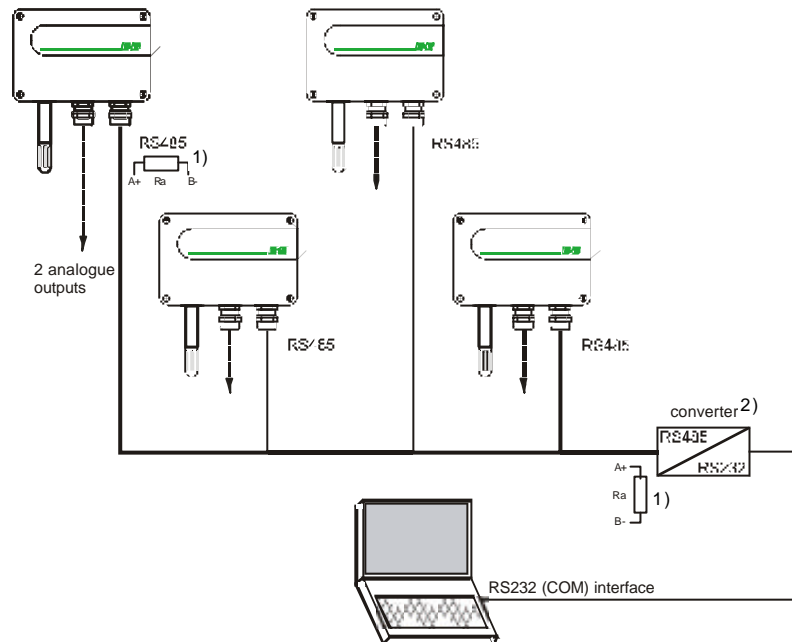
- **Error**
possible cause
⇒ *Measures / Help*
- **Display shows incorrect values**
Error during re-adjustment of the transmitter
⇒ *Reset to factory calibration and repeat the calibration routine*
Filter soiled
⇒ *Replace filter*
Sensor defective
⇒ *Replace sensor*
Output configured incorrectly
⇒ *PC - Software*
- **Long response time**
Filter soiled
⇒ *Replace filter*
Incorrect filter type
⇒ *Filter type should match the application*
- **Transmitter failure**
no supply voltage
⇒ *Check wiring and supply voltage*
⇒ *only green LED is illuminated continuously ⇒ Electronics defect ⇒ contact the manufacturer*
- **High humidity values - red LED blinks**
Dew (condensation) in sensor probe head
⇒ *Dry probe head and check the sensor probe mounting type*
Incorrect filter type (e.g. storage of humidity after stainless steel sintered filter condensation)
⇒ *Filter type should match the application*

9. NETWORK

Up to 32 EE31 transmitters (additional "N" in order code) can be connected in a RS-485 bus system to a single PC interface.

Using the software which is included in the scope of supply the transmitters can be configured individually or in the entire network group.

Network configuration:



- 1) Note: to enable optimum expansion, both ends of the network must be terminated with a terminating resistor with R_a 100 Ohm.
- 2) Note: to adapt the RS232 interface on the PC to the RS485 network protocol, a signal converter is required.

Technical Data:

- Max. network size: 32 transmitters / COM-PORT of PC
- Max. network expansion: 1200m total length
- Transmission rate: 9600 Baud

Mounting notes:

- Data cables:
- external diameter < 4mm
 - 2-core twisted pair
 - Typ. 50 pF/m, impedance 100 Ohm, non-shielded
 - In accordance with the RS485 standard, cables in category 5 (UTP), specified according to EIA/TIA/ANSI 568, meet these requirements.



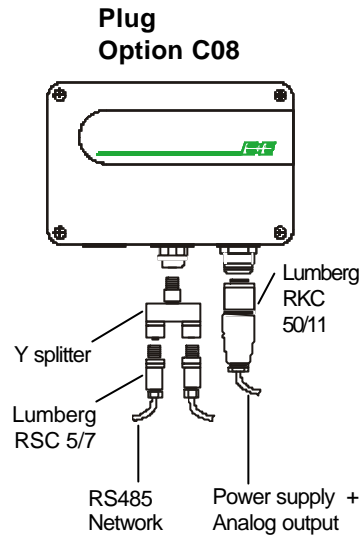
For high noise emissions, especially for large cable lengths, the use of shielded cables is recommended. (Shield laid at GND Ser)

Plug connectors:

To achieve a more flexible network configuration, the transmitters should be equipped with plug connectors. (Option C08)

For the network configuration, the following plug connectors are also necessary:

- Y splitter: Siemens 6ES7 194-1KA01-0XA0
- Plug: Lumberg RSC 5/7



RS232/485 Converter:

To adapt the RS232 interface on the PC to the RS485 network protocol, a signal converter (see schematic, page 19, point 2) is required.

10. REPLACEMENT PARTS / ACCESSORIES:

<u>Description</u>	<u>Order code</u>
- Filter	
- Membrane filter	HA 010101
- Sintered bronze filter	HA 010102
- Sintered stainless steel filter	HA 010103
- Plastic grid	HA 010104
- PTFE Filter	HA 010105
- Metal grid filter	HA 010106
- Display and housing cover	D05
- Replacement probe	
- for EE29/31-xDx with 2 m cable	P02D
- for EE29/31-xDx with 5 m cable	P05D
- for EE29/31-xDx with 10 m cable	P10D
- for EE29/31-xDx with 20 m cable	P20D
- for EE29/31-xEx with 2 m cable	P02E
- for EE29/31-xEx with 5 m cable	P05E
- for EE29/31-xEx with 10 m cable	P10E
- for EE29/31-xEx with 20 m cable	P20E
- Replacement sensors	
- Replacement humidity sensor with sensor data	FE 10
- Replacement humidity sensor with coating and sensor data	FE 10-HC01
- Replacement temperature sensor with sensor data	TE 38
- RS232 interface cable, 2m	HA 010304
- Mounting flange (stainless steel)	HA 010201
- Bracket for fixing onto mounting rails	HA 010203
- Drip water protection	HA 010503
- 1% calibration	1% RH Calibration
- Datalogging and analysis software	HA 010601

11 TECHNICAL DATA:

Technical Data EE31

Measurement values

Relative humidity

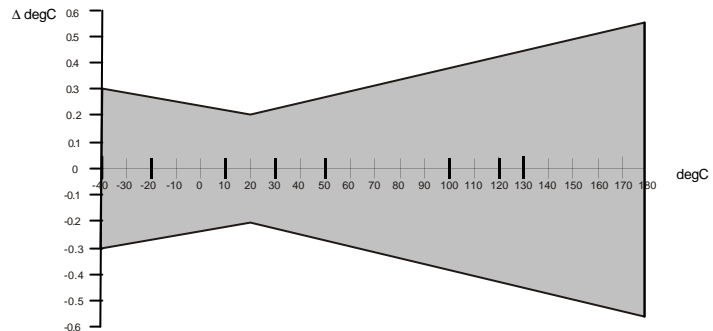
Humidity sensor ¹⁾	HC1000-400		
Working range ¹⁾	0...100% RH		
Accuracy including hysteresis and non-linearity			
- Special calibration against certified standards	± 1% RH (0...90% RH)	± 2% RH (90...100% RH)	
- Standard calibration	± 2% RH (0...90% RH)	± 3% RH (90...100% RH)	
Temperature dependence of electronics	typ. ± 0.01% RH/degC (0.0055% RH/°F)		
Temperature dependence of sensing probe	typ. ± (0.002 + 0.0002 x RH [%]) x ΔT [degC] ΔT = T - 20 degC		
Response time with metal grid filter at 20 degC / t ₉₀	< 15s		

Temperature

Temperature sensor element	Pt1000 (Tolerance class A, DIN EN 60751)		
Working range sensing head	EE31-xAx -40...60 degC (-40...140°F)	EE31-xBx -40...80 degC (-40...176°F)	EE31-xDx -40...180 degC (-40...356°F)
	EE31-xDx -40...180 degC (-40...356°F)	EE31-xEx -40...180 degC (-40...356°F)	
	EE31-xFx -40...60 degC (-40...140°F)		

Accuracy (typ.)

-40...180 degC (-40...356°F)



Temperature dependence of electronics	typ. ± 0.005 degC/degC (°F/°F)		
---------------------------------------	--------------------------------	--	--

Outputs²⁾

Two freely selectable and scaleable analogue outputs 0...100% RH / xx...yy degC respectively	0 - 5V 0 - 10V 4 - 20mA 0 - 20mA	-1mA < I _L < 1mA -1mA < I _L < 1mA R _L < 500 Ohm R _L < 500 Ohm
Serial interface	RS232C RS485 optional	

Max. adjustable measurement range²⁾³⁾

		from	up to			units
			EE31-A,F	EE31-B	EE31-D,E	
Humidity	RH	0	100	100	100	% RH
Temperature	T	-40 (-40)	60 (140)	80 (176)	180 (356)	degC (°F)
Dew-point temperature	T _d	-80 (-112)	60 (140)	80 (176)	100 (212)	degC (°F)
Frost-point temperature	T _f	-80 (-112)	0 (32)	0 (32)	0 (32)	degC (°F)
Wet-bulb temperature	T _w	0 (32)	60 (140)	80 (176)	100 (212)	degC (°F)
Water vapour partial pressure	e	0 (0)	200 (3)	500 (7.5)	1100 (15)	mbar (psi)
Mixture 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 (50000)	1000 (375000)	2800 (999999)	kJ/kg (lbf/lb)

General

Supply voltage	SELV 8...48V DC SELV 12...35V AC (SELV = Self Electrical Low Voltage)	
Current consumption - 2x voltage output - 2x current output	for 24V DC/AC: typ. 40mA typ. 80mA	
Pressure range for pressure tight probe	0.01...15bar (0.15...218psi)	
System requirements for software	WINDOWS 98 or later; serial interface	
Housing / protection class	Plastic PC / IP65; Nema 4	
Cable gland	M16 x 1.5	
Electrical connection	screw terminals up to max. 1.5mm ² (AWG 16)	
Sensor protection	stainless steel sintered filter, PTFE filter or metal grid filter	
Operating temperature range of electronics	-40...+60 degC (-40...140°F)	
Working and storage temperature range		
Housing with display	-20...+50 degC (-4...122°F)	
Storage temperature range	-40...+60 degC (-40...140°F)	
Electromagnetic compatibility according to	EN61000-6-2 EN50081-1	EN61010-1 ICES-003 ClassB FCC Part15 ClassB



Hardware¹⁾ See Working range of the humidity sensor!

²⁾ Can be easily changed by software.

³⁾ See accuracy of computational functions.

Technical Data EE29

Measurement values

Relative humidity

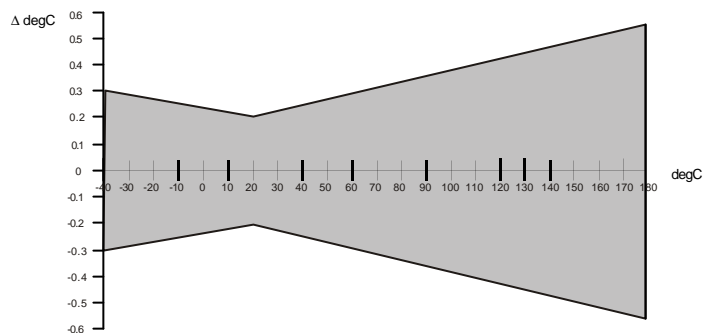
Humidity sensor ¹⁾	HC1000-400	
Working range ¹⁾	0...100% RH	
Accuracy including hysteresis and non-linearity		
- Special calibration against certified standards	± 1% RH (0...90% RH)	± 2% RH (90...100% RH)
- Standard calibration	± 2% RH (0...90% RH)	± 3% RH (90...100% RH)
Temperature dependence of electronics	typ. ± 0.01% RH/degC (0.0055% RH/°F)	
Temperature dependence of sensing probe	typ. ± (0.002 + 0.0002 x RH [%]) x ΔT [degC]	ΔT = T - 20 degC
Response time with metal grid filter at 20 degC / t ₉₀	< 15s	

Temperature

Temperature sensor element	Pt1000 (Tolerance class A, DIN EN 60751)		
Working range sensing head	EE29-xAx -40...60 degC (-40...140°F)	EE29-xBx -40...80 degC (-40...176°F)	EE29-xEx -40...180 degC (-40...356°F)
	EE29-xDx -40...180 degC (-40...356°F)	EE29-xEx -40...180 degC (-40...356°F)	
	EE29-xFx -40...60 degC (-40...140°F)		

Accuracy (typ.)

-40...180 degC (-40...356°F)



Temperature dependence of electronics	typ. ± 0.005 degC/degC (°F/°F)	
---------------------------------------	--------------------------------	--

Outputs²⁾

Two freely selectable and scaleable analogue outputs	0 - 5V	-1mA < I _L < 1mA
0...100% RH / xx...yy degC respectively	0 - 10V	-1mA < I _L < 1mA
	4 - 20mA	R _L < 500 Ohm
	0 - 20mA	R _L < 500 Ohm

General

Supply voltage	SELV 8...48V DC SELV 12...35V AC (SELV = Self Electrical Low Voltage)		
Current consumption - 2x Voltage output	for 24V DC/AC: typ. 40mA		
- 2x Current output	typ. 80mA		
Pressure range for pressure tight sensor	0.01...15bar (0.15...218psi)		
System requirements for software	WINDOWS 98 or later; serial interface		
Housing / protection class	Plastic PC / IP65; Nema 4		
Cable gland	M16 x 1.5		
Electrical connection	screw terminals up to max. 1.5mm ² (AWG 16)		
Sensor protection	stainless steel sintered filter, PTFE filter or metal grid filter		
Working temperature range of electronics	-40...+60 degC (-40...140°F)		
Working and storage temperature range			
Housing with display	-20...+50 degC (-4...122°F)		
Storage temperature range	-40...+60 degC (-40...140°F)		
Electromagnetic compatibility according to	EN61000-6-2	EN61010-1	ICES-003 ClassB
	EN50081-1	FCC Part15 ClassB	

¹⁾ See working range of humidity sensor!

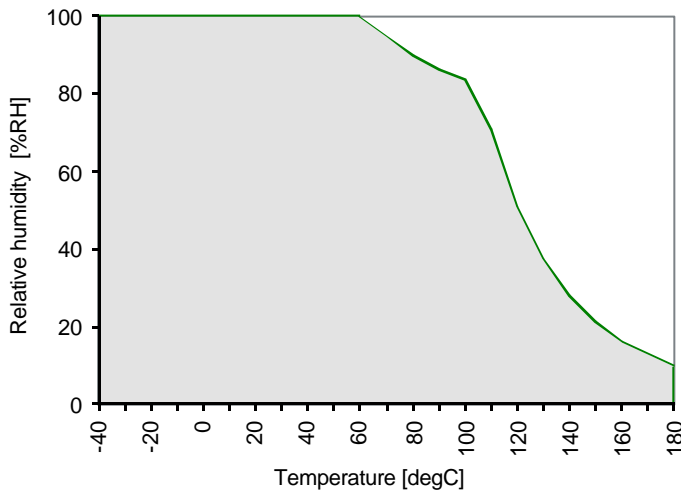
²⁾ Can easily be changed by software.



Technical Data for Options EE29/EE31

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 28V DC / 6A		
Threshold + hysteresis	can be adjusted with configuration software		
Switching parameters	freely selectable between:	EE29	EE31
	RH	Relative humidity	✓
	T	Temperature	✓
	Td	Dew-point temperature	✓
	Tf	Frost-point temperature	✓
	Tw	Wet-bulb temperature	✓
	e	Water vapour partial pressure	✓
	r	Mixture ratio	✓
	dv	Absolute humidity	✓
	h	Specific enthalpy	✓

Operating range humidity sensor



The gray area shows the allowed measurement range for the humidity sensor.

Operating points outside of this range do not lead to destruction of the element, but the specified measurement accuracy cannot be guaranteed.

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 (EE29 / EE31) as well as of transmitter networks (only EE31).

This software tool is included in delivery.

System requirements: MS WINDOWS 98® or higher; RS232 serial interface

2. INSTALLATION

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



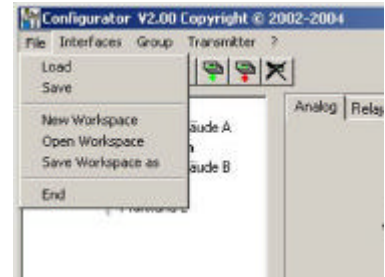
Note:

If the configuration software has already been installed, or for upgrade only, 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 EE29/31 Configurator by clicking on the appropriate button and then install the upgrade.

3. ICONS ON THE TOOLS 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 (new network).

Open Workspace: Opens existing trees (networks).

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

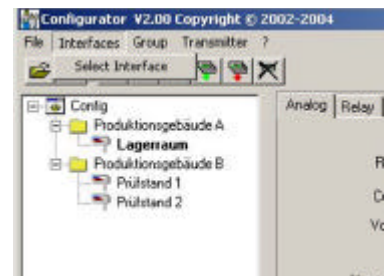


Note:

The functions "Save Workspace" and "Open Workspace" apply to the tree structure only, not to the configurations of individual transmitters! Therefore only the network structure is saved. Transmitters configurations must be reloaded using the command "Read All Transmitters."



3.2 Interfaces



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

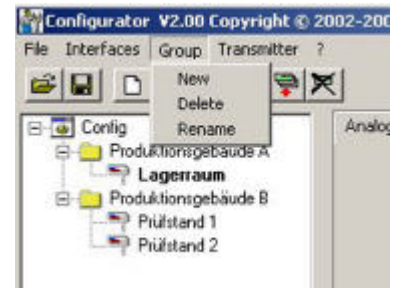
use / do not use: Marked COM ports are greyed out and deactivated for the configuration software (e.g., COM for integrated Notebook Modem).



Note:

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

3.3 Group



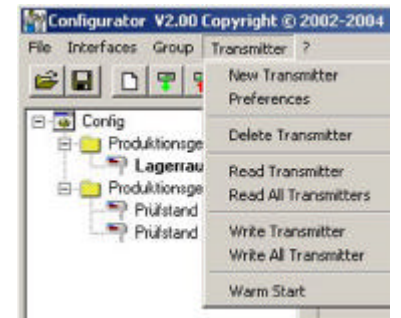
The icon "Group" provides the option of combining transmitters in groups. A group may consist of transmitters used in the same application, for instance assigned to a building (EE29/31), or belonging to the same transmitter network (EE31).

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: The check box "network" must be selected when several transmitters are operated in a network (EE31 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: Input of the network address for the EE31 transmitter for unique assignment within the network (see label on the transmitter housing).

Name: Assigns a meaningful name corresponding 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:

Reads the configuration for all transmitters.



Note:

Only those parameters that have the same value for all transmitters of the network will be displayed. Other values are shaded and can not be selected or changed.

Write:

Writes the current configuration into the selected transmitter.

Write All:

Writes the current configuration to all selected transmitters.



Set the configuration for a transmitter, then select the appropriate network in the tree and write the configuration all transmitters of the target group using the command "Write All."

Warm Start:

Resets and restarts the microprocessor of the selected transmitter.

3.5 ? - Information

Version:

Displays the version number of the EE29/31 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)



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



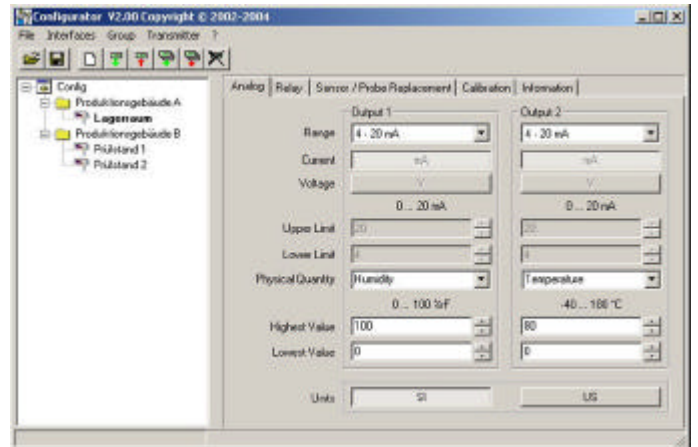
"Write All Transmitters" (see Configuration Software, chapter 3.4 Transmitter)



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

5. INDEX - INDEX CARDS

5.1 Analogue



For easy 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.

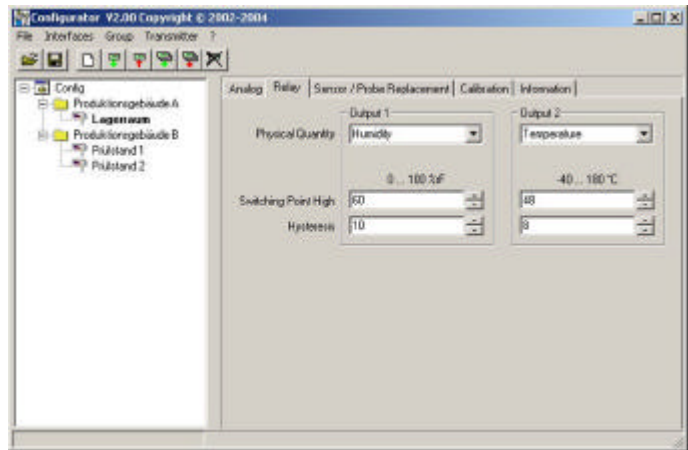
Upper / Lower Limit:

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



It is used to set both optional alarm outputs.

Physical Quantity:

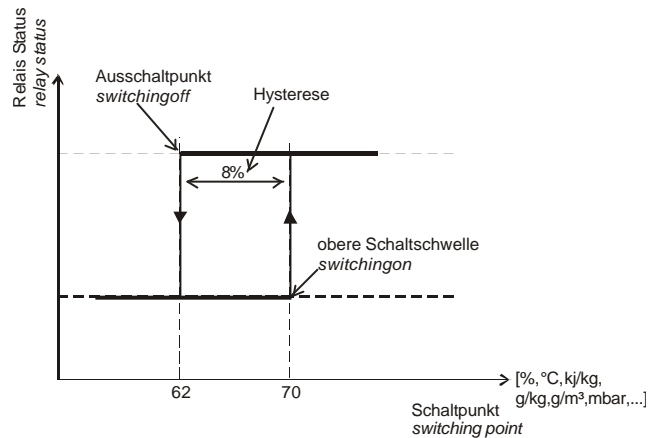
Selects the physical quantity for each alarm output.

Switching Point High:

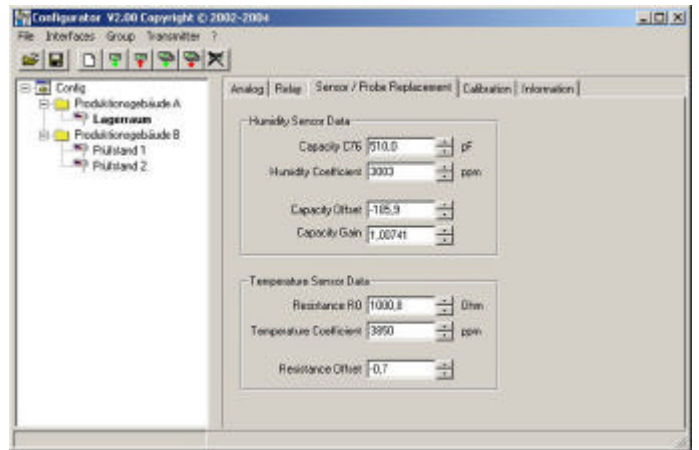
Sets the high switching point.

Hysteresis:

Sets the switching hysteresis that should be maintained each time the signal falls below the upper switching threshold.



5.3 Sensor / Probe Replacement

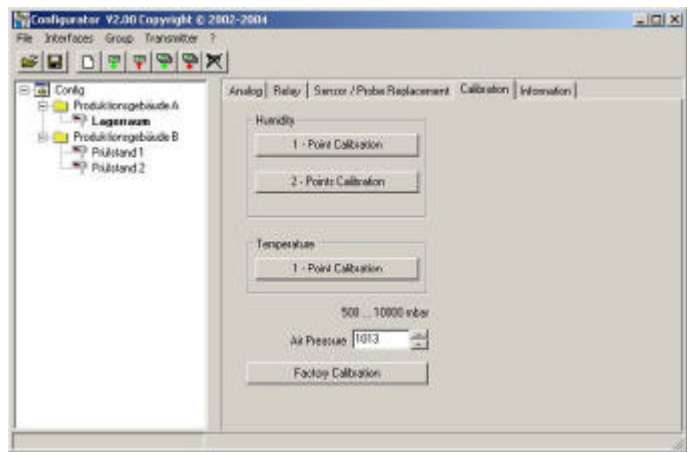


In case of sensor or probe replacement, the characteristic values for this sensor/probe must be saved in the transmitter, thereby the transmitter will operate within the specified accuracy range without the need for costly recalibration.

- 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 humidity sensor 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 coefficients, and the resistor offset in the corresponding input fields.
 - 4) Save the settings by clicking on the button "Save Transmitter."

5.4 Calibration



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 EE29/31 software.



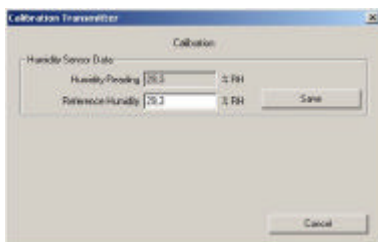
Note: A two-point calibration for temperature is only possible on the circuit board and is not supported by the software.

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”



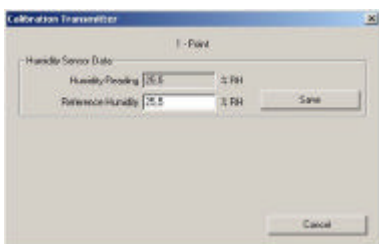
- 1) Stabilise the probe of the desired humidity for min. 30 minutes.
- 2) Click on the Humidity "1-point calibration" button. The measured values will now appear in both input fields.
- 3) Replace the value in the input field "Humidity Reading" with the reference humidity (value of the saline solution 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:**

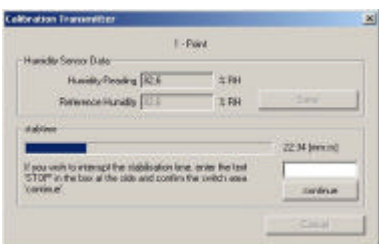
Calibration for accurate results over the entire measurement range.



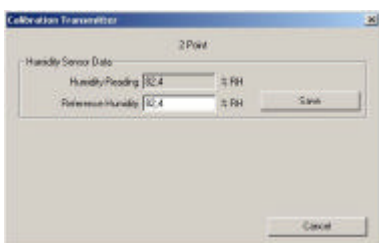
For calibration procedure, see Hardware, chapter 7 "Humidity/Temperature Calibration".



- 1) Place the probe at the reference humidity (lower point).
- 2) Click on the Humidity Two-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.

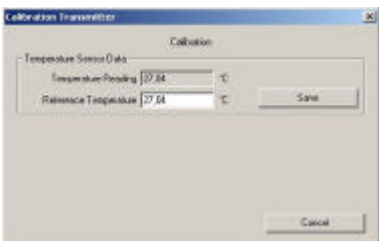


- 5) Place the probe at the reference humidity (high point).
- 6) Before continuing wait till the 30-minute stabilisation period is over.
- 7) Replace the value in the input field "Humidity Reading" with the reference humidity. (Value of the saline solution or display of HUMOR 20)
- 8) By clicking on "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.



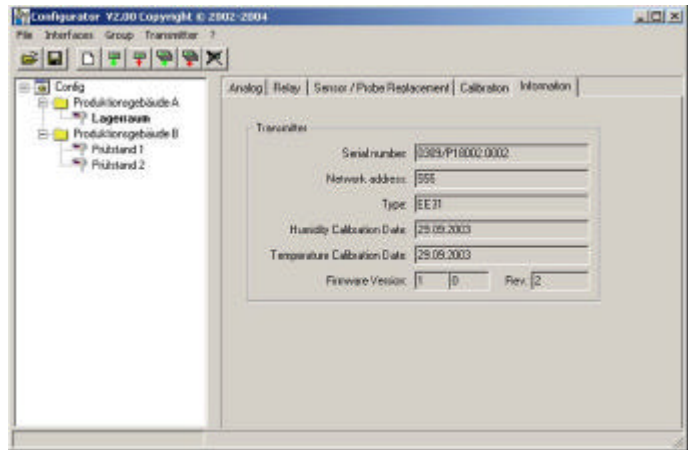
1-point calibration **Temperature:**

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.

Network address:

Each measuring transmitter is assigned a unique network address at the factory for precise identification within the network.



Note:

This identification number is also issued for transmitters of the EE29 series, although transmitters of this series are not network compatible.

Type:

Specifies whether the transmitter belongs to the EE29 or EE31 series.

Humidity Calibration Date:

Provides information on the date of the last humidity calibration, but only where this was performed using the configuration software.



Note:

Manual calibration processes performed directly on the circuit board are not recorded!

Temperature Calibration Date:

Provides information on the date of the last temperature calibration, but only where this was performed using the configuration software.



Note:

Manual calibration processes performed directly on the circuit board are not recorded here!

Production number:

Used to track the manufacturing data of the transmitter.

Version / Revision:

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."

If the transmitter is from the EE31 series and will belong to a transmitter network, then select the box "Network" and enter the network address assigned by E+E (can be found on the housing label) in the "Network Address" field.

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 or adapted.

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."

HEAD OFFICE:

E+E ELEKTRONIK Ges.m.b.H.
Langwiesen 7
A-4209 Engerwitzdorf
Austria
Tel: ++43/7235/605-0
Fax: ++43/7235/605-8
info@epluse.at

TECHNICAL OFFICES:

E+E CHINA

B0820, Hui Bin Office Building,
No. 8, Bei Chen Dong St., Chao Yang District,
Beijing 100101, P.R. China
Tel: ++86/10/84992361; ++86/10/84992362
Fax: ++86/10/84992363
info@epluse.cn

E+E FRANCE

Les Crêtes Dorées 1
F-69210 Sourcieux les Mines
Tél / Fax.: ++33/4/74723582
info@epluse.fr

E+E GERMANY

Schöne Aussicht 8c
D-61348 Bad Homburg
Tel: ++49/6172/13881 0
Fax: ++49/6172/13881 26
epluse@ee-elektronik.de