



# Series **EE30EX**

**HUMIDITY / TEMPERATURE  
TRANSMITTER**

**for intrinsically safe  
applications**

## **Manual**

*YOUR PARTNER IN SENSOR TECHNOLOGY*



**ELEKTRONIK<sup>®</sup>**  
Ges.m.b.H.

These Operating Instructions represent a component part of the supply package and serve to ensure an optimum operation and functioning of the equipment.

In order to guarantee a trouble free operation, these Operating Instructions must be read completely before putting the transducer into operation. They must be familiar to all persons, who are responsible for installation, putting into operation, operation, inspection, maintenance and repair.

These Operating Instructions may not without our written agreement be used for competitive purposes or be passed on to others. It is permitted to take copies for one's own use. All information contained in these instructions, technical data and technical diagrams are based on the latest available information at the time of production.

E+E Elektronik GmbH reserves the right, at any time and without prior notice to make alterations to the technical data or other technical modifications, without assuming an obligation to upgrade models, which were manufactured prior to the date of such modifications.

On this basis we ask you, to make contact with our Customer Services giving the equipment number, reference and type readable on the type shield.

**©Copyright E+E Elektronik GmbH  
All rights reserved.**

# TABLE OF CONTENTS

<b>1.</b>	<b>GENERAL INFORMATION</b>	<b>4</b>
	1.1 <i>Symbol assertion</i>	4
	1.2 <i>Safety instructions</i>	4
	1.2.1 <i>General safety information</i>	4
	1.2.2 <i>Safety information related to the EE30EX</i>	4
<b>2.</b>	<b>TECHNICAL DESCRIPTION</b>	<b>5</b>
	2.1 <i>General</i>	5
	2.2 <i>Construction and identification</i>	6
	2.3 <i>Models</i>	7
<b>3.</b>	<b>INSTALLATION</b>	<b>8</b>
	3.1 <i>Selecting a place for the transmitter</i>	8
	3.2 <i>Installation of the housing</i>	8
	3.3 <i>Installation of the probe</i>	9
	3.3.1 <i>Installation of the drip water protection and the flange</i>	9
	3.3.2 <i>Installation of the threaded tube</i>	9
<b>4.</b>	<b>ELECTRICAL CONNECTIONS</b>	<b>10</b>
	4.1 <i>Cable</i>	10
	4.2 <i>Connection diagram EE30EX</i>	10
	4.2.1 <i>Connection of the data cable</i>	10
	4.2.2 <i>Connection of the data cable on the SEU (option)</i>	11
	4.2.3 <i>Connection of the data cable on the SDU (option)</i>	11
	4.2.4 <i>Connection of supply / analogue outputs / serial interface RS232</i>	12
	4.3 <i>Earthing concept</i>	13
<b>5.</b>	<b>SOFTWARE RELATED OPERATION</b>	<b>14</b>
	5.1 <i>Operation under Windows<sup>TM</sup></i>	14
	5.1.1 <i>System preconditions</i>	14
	5.1.2 <i>Installation of the EE30 RH &amp; T-TRANSMITTER Program</i>	14
	5.1.3 <i>Putting into operation of the EE30 RH &amp; T-TRANSMITTER Program</i>	14
	5.2 <i>Software functions</i>	15
	5.2.1 <i>FILE</i>	15
	5.2.2 <i>SETUP</i>	15
	5.2.3 <i>VIEW</i>	17
	5.2.4 <i>CALIBRATE</i>	18
	5.2.5 <i>HELP</i>	19
	5.3 <i>Operating via a terminal</i>	19
	5.3.1 <i>Hardware preconditions</i>	19
	5.3.2 <i>Operating commands</i>	20
<b>6.</b>	<b>MAINTENANCE</b>	<b>23</b>
	6.1 <i>Filter change</i>	23
	6.2 <i>Cleaning</i>	23
	6.3 <i>Sensor change</i>	23
	6.4 <i>1-point calibration of the relative humidity and temperature</i>	24
	6.4.1 <i>Calibration of the relative humidity</i>	24
	6.4.2 <i>Calibration of the temperature</i>	24
	6.5 <i>Order information for accessories</i>	24
<b>7.</b>	<b>TECHNICAL DATA</b>	<b>25</b>
	7.1 <i>Working range of the humidity sensor</i>	25
	7.2 <i>Accuracy tables for the computer functions</i>	26
<b>8.</b>	<b>CERTIFICATES ATEX</b>	<b>27</b>
<b>9.</b>	<b>CERTIFICATES IECEx</b>	<b>38</b>

# 1. GENERAL INFORMATION

## 1.1 Symbol assertion



**This symbol represents safety instructions.**

These safety instructions should always be followed carefully. The manufacturer shall not accept liability for any use of the equipment that contravenes these instructions and the user shall bear sole responsibility.



**This symbol indicates a note.**

These notes should be observed to achieve optimum functioning of the equipment.



**This symbol indicates instructions which have to be followed strictly in explosive areas.**



## 1.2 Safety instructions

### 1.2.1 General safety information

Dangers can arise from the equipment however, if it is employed by untrained personnel in an unprofessional manner or is used improperly! This creates:

- Dangers for the equipment, further expense for the user and
- Endangers the efficient working of the equipment.

**In view of one's own safety the following information is to be especially observed:**

- Only qualified or specially responsible personnel may be engaged in the working or the operation of the equipment.
- The supplied operating instructions must always be available for each person engaged in the installation, putting it into operation, operation and maintenance.
- The equipment may only be operated in a trouble-free condition.
- Established defects must be immediately eliminated by experienced personnel or by E+E Elektronik Customer Services.
- Any selfconversion and alteration undertaken on the equipment is not permitted.
- 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
- The devices are constructed for the operation of separated extra-low voltage (SELV).



### 1.2.2 Safety information related to the EE30EX

- When connecting the linking cable, creating the earthing and connecting the cable screening these Operating Instructions must be expressly observed.
- The earthing of the screening of the data cable (DC) outside the explosion danger area is strictly forbidden.
- All cable ends must be equipped with suitable cable end sleeves.
- Length alterations of the measuring head lead (MHL) may only be carried out by the manufacturer (the transmitter must be recalibrated).
- Extreme mechanical and incorrect loading of the EE30EX is to be expressly avoided.
- The maximum voltage ( $V_m$ ), which may appear on the non-intrinsically safe connections of the EE30EX Supply and Evaluation Unit in the event of a fault may amount to  $250 V_{eff}$ .



## 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. TECHNICAL DESCRIPTION

### 2.1 General

EE30EX meets the **ATEX requirements** and **IECEx standards** of intrinsically safe machinery:

Applied standards for ATEX:

**EN60079-0:2009**

**EN60079-11:2007**

**EN60079-26:2007**

Applied standards for IECEx:

**IEC 60079-0:2011**

**IEC 60079-11:2011**

**IEC 60079-26:2006**

The EC type examination was carried out by Physikalisch-Technische Bundesanstalt (PTB), the German national institute for science and technology.

The transmitters of EE30EX series consist of:

- EE30EX supply and evaluation unit, classified according to **II (1) G [Ex ia Ga] IIC** subject to EC-type examination certificate **PTB 99 ATEX 2042** and **[Ex ia Ga] IIC** according to **IECEx PTB 05.0031-2**.
- sensor driver unit and sensor probe, classified according **II 1/2 G Ex ia IIC T6 Ga/Gb** subject to EC-type examination certificate **PTB 99 ATEX 2043 X** and **Ex ia IIC T6 Ga/Gb** according to **IECEx PTB 05.0032X-2**.

The basis for this highly accurate transmitter series is created from E+E humidity sensor elements of the HC Series. In addition to the measured values of **relative humidity (rh)** and **temperature (T)** the transmitter provides the following operands:

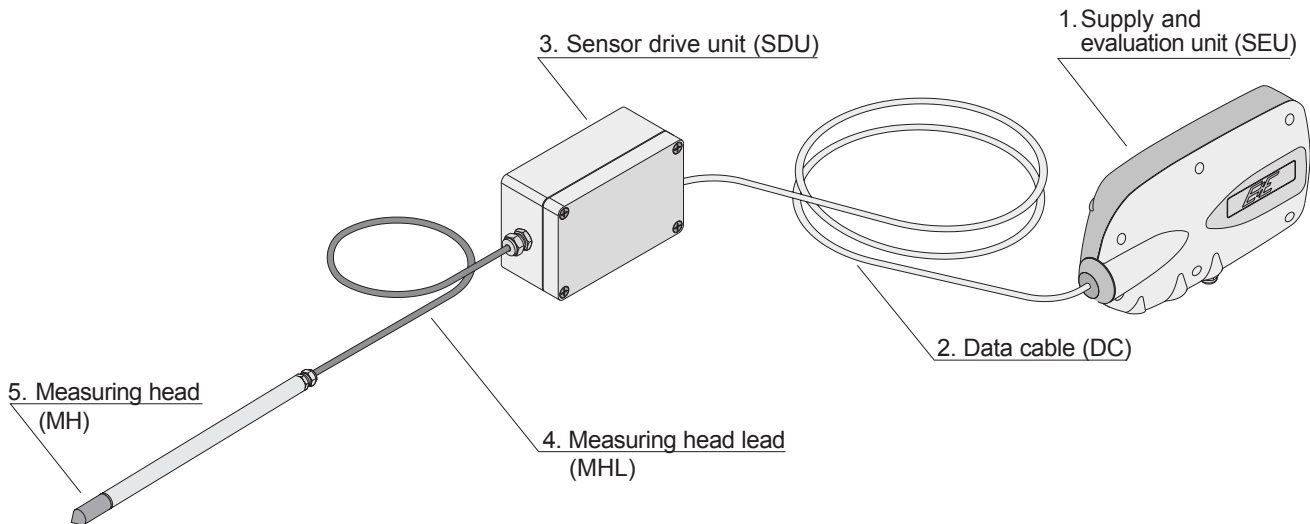
• <b>absolut humidity</b>	<b>dv</b>
• <b>wet bulb temperature</b>	<b>Tw</b>
• <b>specific enthalpy</b>	<b>h</b>
• <b>dew point temperature</b>	<b>Td</b>
• <b>frostpoint temperature</b>	<b>Tf</b>
• <b>mixture ratio</b>	<b>r</b>
• <b>water vapour partial pressure</b>	<b>e</b>

These values can be created on 2 free scale and verifiable analogue outputs either as voltage- or currentsignal.

For digital further processing the output signal provides all output quantities through a serial RS232 interface.

EE30EX complies with the standard EN 61000-4-4 electromagnetic compatibility (EMC) - Part 4-4: testing and measurement techniques - test of immunity to interference against fast transient electrical disturbance/burst (IEC 61000-4-4:2004) "Criterion B".

## 2.2 Construction and identification



### 1. Supply and Evaluation Unit (Abr. SEU):

ABS plastic housing with integrated supply and evaluation unit, electric connections for supply / output and necessary jumper for configuration.

**Identification:** ATEX:  $\text{Ex}$  II (1)G [Ex ia Ga] IIC  
IECEX:  $\text{Ex}$  [Ex ia Ga] IIC

### 2. Data cable (Abr. DC):

Up to a maximum of 100m (328ft) long, screened 6 core cable type LIYCY3x2x0,14 up to LIYCY3x2x0,5 with a blue external cover.  
Connection between the SDU and the SEU.

### 3. Sensor Drive Unit (Abr. SDU):

The SDU fulfils the role of a communication node between the measuring point and the SEU.

The SDU is an independently explosion protected unit with protection type "Intrinsically safe" and is installed in an Ex-certified AISi12 housing.

**Identification:** ATEX:  $\text{Ex}$  II 1/2 G Ex ia IIC T6 Ga/Gb  
IECEX:  $\text{Ex}$  Ex ia IIC T6 Ga/Gb

### 4. Measurement head lead (Abr. MHL):

Up to a maximum of 10m (32.8ft) long, screened 4 core cable as connection between the SDU and the MH (only with EE30EX-D and EE30EX-E).  
The MH is directly built into the SDU with the EE30EX-A.

### 5. Measuring head (Abr. MH):

The MH contains the humidity and temperature sensor under the filter.

**Identification:** ATEX:  $\text{Ex}$  II 1/2 G Ex ia IIC T6 Ga/Gb  
IECEX:  $\text{Ex}$  Ex ia IIC T6 Ga/Gb



**Attention:** The intrinsically safe SDU, MH and SEU are functionally inseparable parts!

## 2.3 Models

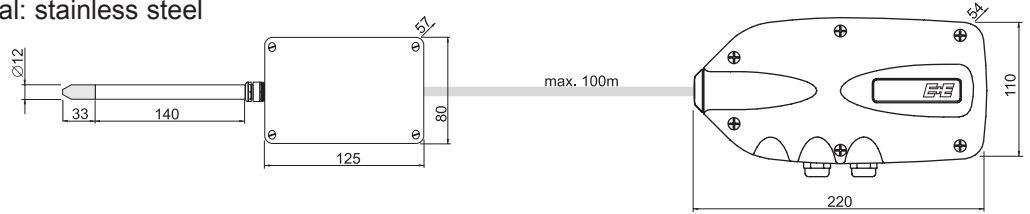
The series EE30EX are available in following models:

1m = 3.28ft / 1ft = 0.30m  
 1 mm = 0.03937" / 1" = 25.4 mm

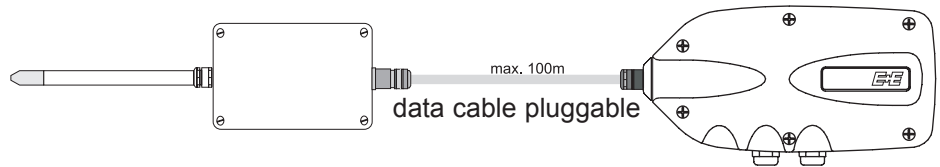
### Wall mounting

#### EE30EX-A

probe material: stainless steel



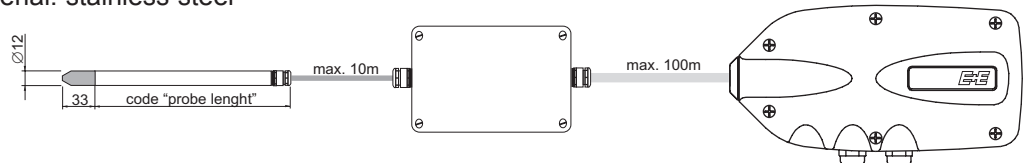
#### EE30EX-A-P02



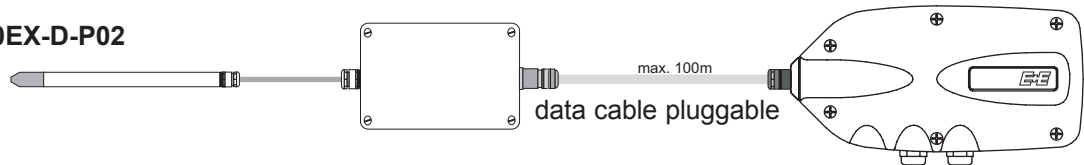
### Remote probe up to 180degC (356°F)

#### EE30EX-D

probe material: stainless steel



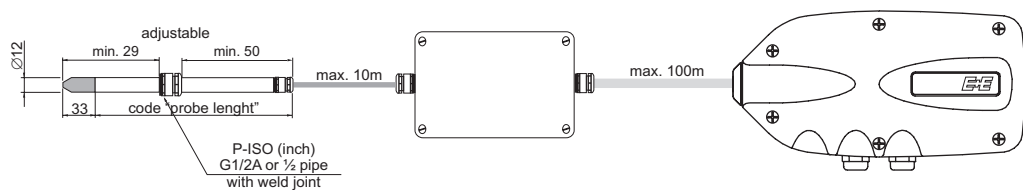
#### EE30EX-D-P02



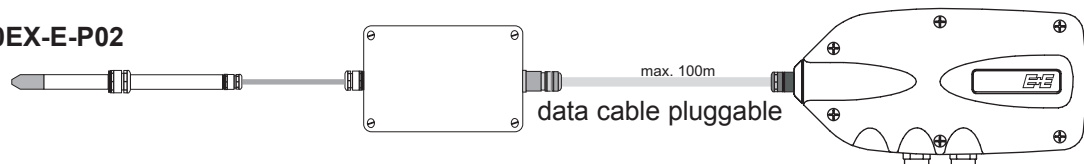
### Pressure tight probe up to 15 bar (218psi)

#### EE30EX-E

probe material: stainless steel



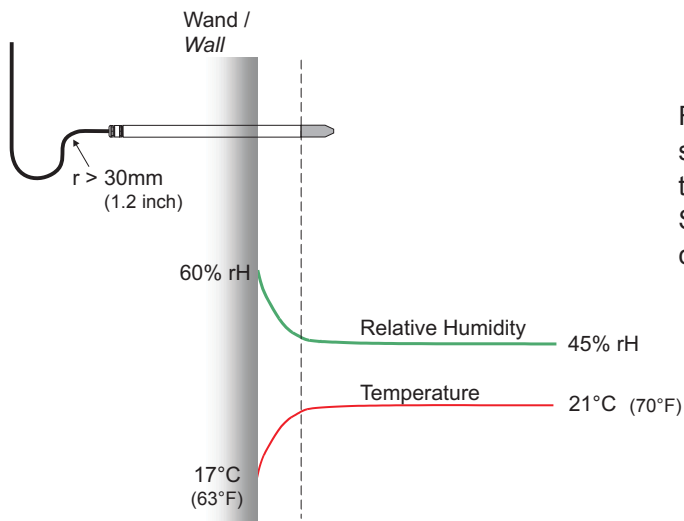
#### EE30EX-E-P02



### 3. INSTALLATION



#### 3.1 Selecting a place for the transmitter

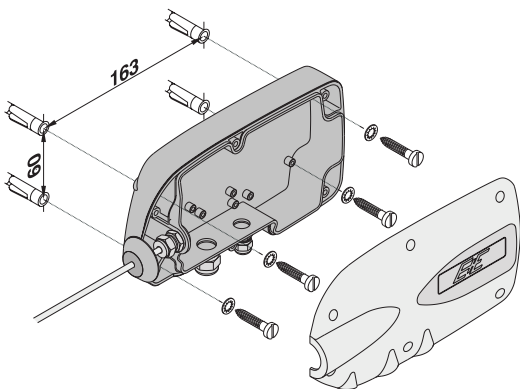


For mounting the transmitter select a place with stable conditions, do not expose the transmitter to direct sunlight or rain. Select a place representing the process conditions when mounting the sensor head.

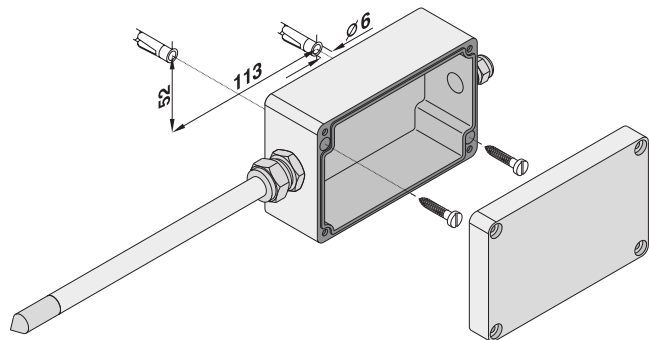
#### 3.2 Installation of the housing

1 mm = 0.03937" / 1" = 25.4 mm

Supply and evaluation unit (SEU)



Sensor drive unit (SDU)



4 pieces metal fixing screws M4x20(...60) are used for mounting and the low-impedance connection between internal varnishing and e.g. grounded mounting panel. (more details see point 4.3 earthing concept)



The measurement head must be mounted horizontally or vertically (pointing downwards). (measurement fault through condensation water)



### 3.3 Installation of the probe



In gas group IIC areas (requiring category I devices) has to be guaranteed that during the installation work of the sensor heads, sparks generated by impacts or friction on the housings surface can never occur even in fault cases.

#### Mechanical environmental conditions



The mechanical factors of the installation site (e.g., vibrations, shock stresses due to start-up processes, temperature fluctuations,...) must be considered during installation of the measuring head.

If the mechanical stability or the tightness of the probe and pressure-tight fitting are not guaranteed, then additional fixtures or supports should be provided. For the EE30Ex model, which can be installed in a zone separation wall, IP67 protection must be guaranteed between the zones.



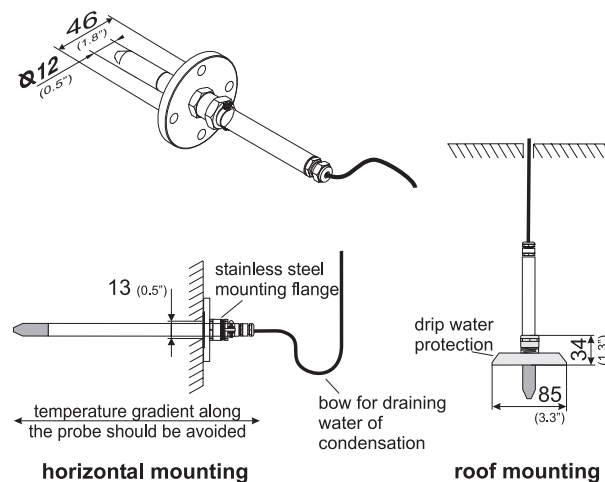
#### Filter caps

The stainless steel sintered filter cap, the stainless steel grid filter cap and the stainless steel filter cap should be used according to specifications without restrictions. The teflon filter cap (PTFE) and the metal grid filter cap guarantee sufficient protection against electrostatic discharge in terms of explosion group IIB.

#### 3.3.1 Installation of the drip water protection and the flange



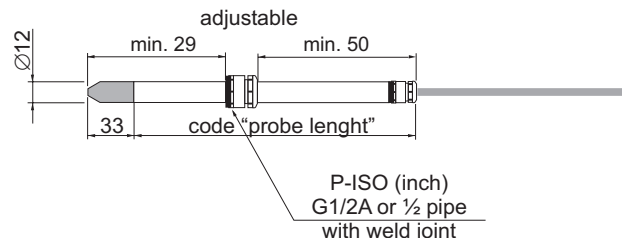
The mounting flange may not be used as separation between two zones. It shall be used for mounting in the explosion endangered area within one certain zone.



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

#### 3.3.2 Installation of the threaded tube

1 mm = 0.03937" / 1" = 25.4 mm



- 1) Mount the threaded tube in the partition wall. The threaded tube can be used as a separation between two zones. Therefore the connection must be screwed in the partition wall and it has to show a tightness of IP67.
- 2) Push the measurement probe into the required position in the fitting, turn the nut "finger tight".
- 3) Then turn the nut with an open ended spanner for **1 1/4 turn**.

#### **Further installation:**

- 1) Push the measurement probe with the clamping ring into the fitting up to the stop.
- 2) Turn the nut "finger tight", then tighten with a spanner ca. **1/4 turn**.

## 4. ELECTRICAL CONNECTIONS

### 4.1 Cable

The electrical installation must be done by qualified personell in compliance with the general electrotechnical connection requirements as well as the accident prevention instruction of the respective country.



#### Data cable

This cable has to be conform with following specifications:

- **LIYCY3x2x0,14 up to LIYCY3x2x0.5**
- single conductor diameter  $\geq 0.1\text{mm}$  (0.004")
- cable diamter (fixed mounting) 4 - 8mm (0.15 - 0.3")
- cable diamter (pluggable mounting) 6 - 8mm (0.2 - 0.3")
- supply voltage:  $\geq 250\text{V}$
- test voltage conductor-conductor  $\geq 500\text{V AC eff.}$
- test voltage conductor-screening  $\geq 500\text{V AC eff.}$
- inductance of cable:  $\leq 1\text{mH/km}$
- resistance of cable:  $\leq 150\ \text{Ohm/km}$

#### Cable for supply voltage and analoque outputs

Recommended cable:

- LiYCY 5 x 0.25 mm<sup>2</sup>
- the cable entry is achieved through **PG 9** cable glands
- cable diameter: **4 - 8 mm** (0.15 - 0.3")

#### Cable for serial interfaces

Recommended cable for serial interfaces:

- LiYCY 3 x 0.25 mm<sup>2</sup>
- the cable entry is achieved through **PG 7** cable glands
- cable diameter: **3 - 6.5 mm** (0.1 - 0.3")

### 4.2 Connection diagram EE30EX

#### 4.2.1 Connection of the data cable

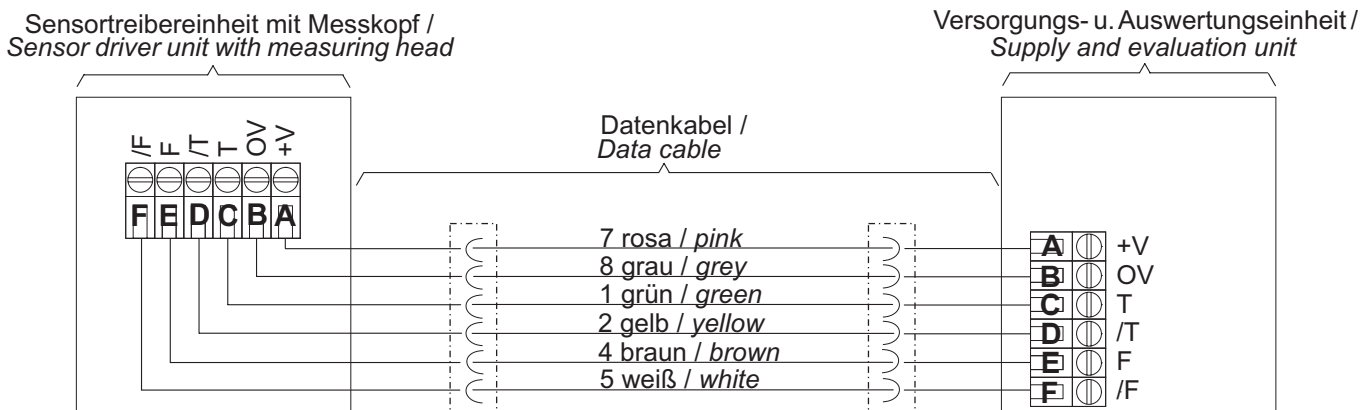


Modification of the cable lenght can be made without influence on the measuring accuracy.

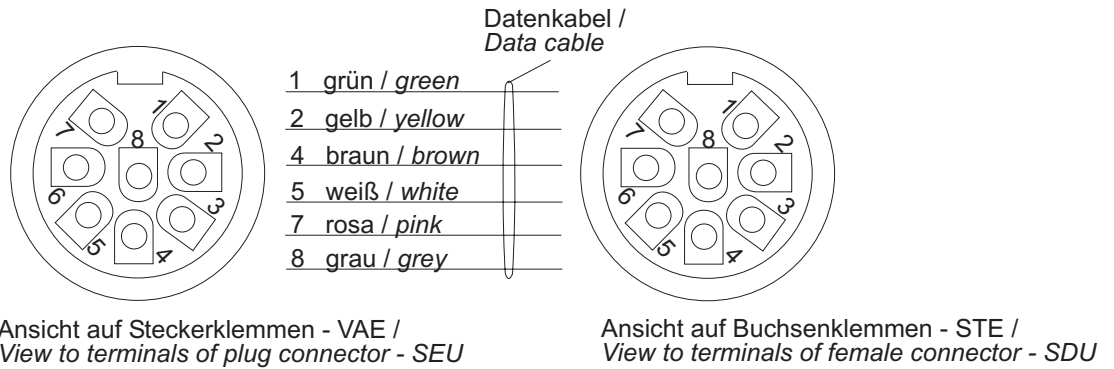


All the cable ends entering the equipment must each be equipped with end sleeves which match the wire diameters.

#### Data cable for connection with screwed terminals (standard)



## Data cable pluggable (option)

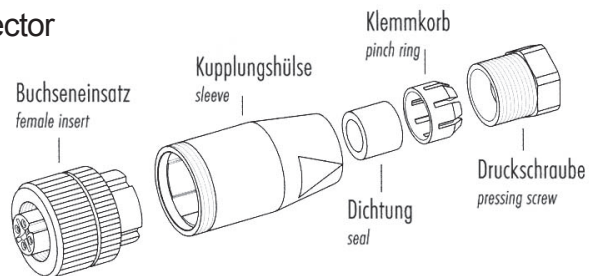


When connecting the data cable you must use cable end sleeves!

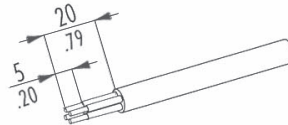
### 4.2.2 Connection of the data cable on the SEU (option)

#### construction of the connector

connector  
Manufacturer: Binder  
Series: 713; 8-pole; plastic



#### cable dimensions

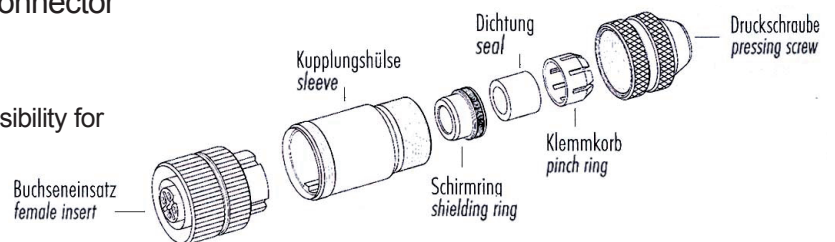


The earthing of the screening of the data cable outside the explosion danger area is strictly forbidden.

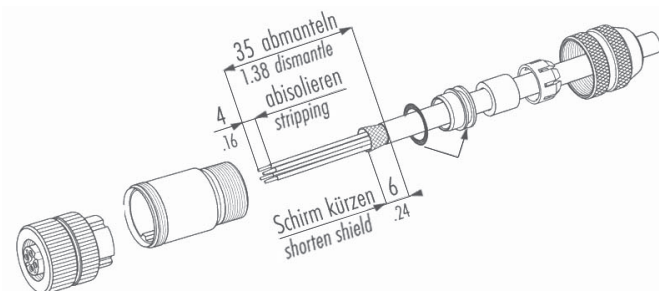
### 4.2.3 Connection of the data cable on the SDU (option)

#### construction of the connector

connector  
Manufacturer: Binder  
Series: 713; 8-pole; possibility for screen



#### cable dimensions



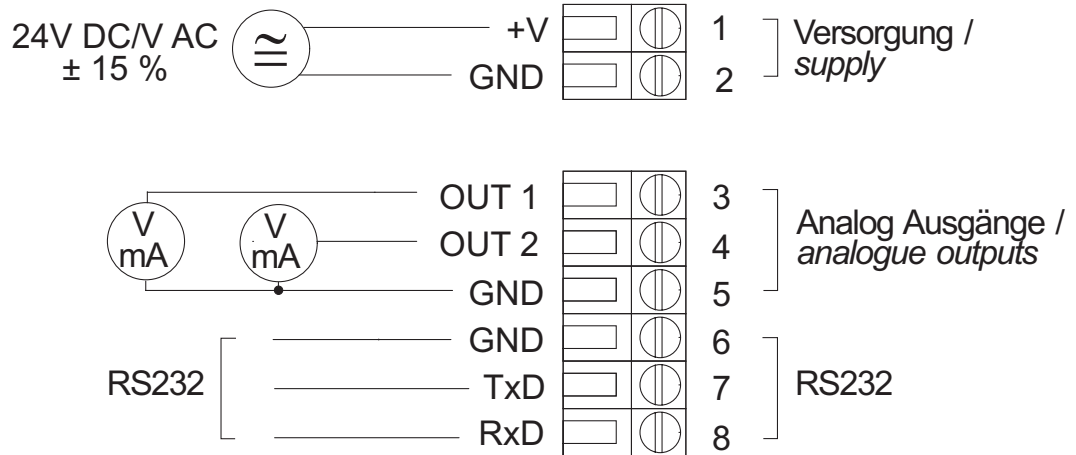
ATTENTION: If the plug is removed, the plug socket must be sealed by means of a protective cap.

#### 4.2.4 Connection of supply / analogue outputs / serial interface RS232

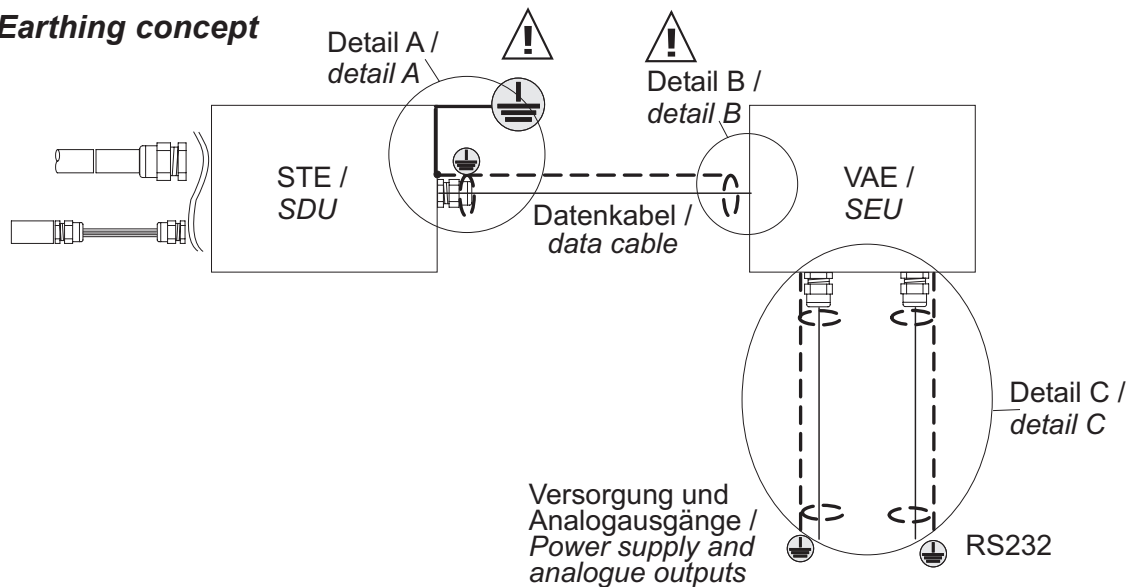
- With respect to the screening of the supply- and measurement connection of the SEU you have to follow the earthing concept. (see point 4.3, detail C)



- When connecting the supply voltage, the analogue- and digital outputs it is recommended to use cable end sleeves.
- Maximal cross-section for the connection of the wire  $\leq 1.5\text{mm}^2$  (AWG 16).



### 4.3 Earthing concept



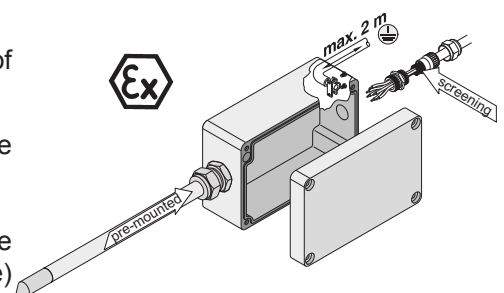
#### Detail A

1. The SDU metal housing must be earthed in the Ex-zone by means of the earthing lug on the housing external wall.

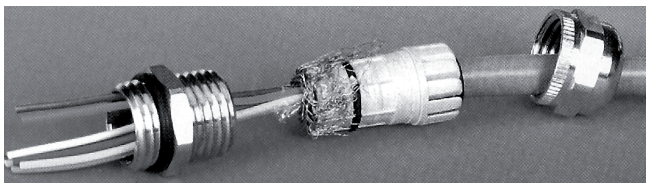


The earth connection must be shorter than 2m (6.6ft). The cross section of the earthing line has to be  $\geq 4\text{mm}^2$  (AWG 10).

2. The screen of the data cable shall be connected directly to the metallic connection or to the PG gland on the SDU. (see picture beside)



#### Connection of the screening to the PG glands:



The screen braiding has to be repressed over the plastic part of the PG gland or plug connection. The screen braid will be pressed against the internal wall of the metallic part.

#### Detail B

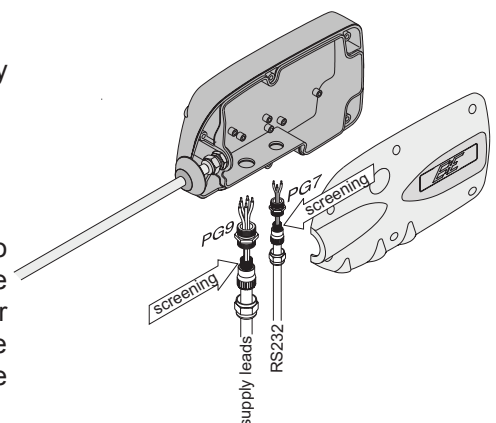


The screening of the data cable at the end of the SEU is strictly forbidden. (see picture 4.3 detail B)

#### Detail C



In order to avoid ground current loops, the connection of SEU to ground (GND) shall be made in just one point, outside the explosion endangered area. In case the power supply cable or the output cables are connected to GND in the evaluation instruments like SPS and controllers, the SEU shall be operated without connection to GND.



In case the VAE is connected to GND, the connection shall be made by the internal surface of the housing. The 4 pieces screws M4x20(...60) are used for mounting and the low-impedance connection between internal varnishing and the grounded mounting panel.

In order to guarantee the electromagnetic compatibility (EMC), the external screen of the supply, interface and output cables shall be connected to the internal varnishing of the SEU housing. This shall be done by connecting the cable screen to the metallic PG gland (see detail A - picture of screening connection)

## 5. SOFTWARE RELATED OPERATION

### 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.

The configuration software was developed by E+E Elektronik Ges.m.b.H to allow fast and easy configuration of EE30EX transmitters.

### 5.1 Operation under Windows™

#### 5.1.1 System preconditions

This software tool is included in delivery.

System requirements: MS WINDOWS 98® till WINDOWS XP; RS232 serial interface

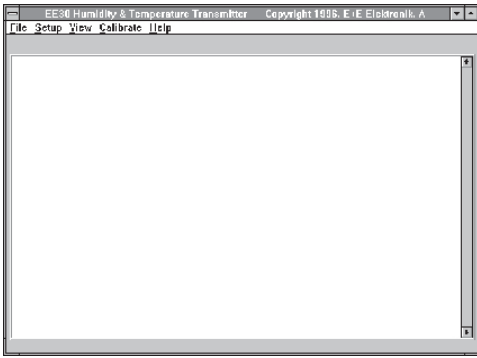
#### 5.1.2 Installation of the EE30 RH & T-TRANSMITTER Program

Insert the CD-ROM supplied with the transmitter into your PC and open the set-up application. Follow the instructions of the dialogue menus.

#### 5.1.3 Putting into operation of the EE30 RH & T-TRANSMITTER Program

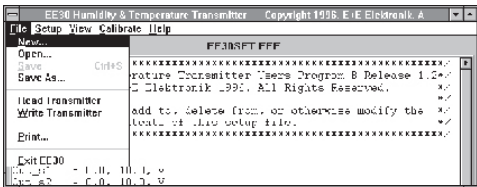
- Connect the transmitter to the COM-Port
- Click the "EE30 - RH & T-TRANSMITTER" symbol
- Click the menu point FILE
- Click the menu point READ TRANSMITTER
- Input the COM - Port No.
- **Input Transmitter Setup**
- Store Setup (settings)

With each new start of the programme the Setup (READ TRANSMITTER) of the transmitter must be inputed.



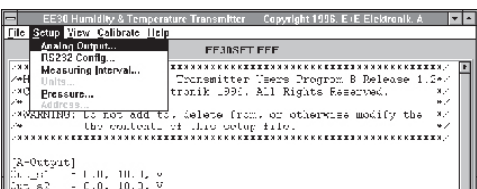
## 5.2 Software functions

Following the start of the EE30 RH & T TRANSMITTER programme the screen appears with the menu strip and the 5 menu points.



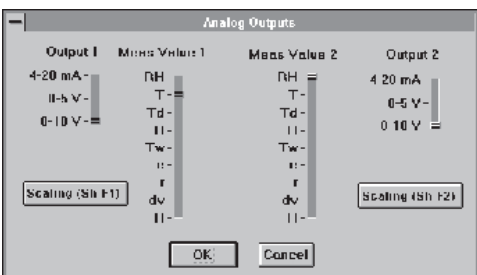
### 5.2.1 FILE:

- **NEW**  
Create new Setup
- **OPEN**  
Open stored file
- **SAVE**  
Store a Setup in a file
- **SAVE AS**  
Stores a Setup in a file with a new name
- **READ TRANSMITTER**  
Readers a transmitter a set of Procedure:
  - Click Read Transmitter
  - Input Com Port No.
  - Following an incorrect input there follows a fault report "No serial port found"  
Click YES  
Input Com Port No.
- **WRITE TRANSMITTER**  
Send new Setup to transmitter
- **PRINT**  
Print out Setup
- **EXIT EE30**  
End programme



### 5.2.2 SETUP

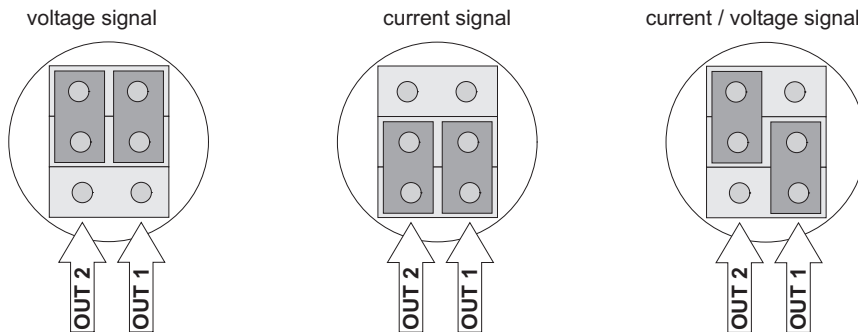
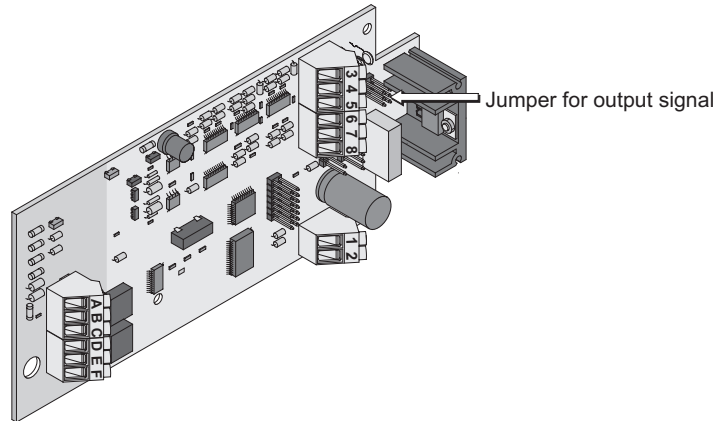
- **ANALOG OUTPUT**  
New configuration of the two analogue outputs
- **OUTPUT 1 ( 2 )**  
Fixing the output characteristics of the two output signals. There is a choice of output signals from 0-5 V or 0-10 V and a current signal of 4-20 mA. Both can be independently scaled from each other.



**When changing from voltage to current or vice-versa the jumper in the transmitter must be correctly fitted.**

## Jumper position EE30EX

The jumper switches the two analogue outputs (OUT 1 and OUT 2) between a current or voltage signal. Each output is independent and the second output can be changed e.g.: OUT 1 current, OUT 2 voltage.



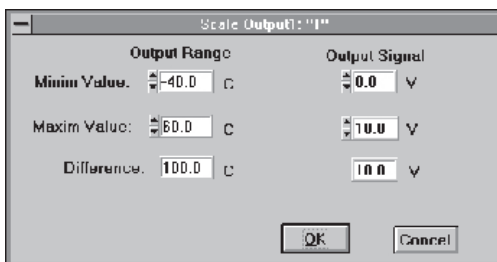
### - ANALOG OUTPUT

#### - MEAS VALUE 1 (2)

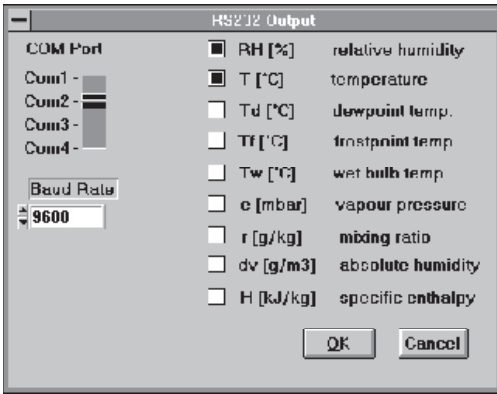
There is a selection of the physical measurement sizes to be displayed.

#### - SCALING (Sh - F1); (Sh - F2)

Setting possibilities for minimum and maximum values of the measured sizes (Output Range) and definition of the minimum and maximum values for the Output Signal.







## - RS232 CONFIG

Configuration of the serial interface

- COM PORT  
Setting possibilities of the interface (e.g. Com 2)
- SELECTION OF THE MEASUREMENT VALUES TO BE EXAMINED  
Setting up possibilities for the measured values should will be transferred through the serial interface. (e.g. RH and T)
- BAUD RATE  
The Baud rate is set at 9600.

## - MEASURING INTERVAL

Setting possibilities of the measured value output intervals in s/m/h.

The following time inputs are possible:

Seconds	from 1 sec...60 sec
Minutes	from 1 min...60 min
Hours	from 1 hour...18 hours

## - UNITS

Change-over between SI and US units.

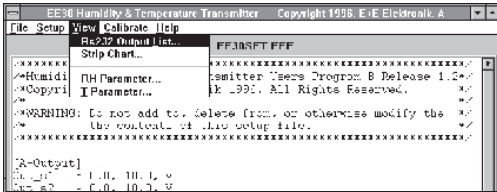
## - PRESSURE

Fixing of a the actual surrounding pressure.

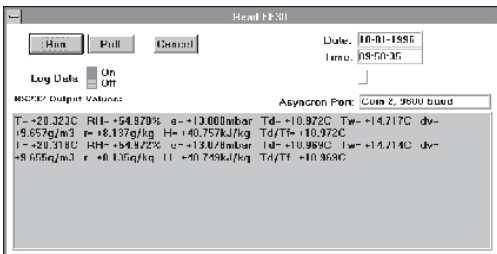
Setting is carried out if the actual surrounding temperature does not correspond to the working setting of 1013 mbar.

## - ADDRESS

No application at the moment!



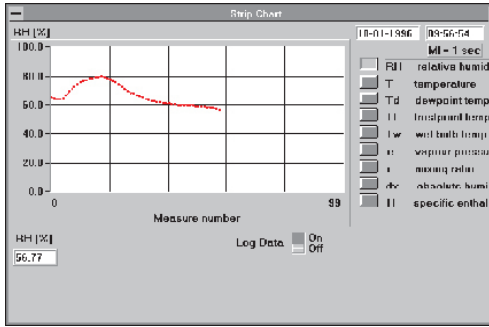
## 5.2.3 VIEW



## - RS232 OUTPUT LIST

Display and storage through the RS232 interface of transferred data in ASCII format.

- RUN  
This initiates the indication of the selected measurement value corresponding to the defined measurement frequency.
- POLL  
Facility for a stepped display of measured values.
- LOG DATA ON/OFF  
The measurement data is stored in an ASCII format. The LOG File can be stored under a file name for a later, further processing e.g. with Excel, Lotus 123, Quatro Pro, etc.



**- STRIP CHART**

Graphic indication of the measured value on the screen and measurement data storage.

**- SELECTION**

By clicking the corresponding measurement sizes.

**- SCALING**

With a selected display a scaling of the x-axis, through the inputting of min./max. values is possible.

**- LOG DATA ON / OFF**

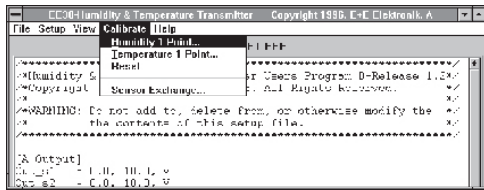
Measurement data storage

**- RH PARAMETER**

Output of the actual humidity sensor value of C76 (nominal capacity at 76% rh in pF) and HC (humidity coefficient in ppm / % r.h)

**- T PARAMETER**

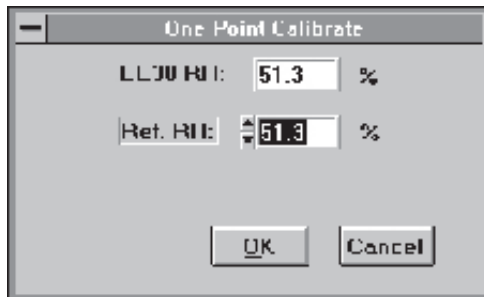
Output of the actual temperature sensor value of R0 (resistance value at 0degC in Ohms) and TC (temperature coefficient in ppm / degC)



**5.2.4 CALIBRATE**

**- HUMIDITY 1 POINT**

Facility of a 1 point humidity calibration (for an accurate description see chapter 5.3.1 Hardware preconditions). With the 1 point humidity calibration the sensor characteristic turns around the zero point (0% rh).



**- TEMPERATURE 1 POINT**

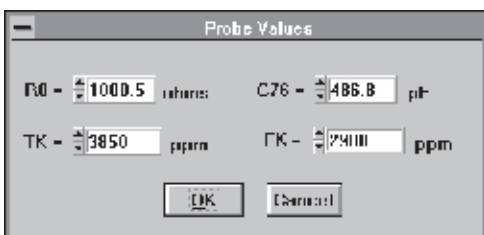
Facility of a 1 point temperature calibration. With the 1 point temperature calibration the sensor characteristic turns around the absolute zero point (0K or -273, 15degC).

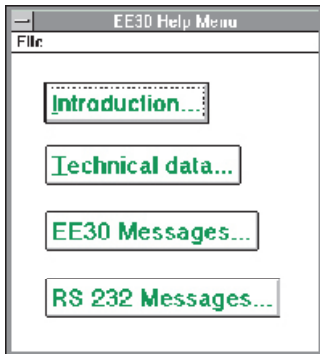
**- RESET**

Returning the calibration to the factory setting.

**- SENSOR EXCHANGE**

Input facility for the new sensor data after an exchange of sensor.





## 5.2.5 HELP

### - CONTENTS

4 Help files opened

#### - INTRODUCTION

This provides a short description of the EE30

#### - TECHNICAL DATA

Display of the technical data

#### - EE30 MESSAGES

Listing of the error codes in the use of the terminal programme

#### - RS232 MESSAGES

Listing of the error codes in the use of the software programme

### - ABOUT EE30

Information on the current software version number

## 5.3 Operating via a terminal

A simple and direct operation of the EE30EX is done via the terminal programme of the operating system.

### 5.3.1 Hardware preconditions

#### a) **Terminal:**

- RS232 interface
  - 9600 Bauds
  - 8 Databits
  - No parity
  - 1 Stopbit
- or

#### b) **Hyper terminal with Microsoft Windows 95<sup>TM</sup>**

(Programme Group Accessory) :

- PC: free serial interface COM 1 or COM 2
- A mouse is recommended

#### OPERATION :

- Start Microsoft Windows 95<sup>TM</sup>
- Open Programme Group Accessory
- Click on "Hypertrm.exe" symbol and set as following:
  - 9600 Bauds
  - 8 Databits
  - No parity
  - 1 Stopbit
- Data transfer runs
- Communication by means of the following operating commands

### 5.3.2 Operating commands

**Definition :**     **BOLD CHARACTERS**                             User input  
                  **ITALIC BOLD CHARACTERS**                   EE30 messages  
An incorrect command is followed by **ERROR CODE FALSE COMMAND 2!**

**AMOD <CR>**     The order fixes the type of output (Voltage V / Current I) and the limiting value for the two analogue outputs.

*Output1 Type[U/I] . New Value:* Input requirement for Voltage V/Current I as analogue output signal for Output 1 (OUT 1)

*Output2 Type[U/I] . New Value:* Input requirement for Voltage V/Current I as analogue output signal for Output 2 (OUT 2)

*Old\_Out1\_Low\_lim = xx.xxZ.New Value:* Input of the minimum output signal (OUT 1) *Old\_Out1\_High\_lim = xx.xxZ.New Value:* Input of the maximum output signal (OUT 1)

*Old\_Out2\_Low\_lim = xx.xxZ.New Value:* Input of the minimum output signal (OUT 2)

*Old\_Out2\_High\_lim = xx.xxZ.New Value:* Input of the maximum output signal (OUT 2)

Non-response to the first two inputs with V / I brings ERRORCODE **ErrNo. 15.**

Definition:        "xx.xx" stands for five digit number value  
                  "Z" for a unit of the output signal (V or mA)



**ATTENTION:** When changing the analogue output signals from voltage to current or vice-versa the jumper (J3) must be correctly fitted in the transmitter.

**ASEL <CR>**     The order fixes the physical measurement size and the scaling for both analogue output.

*Output1 Quantity [T,RH,e,Td,Tw,dv,r,H,Td/Tf]. New Value:* Input of the measurement size e.g. T for the analogue output (OUT 1)

*Output2 Quantity [ T,RH,e,Td,Tw,dv,r,H,Td/Tf ] . New Value:* Input of the measurement size e.g. RH for the analogue output (OUT 2)

Definition :        T..... Temperature [degC]  
                  RH ..... Relative humidity [%]  
                  e ..... Water vapour partial pressure [mbar]  
                  Td ..... Dew point temperature [degC]  
                  Tw ..... Wet ball temperature [degC]  
                  dv ..... Absolute humidity (water vapour density) [g/m3]  
                  r ..... Mix ratio [g/kg]  
                  H ..... Enthalpy [kJ/kg]  
                  Td/Tf .... Frost point temperature [degC]

*Old\_Out1\_Low\_lim = zzzzz.zzU . New Value:* Input of the minimum value (OUT 1)

*Old\_Out1\_High\_lim = zzzzz.zzU . New Value:* Input of the maximum value (OUT 1)

*Old\_Out2\_Low\_lim = zzzzz.zzU . New Value:* Input of the minimum value (OUT 2)

*Old\_Out2\_High\_lim = zzzzz.zzU . New Value:* Input of the maximum value (OUT 2)

If the input of the first two parameters is incorrect there follows ERRORCODE **ErrNo. 11**

Definition:        "zzzzz.zz" stands for eight digit number value  
                  "U" stands for the physical unit of the measured size (e.g. degC, %, mbar, etc.)

**CALH <CR>**     Order on 1 point humidity calibration.

With the 1 point humidity calibration the sensor characteristic turns around the zero point (0% r.h.).

*Input actual Humidity Value:*                             Input of the new reference value for RH

*Old\_RH\_Slope = x.xxx New\_RH\_Slope = y.yyy*

*Input Datum (format DDMMJ):*                             Input of the change data

The new reference value must be found in the range +/- 20% of the factory setting. (i.e from 0.8- to 1.2-times of the standard value)  
If not there follows ERRORCODE **ErrNo. 12.**

**CALT<CR>**

Order on 1 point temperature calibration.

With the 1 point temperature calibration the sensor characteristic turns around the absolute zero point (0K or – 273, 15degC).

Input actual temperature value:              Input of the new reference value for T  
Old\_T\_Slope = x.xxx    New\_T\_Slope = y.yyy  
Input date (format DDMMJJ):              Input of the change date

The new reference value must be found in the range +/- 2% of the factory setting.  
If not there follows ERRORCODE **ErrNo. 13.**

**NEWH<CR>**

Order on input of the new humidity sensor data on the exchange of the humidity element.

Input C76 Value for Humidity Sensor:    Input of the nominal capacity at 76% r.h in pF  
Input HC Value for Humidity Sensor:    Input of the humidity coef. in ppm/ % r.h.

Comment: The data for C76 and HC will be supplied with the new sensor.

**NEWT<CR>**

Order on input of the new temperature sensor data on the exchange of the temperature sensor.

Input R0 Value for Temp. Sensor:              Input of the resistance value at 0oC in Ohms  
Input TC Value for Humidity Sensor:              Input of the temperature coef. in ppm/ oC  
Comment: The data for R0 and TC will be supplied with the new sensor.

**PRES<CR>**

Order on the input of the actual surrounding pressure.

The setting is carried out, if the actual surrounding pressure does not correspond to the factory setting of 1013 mbars.

Actual pressure = xxxx UUU. New Value: Input of the surrounding pressure with  
   the physical unit

Definition: "UUU" stands for the physical unit (mbar – metric, psi – US).

**REST<CR>**

Order on the software related new start of the transmitter.

**STRT<CR>**

Start of the serial transfer of data.

**STOP<CR>**

Stop of the serial transfer of data.

**SENS<CR>**

Order on the readout of the actual sensor data.

Sensor-Data:    R0 = xxxx.x Ohm              TK = yyyy ppm  
   C76 = zzz.z pF              FK = wwww ppm

**SERD<CR>**

Fixes which physical measurement data will be given through the serial interface.

SER\_OUTPUTS: zzz New Value : Input of a decimal number (for calculation see below)

Definition:              "zzz" = 0 .... 611 DEC  
   "zzz" is the result of a decimal conversion  
   of a 16 bit wide word.

Bit 0 to 9 fixed as follows:

Bit 0 – for T,    Bit 1 – for RH,    Bit 2 – for e,    Bit 3 – for Td,    Bit 4 – for Tw,  
Bit 5 – for dv,    Bit 6 – for r,    Bit 7 – for H,    Bit 8 – for Td/Tf

e.g.: 0000 0000 0000 1101B = 13D i.e. The measurement data T, e, Td will be sent via the serial interface.

#### **SERI<CR>**

Order on fixing the repeat rate of the measurement value output.

Minimum value 1 sec.

Maximum value 65535 sec

Time units [s/m/h]:    Input of the time unit (e.g. s for sec.)

Cycle duration:    Input of the time under consideration of the time unit  
e.g. 5 i.e. measured value output every 5 seconds).

In the event of the maximum value of 65535 seconds being exceeded there follows Cycled duration exceeds 65535 seconds !

#### **VERS<CR>**

Order on the output of the actual software version number on the serial interface.

#### **ZERO**

Order on the resetting to factory calibration.

In this case all the individually carried out calibrations and settings are lost.

Return to factory calibration [Y/N]: Input Y / N

## 6. MAINTENANCE

### 6.1 Filter change

The protection filter should be periodically cleaned or exchanged, particularly when an increase in the response time is noticed.

### 6.2 Cleaning

E+E sensing elements are highly robust which makes cleaning very easy. Shake the sensing elements for max. 2 min. in industrial Isopropyl alcohol and after that in water. Let them dry free. Do not touch or rub the active surface of the sensing elements!

### 6.3 Sensor change



Comments:

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



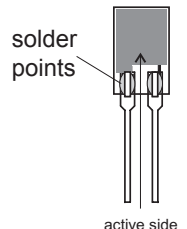
#### **Removal of defected sensor:**

- Switch off the power supply
- Removed the probe from the measurement area
- Unscrew the protection filter
- Extract the old humidity sensor with a tweezers resp. unsolder the temperature sensor



#### **Installation of a new sensor:**

- Insert replacement sensor with the active side facing inside (see picture)
- Screw in the protection filter
- Install the probe in the measurement area
- Switch on the supply voltage



#### **Input the new sensor data:**

The sensor data (C76, HC, R0, TC) will be supplied with the new sensor. With the help of this data a simple and a fast calibration is possible through the software.

Order code F-sensor: FE10

Order code T-sensor: TE38

- Start the EE30 RH & T Transmitter programme
- Input the transmitter Setup (READ TRANSMITTER)
- Click CALIBRATE
- Click SENSOR EXCHANGE
- Input the supplied data for C76, R0, TC, HC
- Click OK
- Open the SENSOR EXCHANGE window
- Click YES
- Open the EE30 MESSAGE window
- Click YES
- The new values will be accepted in the Setup

## 6.4 1-point calibration of the relative humidity and temperature

For the transmitters of the EE30EX Series is the facility of a 1 point calibration of the relative humidity and temperature through software.

It is recommended therefore that some preconditions are taken into consideration:

### **a) Humidity calibration:**

- It is recommended to set up a temperature equilibrium, with the transmitter and the reference chamber being stored for at least 4 hours in the same temperature stable room.
- During the whole calibration procedure a constant temperature is to be provided in the reference chamber.

### **b) Temperature calibration:**

- For the accurate measurement of temperature it is advantageous for the room to be at a constant ambient temperature.

### 6.4.1 Calibration of the relative humidity

As reference of humidity we recommend use of our humidity generator HUMOR 20 or the calibration set. (refer to data for "HUMOR 20" or ""calibration set")

#### **Calibration procedure:**

- Position the probe in the reference chamber
- Notice the stabilising time (about 1 hour)
- Click the EE30 RH & T-TRANSMITTER "READ TRANSMITTER" programme
- Click the EE30 RH & T-TRANSMITTER "CALIBRATE" programme
- Click HUMIDITY 1 POINT
- Input under reference RH the reference humidity value
- Click OK
- The new reference value will be adopted for the measurement

### 6.4.2 Calibration of the temperature

With regard to a comparative measurement with a highly accurate reference equipment for measuring temperature this will be inputted in the software.

#### **Calibration procedure:**

- Place the probe and the reference measuring equipment in a temperature stable room
- Stabilising time of the least 30 minutes
- Click the EE30 RH & T-TRANSMITTER "READ TRANSMITTER" programme
- Click the EE30 RH & T-TRANSMITTER "CALIBRATE" programme
- Click TEMPERATURE 1 POINT
- Input under reference T the reference temperature value
- Click OK
- The new reference value will be adopted for the measurement

## 6.5 Order information for accessories

	Order code
sintered stainless steel filter	HA010103
PTFE - filter	HA010105
metall grid filter	HA010106
stainless steel grid filter	HA010109
stainless steel filter	HA010110
RS232 interface cable	HA010301
replacement humidity sensor incl. sensor data	FE10
replacement temperature sensor incl. sensor data	TE38



## 7. TECHNICAL DATA

### Measuring values

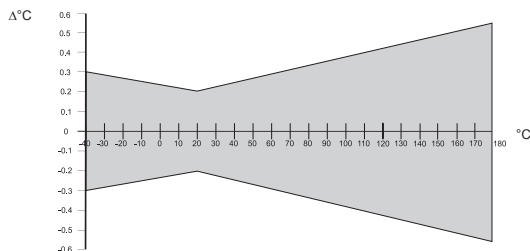
#### Relative humidity

Humidity sensor <sup>1)</sup>	HC1000-400	
Measuring range <sup>1)</sup>	0...100% RH	
Accuracy <sup>2)</sup> (including hysteresis, non-linearity and repeatability, traceable to international standards, administrated by NIST, PTB, BEV...)	<90% RH	$\pm (1.3 + 0.3\% \cdot mv) \% RH$
	>90% RH	$\pm 2.3\% RH$
	-15...40°C (5...104°F)	$\pm (1.4 + 1\% \cdot mv) \% RH$
	-25...70°C (-13...158°F)	$\pm (1.5 + 1.5\% \cdot mv) \% RH$
	-40...180°C (-40...356°F)	
Temperature dependence electronics	typ. 0.08% RH/°C	
Response time with filter at 20°C / t <sub>90</sub>	< 30 sec.	

#### Temperature

Temperature sensor	Pt1000 (DIN EN 60751, class A)		
Measuring range sensor head	EE30EX-A	-20...60°C	(-4...140°F)
	EE30EX-D	-40...180°C	(-40...356°F)
	EE30EX-E	-40...180°C	(-40...356°F)

Accuracy (typ.)



Temperature dependence

typical 0.005°C/°C

#### Max. adjustable Measurement Range <sup>3)</sup>

		from	to		unit
			EE30EX-A	EE30EX-D/E	
Humidity	RH	0	100	100	%RH
Temperature	T	-40 (-40)	60 (140)	180 (356)	°C (°F)
Dew point temperature	T <sub>d</sub>	-80 (-112)	60 (140)	100 (212)	°C (°F)
Frost point temperature	T <sub>f</sub>	-80 (-112)	0 (32)	0 (32)	°C (°F)
Wet bulb temperature	T <sub>w</sub>	0 (32)	60 (140)	100 (212)	°C (°F)
Water vapour pressure	e	0 (0)	200 (3)	1100 (15)	mbar (psi)
Mixing ratio	r	0 (0)	425 (2900)	999 (9999)	g/kg (gr/lb)
Absolute humidity	dv	0 (0)	150 (60)	700 (300)	g/m <sup>3</sup> (gr/ft <sup>3</sup> )
Specific enthalpy	H	-50 (-15000)	400 (150000)	2800 (999999)	kJ/kg (lb/ft)

### Outputs

Two freely selectable and scalable outputs	0 - 5 V	-1 mA < I <sub>L</sub> < 1 mA
	0 - 10 V	-1 mA < I <sub>L</sub> < 1 mA
	4 - 20 mA	R <sub>L</sub> < 360 Ohm

Serial interface

RS232C

### General

Supply voltage	SELV 24V DC/V AC ± 15%	SELV = Safety Extra Low Voltage
Current consumption	≤ 150mA (24V DC); ≤ 280mA (24V AC)	
Pressure range with pressure tight sensor probe	0.01...15 bar (0.15...218psi)	
System requirements for software	MS Windows™ 2000 or later; serial interface	
Housings	supply- and evaluation unit	ABS-plastic / IP65
	sensor driver unit	AlSi12 / IP65
Cable gland	PG 7 and PG 9; for cable diameter 5 - 9 mm (0.2 - 0.35")	
Electrical connection	screw terminals max. 1.5 mm <sup>2</sup> (AWG 16)	
Sensor protection	sintered stainless steel filter, PTFE-filter or metal grid filter	
Temperature range	sensor probe:	according measuring range
	electronic sensor driver device:	-20...60°C (-4...140°F)
	electronic supply- and evaluation device:	-40...60°C (-40...140°F)
	electronic with display:	0...40°C (32...104°F)
Storage temperature range	electronics and sensor head	-30...60°C (-22...140°F)
Electromagnetic compatibility according	EN61326-1	EN61326-2-3
	Industrial Environment	



1) Arbeitsbereich des Feuchtesensors beachten!

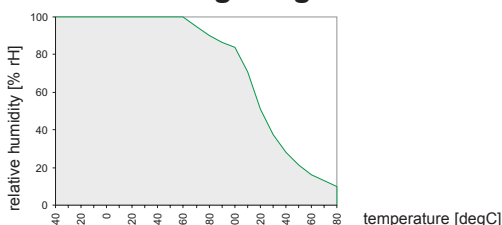
2) Refer to the working range of the humidity sensor.

3) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

3) siehe Genauigkeitstabellen für

3) Refer to accuracies of calculated values.

### 7.1 Working range of the humidity sensor



The grey background surface indicates the permitted measurement area for the humidity sensor.

Working points, which lie outside this area would not lead to the destruction of the elements, the specified measurement accuracy however, cannot be guaranteed.

## 7.2 Accuracy tables for the calculated functions

±dv		Accuracies of absolute humidity									
[g/m <sup>3</sup> ]		10	20	30	40	50	60	70	80	90	1013
%RH											100
-40	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.006	0.007	0.007	0.007
-30	0.010	0.011	0.012	0.013	0.013	0.014	0.015	0.016	0.017	0.017	0.017
-20	0.024	0.026	0.027	0.029	0.031	0.033	0.035	0.036	0.038	0.039	0.039
-10	0.052	0.055	0.059	0.063	0.066	0.070	0.073	0.077	0.080	0.08	0.08
0	0.11	0.11	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.16	0.16
10	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.29	0.30	0.30	0.30
20	0.37	0.39	0.41	0.43	0.45	0.47	0.49	0.51	0.53	0.54	0.54
30	0.65	0.68	0.71	0.75	0.78	0.81	0.85	0.88	0.91	0.93	0.93
40	1.09	1.14	1.19	1.24	1.29	1.35	1.40	1.45	1.50	1.53	1.53
50	1.76	1.84	1.91	1.99	2.07	2.15	2.23	2.30	2.38	2.42	2.43
60	2.75	2.86	2.97	3.09	3.20	3.31	3.43	3.54	3.65	3.71	3.71
70	4.16	4.32	4.48	4.64	4.80	4.96	5.12	5.28	5.44	5.52	
80	6.12	6.34	6.56	6.78	7.00	7.22	7.44	7.66	7.88		
90	8.76	9.06	9.35	9.65	9.94	10.24	10.53	10.83			
100	12.25	12.64	13.03	13.42	13.81	14.20	14.59	14.98			
110	16.82	17.33	17.83	18.33	18.84	19.34	19.85				
120	22.67	23.31	23.95	24.59	25.23						
130	30.02	30.82	31.62								
140	39.12	40.10									
150	50.22	51.41									
160	63.60										

±e		Accuracies of water vapour pressure										
[mbar]		10	20	30	40	50	60	70	80	90	95	100
%RH												
-40	0.004	0.005	0.005	0.006	0.006	0.006	0.007	0.007	0.008	0.008	0.008	0.01
-30	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.020	0.020
-20	0.028	0.030	0.032	0.035	0.037	0.039	0.041	0.043	0.046	0.047	0.046	0.046
-10	0.063	0.068	0.072	0.077	0.081	0.086	0.091	0.095	0.100	0.102	0.102	0.102
0	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.21	0.21	0.21
10	0.27	0.28	0.30	0.32	0.33	0.35	0.37	0.38	0.40	0.41	0.41	0.41
20	0.50	0.53	0.56	0.59	0.62	0.65	0.68	0.71	0.74	0.75	0.75	0.75
30	0.91	0.96	1.01	1.06	1.11	1.16	1.20	1.25	1.30	1.33	1.33	1.33
40	1.58	1.66	1.74	1.82	1.89	1.97	2.05	2.13	2.21	2.25	2.25	2.25
50	2.63	2.76	2.88	3.00	3.13	3.25	3.38	3.50	3.62	3.69	3.69	3.69
60	4.24	4.42	4.61	4.80	4.98	5.17	5.36	5.54	5.73	5.82	5.82	5.82
70	6.60	6.88	7.15	7.42	7.69	7.97	8.24	8.51	8.78	8.92		
80	10.00	10.39	10.77	11.16	11.55	11.93	12.32	12.71	13.09			
90	14.73	15.27	15.80	16.33	16.87	17.40	17.93	18.47				
100	21.16	21.88	22.61	23.33	24.06	24.79	25.51	26.24				
110	29.84	30.81	31.77	32.74	33.70	34.67	35.64					
120	41.26	42.52	43.78	45.05	46.31							
130	56.02	57.64	59.26									
140	74.80	76.85										
150	98.35	100.9										
160	127.5											

±Td		Accuracies of dew point temperature										
[degC]		10	20	30	40	50	60	70	80	90	95	100
%RH												
-40	1.89	1.04	0.77	0.64	0.55	0.50	0.46	0.43	0.41	0.40	0.39	
-30	2.04	1.12	0.83	0.68	0.59	0.53	0.49	0.46	0.43	0.42	0.41	
-20	2.20	1.21	0.88	0.72	0.63	0.56	0.52	0.48	0.46	0.44	0.43	
-10	2.37	1.29	0.94	0.77	0.66	0.60	0.55	0.51	0.48	0.47	0.46	
0	2.53	1.38	1.01	0.82	0.70	0.63	0.58	0.53	0.50	0.49	0.48	
10	2.71	1.47	1.07	0.87	0.75	0.66	0.61	0.56	0.53	0.51	0.50	
20	2.89	1.57	1.14	0.92	0.79	0.70	0.64	0.59	0.55	0.54	0.53	
30	3.07	1.66	1.20	0.97	0.83	0.74	0.67	0.62	0.58	0.57	0.55	
40	3.25	1.76	1.27	1.03	0.88	0.78	0.71	0.65	0.61	0.59	0.58	
50	3.44	1.86	1.35	1.08	0.93	0.82	0.74	0.69	0.64	0.62	0.60	
60	3.63	1.97	1.42	1.14	0.97	0.86	0.78	0.72	0.67	0.65	0.64	
70	3.83	2.07	1.49	1.20	1.03	0.91	0.82	0.76	0.71	0.69		
80	4.03	2.18	1.58	1.27	1.08	0.95	0.86	0.79	0.74			
90	4.23	2.30	1.66	1.33	1.14	1.00	0.91	0.83				
100	4.43	2.42	1.74	1.40	1.19	1.05	0.95	0.87				
110	4.65	2.54	1.83	1.47	1.25	1.10	0.99					
120	4.87	2.66	1.92	1.54	1.31							
130	5.09	2.78	2.01									
140	5.32	2.91										
150	5.55	3.04										
160	5.78											

±r		Accuracies of mixing ratio										
[g/kg]		10	20	30	40	50	60	70	80	90	95	1013
%RH												100
-40	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005
-30	0.007	0.008	0.008	0.009	0.009	0.010	0.011	0.011	0.012	0.012	0.012	0.012
-20	0.017	0.019	0.020	0.021	0.023	0.024	0.025	0.027	0.028	0.029	0.029	0.029
-10	0.039	0.042	0.044	0.047	0.050	0.053	0.056	0.059	0.062	0.063	0.063	0.063
0	0.082	0.088	0.093	0.099	0.105	0.11	0.12	0.12	0.13	0.13	0.13	0.13
10	0.16	0.17	0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.26	0.26
20	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.45	0.47	0.48	0.48	0.48
30	0.56	0.60	0.64	0.67	0.71	0.75	0.79	0.83	0.86	0.89	0.89	0.89
40	0.98	1.05	1.12	1.18	1.26	1.33	1.40	1.48	1.56	1.60	1.61	1.61
50	1.66	1.78	1.91	2.05	2.19	2.33	2.49	2.65	2.82	2.91	2.93	2.93
60	2.72	2.96	3.21	3.49	3.79	4.11	4.46	4.83	5.24	5.46	5.52	5.52
70	4.35	4.83	5.38	5.99	6.67	7.45	8.33	9.34	10.49	11.13		
80	6.83	7.86	9.08	10.54	12.30	14.46	17.13	20.47	24.74			
90	10.61	12.87	15.80	19.68	24.97	32.41	43.29	60.05				
100	16.42	21.58	29.28	41.43	62.14	101.6	190.8	466.4				
110	25.74	38.42	62.29	115.3	273.1	1209						
120	41.28	75.90	177.2	749.9								
130	69.19	185.3	1292									
140	125.4	784.3										
150	263.3	6494										
160	761.4											

±Tf		Accuracies of frost point temperature										
[degC]		10	20	30	40	50	60	70	80	90	95	100
%RH												
-40	1.86	1.01	0.74	0.61	0.53	0.48						
-30	1.98	1.07	0.78	0.64	0.56	0.50	0.46					
-20	2.10	1.14	0.83	0.67	0.58	0.52	0.47	0.44				
-10	2.23	1.20	0.87	0.70	0.60	0.54	0.49	0.46	0.43			
0	2.35	1.26	0.91	0.74	0.63	0.56	0.51	0.47	0.44	0.43	0.42	
10	2.48	1.32	0.95	0.77	0.66	0.61	0.56	0.53	0.51	0.50		
20	2.60	1.39	1.14	0.92	0.79	0.70	0.64	0.59	0.55	0.54	0.53	
30	2.73	1.66	1.20	0.97	0.83	0.74	0.67	0.62	0.58	0.57	0.55	
40	3.17	1.76	1.27	1.03	0.88	0.78	0.71	0.65	0.61	0.59	0.58	
50	3.44	1.86	1.35	1.08	0.93	0.82	0.74	0.69	0.64	0.62	0.60	
60	3.63	1.97	1.42	1.14	0.97	0.86	0.78	0.72	0.67	0.65	0.64	
70	3.83	2.07	1.49	1.20	1.03	0.91	0.82	0.76	0.71	0.69		
80	4.03	2.18	1.58	1.27	1.08	0.95	0.86	0.79	0.74			
90	4.23	2.30	1.66	1.33	1.14	1.00	0.91	0.83				
100	4.43	2.42	1.74	1.40	1.19	1.05	0.95	0.87				
110	4.65	2.54	1.83	1.47	1.25	1.10	0.99					
120	4.87	2.66	1.92	1.54	1.31							
130	5.09	2.78	2.01									
140	5.32	2.91										
150	5.55	3.04										
160	5.78											

±H		Accuracies of specific enthalpy										
[kJ/kg]		10	20	30	40	50	60	70	80	90	95	1013</

## 8. CERTIFICATES ATEX

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

# PTB



## (1) EC-TYPE-EXAMINATION CERTIFICATE (Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

**PTB 99 ATEX 2042**



(4) Equipment: Measuring instrument for temperature and humidity type EE30EX supply and evaluation unit

(5) Manufacturer: E+E Elektronik Gesellschaft mbH

(6) Address: Langwiesen 7, A-4210 Engerwitzdorf

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 99-27385.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
**EN 50014:1997**                      **EN 50020:1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

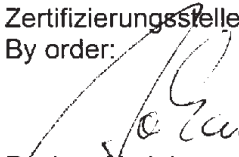
(12) The marking of the equipment shall include the following:

 **II (1) G [EEEx ia] IIC**

Zertifizierungsstelle Explosionsschutz

Braunschweig, May 17, 1999

By order:

  
Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor



Sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

## SCHEDULE

(13)

(14)

### EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2042

(15) Description of equipment

The measuring instrument for temperature and humidity type EE30EX supply and evaluation unit is a microprocessor controlled measuring instrument for the measure of temperature and humidity and calculation of thermodynamics values.

The maximum permissible ambient temperature is: +60 °C

#### Electrical data

Supply  
(Terminal X1:1 and 2)

SELV 24 V (AC/DC)  $\pm 15\%$ , 150 mA  
 $U_m = 250$  V

Analog output  
(Terminal X2:1 to 3)

4-20 mA current loop  
 $U_m = 250$  V  
or  
0-10 V  
 $U_m = 250$  V

Interface circuit  
(Terminal X3:1 to 3)

RS232 C  
 $U_m = 250$  V

Supply circuit  
(Terminal X4:1 and 2)

type of protection Intrinsic Safety EEx ia IIC,  
maximum values:  
 $U_o = 12,6$  V  
 $I_o = 77$  mA  
 $P_o = 243$  mW  
Linear output characteristic  
 $C_i = 52$  nF  
 $L_i$  negligibly small  
 $C_o = 1,1$   $\mu$ F  
 $L_o = 5,5$  mH

Interface circuit (RS422)  
(Terminal X4:3 to 6)

type of protection Intrinsic Safety EEx ia IIC,  
for connection to a certified intrinsically safe circuit  
only; maximum values:  
 $U_i = 12,6$  V  
 $C_i$  negligibly small  
 $L_i$  negligibly small

The intrinsically safe circuits are safely electrically isolated from all other circuits up to a peak value of the nominal voltage of 375 V.

- (16) Report PTB Ex 99-27385
- (17) Special conditions for safe use  
Not applicable.
- (18) Essential health and safety requirements  
Met by the standards mentioned above.

Zertifizierungsstelle Explosionsschutz  
By order:

Braunschweig, May 17, 1999

  
Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor



## 2. ERGÄNZUNG

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

### zur EG-Baumusterprüfbescheinigung PTB 99 ATEX 2042

Gerät: Feuchte und Temperaturmessgerät Typ EE30EX Versorgungs- und Auswerteteil  
Kennzeichnung:  II (1) G [EEx ia] IIC  
Hersteller: E+E Elektronik GmbH  
Anschrift: Langwiesen 7  
4209 Engerwitzdorf, Österreich

#### Beschreibung der Ergänzungen und Änderungen

Das Feuchte- und Temperaturmessgerät Typ EE30EX Versorgungs- und Auswertungseinheit darf auch mit den Änderungen gemäß den im Prüfbericht aufgeführten Unterlagen gefertigt und betrieben werden. Die Änderungen betreffen den inneren Aufbau wie zum Beispiel geändertes Layout, Variation der Bauteile, Erhöhung der Anzahl der Z-Dioden auf drei. Die durchgeführten Maßnahmen bewirken keine Veränderung der bisher getroffenen Festlegungen.

Mit dieser Ergänzung wird eine Anpassung des derzeitigen auf den neuen Normenstand für elektrische Betriebsmittel für explosionsgefährdete Bereiche durchgeführt.

Angewandte Normen:

**EN 60079-0:2006**

**EN 60079-11:2007**

Die Kennzeichnung ändert sich mit dem neuen Normenstand und lautet künftig:

 II (1) G [Ex ia] IIC

Bewertungs- und Prüfbericht: PTB Ex 09-29013

Zertifizierungssektor Explosionsschutz  
Im Auftrag

Braunschweig, 19. Juni 2009

  
Dr.-Ing. U. Gerlach  
Oberregierungsrat



ZSEx10101d.dot

Seite 1/1

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.  
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.  
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.  
Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND

## 3. E R G Ä N Z U N G

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

### zur EG-Baumusterprüfbescheinigung PTB 99 ATEX 2042

Gerät: Feuchte- und Temperaturmessgerät Typ EE30EX Versorgungs- und Auswertungsteil

Kennzeichnung:  II (1) G [Ex ia] IIC

Hersteller: E+E Elektronik GmbH

Anschrift: Langwiesen 7, 4209 Engerwitzdorf, Österreich

#### Beschreibung der Ergänzungen und Änderungen

Das Feuchte- und Temperaturmessgerät Typ EE30EX Versorgungs- und Auswerteteil darf auch mit den Änderungen gemäß den diesem Prüfbericht zugrunde liegenden Unterlagen gefertigt und betrieben werden. Die Änderungen betreffen den inneren Aufbau. Die durchgeführten Maßnahmen bewirken keine Veränderung der bisher getroffenen Festlegungen. Mit dieser Ergänzung wird eine Anpassung des derzeitigen auf den neuen Normenstand für elektrische Betriebsmittel für explosionsgefährdete Bereiche durchgeführt.

Angewandte Normen:

EN 60079-0:2009

EN 60079-11:2012

Die Kennzeichnung ändert sich mit dem neuen Normenstand und lautet künftig:

 II (1) G [Ex ia Ga] IIC

Prüfbericht: PTB Ex 12-22211

Zertifizierungssektor Explosionsschutz  
Im Auftrag

Braunschweig, 16. Juli 2012

  
Dr.-Ing. U. Johannsmeyer  
Direktor und Professor



Seite 1/1



## (1) EC-TYPE-EXAMINATION CERTIFICATE (Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**



(3) EC-type-examination Certificate Number:

**PTB 99 ATEX 2043 X**

(4) Equipment: Measuring instrument for temperature and humidity type EE30EX sensor driver unit

(5) Manufacturer: E+E Elektronik Gesellschaft mbH

(6) Address: Langwiesen 7, A-4210 Engerwitzdorf

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 99-27467.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 50014:1997**

**EN 50020:1994**

**EN 50284:1998**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

**II 1/2 G EEx ia IIC T6**

Zertifizierungsstelle Explosionschutz  
By order:

Braunschweig, May 17, 1999

Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor



Sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.



## SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2043 X**

(15) Description of equipment

The measuring instrument for temperature and humidity type EE30EX sensor driver unit is a part of the microprocessor controlled measuring instrument series EE30EX for the measure of temperature and humidity and calculation of thermodynamics values. The measuring instrument for temperature and humidity type EE30EX sensor driver unit consists of the parts sensor driver electronic and the sensor. The relation between the part of device and the category are shown in the following table.

Part of device	User area
Sensor driver electronic	Category 2
Sensor driver electronic with sensor	Category 2
Sensor with cable tail	Category 1

The maximum permissible ambient temperature is: +60 °C

### Electrical data

Supply circuit  
(Terminal X1:1 und 2)

type of protection Intrinsic Safety EEx ia IIC,  
for connection to a certified intrinsically safe circuit  
only; maximum values:  
 $U_i = 12,6 \text{ V}$   
 $I_i = 77 \text{ mA}$   
 $P_i = 243 \text{ mW}$   
 $C_i = 820 \text{ nF}$   
 $L_i$  negligibly small

Sensor output  
(Terminal X2:1 bis 6)

type of protection Intrinsic Safety EEx ia IIC,  
for connection to the related sensor only.

(16) Report PTB Ex 99-27467

(17) Special conditions for safe use

The measuring instrument for temperature and humidity of type EE30EX sensor driver unit consists of the sensor driver electronics and the sensor.

Sheet 2/3

---

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

The sensor driver electronics may only be used in hazardous areas for which, according to the requirements for equipment-group II, equipment of category 2 is necessary.

The sensor in the version separated from the sensor driver electronics, with cable tail, may be installed in the partition of the area for which, according to the requirements for equipment-group II, equipment of category 2 is necessary. The ambient conditions must be in compliance with the atmospheric conditions according to EN 50284 (temperature range: -20 °C to +60 °C, absolute pressure range: 0,8 bar to 1,1 bar).

The sensor in the version separated from the sensor driver electronics, with cable tail, may be used in the area for which, according to the requirements for equipment-group II, equipment of category 1 is necessary, even with a maximum cable length of 10 m. The ambient conditions must be in compliance with the atmospheric conditions according to EN 50284 (temperature range: -20 °C to +60 °C, absolute pressure range: 0,8 bar to 1,1 bar).

When the sensor is installed inside the category 1 area, the sensor is to be installed such that impact sparks and friction sparks must not be taken into consideration even in the case of faults occurring rarely. The cable pertaining to the sensor is to be run inside the category 1 area so that it is protected from electrostatic charging related to explosion group IIC. The cable provides sufficient protection from electrostatic discharges related to explosion group IIB.

(18) Essential health and safety requirements

Met by the standards mentioned above.

Zertifizierungsstelle Explosionsschutz

By order:

  
Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor



Braunschweig, May 17, 1999

## 4. ERGÄNZUNG

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

### zur EG-Baumusterprüfbescheinigung PTB 99 ATEX 2043 X

Gerät: Feuchte und Temperaturmessgerät Typ EE30EX Sensoreinheit

Kennzeichnung:  II 1/2 G EEx ia IIC T6

Hersteller: E+E Elektronik GmbH

Anschrift: Langwiesen 7, 4209 Engerwitzdorf, Österreich

#### Beschreibung der Ergänzungen und Änderungen

Das Feuchte- und Temperaturmessgerät Typ EE30EX Sensoreinheit darf auch mit den Änderungen gemäß den diesem Prüfbericht zugrunde liegenden Unterlagen gefertigt und betrieben werden. Die Änderungen betreffen den inneren Aufbau, neue Varianten der bisher zertifizierten Filterkappen und eine alternative Befestigungsverschraubung des Messkopfes. Die durchgeführten Maßnahmen bewirken keine Veränderung der bisher getroffenen Festlegungen.

Mit dieser Ergänzung wird eine Anpassung des derzeitigen auf den neuen Normenstand für elektrische Betriebsmittel für explosionsgefährdete Bereiche durchgeführt.

Angewandte Normen:

EN 60079-0:2006

EN 60079-11:2007

EN 60079-26:2007

Die Kennzeichnung ändert sich mit dem neuen Normenstand und lautet künftig:

 II 1/2 G Ex ia IIC T6

Bewertungs- und Prüfbericht: PTB Ex 09-29012

Zertifizierungssektor Explosionsschutz  
Im Auftrag

Braunschweig, 13. Mai 2009

Dr.-Ing. U. Johannsmeyer  
Direktor und Professor



Seite 1/1

## 5. E R G Ä N Z U N G

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

### zur EG-Baumusterprüfbescheinigung PTB 99 ATEX 2043 X

Gerät: Feuchte und Temperaturmessgerät Typ EE30EX Sensoreinheit

Kennzeichnung:  II 1/2 G Ex ia IIC T6

Hersteller: E+E Elektronik GmbH

Anschrift: Langwiesen 7, 4209 Engerwitzdorf, Österreich

#### Beschreibung der Ergänzungen und Änderungen

Das Feuchte- und Temperaturmessgerät Typ EE30EX Sensoreinheit darf auch mit den Änderungen gemäß den diesem Prüfbericht zugrunde liegenden Unterlagen gefertigt und betrieben werden. Die Änderungen betreffen den inneren Aufbau. Die durchgeführten Maßnahmen bewirken keine Veränderung der bisher getroffenen Festlegungen.

Mit dieser Ergänzung wird eine Anpassung des derzeitigen auf den neuen Normenstand für elektrische Betriebsmittel für explosionsgefährdete Bereiche durchgeführt.

#### Angewandte Normen:

EN 60079-0:2009

EN 60079-11:2007

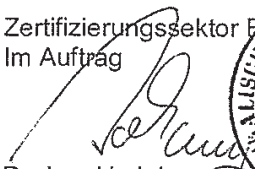
EN 60079-26:2007

Die Kennzeichnung ändert sich mit dem neuen Normenstand und lautet künftig:

 II 1/2 G Ex ia IIC T6 Ga/Gb

Prüfbericht: PTB Ex 12-22132

Zertifizierungssektor Explosionschutz  
Im Auftrag

  
Dr.-Ing. U. Johannsmeyer  
Direktor und Professor



Braunschweig, 7. Juni 2012

ZSEx10101d.doim

Seite 1/1

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.  
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.  
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.  
Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND

# DECLARATION OF CONFORMITY

(According to ISO/IEC 17050-1)

Product(s) Type	From Version:	Measure:	Output signal:
EE30EX-A EE30EX-D EE30EX-E	100201_6; 100202_7	humidity & temperature	4-20mA; 0-5V; 0-10V



E+E ELEKTRONIK Ges.m.b.H  
Langwiesen7  
A-4209 Engerwitzdorf / AUSTRIA

## EC-TYPE-EXAMINATION CERTIFICATE:

PTB 99 ATEX 2042 II (1) G [Ex ia Ga] IIC (Supply and Evaluation Unit)

PTB 99 ATEX 2043 X II 1/2 G Ex ia IIC T6 Ga/Gb (Sensor Driver Unit)

The EC-Type-Examination was certified by the Pysikalisch-Technische Bundesanstalt (notified body No 0102), Bundesallee 100, D-38116 Braunschweig.

We declare under our sole responsibility that this product(s) (see product table above) corresponds to the following regulations and their subsequent modifications:

Directive Ref.	Directive area
2004/108/EC	Electromagnetic compatibility
94/9/EC	Equipment and protective systems in potentially explosive atmospheres

The products conform with the following standards or standardized documents:

Standard	Year of ratification	Standard	Year of ratification
EN 60079-0	2009	EN 61326-1	2006
EN 60079-11	2007	EN 61326-2-3	2006
EN 60079-26	2007		

Designed for use in industrial environment.

Test Report: EMV\_I\_EE30Ex\_D\_01.doc

Modification: ..... Ex standard update

Hartl Josef  
(business manager)

Engerwitzdorf, 16.07.2012

Birklbauer Martin  
(Ex-authorized person)

## **9. CERTIFICATES IECEX**

Find more Information at [www.iecex.com](http://www.iecex.com)



**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.com  
**www.epluse.com**

**TECHNICAL OFFICES:**

**E+E CHINA / BEIJING**

Tel: +86 10 84992361  
info@epluse.cn [www.epluse.cn](http://www.epluse.cn)

**E+E CHINA / SHANGHAI**

Tel: +86 21 61176129  
info@epluse.cn [www.epluse.cn](http://www.epluse.cn)

**E+E GERMANY**

Tel: +49 6172 13881 0  
info@epluse.de [www.epluse.de](http://www.epluse.de)

**E+E FRANCE**

Tel : +33 4 7472 35 82  
info@epluse.fr [www.epluse.fr](http://www.epluse.fr)

**E+E ITALY**

Tel: +39 0331 177 31 02  
info@epluse.it [www.epluse.it](http://www.epluse.it)

**E+E KOREA**

Tel: +82 31 728 2223  
info@epluse.co.kr [www.epluse.co.kr](http://www.epluse.co.kr)

**E+E USA**

Tel: +1 781 828 6200  
office@epluse.com [www.epluse.com](http://www.epluse.com)