Series EE30EX

HUMIDITY / TEMPERATURE TRANSMITTER

for intrinsically safe applications

Manual

YOUR PARTNER IN SENSOR TECHNOLOGY

E+E

ELEKTRONIK®
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.

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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.

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}.

2. TECHNICAL DESCRIPTION

2.1 General

Compliance with the European requirements:

- **EU-Richtlinie 94/9/EG (ATEX 100a)**
  C€ 0408 ⊕ II 1 G EEx ia IIC T6
  at temperature range -20...60degC and pressure range 0.8...1.1 bar
- **Normen EN50014 and EN50020**
- **Norm EN50284 for apparatus of equipment group II, categorie 1 G (intended for hazardous locations)**
- **EMV Normen: EN61000-6-4 and EN61000-6-2**

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:

- **absolut humidity**   **dv**
- **wet bulb temperature**   **Tw**
- **specific enthalpy**   **h**
- **dew point temperature**   **Td**
- **frostpoint temperature**   **Tf**
- **mixture ratio**   **r**
- **Water vapour partial pressure**   **e**

These values can be created on 2 free scale and verifiable analogue outputs either as voltage- or currentspacesignal.
For digital further processing the output signal provides all output quantities through a serial RS232 interface.

2.2   Construction and identification
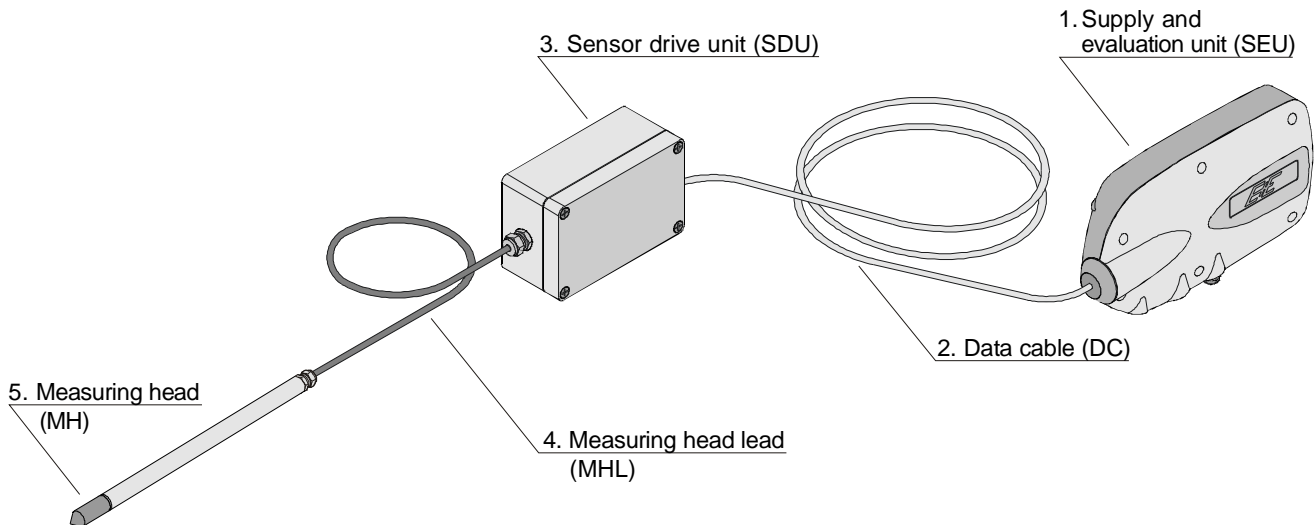
1. Supply and Evaluation Unit (Abr. SEU):

ABS plastic housing with integrated supply and evaluation unit, electric connections for supply / output and necessary jumper for configuration.
Identification: ⚒ **II (1)G [EEx ia] IIC**

2. Data cable (Abr. DC):

Up to a maximum of 100 metres 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 be 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 AlSi12 housing.
Identification: ⚒ **II 1/2 G EEx ia IIC T6**

4. Measurement head lead (Abr. MHL):

Up to a maximum of 10 metres 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: ⚒ **II 1/2 G EEx ia IIC T6**

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

2.3   Models

The series EE30EX are available in following models:

Wall mounting
EE30EX-A
probe material: stainless steel

EE30EX-A-P02

data cable pluggable
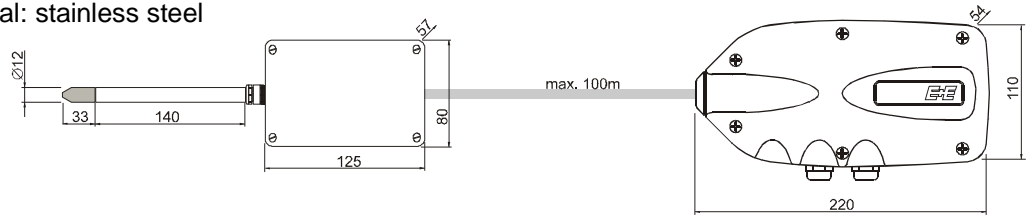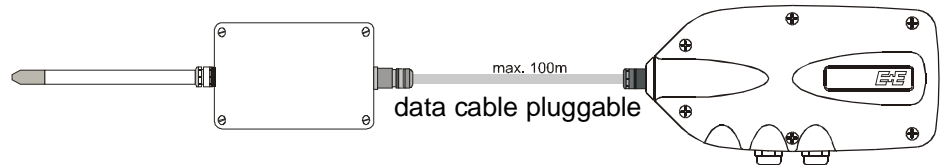
Remote probe up to 180degC
EE30EX-D
probe material: stainless steel

EE30EX-D-P02

data cable pluggable
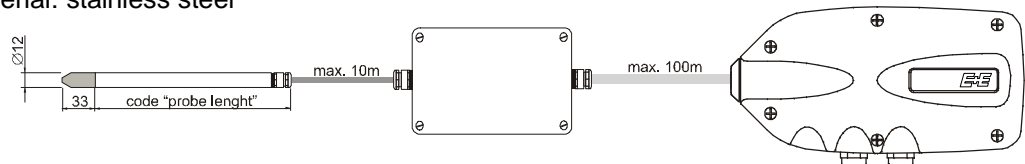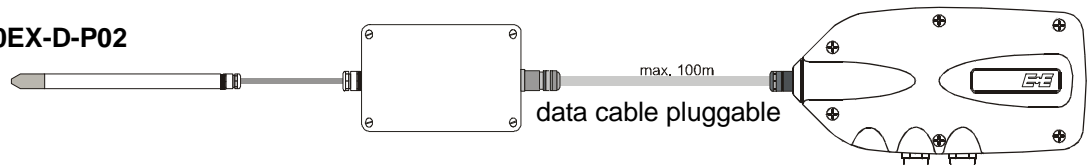
Pressure tight probe up to 15 bar
EE30EX-E
probe material: stainless steel

EE30EX-E-P02

data cable pluggable

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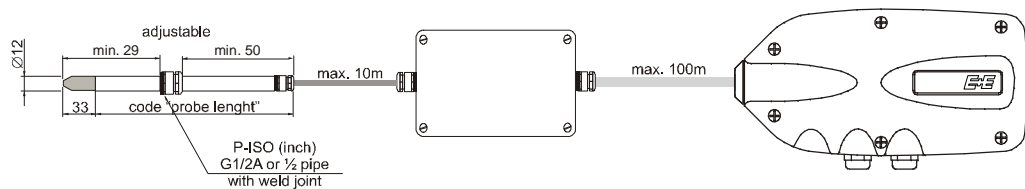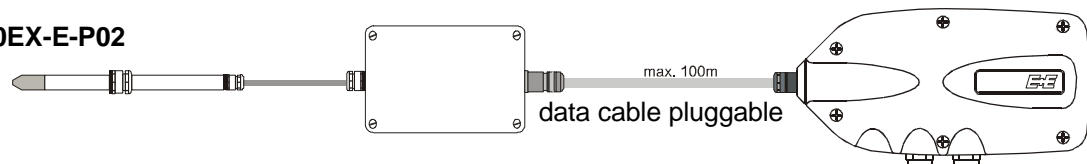
3.   INSTALLATION

3.1   Selecting a place for the transmitter
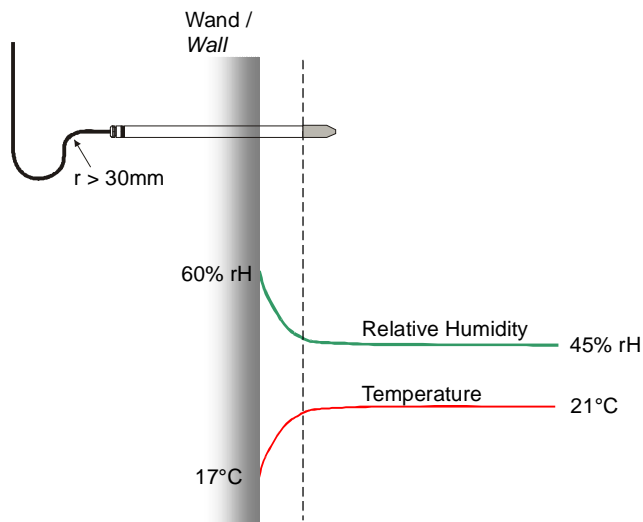
For mounting the transmitter select a place with stable conditions, do not expose the transmitter to direct sunlight or rain.

Select a place representing the process conditions when mounting the sensor head.

3.2   Installation of the housing

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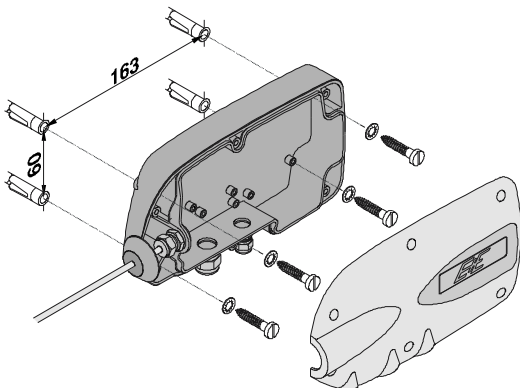
Sensor drive unit (SDU)
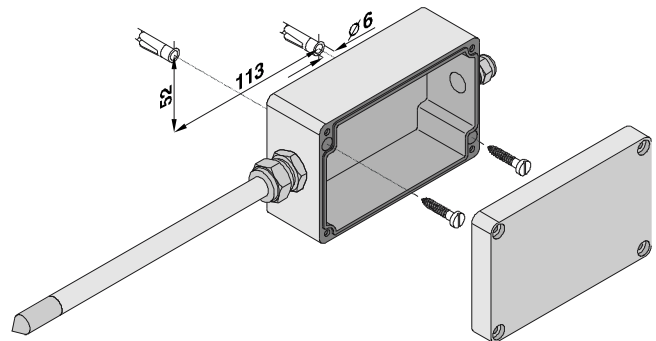
4 pieces metal fixing screws M4x20(...60) are used for mounting and the low-impedance connection between internal varnishing and e.g. grounded mounting panel.
(more details see point 4.3 earthing concept)

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 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 exposion endangered area within one certain zone.
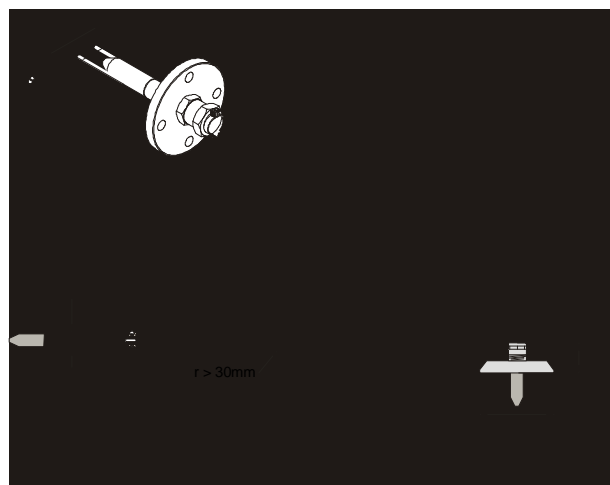
The sensor probe must be mounted horizontally or vertically (pointing downwards).
When possible, a drip sheet should be fitted for each mounting.

3.3.2 Installation of the threaded tube
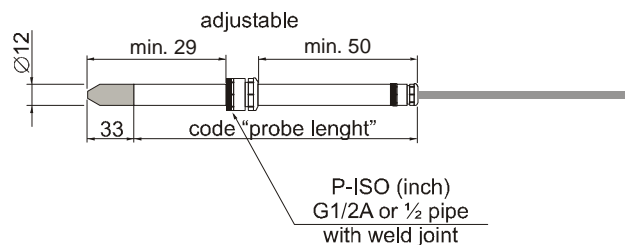
1) Mount the threaded tube in the partition wall. The threaded tube can be used as a separation between two zones. Therefore the connection must be screwed in the partition wall and it has to show a tightness of IP67.
2) Push the measurement probe into the required position in the fitting, turn the nut "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**
- colour of the external screen is blue
- single conductor diameter $\geq$ 0.1mm
- test voltage conductor-conductor $\geq$ 500V AC eff.
- test voltage conductor-screening $\geq$ 500V AC eff.

Cable for supply voltage and analoque outputs

Recommended cable:
- LiYCY 5 x 0,25 mm²
- the cable entry is achieved through **PG 9** cable glands
- cable diameter: **4 - 8 mm**

Cable for serial interfaces

Recommended cable for serial interfaces:
- LiYCY 3 x 0,25 mm²
- the cable entry is achieved through **PG 7** cable glands
- cable diameter: **3 - 6,5 mm**

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)
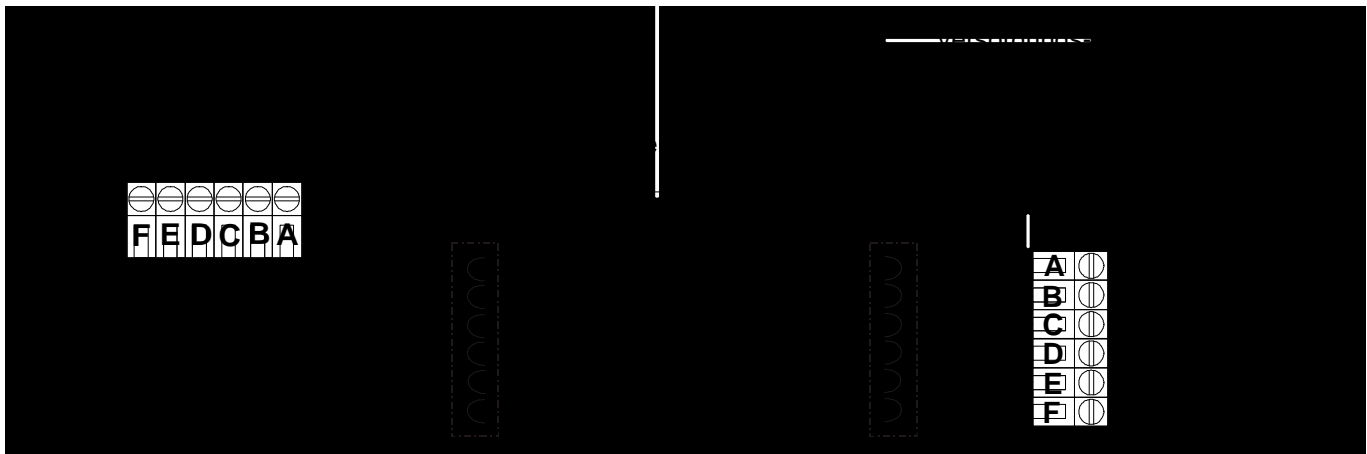
Data cable pluggable (option)

Datenkabel /
Data cable

1 grün / *green*
2 gelb / *yellow*
4 braun / *brown*
5 weiß / *white*
7 rosa / *pink*
8 grau / *grey*

Ansicht auf Steckerklemmen - VAE /
View to terminals of plug connector - SEU

Ansicht auf Buchsenklemmen - STE /
View to terminals of female connector - SDU
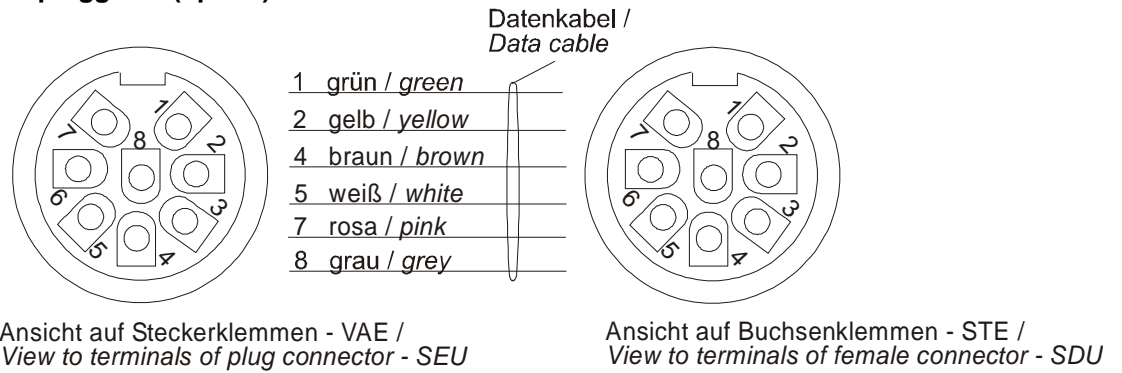
⚠ When connecting the data cable you must use cable end sleeves!

construction of the connector

connector
Manufacturer: Binder
Series: 713; 8-pole; plastic
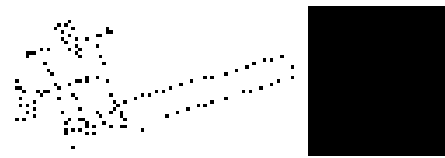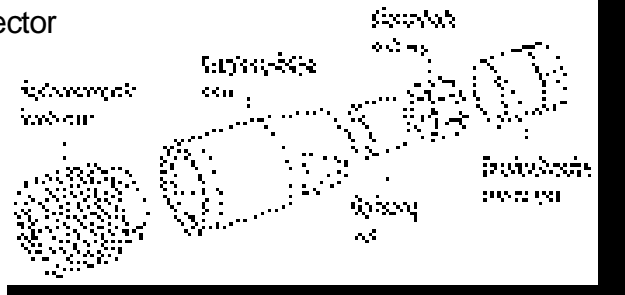
4.2.3 Connection of the data cable on the SDU (option)

construction of the connector

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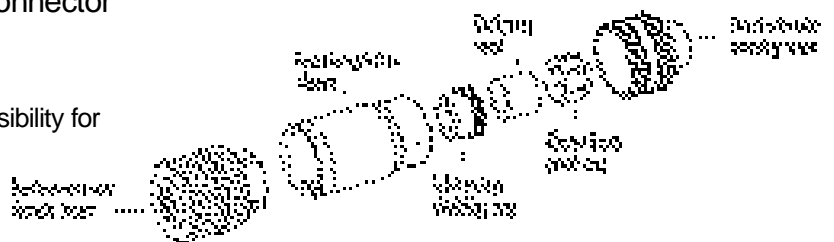
cable dimensions

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

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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)

| **i** | - When connecting the supply voltage, the analogue- and digitaloutputs it is recommended to use cable end sleeves.

- Maximal cross-section for the connection of the wire ≤ 1,5mm².

```
24V DC/V AC  (≃)──────────── +V  ▭ Ⓘ  1 ┐ Versorgung /
  ± 15 %     (≡)──────────── GND ▭ Ⓘ  2 ┘ supply


              ┌──────────── OUT 1 ▭ Ⓘ  3 ┐ Analog Ausgänge /
  (V )  (V )──│──────────── OUT 2 ▭ Ⓘ  4 │ analogue outputs
  (mA)  (mA)  └──────────── GND   ▭ Ⓘ  5 ┘
         └─────────────────── GND  ▭ Ⓘ  6 ┐
RS232 ┌──────────────────── TxD  ▭ Ⓘ  7 │ RS232
      └──────────────────── RxD  ▭ Ⓘ  8 ┘
```

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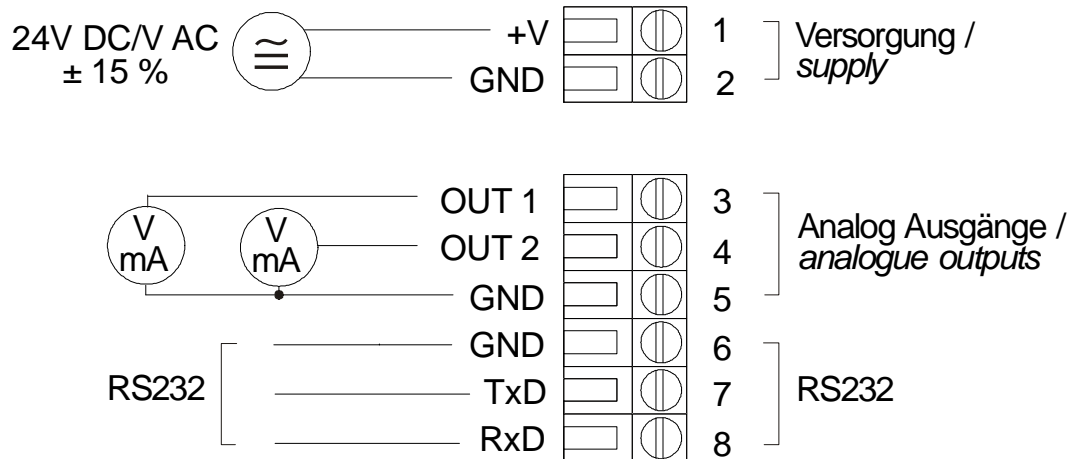
4.3 Earthing concept

Detail A / *detail A*

Detail B / *detail B*

STE / *SDU*

VAE / *SEU*

Datenkabel / *data cable*

Detail C / *detail C*

Versorgung und Analogausgänge / *Power supply and analogue outputs*

RS232
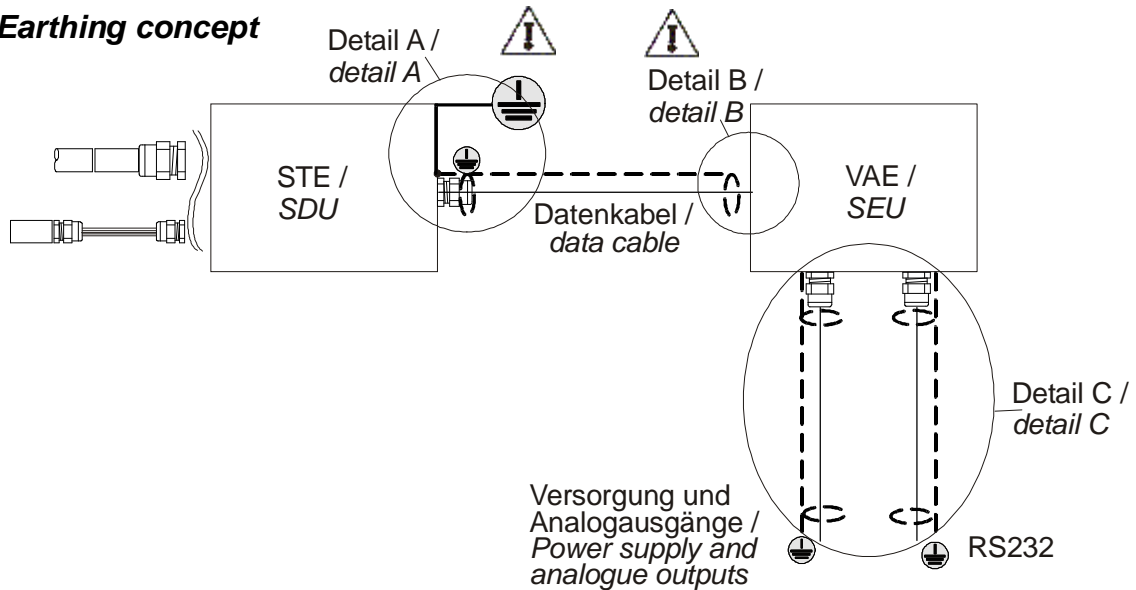
Detail A

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 2 metres. The cross section of the earthing line has to be ≥ 4mm².

2. The screen of the data cable shall be connected directly to the metalic connection or to the PG gland on the SDU. (see picture beside)
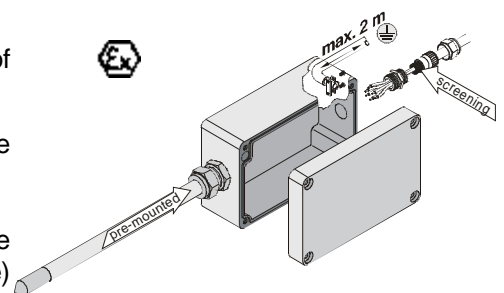
Connection of the screening to the PG glands:
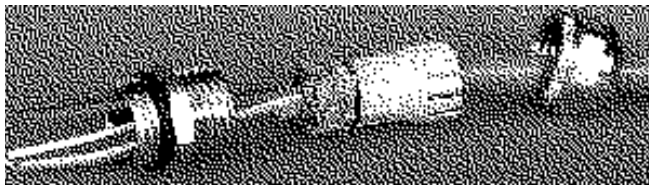
i The screen braiding has to be repressed over the plastic part of the PG gland or plug connection. The screen braid will be pressed against the internal wall of the metalic part.

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

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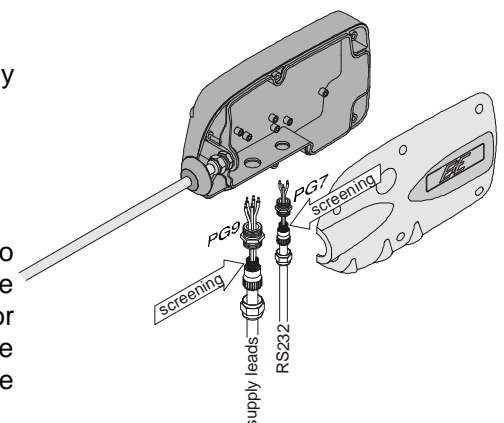
In case the VAE is connected to GND, the connection shall be made by the internal surface of the housing. The 4 pieces screws M4x20(...60) are used for mounting and the low-impedance connection between internal varnishing and the grounded mounting panel.

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 metalic PG gland (see detail A - picture of screening connection)

5.   SOFTWARE RELATED OPERATION

The transmitters of the Series EE30EX are supplied supported by Windows™ Software. The transmitter can be individually configured with the help of this software. This makes it possible to have direct communication through a terminal program.

5.1   Operation under Windows™

5.1.1   System preconditions

Windows 98™ or later, serial interface

5.1.2   Installation of the EE30 RH & T-TRANSMITTER Program

In order to install the EE30 RH & T-TRANSMITTER INSTALLATION software on your PC, start the installation program "SETUP" on the supplied disc.
Then proceed as follows:

- Start Microsoft-Windows™
- Insert the disc in drive A or B (3.5 inch, 1.44 MByte)
- Click START on the desktop
- Click run
- Input A:\ Setup or B:\ Setup
- Open the window EE30 RH & T TRANSMITTER INSTALLATION
- A list of that installed should be inputted and click OK (this point occurs twice).

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
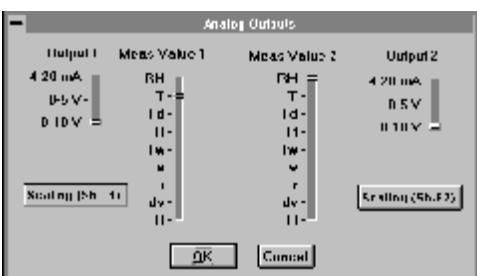
- ANALOG OUTPUT
New configuration of the two analogue outputs

- 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.**

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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.

Jumper for output signal

voltage signal   current signal   current / voltage signal

OUT 2   OUT 1   OUT 2   OUT 1   OUT 2   OUT 1
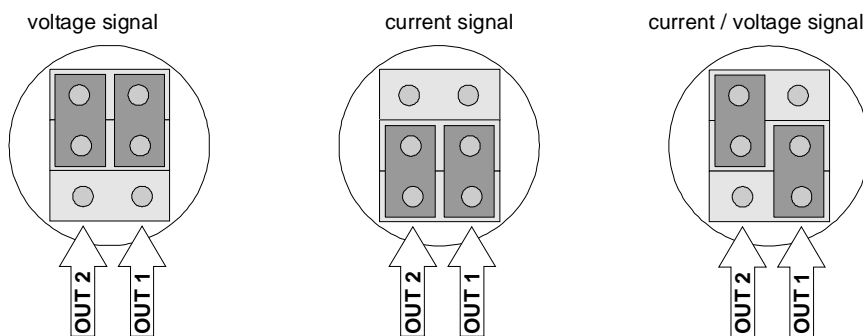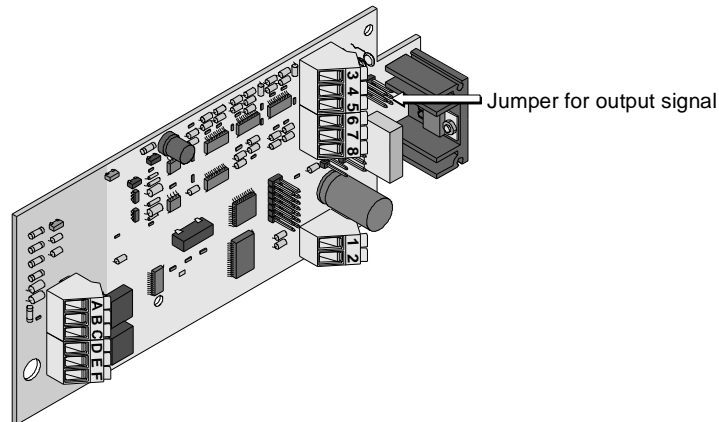
- ANALOG OUTPUT

- 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.

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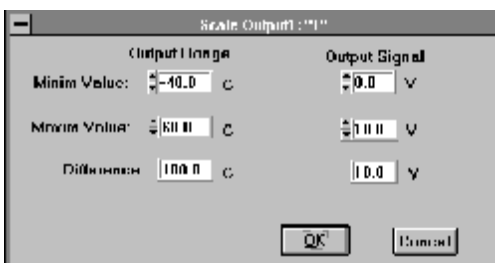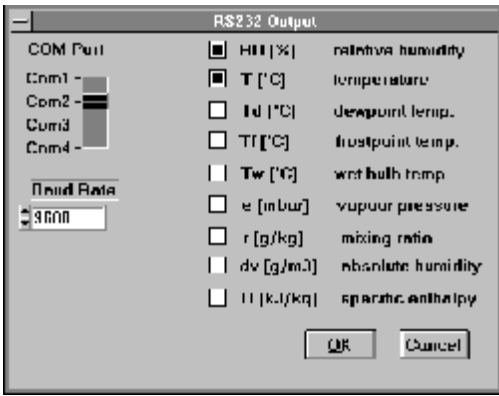
- RS232 CONFIG
  Configuration of the serial interface

  - 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.

- ADRESS
  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.
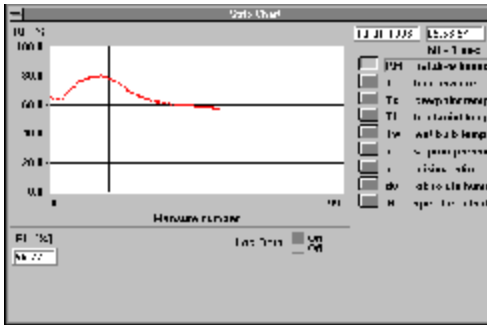
- STRIP CHART
Graphic indication of the measured value on the screen and
measurement data storage.

- 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 characte-
ristic turns around the zero point (0% rh).
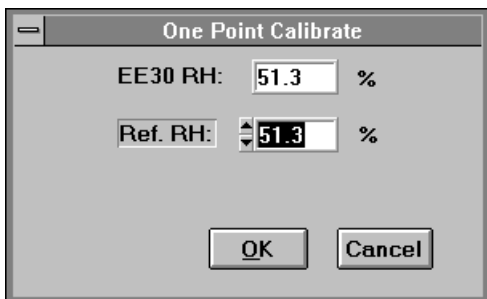
- TEMPERATURE 1 POINT
Facility of a 1 point temperature calibration. With the 1 point
temperature calibration the sensor characteristic turns around
the absolute zero point (0K or –273, 15degC).

- RESET
Returning the calibration to the factory setting.

- SENSOR EXCHANGE
Input facility for the new sensor data after an exchange of sensor.
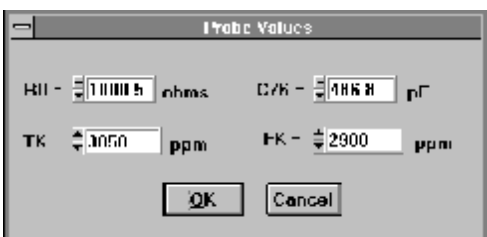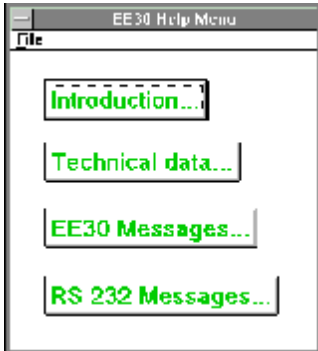
5.2.5 HELP

- 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) <u>Terminal:</u>
   - RS232 interface
   - 9600 Bauds
   - 8 Databits
   - No parity
   - 1 Stopbit
   or

b) <u>Hyper terminal with Microsoft Windows 95 ™</u>
   (Programme Group Accessory) :

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

   OPERATION :
   - Start Microsoft Windows 95TM
   - 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 minimum 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 minimum 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_Out_Low_lim = zzzzz.zzU .   New Value: Input of the minimum value (OUT 2)
Old_Out_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- to1.2-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 DDMMJ):   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 Sensor change

i

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

solder points

active side
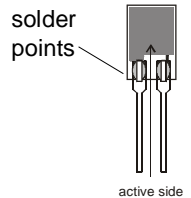
Input the new sensor data:

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

6.3 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.

6.3.1 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

6.3.2 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

6.4   Order information for accessories

	Order code
sintered stainless steel filter	HA 01 01 03
PTFE - filter	HA 01 01 05
metall grid filter	HA 01 01 06
RS232 interface cable	HA 01 03 01
protection cap for sensor probe	S01
replacement humidity sensor incl. sensor data	FE 10
replacement temperature sensor incl. sensor data	TE 38

7. TECHNICAL DATA

Measuring values

Relative humidity

Humidity sensor[1]	HC1000-400
Measuring range[1]	0...100% RH

Accuracy incl. hysteresis and nonlinearity

-with special calibration against certificated 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 electronic	typical 0.06% RH/degC
Temperature dependence sensor head	typical 0.03% RH/degC
Response time with filter at 20 degC / t_{90}	< 30 sec.

Temperature

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

Accuracy (typ.)
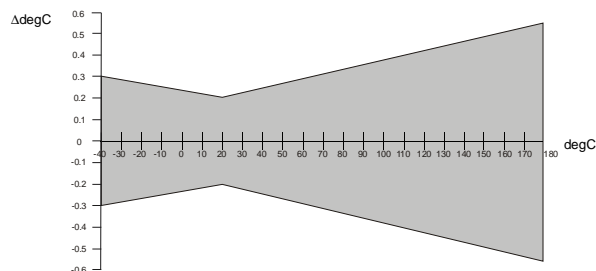
Temperature dependence	typical 0.005 degC/degC

Max. adjustable Measurement Range [3]

		from	to		unit
			EE30EX-A	*EE30EX-D/E*	
Humidity	RH	0	100	100	%RH
Temperature	T	-40 (-40)	60 (140)	180 (356)	degC (°F)
Dew point temperature	Td	-80 (-112)	60 (140)	100 (212)	degC (°F)
Frost point temperature	Tf	-80 (-112)	0 (32)	0 (32)	degC (°F)
Wet bulb temperature	Tw	0 (32)	60 (140)	100 (212)	degC (°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/m³ (gr/ft³)
Specific enthalpy	H	-50 (-15000)	400 (150000)	2800 (999999)	kJ/kg (lbf/lb)

Outputs

Two freely selectable and scalable outputs	0 - 5 V	-1 mA < I_L < 1 mA
	0 - 10 V	-1 mA < I_L < 1 mA
	4 - 20 mA	R_L < 360 Ohm
Serial interface	RS232C	

General

Supply voltage	SELV 24V DC/V AC ± 15%	
Current consumption	≤ 150mA (24V DC); ≤ 280mA (24V AC)	
Pressure range with pressure tight sensor probe	0.01...15 bar	
System requirements for software	MS Windows™ 98 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	
Electrical connection	screw terminals max. 1.5 mm²	
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 degC (-4...140°F)
	electronic supply- and evaluation device:	-40...60 degC (-40...140°F)
	electronic with display:	0...40 degC (32...104°F)
Storage temperature range	electronics and sensor head	-30...60 degC (22...140°F)
Electromagnetic compatibility according	EN61000-6-4	
	EN61000-6-2	CE

[1] Refer to the working range of the humidity sensor!

[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 [g/m³] Accuracies of absolute humidity — p [mbar] 1013

%RH	10	20	30	40	50	60	70	80	90	95	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 [mbar] Accuracies of water vapour pressure — p [mbar] 1013

%RH	10	20	30	40	50	60	70	80	90	95	100
-40	0.004	0.005	0.005	0.006	0.006	0.006	0.007	0.007	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
-20	0.028	0.030	0.032	0.035	0.037	0.039	0.041	0.043	0.046	0.047	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	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	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
20	0.50	0.53	0.56	0.59	0.62	0.65	0.68	0.71	0.74	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
40	1.58	1.66	1.74	1.82	1.89	1.97	2.05	2.13	2.21	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
60	4.24	4.42	4.61	4.80	4.98	5.17	5.36	5.54	5.73	5.82	5.83
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 [degC] Accuracies of dew point temperature

%RH	10	20	30	40	50	60	70	80	90	95	100
-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 [g/kg] Accuracies of mixing ratio — p [mbar] 1013

%RH	10	20	30	40	50	60	70	80	90	95	100
-40	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.004	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
-20	0.017	0.019	0.020	0.021	0.023	0.024	0.025	0.027	0.028	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	0.082	0.088	0.093	0.099	0.105	0.11	0.12	0.12	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
20	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.45	0.47	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
40	0.98	1.05	1.12	1.18	1.26	1.33	1.40	1.48	1.56	1.60	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
60	2.72	2.96	3.21	3.49	3.79	4.11	4.46	4.83	5.24	5.46	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 [degC] Accuracies of frost point temperature

%RH	10	20	30	40	50	60	70	80	90	95	100
-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 [kJ/kg] Accuracies of specific enthalpy — p [mbar] 1013

%RH	10	20	30	40	50	60	70	80	90	95	100
-40	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
-30	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.23	0.23
-20	0.24	0.25	0.25	0.25	0.26	0.26	0.26	0.27	0.27	0.27	0.27
-10	0.30	0.30	0.31	0.32	0.33	0.33	0.34	0.35	0.35	0.36	0.36
0	0.41	0.42	0.43	0.45	0.46	0.48	0.49	0.50	0.52	0.52	0.52
10	0.61	0.64	0.66	0.69	0.72	0.74	0.77	0.80	0.82	0.83	0.83
20	0.98	1.03	1.08	1.12	1.17	1.22	1.26	1.31	1.36	1.38	1.38
30	1.62	1.70	1.78	1.86	1.95	2.03	2.12	2.20	2.29	2.33	2.33
40	2.67	2.81	2.95	3.09	3.24	3.39	3.53	3.68	3.83	3.91	3.91
50	4.35	4.59	4.83	5.08	5.33	5.59	5.85	6.11	6.38	6.52	6.54
60	6.95	7.36	7.78	8.21	8.65	9.11	9.58	10.06	10.56	10.82	10.86
70	10.86	11.57	12.32	13.09	13.91	14.76	15.65	16.58	17.55	18.06	
80	16.62	17.89	19.26	20.72	22.27	23.94	25.73	27.64	29.70		
90	24.94	27.29	29.88	32.73	35.88	39.36	43.23	47.54			
100	36.79	41.25	46.35	52.22	59.02	66.94	76.24	87.22			
110	53.90	62.57	73.09	86.02	102.1	122.4	140.8				
120	78.44	95.70	118.5	149.4	180.2						
130	114	149.3	202.1								
140	166.4	241.7									
150	246	367.1									
160	372.1										

±Tw [degC] Accuracies of wet bulb temperature

%RH	10	20	30	40	50	60	70	80	90	95	100
10	0.34	0.35	0.35	0.35	0.36	0.36	0.36	0.36	0.36	0.36	0.36
20	0.46	0.45	0.45	0.44	0.44	0.44	0.43	0.43	0.42	0.42	0.42
30	0.62	0.60	0.58	0.56	0.54	0.52	0.51	0.49	0.48	0.48	0.47
40	0.85	0.78	0.72	0.68	0.64	0.61	0.58	0.56	0.54	0.53	0.52
50	1.13	0.98	0.88	0.80	0.73	0.68	0.65	0.61	0.58	0.57	0.56
60	1.46	1.20	1.03	0.91	0.82	0.76	0.71	0.67	0.63	0.62	0.60
70	1.84	1.42	1.18	1.02	0.91	0.83	0.76	0.72	0.68	0.66	
80	2.24	1.63	1.32	1.12	0.99	0.89	0.82	0.76	0.72		
90	2.64	1.84	1.45	1.22	1.06	0.95	0.87	0.81			
100	3.05	2.03	1.57	1.31	1.13	1.01	0.93	0.86			
110	3.45	2.22	1.69	1.40	1.21	1.08	0.99				
120	3.84	2.40	1.81	1.49	1.29						
130	4.21	2.57	1.93								
140	4.56	2.74									
150	4.90	2.92									
160	5.23										

Accuracies of the calculated variables are subject to the accuracy of the humidity and temperature - measurement.

The above accuracy values are valid for **±2%RH and ±0.2degC**.

High accuracy values can be reached by a special humidity/temperature calibration.

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   [EEx ia] IIC

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, May 17, 1999

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

PTB

(13)

S C H E D U L E

(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) ±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 $C_o = 1,1$ µF $L_o = 5,5$ 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

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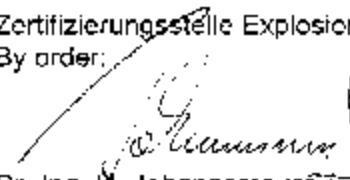
Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2042

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   Braunschweig, May 17, 1999
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Physikalisch-Technische Bundesanstalt

PTB

Braunschweig und Berlin

(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:

⟨Ex⟩   **II 1/2 G   EEx ia IIC T6**

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, May 17, 1999

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

PTB

(13) # S C H E D U L E

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

(15) <u>Description of equipment</u>

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

<u>Electrical data</u>

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:
$U_i = 12,6$ V
$I_i = 77$ mA
$P_i = 243$ mW
$C_i = 820$ 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) <u>Report</u> PTB Ex 99-27467

(17) <u>Special conditions for safe use</u>

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

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2043 X

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

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CERTIFICATE OF CONFORMITY

E+E Elektronik, A-4210 Engerwitzdorf, Langwiesen 7

EE30EX

(Instrument Group IIC Category 1G Temperature class T6)

In accordance with the guidelines 94/9/EG of the European Parliament and Council from March 23rd, 1994 we certify herewith that

The microprocessor controlled measuring instrument for humidity and temperature in intrinsically safe design (Eex i) consisting of following two parts:

- „EE30EX – Supply and Evaluation Unit", designed to be used outside the hazardous, explosion endangered area „Electrical instruments" according to EN 50014)
- „EE30EX – Sensor Unit", designed for use in hazardous, explosion endangered atmosphere Zone 0 „Intrinsically Electrical Instruments" according EN 50014)

has been designed and manufactured in conformity with the requirements of the guidelines 94/9/EG.

This statement is based on the conformity with:

- ☒ EN 50014 – Electrical Instruments for Explosive Endangered Area – General Requirements
- ☒ EN 50020 – Electrical Instruments for Explosion Endangered Area – Intrinsically Safe „i"
- ☒ EN 50284 – Special Requirements for Manufacturing, Testing and Labeling of Electrical Instruments of Group II, Category 1G
- ☒ EN 60079-14- Set Up of Electrical Systems in Explosion Endangered Areas.
- ☒ EN 1127-1 Explosion Endangered Atmosphere , Explosion Safe – Part 1: Basics and Methodology

The type examination certificate was issued by Physikalisch-Technischen Bundesanstalt (Site Nr.0102), Bundesallee 100, D-201 16 Braunschweig.
The numbers of the type examination certificates are:
Baumusterprüfbescheinigungsnummer sind:

- PTB 99 ATEX 2042 for „EE30Ex – Supply and Evaluation Unit"
- PTB 99 ATEX 2043 X for „EE30EX – Sensor Unit"

Date: August 23rd 1999

Dr. Dieter Wagner
E+E Elektronik

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