The highly accurate EE33 series are designed for fast and reliable measurement of relative humidity / dew point temperature / absolute humidity / ... under the most demanding conditions. Neither condensation nor heavy chemical pollutions will affect prompt and reliable measurements. Process pressures as high as 100 bar (1450 psi) and continuous high humidity are also no problem for the EE33 series. The core of the EE33 series is the new monolithic measurement cell type HMC01, manufactured in thin-film technology by E+E Elektronik. Chemical contamination and also condensation will actually evaporate due to the innovative design of the HMC01 measurement cell. The monolithic construction of the sensor allows a fast return to normal conditions and a continuation of the measurement. Additionally, with the inimitable E+E sensor coating the HMC01 measurement cell is even better protected against corrosive and short-circuit-causing conductive soils. Distinctive models and mounting versions allow the EE33 series to be utilized in numerous applications:

- **Measurement of relative humidity during temporary condensation**: the measurement cell is briefly heated, but very intense
- **Measurement of dew point temperature at continuous high humidity**: the measurement cell is controlled and heated continuously
- **Measurement of relative humidity at continuous high humidity**: the measurement cell is controlled and heated continuously; an additional temperature sensor is added
- **Measurement of relative humidity at high chemical exposure and average humidity**: the measurement cell is briefly heated, but very intense
- **Measurement of relative humidity at process pressure up to 100 bar (1450 psi) and average humidity**: the measurement cell is installed in a special high pressure probe

The configuration software included in the scope of supply allows user friendly setup of the operation / sensor heating mode as well as selection and adjustment of the electrical outputs.

**Model** | **Environmental Conditions**
--- | ---
C - remote sensing probe up to 120 °C (248 °F) | chemical pollution, temporary condensation
D - remote sensing probe up to 180 °C (356 °F) | chemical pollution, temporary condensation
E - remote sensing probe, pressure tight up to 20 bar (300 psi) | chemical pollution, temporary condensation
I - 2 remote sensing probes (RH-measurement), pressure tight up to 100 bar (1450 psi) | chemical pollution, temporary condensation
J - remote sensing probe (Td-measurement), pressure tight up to 20 bar (300 psi) | continuous high humidity and condensation
K - remote sensing probe (Td-measurement), pressure tight up to 20 bar (300 psi) | continuous high humidity and condensation

**Typical Applications**

- pharmaceutical and food industry
- dryers for ceramics, wood, concrete and polyester, etc.
- mushroom farms
- high-humidity storage rooms
- climate, test and curing chambers
- meteorology

**Features**

- heated, monolithic measurement cell
- working range 0...100 % RH / -40...+180 °C (-40...356 °F)
- measurement near condensation
- fast recovery after condensation
- chemical purge after chemical exposure
- pressure tight up to 100 bar (1450 psi)
- calculation of additional physical quantities
- optional sensor coating
Networkability
The optional RS485 interface (order code N) allows for building a network of up to 32 transmitters. The measurement data can be collected in a shared database and made available for all kinds of further processing.

Product Configuration Software (EE-PCS)
The configuration software allows flexible and simple adjustment of the analogue and alarm outputs in accordance with the requirements. The adjustment / calibration of the humidity and temperature outputs is possible as well. Furthermore the settings of the start and duration of the heating of the measurement cell can be defined.

Integrated Display
The actual measurement data and the corresponding Min/Max values can be indicated in an optional display (order code D05). The physical quantity to be displayed is selected by the push buttons next to the display.

Alarm Outputs
An optional alarm module with 2 relay outputs is available for control and alarm purposes (order code SW). The selection of the physical quantity and the setting of threshold and hysteresis can be made with the configuration software included in the scope of supply.
Connection Versions

<table>
<thead>
<tr>
<th>Standard</th>
<th>plug option C03</th>
<th>plug option C06</th>
<th>plug option C08</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td>3x M16 x 1.5</td>
<td>Lumberg RKC 5/7 power supply+</td>
<td>Lumberg RKC 5/7 M16x1.5</td>
<td>RS232 Lumberg RKC 5/7 power supply+</td>
</tr>
</tbody>
</table>

Dimensions (mm)

**Housing:**
- Dimensions (mm): 135 (5.3”) x 90 (3.5”) x 163 (6.4”)

**Remote Probe:**
- EE33-MFTCx
- EE33-MFTDx
- Remote sensing probe
- Probe material: stainless steel

Remote Probe:
- L = Filter length: refer to data sheet Accessories

Sensing probes:

**EE33-MFTEx**
- Pressure tight probe up to 20 bar (300 psi)
- Probe material: stainless steel

**EE33-MFTIx**
- Pressure tight probe up to 100 bar (1450 psi)
- Probe material: stainless steel

**EE33-MFTKx**
- Remote sensing probe, pressure tight up to 20 bar (300 psi)
- (screw connection is not included in the scope of supply)
- Probe material: stainless steel

**EE33-MFTJx**
- Two remote sensing probes, pressure tight up to 20 bar (300 psi)
- (screw connections are not included in the scope of supply)
- Probe material: stainless steel

**Screw connection:**
- 1/2” ISO 212 mm
- 1/2” NPT 212 mm

**Order code:**
- HA011102
- HA011103
- HA011104
- HA011105

**Power supply:**
- Analogue output

**Analogue output:**
- RS232

**Analogue output:**
- RS485 network

* Siemens 6ES7 194-1KA01-0XA0

**Remote Probe:**
- Probe material: stainless steel

**Dimensions:**
- 135 (5.3”) x 90 (3.5”) x 163 (6.4”)
- 66.5 (2.6”) x 150 (5.9”)
- 15 (0.6”) x 13 (0.51”)
Technical Data

Measurement values

**Relative humidity**

- **Humidity sensor**
  - heated, monolithic measurement cell HMC01

- **Working range**
  - 0...100 % RH

- **Accuracy** (including hysteresis, non-linearity and repeatability, traceable to intern. standards, administered by NIST, PTB, BEV...)
  - -15...+40 °C (5...104 °F)
  - 0 % RH ± (1.3 + 0.3%*mv) % RH
  - >90 % RH ± 2.3 % RH

- **Temperature dependence of electronics**
  - typ. ± 0.01 % RH/°C (0.005 % RH/F)

- **Response time**
  - with metal grid filter at 20°C (68°F) / t<sub>90</sub> < 15 s

**Temperature**

- **Temperature sensor element**
  - monolithic measurement cell HMC01

- **Working range sensing head**
  - EE33-MFTC: -40...120 °C (-40...248 °F)
  - EE33-MFTD/E/I/J/K: -40...180 °C (-40...356 °F)

- **Accuracy**
  - Temperature dependence of electronics typ. ± 0.005 °C/°C

- **Temperature dependence of electronics**
  - typ. ± 0.005 °C/°C

- **External temperature probe**
  - Pt1000 (DIN A)

**Outputs**

- Two freely selectable and scaleable analogue outputs
  - 0...1 V
  - -1mA < I<sub>L</sub> < 1 mA
  - 0...5 V
  - -1mA < I<sub>L</sub> < 1 mA
  - 0...10 V
  - -1mA < I<sub>L</sub> < 1 mA
  - 4...20 mA
  - RL < 500 Ohm
  - 0...20 mA
  - RL < 500 Ohm

**Digital interface**

- RS232 optional: RS485

**Max. adjustable measurement range**

<table>
<thead>
<tr>
<th>from</th>
<th>to</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EE33-C</td>
<td>EE33-D/E/I/J</td>
</tr>
<tr>
<td>Humidity RH</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Temperature T</td>
<td>-40 (40)</td>
<td>120 (248)</td>
</tr>
<tr>
<td>Dew point temperature Td</td>
<td>-40 (40)</td>
<td>100 (212)</td>
</tr>
<tr>
<td>Frost point temperature TF</td>
<td>-40 (40)</td>
<td>0 (32)</td>
</tr>
<tr>
<td>Wet bulb temperature TW</td>
<td>0 (32)</td>
<td>100 (212)</td>
</tr>
<tr>
<td>Water vapour partial pressure e</td>
<td>0 (0)</td>
<td>1000 (15)</td>
</tr>
<tr>
<td>Mixture ratio r</td>
<td>0 (0)</td>
<td>999 (9999)</td>
</tr>
<tr>
<td>Absolute humidity dv</td>
<td>0 (0)</td>
<td>700 (300)</td>
</tr>
<tr>
<td>Specific enthalpy h</td>
<td>0 (0)</td>
<td>2800 (9999)</td>
</tr>
</tbody>
</table>

**General**

- **Supply voltage**
  - 8...35 V DC
  - 12...30 V AC (optional 100...240 V AC, 50/60 Hz)

- **Current consumption**
  - 2x voltage output typ. 40 mA / 80 mA
  - 2x current output typ. 80 mA / 160 mA

- **Pressure range for pressure tight probe**
  - EE33-MFTEX/Jx/Kx: 0.01...20 bar (0.15...300 psi)
  - EE33-MFTx: 0...100 bar (0...1450 psi)

- **System requirements for software**
  - WINDOWS 2000 or later; serial interface

- **Housing / protection class**
  - A1 S1 9 Cu 3 / IP65 (NEMA 4)

- **Cable gland**
  - M16 x 1.5

- **Electrical connection**
  - screw terminals up to max. 1.5 mm² (AWG 16)

- **Working and storage temperature range of electronics**
  - -40...60 °C (-40...140 °F)
  - -20...50 °C (-4...122 °F) - housing with display

- **Electromagnetic compatibility according to**
  - EN61326-1
  - EN61326-2-3
  - ICES-003 ClassA
  - FCC Part15 ClassA

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

2) Can be easily changed by software.

3) Refer to accuracies of calculated values (www.epluse.com/feuchtemessung)

*) 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).
### Technical Data for Options

**Display**
- Graphical LC display (128x32 pixels), with integrated push-buttons for selecting parameters and MIN/MAX function

**Alarm outputs**
- 2 x 1 switch contact
- 250 V AC / 6A
- 28 V DC / 6A

**Threshold + hysteresis:** can be adjusted with configuration software

Switching parameters:
- Freely selectable between RH Relative humidity
- T Temperature
- Td Dew point temperature
- Tf Frost point temperature
- Tw Wet bulb temperature
- e Water vapour partial pressure
- r Mixture ratio
- dv Absolute humidity
- h Specific enthalpy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>EE33-MFTC/D/E/II/J</th>
<th>EE33-MFTK</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH Relative humidity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>T Temperature</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Td Dew point temperature</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tf Frost point temperature</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tw Wet bulb temperature</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>e Water vapour partial pressure</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>r Mixture ratio</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>dv Absolute humidity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>h Specific enthalpy</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

### Working Range Humidity Sensor

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

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

### Connection Diagram

**Terminal configuration - Alarm output**
(order code SW)

- Relay 1 (NC)
- Relay 2 (NC)

### Accessories / Replacement Parts

(For further information, see data sheet "Accessories")

- Filter caps (HA0101xx)
- Display + housing cover (D05M)
- Interface cable for PCB (HA010304)
- Interface cable for plug C06 (HA010311)
- Mounting flange 12 mm (RH probe) (HA010201)
- Mounting flange 6 mm (T probe) (HA010207)
- Adapter M16x1.5 to NPT ½” (HA011101)
- Drip water protection (HA010503)
- Calibration set (HA0104xx)
- Pressure tight screw connections (HA111102)
- Pressure tight screw connections (HA111103)
- Pressure tight screw connections (HA111104)
- Pressure tight screw connections (HA111105)
- Radiation shield for RH-probe (HA010502)
- Radiation shield for T-probe (HA010506)

### Scope of Supply

Included in all versions: ✓

Only for metal housing:
- V01
- V01 / C03 / C08
- C08 & N
- C06 / C08
- Except C03, C06, C08, V01

EE33-xFTI
1) Following combinations are not possible: alarm output / ARC-Module / integrated power supply
2) Combination alarm output and plugs is not possible (with cable glands only)
3) Plug options are not possible / If using an ARC-Module the transmitter has to be supplied with 24V AC/DC +/- 20 %
4) Digital interface occupied
5) Integrated power supply includes 2 plugs for power supply and outputs / further plug options are not possible

Ordering Guide

<table>
<thead>
<tr>
<th>Hardware Configuration</th>
<th>EE33-</th>
<th>EE33-</th>
<th>EE33-</th>
<th>EE33-</th>
<th>EE33-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Type</td>
<td>FT</td>
<td>FT</td>
<td>FT</td>
<td>FT</td>
<td>FT</td>
</tr>
<tr>
<td>Filter</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>I</td>
<td>J</td>
</tr>
<tr>
<td>Model</td>
<td>K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filter</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>I</td>
<td>J</td>
</tr>
<tr>
<td>Model</td>
<td>K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable length (incl. probe length)</td>
<td>2 m (6.6 ft)</td>
<td>5 m (16.4 ft)</td>
<td>10 m (32.8 ft)</td>
<td>2 m (6.6 ft)</td>
<td>5 m (16.4 ft)</td>
</tr>
<tr>
<td>Probe length</td>
<td>65 mm (2.6&quot;) (for model E: 80mm (3.1&quot;)</td>
<td>200 mm (7.9&quot;)</td>
<td>400 mm (15.8&quot;)</td>
<td>2 m (6.6 ft)</td>
<td>5 m (16.4 ft)</td>
</tr>
<tr>
<td>Pressure tight</td>
<td>1/2&quot; male thread</td>
<td>1/2&quot; NPT thread</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>feedthrough</td>
<td>HA03</td>
<td>HA03</td>
<td>HA07</td>
<td>HA07</td>
<td>HA07</td>
</tr>
<tr>
<td>Interface</td>
<td>RS232</td>
<td>RS485</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Display</td>
<td>without display</td>
<td>with display</td>
<td>D05</td>
<td>D05</td>
<td>D05</td>
</tr>
<tr>
<td>Alarm output</td>
<td>with relay</td>
<td>with relay</td>
<td>SW</td>
<td>SW</td>
<td>SW</td>
</tr>
<tr>
<td>ARC-Module</td>
<td>without external triggering of sensor-heating</td>
<td>with external triggering of sensor-heating</td>
<td>ARC</td>
<td>ARC</td>
<td>ARC</td>
</tr>
<tr>
<td>Plug</td>
<td>cable glands</td>
<td>1 plug for power supply and outputs</td>
<td>C03</td>
<td>C03</td>
<td>C03</td>
</tr>
<tr>
<td>Sensing probe</td>
<td>fixed</td>
<td>connectable in the housing</td>
<td>P03</td>
<td>P03</td>
<td>P03</td>
</tr>
<tr>
<td>Coating sensor</td>
<td>no</td>
<td>yes</td>
<td>HC01</td>
<td>HC01</td>
<td>HC01</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>8...35 V DC / 12...30 V AC</td>
<td>integrated power supply 100...240 V AC, 50/60 Hz</td>
<td>V01</td>
<td>V01</td>
<td>V01</td>
</tr>
<tr>
<td>Software Configuration</td>
<td>C</td>
<td>Select according to Ordering Guide</td>
<td>(A - J)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical parameters of outputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative humidity RH [%]</td>
<td>(A)</td>
<td>Output 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature °C</td>
<td>(B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dew point temperature °C</td>
<td>(C)</td>
<td>Output 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frost point temperature °C</td>
<td>(D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet bulb temperature °C</td>
<td>(E)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water vapour partial pressure e [mbar]</td>
<td>(F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixture ratio [g/kg]</td>
<td>(G)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute humidity [g/m³]</td>
<td>(H)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific enthalphy [kJ/kg]</td>
<td>(J)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of output signal</td>
<td>0-1 V</td>
<td>0-5 V</td>
<td>0-10 V</td>
<td>0-20 mA</td>
<td>4-20 mA</td>
</tr>
<tr>
<td>Measured value units</td>
<td>non metric / US</td>
<td>E01</td>
<td>E01</td>
<td>E01</td>
<td>E01</td>
</tr>
<tr>
<td>T-Scaling</td>
<td>-40...60 °C (T02)</td>
<td>-20...100 °C (T14)</td>
<td>Output T</td>
<td>Select according to Ordering Guide (Txx)</td>
<td></td>
</tr>
<tr>
<td>Td-Scaling</td>
<td>-10...50 °C (T03)</td>
<td>+20...120 °C (T15)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tf-Scaling</td>
<td>0...50 °C (T04)</td>
<td>0...120 °C (T16)</td>
<td>Output Td</td>
<td>Select according to Ordering Guide (Tdxx)</td>
<td></td>
</tr>
<tr>
<td>Tw-Scaling</td>
<td>0...100 °C (T05)</td>
<td>0...80 °C (T21)</td>
<td>Select according to Ordering Guide (Txx)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(in °C or °F)</td>
<td>0...60 °C (T07)</td>
<td>-40...80 °C (T22)</td>
<td>Output Tf</td>
<td>Select according to Ordering Guide (Txx)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-30...70 °C (T08)</td>
<td>-20...80 °C (T24)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-30...120 °C (T09)</td>
<td>-40...180 °C (T33)</td>
<td>Output Tw</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-20...120 °C (T10)</td>
<td>+20...180 °C (T40)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-40...120 °C (T12)</td>
<td>-40...180 °C (T52)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Order Example

EE33-MFTD5025ND05SSW/BC3-T02-Td07

<table>
<thead>
<tr>
<th>Housing</th>
<th>metal</th>
<th>Display</th>
<th>with display</th>
<th>Output 1:</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>humidity + temperature</td>
<td>Alarm output</td>
<td>with relay</td>
<td>Output 2:</td>
<td>Td</td>
</tr>
<tr>
<td>Model</td>
<td>remote sensing probe</td>
<td>ARC-Module:</td>
<td>without</td>
<td>Output signal:</td>
<td>0-10 V</td>
</tr>
<tr>
<td>Filter</td>
<td>PTFE filter</td>
<td>Plug:</td>
<td>cable glands</td>
<td>Measurand value unit:</td>
<td>metric / SI</td>
</tr>
<tr>
<td>Cable length</td>
<td>2 m (6.6 ft)</td>
<td>Sensing probe:</td>
<td>fixed</td>
<td>T-Scaling:</td>
<td>-40...60 °C</td>
</tr>
<tr>
<td>Probe length</td>
<td>200 mm (7.9&quot;)</td>
<td>Coating sensor:</td>
<td>no</td>
<td>Td-Scaling:</td>
<td>0...60 °C</td>
</tr>
<tr>
<td>Interface</td>
<td>RS485</td>
<td>Supply voltage:</td>
<td>8...35 V DC / 12...30 V AC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>