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# User Manual EE08

## High-Precision Miniature Humidity and Temperature Probe


www.epluse.com

# Content

# 1 General Information

This user manual is intended to ensure proper handling and optimal functioning of the device. The user manual shall be read before commissioning the equipment and it shall be provided to all staff involved in transport, installation, operation, maintenance and repair. E+E Elektronik Ges.m.b.H. accepts no liability for any warranty or liability claims arising from this publication or improper handling of the product(s) described.

All information, technical data and diagrams included in this document are based on the information available at the time of writing. The document may contain technical inaccuracies and typographical errors. The contents will be revised on a regular basis and changes will be implemented in subsequent versions. The product(s) described and the contents of this document may be changed or improved at any time without prior notice.



**PLEASE NOTE**

Find this document and further product information on our website at www.epluse.com/ee08.

## 1.1 Explanation of Warning Notices and Symbols

### Safety precautions

Precautionary statements warn of hazards in handling the device and provide information on their prevention. The safety instruction labeling is classified by hazard severity and is divided into the following groups:

**DANGER**

**Danger** indicates hazards for persons. If the safety instruction marked in this way is not followed, the hazard will verly likely result in severe injury or death.

**WARNING**

**Warning** indicates hazards for persons. If the safety instruction marked in this way is not followed, there is a risk of injury or death.

**CAUTION**

**Caution** indicates hazards for persons. If the safety instruction marked in this way is not followed, minor or moderate injuries may occur.

**NOTICE**

**Notice** signals danger to objects or data. If the notice is not observed, damage to property or data may occur.

### Informative notes

Informative notes provide important information that is characterised by its relevance.

**INFO**

The information symbol indicates tips on handling the device or provides additional information on it. This information is useful to achieve optimum performance of the device.

The title field may deviate from “INFO” depending on the context. For instance, it may also read “PLEASE NOTE”.

## 1.2 Safety Instructions

### 1.2.1 General Safety Instructions

**NOTICE**

Improper handling of the device may result in its damage.

- The EE08 probe and mainly the filter cap shall not be exposed to unnecessary mechanical stress.
- Use the EE08 only as intended and observe all technical specifications.

### 1.2.2 Intended Use

The EE08 is intended for the humidity (RH) and temperature (T) measurement in applications that require accurate measurement over wide RH and T ranges. It must not be applied in hazardous environment with agressive or flammable gases or in explosive areas. For use outdoors and/or in meteorolgy, optional radiation shields are available. Please refer to chapter 3 Product Description.

**⚠ WARNING**

Non-compliance with the product documentation may cause safety risks for people and the entire measurement installation.

The manufacturer is not liable for any damage caused by improper handling, installation and maintenance of the device.

- Do not use the EE08 in explosive atmosphere or for measurement in aggressive or flammable gases.
- This device is not appropriate for safety, emergency stop or other critical applications where device malfunction or failure could cause injury to human beings.
- The device may not be manipulated with tools other than specifically described in this manual.

**NOTICE**

Failure to follow the instructions in this user manual may lead to measurement inaccuracy and device failures.

- The EE08 may only be operated under the conditions described in this user manual and within the specification included in chapter 9 Technical Data.
- Any unauthorised product modifications will invalidate all warranty claims. Modifications may only be carried out with express authorisation of E+E Elektronik Ges.m.b.H.!
- The probe must be operated with the filter cap on at all times. Do not touch the sensing element inside the sensing head.
- While replacing the filter cap, take very good care not to touch or rub the sensing elements.
- For sensor cleaning please see “Cleaning Instructions” at www.epluse.com/ee08.

### 1.2.3 Mounting, Start-up and Operation

The EE08 has been produced under state of the art manufacturing conditions, has been thoroughly tested and has left the factory after fulfilling all safety criteria. The manufacturer has taken all precautions to ensure safe operation of the device. The device shall be set up and installed in a way that does not impair its safe use. All applicable local and international safety guidelines for safe installation and operation of the device have to be observed. This user manual contains information and warnings that must be observed in order to ensure safe operation.

**ⓘ PLEASE NOTE**

The manufacturer or his authorised agent can only be held liable in case of willful or gross negligence. In any case, the scope of liability is limited to the corresponding amount of the order issued to the manufacturer. The manufacturer assumes no liability for damage caused by non-compliance with the applicable regulations, operating instructions or the specified operating conditions. Any consequential damage is excluded from liability.

**⚠ WARNING**

Non-compliance with the product documentation may result in accidents, personal injury or property damage.

- Mounting, installation, commissioning, start-up, operation and maintenance of the device may only be carried out by qualified staff. Such staff must be authorised by the operator of the facility to carry out the mentioned activities.
- The qualified staff must have read and understood this user manual and must follow the instructions contained within. The manufacturer accepts no responsibility for non-compliance with instructions, recommendations and warnings.
- All process and electrical connections must be thoroughly checked by authorised staff before commissioning the device.
- Do not install or start-up a device suspected to be faulty. Mark it clearly as faulty and remove it from the process.
- Service operations other than described in this user manual may only be performed by the manufacturer. A faulty device may only be investigated and possibly repaired by qualified, trained and authorised staff. If the fault cannot be fixed, the device shall be removed from the process.

## 1.3 Environmental Aspects

**PLEASE NOTE**

Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with relevant environmental protection requirements. Please observe local regulations for the disposal of the device.

For disposal, the individual components of the device must be separated according to local recycling regulations. The electronics shall be disposed of correctly as electronics waste.

# 2 Scope of Supply

- EE08 probe
- Inspection certificate according to DIN EN 10204-3.1

# 3 Product Description

## 3.1 General

The EE08 is a probe for the highly accurate measurement of humidity (RH) and temperature (T) over wide RH and T ranges of 0...100 % RH and -40...80 °C (-40...176 °F).

Typical application fields of the probe are

- Meteorology / weather stations
- Humidity / temperature data logging
- Incubators
- Fermentation chambers
- Green houses
- Snow machines
- Dry storage facilities

There are two types of probe: the EE08 with a cable (type E8) of up to 5 m (16.4 ft) in length, and the EE08 with a connector (type E11). Connection cables of 1.5, 3, 5 or 10 m (5, 10, 16.4 or 32.8 ft) are available as accessories for the latter.

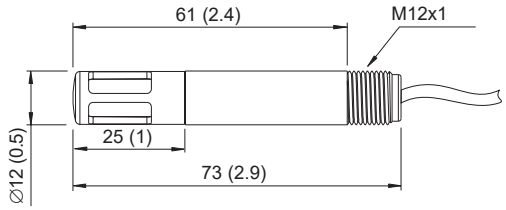
For outdoor operation, it is of paramount importance to use an appropriate radiation shield. The EE08 is compatible with rotationally symmetric radiation shields, which protect against rain, snow, and overheating caused by direct sunlight. These are available as accessories (HA010502 for type E8 and HA010506 for type E11).

## 3.2 Dimensions

Values in mm (inch)

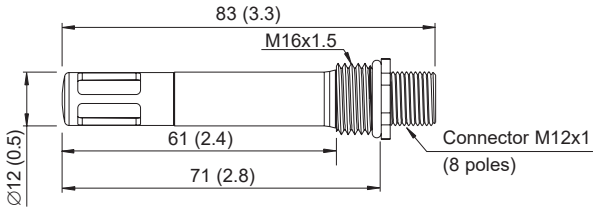
**Cable version**

(Connection type E8)



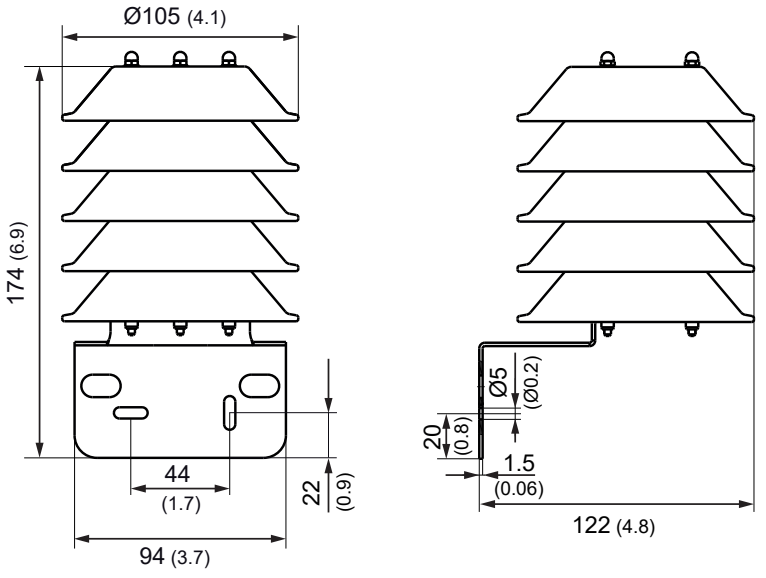

**Type T2**

(Connection type E11)




**Radiation shield HA010502 and HA010506**

(needs to be ordered separately)



## 3.3 Electrical Connection

**⚠ WARNING**

Incorrect installation, wiring or power supply may cause overheating and result in personal injury or property damage.

For correct cabling, always observe the presented wiring diagram for the product version used.

The manufacturer cannot be held responsible for personal injury or damage to property caused by incorrect handling, installation, wiring, power supply or maintenance of the device.

**NOTICE**

**Ground connection**

A low impedance connection between the shield of the connection cable and the ground potential is important for the flawless operation of the EE08.

**PLEASE NOTE**

- With a 4-wire measurement of the passive T element, there is a residual uncertainty. This corresponds to the additional lead resistance of the circuit board inside the EE08 sensor from the cable/plug side to the passive T sensor element (the 4-wire measurement is carried out up to the circuit board connection). To obtain the correct value, this additional resistance must be subtracted from the measured resistance value.
- Plug version, type E9: 0.3 Ω
- Cable version, type E8: 0.2 Ω
- Another way to eliminate the residual uncertainty is to carry out a 1-point adjustment of the resistance measurement.

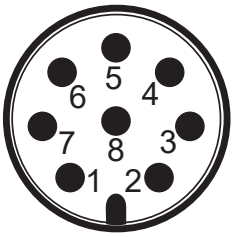
**NOTICE**

**E2 voltage level**

Please observe an E2 voltage level of 3.3 V / ±0.1 V on the data lines.

| EE08 with cable | | EE08-M1xE8xxx<br>T active | EE08-M6xE8xxx<br>T passive, 4 wire |
|---|---|---|---|
| GND | | Pink | Pink |
| T-out | | Grey | Not connected (grey) |
| RH-out | | Yellow | Yellow |
| SCL | } E2-interface | Green | Green |
| SDA | } E2-interface | Brown | Brown |
| +UB | | Red | Red |
| T passive | | Not connected (white) | White, black |
| T passive | | Not connected (blue) | Blue, violet |

Tab. 1 Electrical connection via cable

| EE08 with connector | EE08-MxE11xxx T active / passive, 2 wire | Assignment of M12 connection cable (HA010322, HA010323, HA010324, HA010325) |
|---|---|---|
|  | 1 T passive[1)] | White |
| | 2 SDA } E2-interface | Brown |
| | 3 SCL | Green |
| | 4 RH out | Yellow |
| | 5 T out | Grey |
| | 6 GND | Pink |
| | 7 T-passive[1)] | Blue |
| | 8 +UB | Red |



1) Not connected for T active versions (M1)

Tab. 2 Electrical connection via cable

# 4 Mounting and Installation

The follwing mounting types are possible:

- Wall mount with the help of a mounting clip, available as accessory HA010211.
- Outdoor operation with radiation shield: wall mount or pole mount.
  Please mind the mounting instructions included in the manuals of HA010502 and HA010506.

# 5 Setup and Adjustment

## 5.1 EE-PCS Product Configuration Software

Use the software to perform adjustments and changes in the settings and proceed as follows:

1. Download the EE-PCS Product Configuration Software from www.epluse.com/configurator and install it on a PC.
2. Connect the E+E device to the PC using the USB configuration adapter.
3. Start the EE-PCS software.
4. Follow the instructions on the EE-PCS opening page to scan the ports and to identify the connected device.
5. Click on the desired setup or adjustment mode from the main EE-PCS menu on the left and follow the online instructions of the EE-PCS

# 6 Maintenance and Service

## 6.1 Calibration and Adjustment

To carry out a one point or a two point calibration / adjustment, the E2 / RS232 converter (available as an accessory, order code HA011005) and the EE-PCS Product Configuration Software are necessary. The EE-PCS is freely available at www.epluse.com/ee08.

**Definitions**

- **Calibration** documents the accuracy of a measurement device. The device under test (specimen) is compared with the reference and the deviations are documented in a calibration certificate. During the calibration, the specimen is not changed or improved in any way.
- **Adjustment** improves the measurement accuracy of a device. The specimen is compared with the reference and brought in line with it. An adjustment can be followed by a calibration which documents the accuracy of the adjusted specimen.

## 6.2 RH and T Calibration and Adjustment

**Humidity calibration and adjustment**

Depending on the application and the requirements of certain industries, there might arise the need for periodical humidity calibration (comparison with a reference) or adjustment (bringing the device in line with a reference).

**Calibration and adjustment at E+E Elektronik**

Calibration and/or adjustment can be performed in the E+E Elektronik calibration laboratory. For information on the E+E capabilities in ISO or accredited calibration please see www.eplusecal.com and ww.epluse.com/iso9001cal.

**Calibration and adjustment by the user**

Depending on the level of accuracy required, the humidity reference can be:

- Humidity Calibrator (e.g. Humor 20), please refer to www.epluse.com/humor20.
- Hand-held Meter (e.g. Omniport 40), please refer to www.epluse.com/omniport40.
- Humidity Calibration Kit (e.g. E+E Humidity Standards), please refer to www.epluse.com/ee08.

## 6.3 Cleaning the Sensing Head and Filter Cap Exchange

In a dusty, polluted environment it might be necessary to replace the filter cap occasionally. In most cases, visible contamination or dirt indicate a clogged filter. Longer response time of the measurement also indicates a clogged filter cap. In this cases, replace the filter by a new, original one, see datasheet “Accessories”.

**Procedure:**

1. Turn the filter cap counter-clockwise to remove it.
2. Install the new filter cap finger-tight by turning it clockwise.

**NOTICE**

Failing to follow the instructions in this user manual may lead to measurement inaccuracy and device failures.

- While replacing the filter cap, or cleaning the sensing head take very good care not to touch or rub the humidity sensing element.

If needed, the sensing head can be cleaned. For cleaning instructions please see www.epluse.com/ee08.

## 6.4 Repairs

**PLEASE NOTE**

Repairs may only be carried out by the manufacturer. The attempt of unauthorised repair excludes any warranty claims.

# 7 Spare Parts / Accessories

For further information please refer to the Accessories datasheet.

| Description | Code |
|---|---|
| **E+E Product Configuration Software**<br>(Free download from www.epluse.com/configurator) | **EE-PCS** |
| **Interface cable RS232 ←→ E2 bus for EE08, 2 m (6.6 ft)** | **HA011005** |
| **Sensor connection cable M12x1 socket ←→ free ends, 8 poles, shielded**<br>**1.5 m (5 ft)**<br>**3 m (10 ft)**<br>**5 m (16.4 ft)**<br>**10 m (32.8 ft)** | <br>**HA010322**<br>**HA010323**<br>**HA010324**<br>**HA010325** |
| **Radiation shield with clamp ring M20x1.5 for cable version (E8)** | **HA010502** |
| **Radiation shield with screw-in thread M16x1.5 for plug version (E11)** | **HA010506** |
| **Wall mounting clip Ø12 mm (0.47")** | **HA010211** |
| **Protection cap for Ø12 mm (0.47") probe, RAL6018** | **HA010783** |
| **Flange socket, M12x1 ←→ 50 mm (1.97") stranded wire, 8 poles, M16x1 screw-in thread** | **HA010703** |
| **Connector, M12x1 socket, 8 poles, for self assembly** | **HA010704** |
| **Metal grid filter cap for EE08, polycarbonate body** | **HA010113** |

# 8 Technical Data

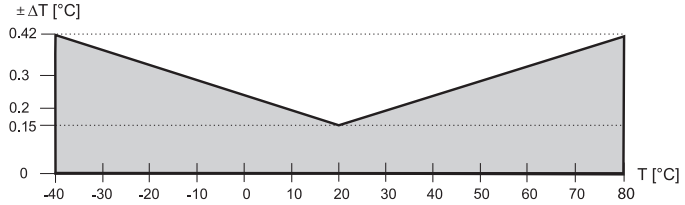
## Measurands

### Relative Humidity (RH)

| | | |
|---|---|---|
| **Measuring range** | 0...100 %RH | |
| **Accuracy**[1] including hysteresis, non-linearity and repeatability,<br>@ 23 °C (73 °F) and nominal voltage<br>**≤90 %RH**<br>**>90 %RH** | <br><br>±1.65 %RH<br>±2.45 %RH | |
| **Factory calibration uncertainty**[2] **≤90 %RH**<br>**>90 %RH** | ±(0.7 + 0,003 * mv) %RH<br>±1 %RH | mv = measured value |
| **Temperature dependency**, typ. | ±0.03 %RH / °C (±0.017 %RH / °F) | |

1) Defined against E+E calibration reference.
2) Defined at 23 °C with a coverage factor k=2, corresponding to a confidence level of 95 %.

### Temperature (T)

| | |
|---|---|
| **Measuring range** | -40...+80 °C (-40...+176 °F) |
| **Accuracy**[1] |  |
| **Factory calibration uncertainty**[2] | ±0.1 °C |

1) Defined against E+E calibration reference.
2) Defined at 23 °C with a coverage factor k=2, corresponding to a confidence level of 95 %.

## Outputs

| | | |
|---|---|---|
| **Analogue** | 0 - 1 V / 0 - 2.5 V / 0 - 5 V / 0 - 10 V | -0.2 mA < $I_L$ < 0.2 mA |
| **Digital interface** | E2 interface[1)] | |

1) E2 voltage level = 3.3 V / ±0.1 V, for further support literature refer to www.epluse.com/ee08.

## General

| | | |
|---|---|---|
| **Power supply** class III<br>USA & Canada: Class 2 supply necessary, max. voltage 30 V DC | | |
| **output 0 - 1 V / 0 - 2.5 V** | V1: 4.5 - 15 V DC | V2: 7 - 30 V DC |
| **output 0 - 5 V** | | V2: 7 - 30 V DC |
| **output 0 - 10 V** | | V2: 12 - 30 V DC |
| **Current consumption**, typ. | <1.3 mA | |
| **Electrical connection** | M12x1, 8/10 poles<br>Cable PVC 8 x 0.14 mm² (M1 models)<br>Cable PVC 10 x 0.14 mm² (M6 models) | |
| **Filter** | Metal grid | |
| **Storage conditions** | -40...+80 °C (-40...176 °F)<br>0...95 %RH non-condensing | |
| **Enclosure** **Material**<br>**Protection rating** | PC (Polycarbonate)<br>IP65 | |
| **Electromagnetic compatibility** | EN 61326-1<br>FCC Part15 Class B | EN 61326-2-3<br>ICES-003 Class B<br>Industrial Environment |
| **Conformity** | CE UKCA | |
| **Adjustment** | EE-PCS Product Configuration Software (www.epluse.com/configurator) and configuration adapter | |

## Accuracy of E+E Humidity and Temperature Sensors

The measurement accuracy depends both on the performance of the measuring instrument and on the correct installation in the application.

For best accuracy, every E+E RH and T sensor is multi-point factory adjusted and calibrated in a highly stable RH / T reactor. Using a high-precision dew point mirror as reference, the overall uncertainty of the factory calibration $U_{cal}$ is minimal.

The total measurement uncertainty $U_{total}$ for E+E sensors is calculated in accordance with EA-4/02 (European Accreditation, Evaluation of the Measurement Uncertainty in Calibration) and with GUM (Guide to the Expression of Uncertainty in Measurement) as follows:

$$U_{total} = k \cdot \sqrt{\left(\frac{U_{cal}}{2}\right)^2 + \left(\frac{U_{accuray}}{\sqrt{3}}\right)^2}$$

$U_{total}$ .....total accuracy incl. factory calibration
$U_{cal}$.....uncertainty of the factory calibration
$u_{accuracy}$...accuracy of the measurement device
k.....coverage factor k=2, corresponding to a confidence level of 95 %.

For external calibrations, $U_{total}$ is to be used as the evaluation criterion. The calculation does not include effects due to long-term drift or chemical exposure.

As National Metrological Institute (NMI) / Designated Institute (DI) responsible for maintaining National Standards in Austria, E+E Elektronik represents the highest level in calibration. For further details, please refer to www.epluseCal.com.

# 9 Conformity

## 9.1 Declarations of Conformity

E+E Elektronik Ges.m.b.H. hereby declares that the product complies with the respective regulations listed below:

CE European directives and standards.

and

UKCA UK statutory instruments and designated standards.

Please refer to the product page at www.epluse.com/ee08 for the Declarations of Conformity.

## 9.2 Electromagnetic Compatibility

EMC for industrial environment.
The probe is a group 1 device and corresponds to class B.

## 9.3 FCC Part 15 Compliance Statement

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

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

## 9.4 ICES-003 Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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