



Epluse EE431 Duct and Immersion Temperature Sensor User Manual

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Epluse EE431 Duct and Immersion Temperature Sensor



Product Information

Specifications

- **Product Name:** EE431 Duct and Immersion Temperature Sensor
- **Scope of Supply:** Refer to section 2 for details
- **Accessories:** Refer to section 7 for details
- **Technical Data:** Refer to section 8 for details

General Information

The EE431 Duct and Immersion Temperature Sensor is designed for reliable and accurate temperature monitoring in air and liquids within the specified temperature range. It is commonly used in building automation, HVAC, and process control applications.

For more detailed product information, please visit our website at www.epluse.com/ee431.

Explanation of Warning Notices and Symbols

The safety instructions provided in this manual are classified by hazard severity and divided into different groups:

- **DANGER:** Indicates hazards for persons that can result in severe injury or death if not followed.
- **WARNING:** Indicates hazards for persons that can result in injury or death if not followed.
- **CAUTION:** Indicates hazards for persons that can result in minor or moderate injuries if not followed.
- **NOTICE:** Signals danger to objects or data, and may result in property or data damage if not observed.
- **INFO:** Provides important information and tips on handling the device for optimal performance.

Safety Instructions

General Safety Instructions

Improper handling of the device may result in damage. Follow these safety precautions:

- Avoid any unnecessary mechanical stress and inappropriate use.
- Installation, electrical connection, maintenance, and commissioning should only be performed by qualified

personnel.

- Use the temperature sensors only as intended and observe all technical specifications.
- The device is designed for operation with class III supply (EU) and class 2 supply (NA).
- Do not apply the supply voltage to the RS485 data lines.

Intended Use

The EE431 duct and immersion temperature sensor is optimized for reliable and accurate temperature monitoring in air and liquids within the specified temperature range. Refer to the datasheet on our website for more information (www.epluse.com/ee431). Typical applications include building automation, HVAC, and process control. Follow the mounting and installation methods described in chapter 4 for proper installation.

WARNING:

The manufacturer cannot be held responsible for damages resulting from incorrect handling, installation, and maintenance of the device.

FAQ (Frequently Asked Questions)

• Can the EE431 temperature sensor be used in liquids?

Yes, the EE431 temperature sensor is optimized for temperature monitoring in both air and liquids within the specified temperature range.

• What is the maximum temperature range for the EE431 sensor?

The maximum temperature range for the EE431 sensor can be found in the datasheet on our website (www.epluse.com/ee431).

• Can I connect the supply voltage to the RS485 data lines?

No, do not apply the supply voltage to the RS485 data lines.

General Information

This user manual serves for ensuring 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. does not accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products. This document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described product(s) can be improved and changed at any time without prior notice.

The user manual may not be used for the purposes of competition without the written consent of E+E Elektronik Ges.m.b.H. and may not be forwarded to third parties. Copies may be made for internal purposes. All information, technical data and diagrams included in these instructions are based on the information available at the time of writing.

PLEASE NOTE

Find this document and further product information on our website at www.epluse.com/ee431.

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 very 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 of danger to objects or data. If the notice is not observed, damage to property or data may occur.

Informational notes

Informational notes provide important information that stands out due to its relevance.

INFO

- The information symbol indicates tips on handling the device or provides additional information on it. The information is useful for reaching optimal performance of the device.
- The title field can deviate from “INFO” depending on the context. For instance, it may also read “PLEASE NOTE”.

Safety Instructions

General Safety Instructions

NOTICE

Improper handling of the device may result in its damage.

- Avoid any unnecessary mechanical stress and inappropriate use.
- Installation, electrical connection, maintenance, and commissioning shall be performed by qualified personnel only.
- Use the temperature sensors only as intended and observe all technical specifications.
- The device is designed for operation with class III supply (EU) and class 2 supply (NA).
- Do not apply the supply voltage to the RS485 data lines.

Intended Use

The EE431 duct and immersion temperature sensor is optimized for reliable and accurate temperature monitoring in air and liquids within the specified temperature range (refer to datasheet www.epluse.com/ee431). Typical applications for the sensor are building automation, HVAC, and process control. Apply the mounting and installation methods described in Chapter 4 Mounting and Installation.

WARNING

The manufacturer cannot be held responsible for damages as a result of incorrect handling, installation, and maintenance of the device.

- Do not use temperature sensors in explosive atmospheres or for the measurement of aggressive 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

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

- The EE431 may only be operated under the conditions described in this user manual and within the specification included in chapter 8 Technical Data.
- Unauthorized product modification leads to the loss of all warranty claims. Modification may be accomplished only with the explicit permission of E+E Elektronik Ges.m.b.H.!

Mounting, Start-up and Operation

The EE431 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 user must ensure that the device is set up and installed in a way that does not impair its safe use. The user is responsible for observing all applicable local and international safety guidelines for safe installation and operation of the device. This user manual contains information and warnings that must be observed by the user in order to ensure safe operation.

PLEASE NOTE

The manufacturer or his authorized 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 damages incurred due to failure to comply with the applicable regulations, operating instructions, or the specified operating conditions. Consequential damages are excluded from the liability.

WARNING

Non-compliance with the product documentation may cause safety risks for persons (accidents, personal injury) or damage to property (measurement installation).

- Mounting, installation, commissioning, start-up, operation, and maintenance of the device may be performed by qualified staff only. Such staff must be authorized 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.
- All process and electrical connections shall be thoroughly checked by authorized staff before putting the device into operation.
- Do not install or start up a device supposed to be faulty. Make sure that such devices are not accidentally used by marking them clearly as faulty.
- A faulty device may only be investigated and possibly repaired by qualified, trained, and authorized staff. A faulty device shall be removed from the process.
- Service operations other than those described in this user manual may only be performed by the manufacturer.

Environmental Aspects

PLEASE NOTE

- Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with all 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.

Scope of Supply

- Temperature sensor according to ordering code
- Test report according to DIN EN10204-2.2 (for active output only)
- Quick guide (digital interface only)
- Cable gland

Product Description

General

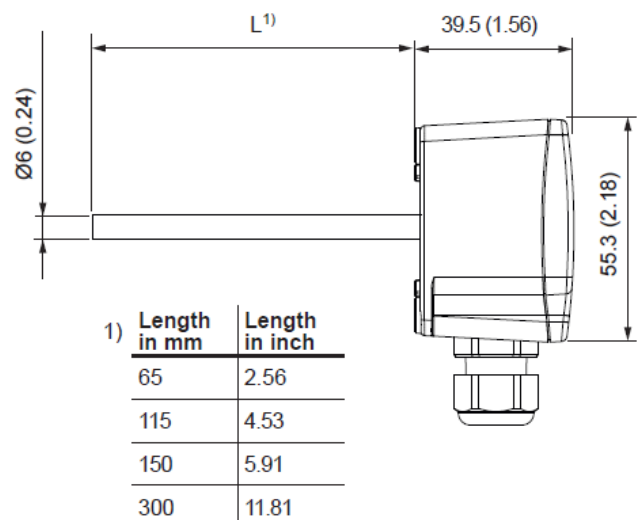
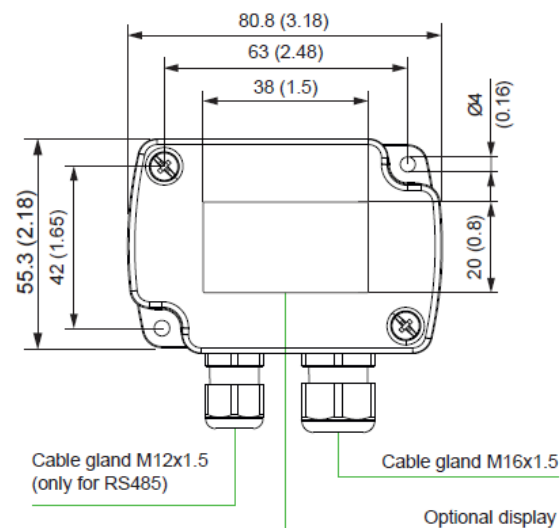
The EE431 duct and immersion sensor reliably measures the temperature (T) in air and liquids. It is optimized for building automation, HVAC, and process control. The measured data is available at the voltage or current output, on the RS485 interface with Modbus RTU or BACnet MS/TP protocol and on the optional display. The analog output can be set to °C or °F. In addition, the EE431 features a wide choice of sensing elements for passive temperature measurement.

Dimensions

EE431 Duct and Immersion Temperature Sensor

Values in mm (inch)

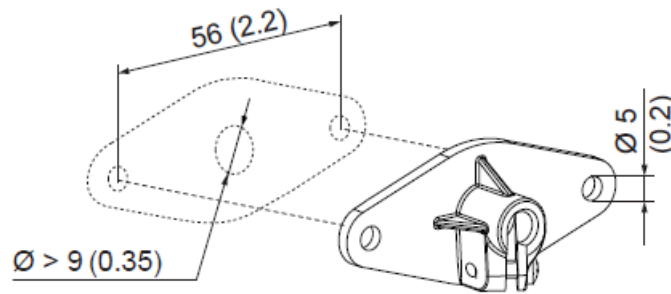
Temperature sensor



Mounting accessories

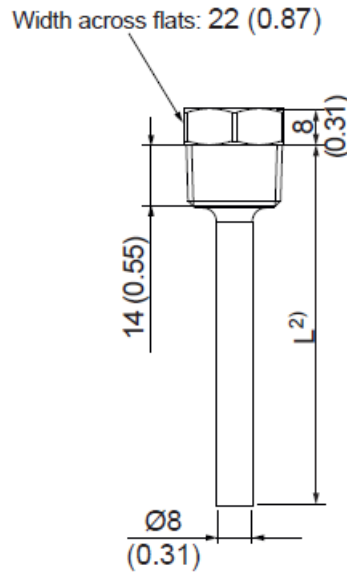
Mounting flange

(not included in the scope of supply)



Immersion well

(not included in the scope of supply)



2)

| Length in mm | Length in inch |
|-----------------|-------------------|
| 50 | 1.97 |
| 100 | 3.94 |
| 135 | 5.31 |
| 285 | 11.22 |

Electrical Connection

EE431 features screw terminals for connecting the power supply and the outputs. Insert the cables into the enclosure through the M16 cable gland.

NOTICE

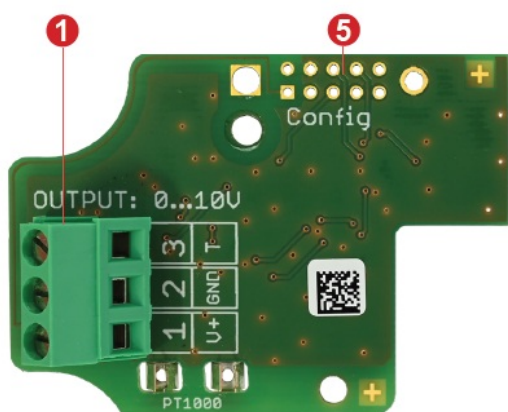
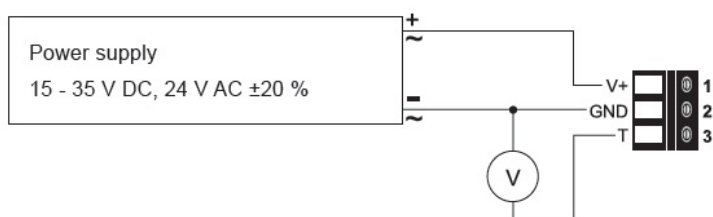
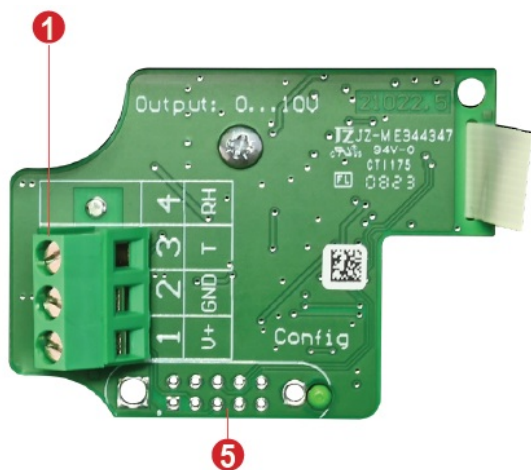
It is important to make sure that the cable glands are closed tightly. This is necessary for assuring the IP rating of the enclosure according to EE431 specification, as well as for stress relief at the screw terminals on the EE431 board.

WARNING

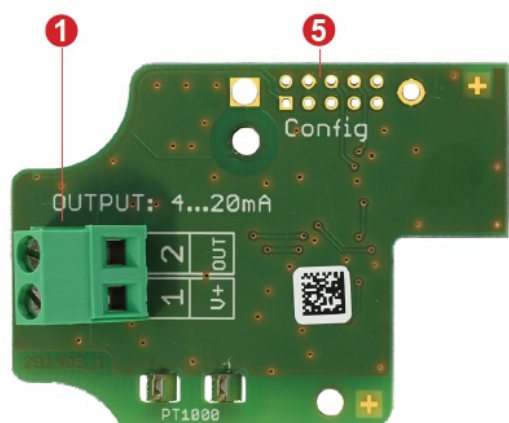
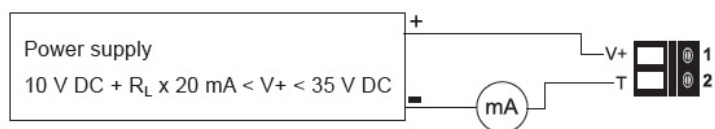
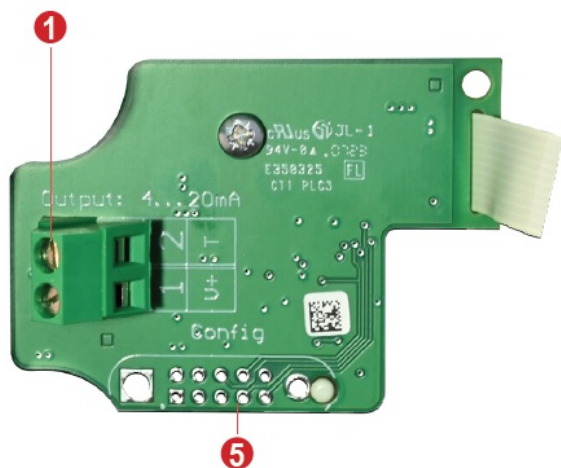
- Incorrect installation, wiring, or power supply may cause overheating and therefore personal injuries or damage to property.
- For correct cabling of the device, always observe the presented wiring diagram for the product version used.
- The manufacturer cannot be held responsible for personal injuries or damage to property as a result of incorrect handling, installation, wiring, power supply and maintenance of the device.

Wiring for Active Models

Models with analog output (0...10V)



Models with analogue output (4...20mA)



Models with digital interface

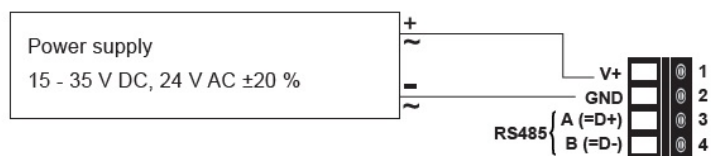
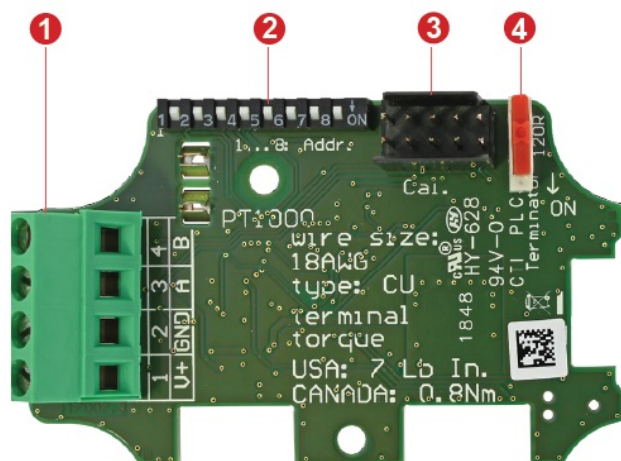


Fig. 1 Temperature sensor connection options

| No. | Function |
|-----|---|
| 1 | Screw terminals for power supply and outputs |
| 2 | Address DIP switch for RS485 interface |
| 3 | Configuration connector (USB configuration adapter) for RS485 interface |
| 4 | Bus termination resistor 120 Ω (jumper) |
| 5 | Configuration connector for analogue version |

Tab. 1 Part of the digital temperature sensor electronics board types

Wiring Diagram for Models with Passive T output

The unit wiring diagram applies to all passive types. The connections can be interchanged.

2-wire connection



Fig. 2 Temperature sensor connection for passive models

Display

- The single-line LC (Liquid Crystal) display is only available for the active models with analogue output (according to the ordering code see datasheet www.epluse.com/ee431).
- Depending on the order code, the measured data is displayed in $^{\circ}\text{C}$ or $^{\circ}\text{F}$. The displayed unit can be changed with the free PCS10 Product Configuration Software, refer to chapter 5 Setup and Configuration for further details.



EE431 set for $^{\circ}\text{F}$



EE431 set for $^{\circ}\text{C}$

Mounting and Installation

NOTICE

Improper handling of the device may result in damage.

- Assembly and installation may only be carried out by qualified personnel.

NOTICE

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

- For accurate measurement, it is essential that the temperature of the sensor is the same as the temperature of the air to measure.
- Mount the temperature sensor at representative locations of the space to be monitored (see Fig. 3 and Fig. 5).
- The sensor may not be exposed to extreme mechanical stress.

For best accuracy please observe the following general mounting instructions and recommended mounting positions.

Duct Mounting

Mounting with flange

- Mount the sensor about one meter from the inlet
- Mount the probe in a way, that the probe tip is placed in the middle of the duct

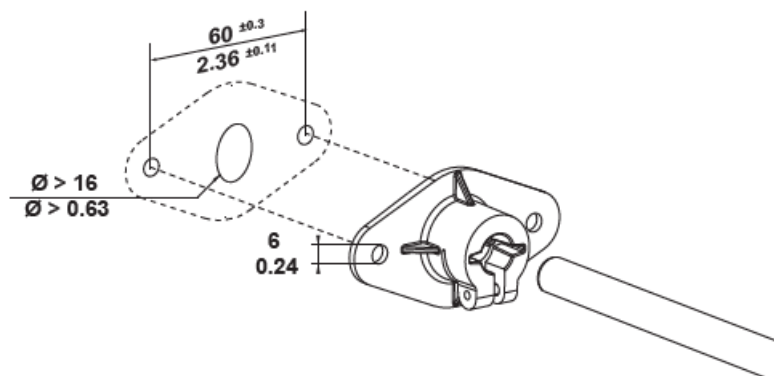


Fig. 3 Correct position of the probe in a flange

Minimum Immersion Depth

Placement options



Fig. 4 Correct position in a pipe

Mounting with Immersion Well



Fig. 5 Handling of the immersion well

Procedure:

- The spring inside the well must be removed and replaced by a standard M12x1.5 cable gland (not included in the scope of supply).
- Insert the sensor and fix it by fastening the cable gland.

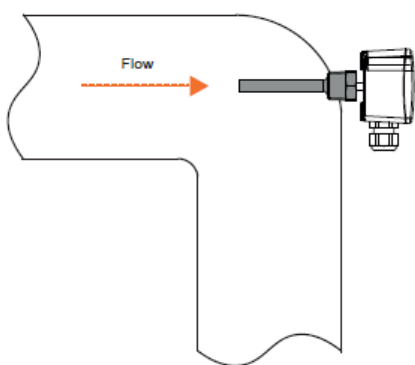
NOTICE

Observe the operating temperature range of the cable gland to match the process parameters.

PLEASE NOTE

- For installation avoid regions of high turbulences (e.g. after fittings)
- Mount the sensor in the opposite direction to flow (see the picture Correct Position below)

Correct Position



Incorrect Position

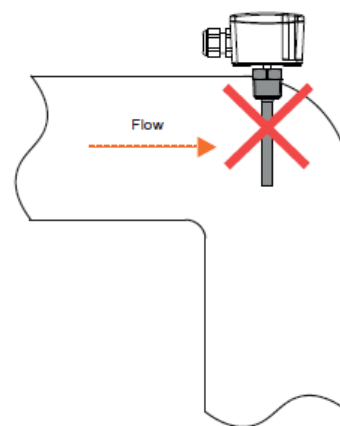


Fig. 6 Position of the probe in the pipe with immersion well

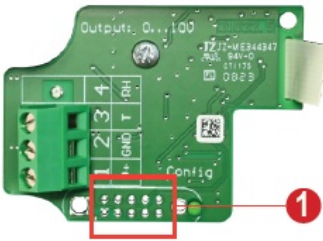
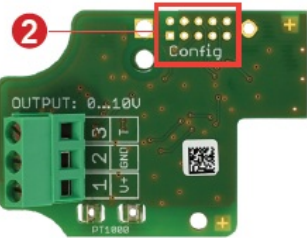
Maximum Inflow Velocity on the Immersion Well

| Immersion Well Length | Brass | Stainless Steel |
|-----------------------|----------------------|----------------------|
| 50 mm (1.97") | 26 m/s (5118 ft/min) | 29 m/s (5708 ft/min) |
| 100 mm (3.94") | 12 m/s (2362 ft/min) | 15 m/s (2953 ft/min) |
| 135 mm (5.31") | 6 m/s (1181 ft/min) | 9 m/s (1771 ft/min) |
| 285 mm (11.22") | 1 m/s (197 ft/min) | 2 m/s (394 ft/min) |

Tab. 2 Maximal inflow velocity

Setup and Configuration

The temperature sensor is ready to use and does not require any configuration by the user. The factory setup corresponds to the type number ordered. For ordering guide please refer to the datasheet at www.epluse.com/ee431. The user can change the factory setup with the free Product Configuration Software and corresponding accessories (see Tab. 3 Configuration accessories).

| Sensor Models | | Configuration with | |
|-----------------------------|---|----------------------|----------|
| | | EE-PCS | PCS10 |
| Analogue 0 - 10 V / 4 20 mA |  | | HA011023 |
| Analogue 0 - 10 V / 4 20 mA |  | EE-PCA with HA011065 | |
| Digital version | EE431-M3J3 | HA011066 | |

Tab. 3 Configuration accessories

| No. | Description |
|-----|---|
| 1 | Plug in the configuration adapter at the bottom |
| 2 | Plug in the configuration adapter on the top |

Tab. 4 Positioning of the configuration adapter

Software

EE-PCS Product Configuration Software

For sensor adjustment and for changing the settings, please proceed as follows:

1. Download the EE-PCS Product Configuration Software from www.epluse.com/configurator and install it on the PC.
2. Connect the E+E device to the PC using the appropriate configuration adapter.
3. Start the EE-PCS software.
4. Follow the instructions on the EE-PCS opening page for scanning the ports and identifying 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.

PCS10 Product Configuration Software

For sensor adjustment and for changing the settings, please proceed as follows:

1. Download the PCS10 Product Configuration Software from www.epluse.com/pcs10 and install it on the PC.
2. Connect the E+E device to the PC using the USB configuration adapter.
3. Start the PCS10 software.
4. Follow the instructions on the PCS10 opening page for scanning the ports and identifying the connected device.
5. Click on the desired setup or adjustment mode from the main PCS10 menu on the left and follow the online instructions of the PCS10.

EE431 analogue with HA011023

- Use the PCS10 and the HA011023 USB Configuration Adapter for EE431 with analog output. An external power supply according to the technical data is required. The power supply adapter V03 is suitable. As soon as the device is connected to the adapter, the display shows CAL.
- With the PCS10, the output scaling, the output measuring unit, and the displayed unit (°C or °F) can be changed.
- Upper and lower thresholds can be set up for the measurements. The display flashes at one-second intervals for measured T beyond the range.
- An offset (Fig. 11) and a 1- or 2-point adjustment (Fig. 12) can be performed, as well as a reset to the factory adjustment and settings. Besides, the configuration settings can also be exported or imported.



Fig. 7 HA011023 USB Configuration Adapter for EE431 with analogue output

EE431 analogue with EE-PCA and HA011065

- Use the EE-PCS and EE-PCA with the connection cable HA011065. For further details see datasheet EE-PCA (available at www.epluse.com/ee431).
- With the PCS10, the output scaling, the output measuring and the displayed unit (°C or °F) can be changed.
- An offset (Fig. 11) and a 1- or 2-point adjustment (Fig. 12) can be performed, as well as a reset to the factory adjustment and settings. Besides, the configuration settings can also be exported or imported.

EE431 with RS485 Digital Interface

- Use the EE-PCS and the USB configuration adapter HA011066.
- With the EE-PCS, an offset adjustment (Fig. 11) and 1- or 2-point adjustment (Fig. 12) can be performed.
- The temperature adjustment can be reset to the factory settings. In addition, further digital configuration settings can be made (see below).

Hardware Bus Termination

The bus termination can be realized with 120 Ω resistor (slide switch on the board).

Device Address

Address Switch



Address setting via EE-PCS Product Configuration Software

All DIP switches at position 0 → address has to be set via EE-PCS. (factory setting)

- **Modbus (slave device):**
Factory setting 66 (permitted values: 1...247).
- **BACnet (master device):**
Factory setting 66 (permitted values: 0...127).

Example: 0000 0000 = Address is set via configuration software.

Address Switch



Address setting via DIP switch

- **Modbus (slave device):** Setting the DIP switches to any other address than 0, overrules the Modbus address set via EE-PCS (permitted values: 1...247).
- **BACnet (master device):** Setting the DIP switches to any other address than 0, overrules the BACnet address set via configuration software.

- **BACnet Note:** permitted values are 0...127. The 8th bit of the DIP switches is ignored (ID 127 = 0111 111). To set address 0 via DIP switches, the 8th bit shall be set to 1 (ID 0 = 1000 0000).

Example: 0000 1011 binary = Address set to 11.

BACnet MS/TP Setup

Refer to PICS (Product Implementation Conformance Statement) – available on www.epluse.com/ee431.

BACnet MS/TP Protocol Settings

| | Factory settings | User selectable values (via EE-PCS / BACnet MS/TP protocol) |
|----------------|----------------------------|--|
| Baud rate | As per type number ordered | 9 600, 19 200, 38 400, 57 600, 76 800, 115 200 |
| Data bits | 8 | 8 |
| Parity | None | None |
| Stop bits | 1 | 1 |
| BACnet address | 66 | 0...127 |

Tab. 5 BACnet protocol settings

PLEASE NOTE

- The recommended settings for multiple devices in a BACnet MS/TP network are 38 400, 8, none, 1.
- The EE4x1D PICS (Product Implementation Conformance Statement) are available on the E+E website at www.epluse.com/ee431.

BACnet address and baud rate can be set via:

- EE-PCS Product Configuration Software and the USB configuration adapter HA011066.
- BACnet protocol, see the PICS.

Modbus RTU Protocol Settings

| | Factory settings | User selectable values (via EE-PCS / Modbus protocol) |
|----------------|----------------------------|--|
| Baud rate | As per type number ordered | 9 600, 19 200, 38 400 |
| Data bits | 8 | 8 |
| Parity | Even | None, odd, even |
| Stop bits | 1 | 1, 2 |
| Modbus address | 66 | 1...247 |

Tab. 6 Modbus RTU protocol settings

PLEASE NOTE

The recommended settings for multiple devices in a Modbus RTU network are 9 600, 8, even, 1.

Device address, baud rate, parity, and stop bits can be set via the:

- EE-PCS Product Configuration Software and the USB configuration adapter HA011066. The EE-PCS10 can be downloaded free of charge from www.epluse.com/configurator.
- Modbus protocol in the register 1 (0x00) and 2 (0x01).

See Application Note Modbus AN0103 (available at www.epluse.com/ee431).

- The measured values are saved as 32-bit float values (FLOAT32) and 16-bit signed integers (INT16). The factory setting for the Modbus address is 66 as an INT16 value. This address can be changed by the user in the register 1 (0x00), permitted values are 1...247.
- The serial number as ASCII-code is located in read-only registers 1 – 8 (0x00 – 0x07, 16 bits per register).
- The firmware version is located in register 9 (0x08) (bit 15...8 = major release; bit 7...0 = minor release). The sensor name ASCII-code is located in read-only registers 10 – 17 (0x09 – 0x11, 16 bits per register).

NOTICE

When reading the serial number or the sensor name, it is always necessary to read all 8 registers, even if the desired information requires less.

NOTICE

To obtain the correct floating point values, both registers have to be read within the same reading cycle. The measured value can change between two Modbus requests, exponent and mantissa may get inconsistent then.

| Communication settings (INT16) | | |
|--|---|--|
| Parameter | Register number¹⁾ [Dec] | Register address²⁾ [Hex] |
| Write register: function code 0x06 | | |
| Modbus address ³⁾ | 1 | 0x00 |
| Modbus protocol settings ⁴⁾ | 2 | 0x01 |

Device information (INT16)

| Parameter | Register number ¹⁾ [Dec] | Register address ²⁾ [Hex] |
|--|-------------------------------------|--------------------------------------|
| Read register: function code 0x03 / 0x04 | | |
| Serial number (as ASCII) | 1 | 0x00 |
| Firmware version | 9 | 0x08 |
| Sensor name (as ASCII) | 10 | 0x09 |

1. The register number starts from 1.
2. The protocol address starts from 0.
3. If the address is set via the DIP switch, the response will be NAK.
4. For Modbus address and protocol settings see Application Note Modbus AN0103 (available at www.epluse.com/ee431).

Tab. 7 Digital sensors' registers for device setup

Modbus Register Map

The measured data is saved as 32-bit floating point values (FLOAT32) and as 16-bit signed integer values (INT16).

| FLOAT32 | | | |
|--|--------------------|-------------------------------------|--------------------------------------|
| Measurand | Unit ¹⁾ | Register number ²⁾ [DEC] | Register address ³⁾ [HEX] |
| Read register: function code 0x03 / 0x04 | | | |
| Temperature | °C | 1003 | 0x3EA |
| Temperature | °F | 1005 | 0x3EC |
| Temperature | °K | 1009 | 0x3F0 |

INT16

| Measurand | Unit ¹⁾ | Scale ⁴⁾ | Register number ²⁾ [DEC]] | Register address ³⁾ [HEX] |
|--|--------------------|---------------------|--|--------------------------------------|
| Read register: function code 0x03 / 0x04 | | | | |
| Temperature | °C | 100 | 4002 | 0xFA1 |
| Temperature | °F | 50 | 4003 | 0xFA2 |
| Temperature | K | 50 | 4005 | 0xFA4 |

1. The choice of measurement units (metric or non-metric) must be done according to the ordering guide, see EE431 datasheet. Switching from metric to non-metric or vice versa by using the EE-PCS is not possible.
2. Register number starts from 1
3. Register address starts from 0

4. Examples: For the scale of 100, the reading of 2550 means a value of 25.5. For a scale of 50, a reading of 2550 means a value of 51.

Tab. 8 FLOAT32 and INT16 measured data registers

Modbus RTU Example

- Example of Modbus RTU command for reading the Temperature (float value) T = 26,953624 °C from the register 0x3EA.
- Device EE431; Modbus address 66 [42 in HEX]
- Reference document (chapter 6.3): http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b.pdf.

Read the temperature (FLOAT32) T from register address 0x3EA:

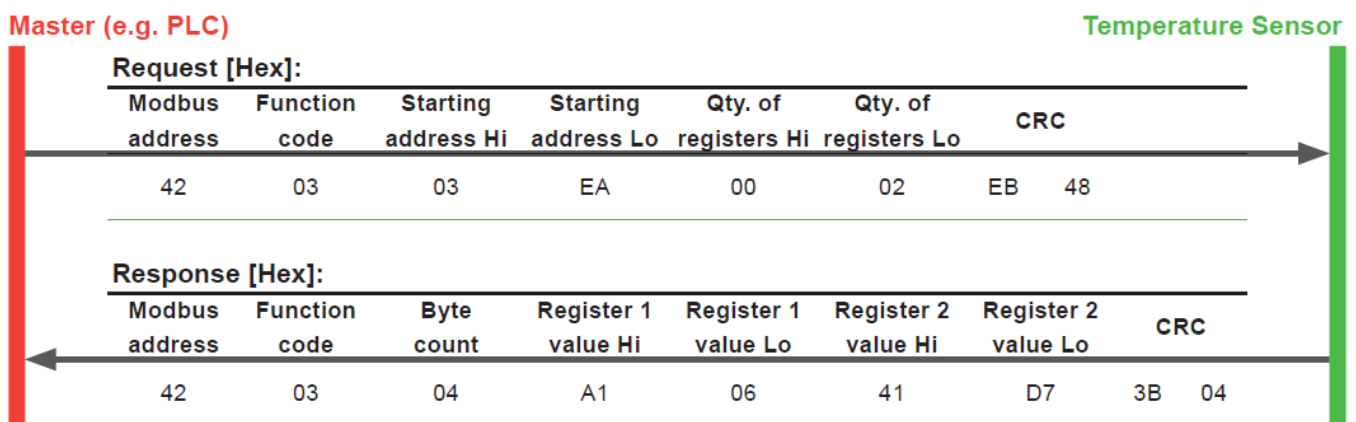


Fig. 8 Example temperature query

Decoding of floating point values:

Floating point values are stored according to IEEE754. The byte pairs 1, 2 and 3, 4 are transformed as follows (numbers taken from T reading Modbus request/response example, Fig. 8):

| Modbus response [Hex] | | | |
|-----------------------|---------------|---------------|---------------|
| Register 1 Hi | Register 1 Lo | Register 2 Hi | Register 2 Lo |
| A1 | 06 | 41 | D7 |
| MMMMMMMM | MMMMMMMM | SEEEEEEE | EMMMMMMM |

Fig. 9 Modbus response

IEEE754

| Register 2 Hi | Register 2 Lo | Register 1 Hi | Register 1 Lo |
|---------------|---------------|---------------|---------------|
| 41 | D7 | A1 | 06 |
| 0100 0001 | 1101 0111 | 1010 0001 | 0000 0110 |
| SEEE EEEE | EMMM MMMM | MMMM MMMM | MMMM MMMM |

- **Decimal value:** 26.953624725341796875

Fig. 10 Data representation according to IEEE754

Maintenance and Service

Calibration and Adjustment

Definitions

- **Calibration:** The specimen is compared with a reference and its deviation from the reference is documented.
- **Adjustment:** The specimen is brought in line with the reference.

Temperature Calibration and Adjustment

Depending on the application and the requirements of certain industries, there might arise the need for periodical temperature calibration or adjustment.

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.

Calibration and Adjustment by the User

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

- Liquid bath calibrator
- Dry block calibrator
- Climate chamber
- For handheld devices (e.g. Omniport30), please see www.epluse.com/omniport30.

Perform offset and 1- or 2-point adjustment via the E+E Product Configuration Software (see below).

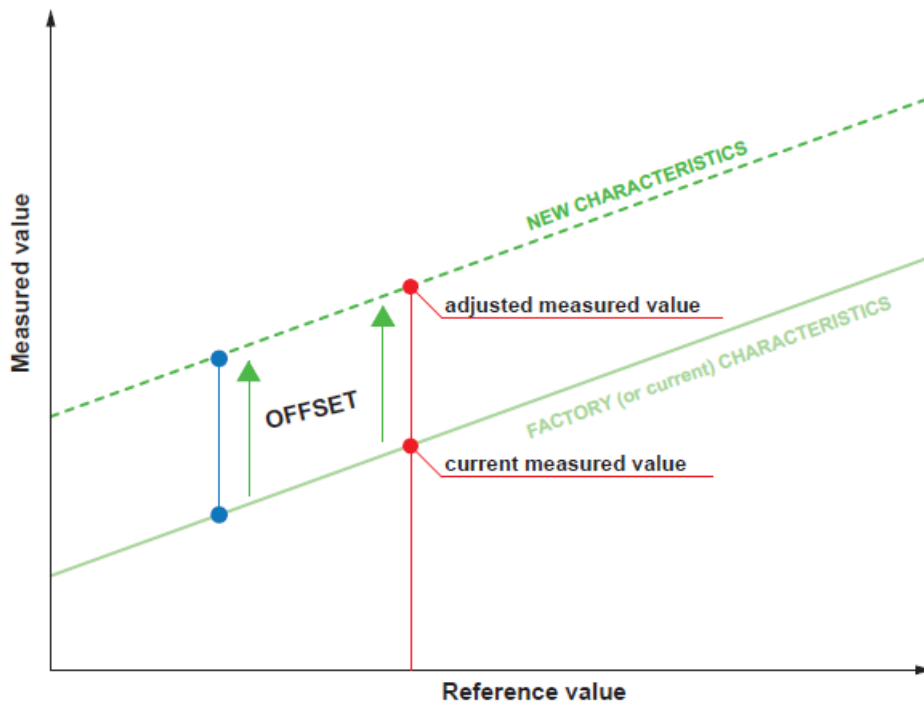


Fig. 11 Offset adjustment

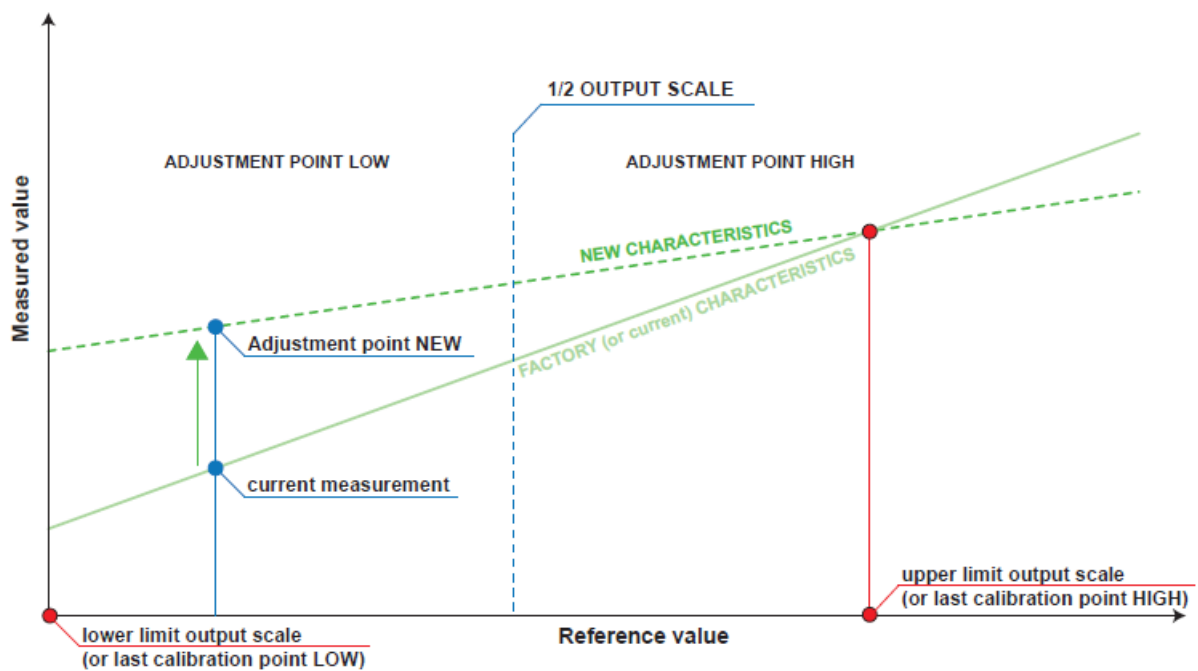


Fig. 12 1- or 2-point adjustment

Repairs and Display Change

PLEASE NOTE

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

Accessories

For further information see datasheet Accessories.

| Description | | Code | | | |
|---|---------------------|--------------------------------------|-------------|-------------|--------------|
| Product configuration adapter for 4 – 20 mA version without display (Available at EE-PCA) | | See datasheet EE-PCA | | | |
| Configuration adapter for display and 0 – 10 V versions without display | | HA011023 | | | |
| USB configuration adapter for digital output | | HA011066 | | | |
| E+E Product Configuration Software for digital output and for 4 – 20 mA version without display (Free download: www.epluse.com/configurator) | | EE-PCS | | | |
| E+E Product Configuration Software (Free download: www.epluse.com/pcs10) for display and 0 – 10 V versions without display | | PCS10 | | | |
| Power supply adapter for digital output | | V03 | | | |
| Conduit Adapter, M16x1.5 auf 1/2" | | HA011110 | | | |
| Mounting flange | | HA401101 | | | |
| Immersion well – thread R ½" ISO | Length in mm (inch) | 50 (1.97") | 100 (3.94") | 135 (5.31") | 285 (11.22") |
| | Brass | HA400101 | HA400104 | HA400102 | HA400103 |
| | Stainless steel | HA400201 | HA400204 | HA400202 | HA400203 |
| Immersion well – thread ½" NPT | Length in mm (inch) | 50 (1.97") | 100 (3.94") | 135 (5.31") | 285 (11.22") |
| | Brass | HA400111 | HA400114 | HA400112 | HA400113 |
| | Stainless steel | HA400211 | HA400214 | HA400212 | HA400213 |

Technical Data

Measurands

Temperature (T) – Active

| | | |
|---|----------------------|--|
| Measuring range probe tip) | Duct sensor (| -40 °C...+110 °C (-40...+230 °F) |
| With immersion well (probe tip) | | -40 °C...+130 °C (-40...+266 °F) |
| Accuracy @ 20 °C (68 °F) Optional for analog output | | ±0.25 °C (0.36 °F) ±0.1 °C (±0.18 °F) ¹⁾ |

1. Uncertainty of factory calibration at 20 °C ± 0.1 °C (68 °F ± 0.18 °F).

Temperature (T) – Passive

| | | | | |
|---|----------------------------|--|---|-----------------|
| Measuring range | | | | |
| Duct sensor Immersion Sensor with Pt and Ni T sensor | | -40 °C...+110 °C (-40...+230 °F) -40 °C...+150 °C (-40...+302 °F) | | |
| Sensor type | | Nominal resistance | Sensitivity | Standard |
| | Pt100 DIN B | R_0 : 100 Ω | TC: $3.850 \times 10^{-3}/^{\circ}\text{C}$ | DIN EN 60751 |
| | Pt1000 DIN B | R_0 : 1000 Ω | TC: $3.850 \times 10^{-3}/^{\circ}\text{C}$ | DIN EN 60751 |
| | NTC10k B3950 | R_{25} : 10 k Ω ± 0.5 % | $B_{25/85}$: 3989 K | — |
| | | | ($B_{25/50}$: 3950 K ± 1.0 %) | |
| | NTC20k B4286 | R_{25} : 20 k Ω ± 0.2 °C | $B_{25/85}$: 4286 K | — |
| | | | ($B_{25/85}$: 4286 K ± 1.0 %) | |
| | Ni1000 TK6180 DIN B | R_0 : 1000 Ω | TC: 6180 ppm/K | DIN 43760 |
| | Ni1000 TK5000 DIN B | R_0 : 1000 Ω | TC: 5000 ppm/K | DIN 43760 |


Outputs



| | | | |
|------------------------|--------------------------------------|-----------------------------------|-------------|
| Analogue | | | |
| Analogue output | 0 – 10 V ad current | $-1\text{mA} < I_L < 1\text{ mA}$ | $I_L = I_0$ |
| | 4 – 20 mA (2-wire) oad resistance | $R_L \leq 500\ \Omega$ | $R_L = I$ |

| | |
|---|---|
| Digital | |
| Digital interface | RS485 (EE431 = 1 Unit Load) |
| Protocol Factory settings Supported Baud rates Measured data types | Modbus RTU Baud rate see order information, data bits 8, parity even, 1 stop bit, Modbus address 66 9 600, 19 200 und 38 400 FLOAT32 and INT16 |
| Protocol Factory settings Supported Baud rates | BACnet MS/TP Baud rate see order information, data bits 8, parity none, 1 stop bit, BACnet address 66 9 600, 19 200, 38 400, 57 600, 76 800 und 115 200 |

| | |
|--------------------------------|---|
| T Sensor Passive | |
| Sensor connection | 2-wire connection |
| Measuring current, typ. | <1 mA (according to technical data of the specific T sensing element) |

General

| | | | | | |
|--|--------------------------|--|--|--|----------------------------------|
| Power Supply Class III  | | | | | |
| USA & Canada: Class 2 supply necessary, max. voltage 30 V DC for output RS485 and 0 – 10 V for output 4 – 20 mA | | 15 – 35 V DC or 24 V AC ±20 % 10 V DC + R _L x 20 mA < V ₊ < 35 V DC | | | R _L = load resistance |
| Current consumption , @ 24 V | Voltage output | DC supply max. 0.8 mA AC supply max. 4.6 mA _{rms} | with display max. 1.7 mA with display max. 7 mA _{rms} | | |
| | Current output | According to the output current | According to the output current | | |
| | Digital interface | DC supply typ. 3.5 mA AC supply typ. 12 mA _{rms} | | | |
| Electrical connection | | Screw terminals max. 2.5 mm ² (AWG14) | | | |
| Cable glands | | M16x1.5 / M12x1.5 / UL94 V-2 | | | |

| | | | | | | |
|--|-------------------------------------|---|--|----------------------------------|------------------------------------|---------------------------------|
| Insulation resistance (probe) @20 °C (68 °F) | | >100 MΩ | | | | |
| LC-display | | Available for output A3 and A6 1 line, switchable between °C / °F or according to order code Without backlight Visible area 38 mm x 20 mm (1.5" x 0.8") | | | | |
| Response time t₆₃ Duct sensor at 3 m/s (590 ft/min) air velocity Immersion sensor in a liquid water bath | | <1 min <30 s | | | | |
| Humidity working range | | 5...95 %RH, non-condensing | | | | |
| Temperature working range | | Duct sensor (probe tip) | With immersion well (probe tip) | | Electronics without Display | Electronics with Display |
| | | | Active | Passive | | |
| | | -40...+110 °C (-40...+230 °F) | -40...+130 °C (-40...+266 °F) | -40 °C...+150 °C (-40...+302 °F) | -40...+70 °C (-40...+158 °F) | -20...+50 °C (-4...+122 °F) |
| Storage conditions | Without display With display | -30...+70 °C (-22...+158 °F) 5...95 %RH, non-condensing -20...+50 °C (-4...+122 °F) 5...95 %RH, non-condensing | | | | |
| Probe material | | Stainless steel (1.4571 / 316Ti) | | | | |
| Enclosure | Material Protection rating | Polycarbonate (PC), UL94 V-0 approved IP65 / NEMA 4X | | | | |
| Electromagnetic compatibility | | EN 61326-1 FCC Part15 Class B ICES-003 Class B | EN 61326-2-3 | Industrial | environment | |
| Conformity | |   | | | | |

| | |
|---|---|
| Configuration and adjustment For display and 0 – 10 V F or digital and 4 – 20 mA version without display | PCS10 Product Configuration Software (free download: www.epluse.com/pcs10) and configuration adapter. EE-PCS Product Configuration Software (free download: www.epluse.com/configurator) and configuration adapter. |
|---|---|

Conformity

Declarations of Conformity

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

- European directives and standards. and
- UK statutory instruments and designated standards.

Please refer to the product pages at www.epluse.com/ee431 for the Declarations of Conformity.

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 the receiver.
- Connect the equipment to 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.

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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www.epluse.com.

Documents / Resources

| | |
|--|---|
|  The image shows the cover of the 'User Manual EE431' for the 'Duct and Immersion Temperature Sensor'. It features the E+E logo at the top right, a small image of the sensor unit in the center, and the text 'User Manual EE431' and 'Duct and Immersion Temperature Sensor' on the left. The website 'www.e-e.com' is at the bottom. | <p>Epluse EE431 Duct and Immersion Temperature Sensor [pdf] User Manual EE431, EE431 Duct and Immersion Temperature Sensor, Duct and Immersion Temperature Sensor, Immersion Temperature Sensor, Temperature Sensor, Sensor</p> |
|--|---|

References

- [E+E Sensor Technology: Humidity, CO2, Flow & Temperature Measurement](#)
- [E+E epluse.com/configurator](#)
- [E+E Duct / Immersion Temperature Sensor](#)
- [E+E Multifunctional hand-held meter](#)
- [E+E Accredited calibration laboratory | E+E Elektronik](#)
- [E+E epluse.com/configurator](#)
- [E+E Duct / Immersion Temperature Sensor](#)
- [User Manual](#)