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User Manual EE160

**Humidity and Temperature Sensor
for Building Automation**



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1 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/ee160.

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 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 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 which 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".

1.2 Safety Instructions

1.2.1. General Safety Instructions

NOTICE

Improper handling of the device may result in its damage.

- The device and mainly the filter cap shall not be exposed to unnecessary mechanical stress.
- When replacing the filter cap make sure not to touch the sensing elements.
- The device must be operated with the filter cap on at all times.
- Installation, electrical connection, maintenance and commissioning shall be performed by qualified personnel only.
- Use the EE160 only as intended and observe all technical specifications.
- Do not apply the nominal voltage to the RS485 data lines.

1.2.2. Intended Use

The EE160 is intended for the humidity (RH) and temperature (T) measurement in building automation.

WARNING

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

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

- Do not use EE160 in explosive atmosphere or for 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 EE160 may only be operated under the conditions described in this user manual and within the specification included in chapter 7 Technical Data.
- Unauthorized product modification leads to loss of all warranty claims. Modification may be accomplished only with an explicit permission of E+E Elektronik Ges.m.b.H.!

PLEASE NOTE

For accurate measurement it is essential that the temperature of the sensing probe and mainly of the sensing head is same as the temperature of the air to measure. Avoid mounting the EE160 sensor in a way which creates temperature gradients along the probe.

1.2.3. Mounting, Start-up and Operation

The EE160 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.

i PLEASE NOTE

The manufacturer or his authorized agent can be 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 accidents, personal injury or property damage.

- 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 shall be removed from the process.
- Service operations other than described in this user manual may only be performed by the manufacturer.

1.3 Environmental Aspects

i 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.

1.4 ESD Protection



The sensing elements and the electronics board are ESD (electrostatic discharge) sensitive components of the device and must be handled as such. Failure to do so may damage the device by electrostatic discharge when touching exposed sensitive components.

2 Scope of Supply

Model	EE160 Wall mount (Type T1)	EE160 Duct mount (Type 2)	Additionally for all EE160 with RS485 interface
EE160 Humidity and Temperature Sensor according to order code	✓	✓	
Cable gland	✓	✓	✓
Mounting kit	✓	✓	
Mounting flange		✓	
Inspection certificate according to DIN EN 10204-3.1	✓	✓	
Quick Guide - EE160 RS485 Setup			✓

Tab. 1 Items included in the scope of supply

3 Product Description

3.1 General

The EE160 sensor is optimized for cost effective, accurate measurement of relative humidity (RH) and temperature (T) in building automation.

The measured data is available on

- Two voltage or current (2-wire) outputs
- The RS485 interface with BACnet MS/TP or Modbus RTU protocol
- A passive T output

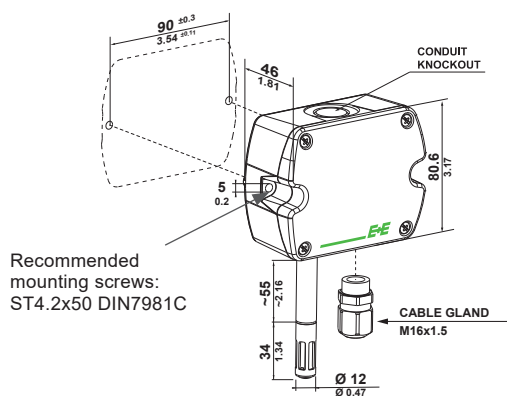
Both, the wall mount and the duct mount model come with an IP65 / NEMA 4X enclosure which provides minimal installation costs and reliable protection against contamination and condensation. The encapsulated electronics in the probe and the E+E sensor coating ensure long-term stable and accurate measurements.

The user can set the RS485 interface parameters, the output scaling and perform 1- or 2-point adjustment for RH and T with an optional configuration adapter and the free PCS Product Configuration Software.

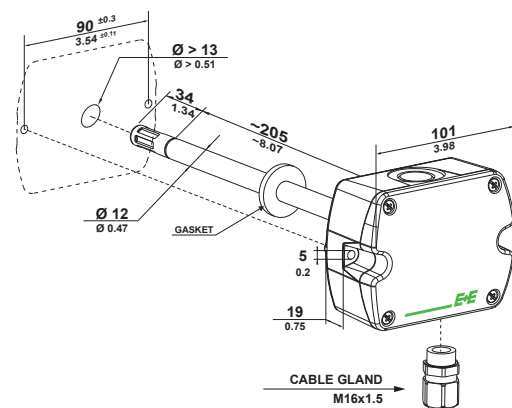
3.2 Dimensions

Values in mm / inch

Type T1 wall mount

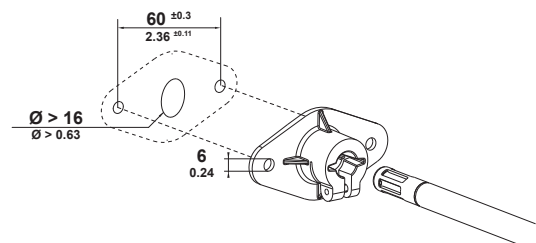


Type T2 duct mount



Mounting flange

in the scope of supply for type T2



3.3 Electrical Connection

⚠ WARNING

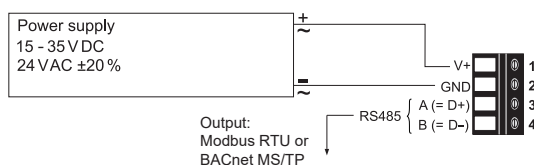
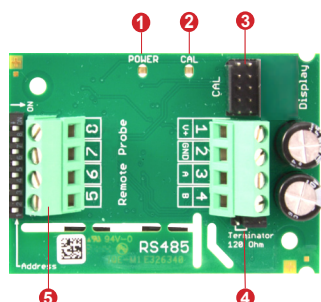
Incorrect installation, wiring or power supply may cause overheating and therefore personal injuries or damage to property.

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.

Connection Diagram

EE160-M1TxJ3

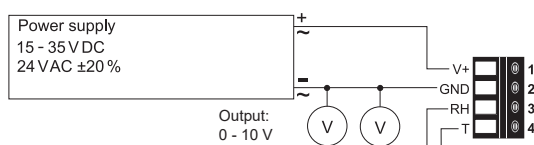
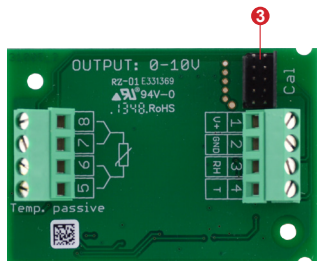


i PLEASE NOTE

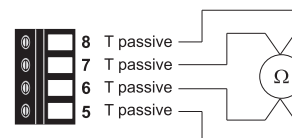
Bus Termination:

If required, the RS485 bus termination can be realized with 120 Ω resistor, jumper on the board.

EE160MxTxA3



T-passive connection for M8TxA3/M8TxA6



EE160 MxTxA6

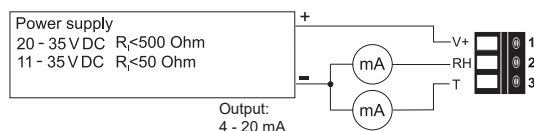
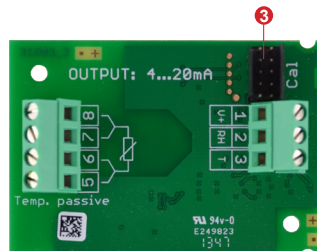


Fig. 1 EE160 connection options

No.	Function
1	Green LED Information during operation On normal operation Flashing the main board does not recognize the probe's measurement electronics Off no power supply or main board failure
2	Blue LED Information during setup with the optional USB configuration adapter HA011066 and the PCS Product Configuration Software On USB connection to PC, no communication with PCS Flashing communication with PCS in progress Off no USB connection to PC
3	Connector for configuration adapter
4	Bus termination resistor 120 Ω (jumper)
5	Screw terminals, do not connect

Tab. 2 Parts of the EE160 electronics board types

4 Setup and Adjustment

The EE160 is ready to use and does not require any configuration by the user. The factory setup of EE160 corresponds to the type number ordered. Please refer to the data sheet at www.epluse.com/ee160. The user can change the factory setup with the help of the Product Configuration Software and the USB configuration adapter.

Besides the output scaling the user can change the communication settings for digital interface and perform one or two point adjustment for humidity and temperature.

4.1 Product Configuration Adapter and Software for EE160 with legacy Sensing Element

Remove the filter cap and check the sensing element of your EE160.



Fig. 2 EE160 with legacy sensing element

If the EE160 is equipped with a legacy sensing element according to the picture above, it must only be configured or adjusted using the EE-PCS Product Configuration Software (free download from www.epluse.com/configurator) and the adapters according to the following table:

	Version	EE160 legacy sensing element	
		Configuration adapter	Configuration software
	EE160-MxTxA3 Analogue voltage 0...10 V	EE-PCA + HA011059	EE-PCS
	EE160-MxTxA6 Analogue voltage 4...20 mA	EE-PCA + HA011059	EE-PCS
	EE160-M1TxJ3 Digital RS485 Modbus/BACnet	HA011066	EE-PCS

Fig. 3 EE160 legacy sensing element

4.1.1. EE160-MxTxAx (analogue output)

NOTICE

EE160 with analogue output must be powered externally when using the EE-PCA kit.

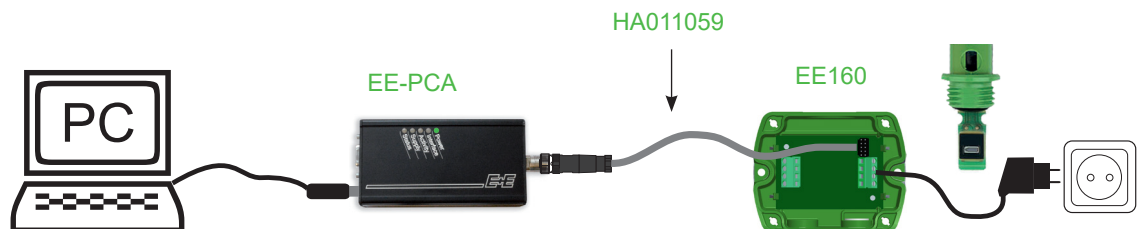


Fig. 4 EE160 configuration analogue output using EE-PCA kit

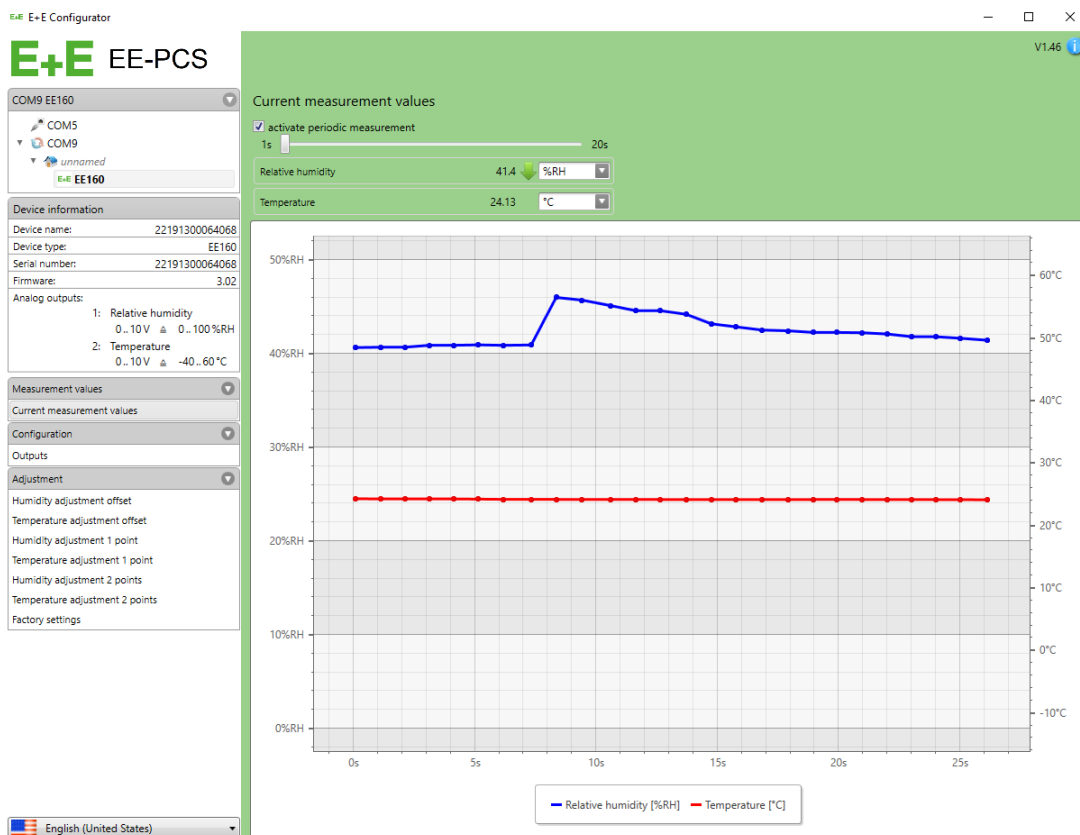


Fig. 5 EE-PCS software for analogue versions

4.1.2. EE160-M1TxJ3 (digital interface)

NOTICE

- For the EE160 with digital interface, either the supply of the configuration adapter HA011066 (for configuration purposes) or an external supply (for configuration, calibration and adjustment purposes) must be used.
- It is not permitted to use both (external supply and configuration adapter supply) at the same time.
- For best results the use of an external power supply is recommended for calibration and adjustment purposes.

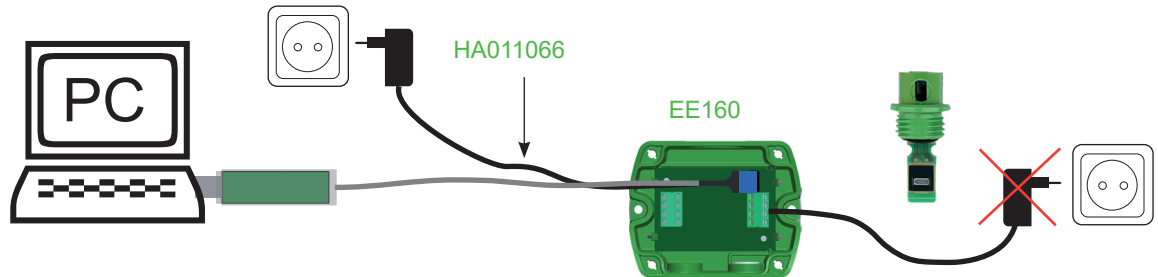


Fig. 6 EE160 configuration (digital interface) using the supply of HA011066

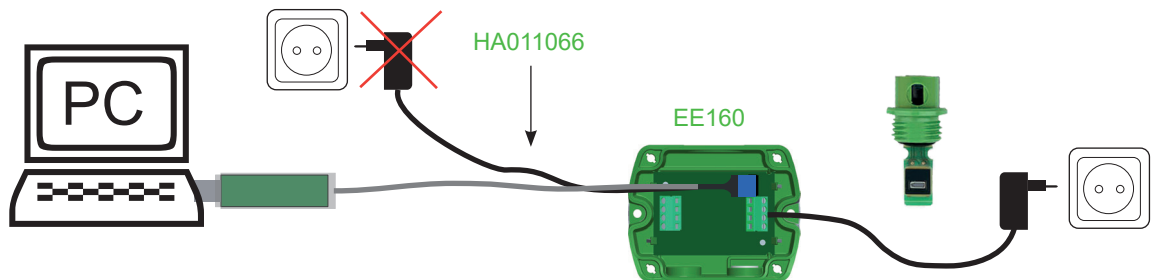


Fig. 7 EE160 configuration (digital interface) using external supply

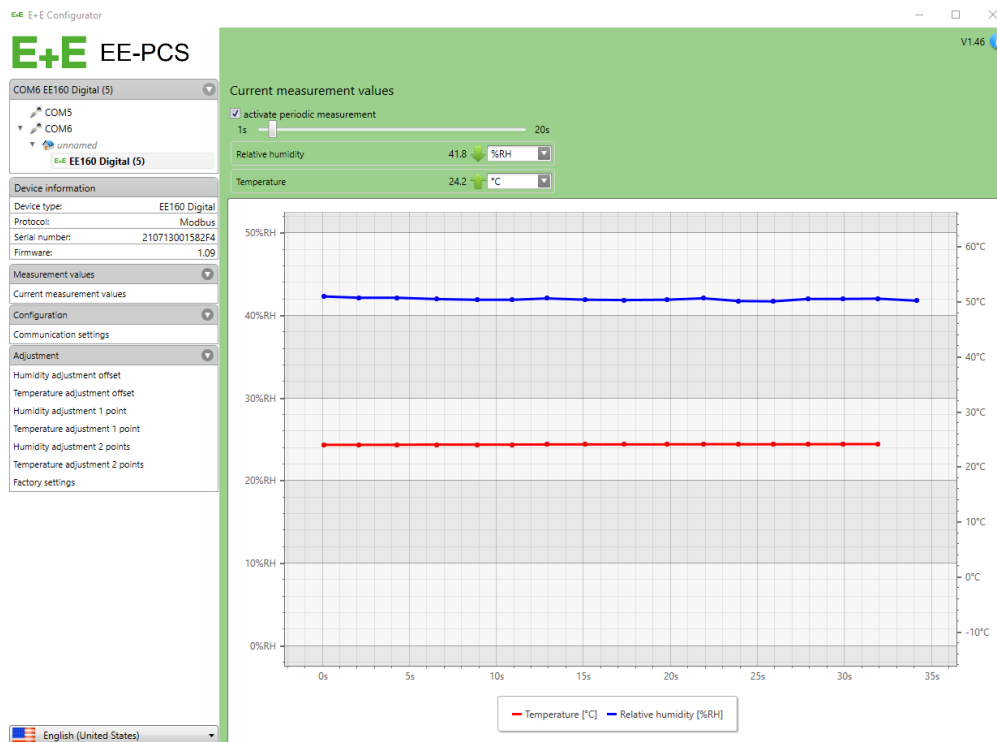


Fig. 8 EE-PCS software for digital interface

4.2 Product Configuration Adapter and Software for EE160 with new Sensing Element

Remove the filter cap and check the sensing element of your EE160.



Fig. 9 EE160 with new sensing element

If the EE160 is equipped with a new sensing element according to the picture above it must be only be configured or adjusted using the PCS10 Product Configuration Software (free download from www.epluse.com/pcs10 and the adapters according to the following table:

	Version	EE160 new sensing element	
		Configuration adapter	Configuration software
	EE160-MxTxA3 Analogue voltage 0...10 V	HA011069	PCS10
	EE160-MxTxA6 Analogue voltage 4...20 mA	HA011069	PCS10
	EE160-M1TxJ3 Digital RS485 Modbus/BACnet	HA011066	PCS10

Fig. 10 EE160 new sensing element

The USB configuration adapter HA011069 comes with a USB isolator stick that galvanically isolates the USB interface of the PC from the supply voltage of the EE160.



PLEASE NOTE

The USB configuration adapter HA011069 must always be operated together with the USB isolator stick.

4.2.1. EE160-MxTxA3 (analogue output, voltage version)

NOTICE

- For the EE160 with voltage output, either the supply of the configuration adapter (for configuration purposes) or an external supply (for configuration, calibration and adjustment purposes) must be used.
- It is not permitted to use both (external supply and configuration adapter supply) at the same time.
- For best results the use of an external power supply is recommended for calibration and adjustment purposes.

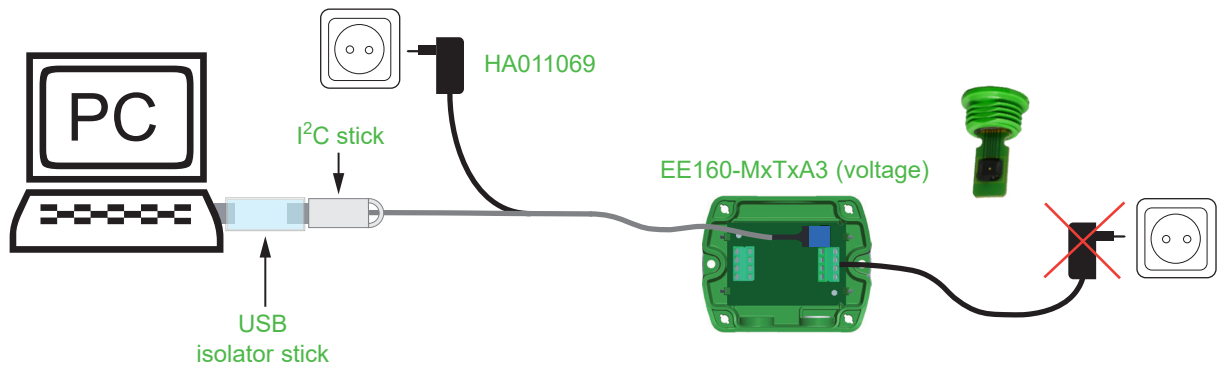


Fig. 11 EE160 configuration voltage output using HA011069 supply

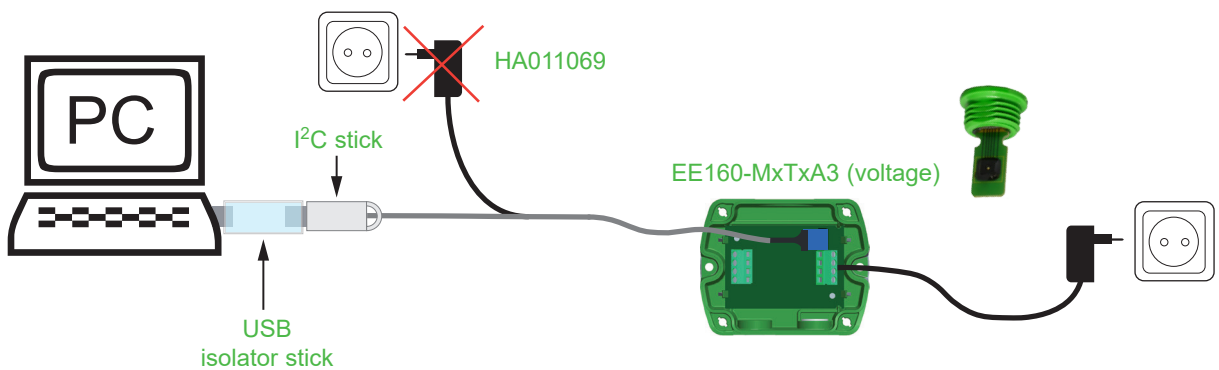


Fig. 12 EE160 configuration voltage output using external supply

4.2.2. EE160-MxTxA6 (analogue output, current version)

NOTICE

- For the EE160 with current output an external supply must be used for configuration, calibration and adjustment purposes.
- It is not permitted to use the configuration adapter supply (only for voltage output).
- It is not permitted to use both (external supply and configuration adapter supply) at the same time.

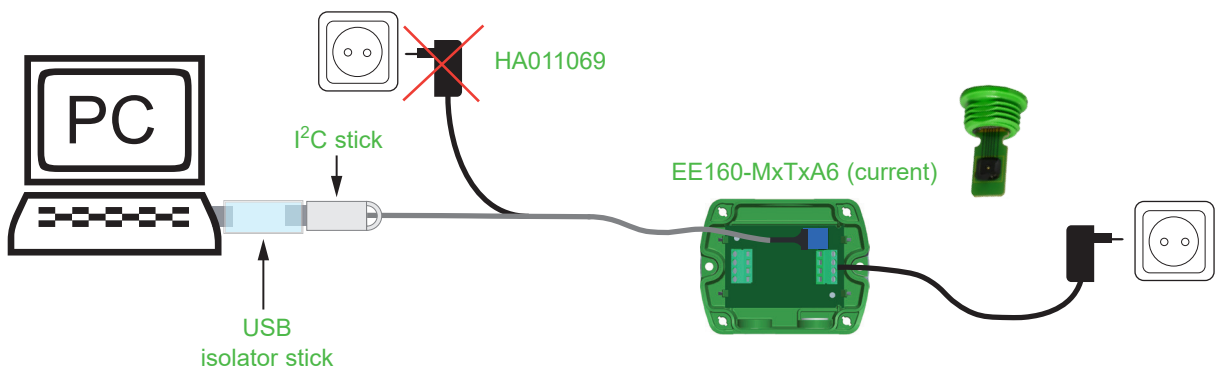


Fig. 13 EE160 configuration current output using external supply only

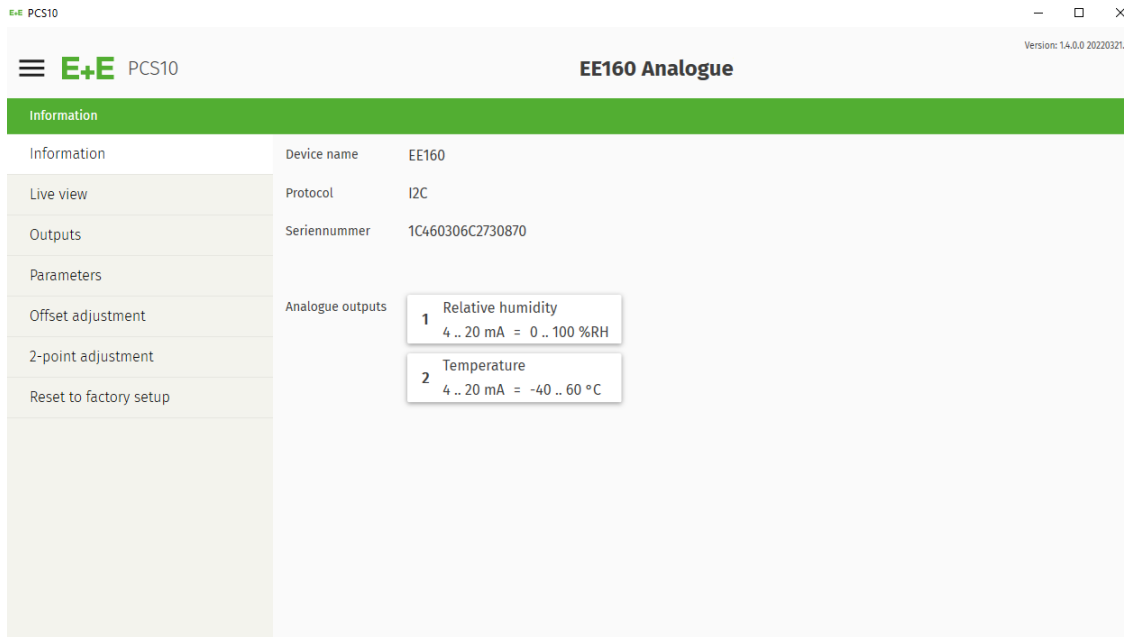


Fig. 14 PCS10 software for analogue version

4.2.3. EE160-M1TxJ3 (digital interface)

NOTICE

- For the EE160 with digital interface, either the supply of the configuration adapter HA011066 (for configuration purposes) or an external supply (for configuration, calibration and adjustment purposes) must be used.
- It is not permitted to use both (external supply and configuration adapter supply) at the same time.
- For best results the use of an external power supply is recommended for calibration and adjustment purposes.

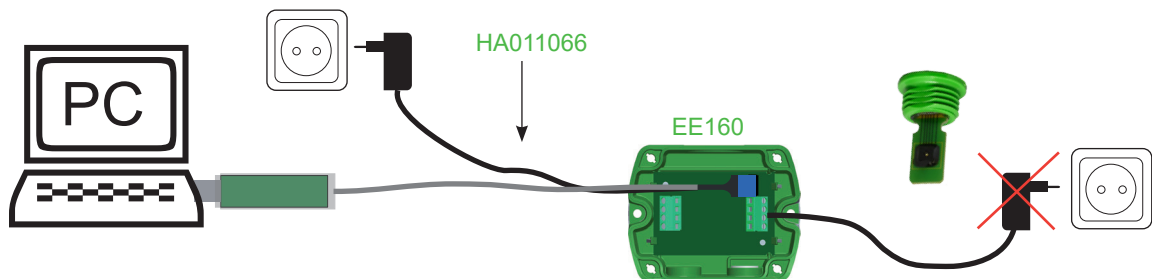


Fig. 15 EE160 configuration (digital interface) using supply of HA011066

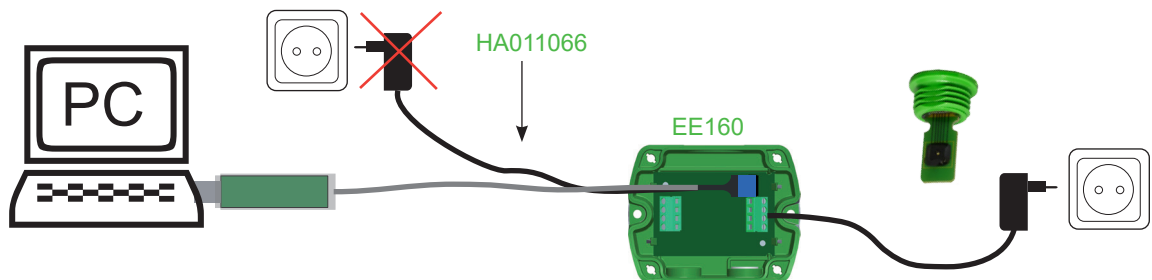


Fig. 16 EE160 configuration (digital interface) using external supply

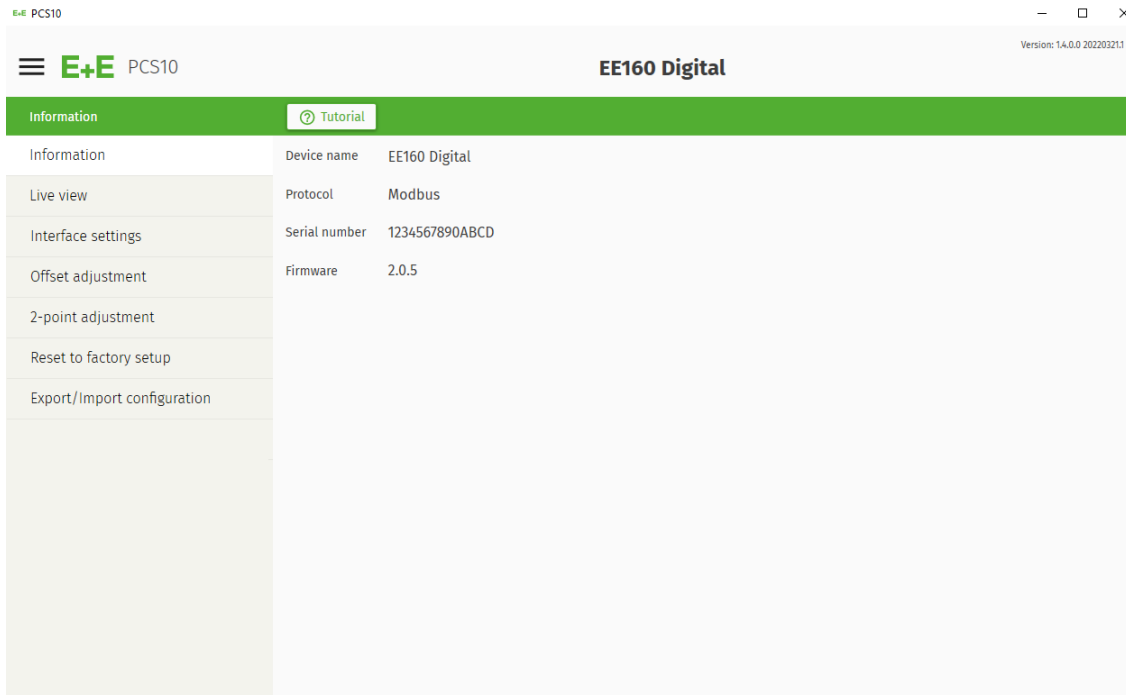


Fig. 17 PCS10 software for digital interface

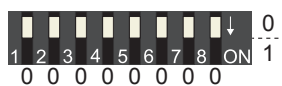
4.3 PCS10 Product Configuration Software

To use the software for performing adjustments and changes in 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 EE160 to the PC using the Modbus 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 mode from the main PCS10 menu on the left. Follow the online instructions of the PCS10 which are displayed when clicking the "Tutorial" button.
6. Changes are uploaded to the sensor by pressing the "Sync" button.

4.4 Device Address

Address Switch



Address setting via PCS Product Configuration Software

All DIP switches at position 0 → address has to be set via PCS

Modbus (Slave device): factory setting 245 (permitted values: 1...247).

BACnet (Master device): factory setting 2 (permitted values: 1...127).

Example: Address is set via configuration software = factory setting.

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 configuration software (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: Address set to 11 (= 0000 1011 binary).

4.5 BACnet Setup

BACnet PICS is available for download at www.epluse.com/ee160.

4.6 Digital Interface RS485 with Modbus RTU Protocol

	Factory settings	User selectable values (via PCS)
Baud rate	9600	9 600, 19 200, 38 400, 57 600, 76 800, 115 200
Data bits	8	8
Parity	Even	None, odd, even
Stop bits	1	1, 2
Modbus address	245	1...247

Tab. 3 Digital interface default settings

The recommended settings for multiple devices in a Modbus RTU network are 9600, 8, even, 1.

The EE160 represents 1 unit load on an RS485 network.

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

- PCS10 Product Configuration Software, the USB configuration adapter HA011066.
The PCS10 can be downloaded free of charge from www.epluse.com/pcs10
- Modbus protocol in the register 60001 (0x00) and 60002 (0x01).
See Modbus Application Note AN0103 (available at www.epluse.com/ee160)

The serial number as ASCII-code is located in the register addresses 0x00...0x07 (16 bits per address).

The firmware version is located in the register address 0x08 (bits 15...8 = major release; bits 7...0 = minor release). The sensor name is located in register address 0x09. The beforementioned registers can be read out with function code 0x03 or 0x04.

NOTICE

When reading information that spans multiple registers, it is always necessary to read all registers, even if the desired information requires less.

NOTICE

For obtaining 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.

INFO

The Modbus function codes mentioned throughout this document shall be used as described in the MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3, chapter 6:
www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

Communication settings (INT16)

Parameter	Register number ¹⁾ [Dec]	Register address ²⁾ [Hex]	Size ³⁾
Write register: function code 0x06			
Modbus address ⁴⁾	1	00	1
Modbus protocol settings ⁴⁾	2	01	1

Device information (INT16)

Parameter	Register number ¹⁾ [Dec]	Register address ²⁾ [Hex]	Size ³⁾
Read register: function code 0x03 / 0x04			
Serial number (as ASCII)	1	00	8
Firmware version	9	08	1
Sensor name (as ASCII)	10	09	8

1) Register number (decimal) starts from 1.

2) Register address (hexadecimal) starts from 0.

3) Number of registers

4) For Modbus address and protocol settings see Application Note Modbus AN0103 (available at www.epluse.com/ee160).

Tab. 4 EE160 registers for device setup

4.7 Modbus Register Map

The measured data is saved as a 32 bit floating point values (data type FLOAT) and as 16 bit signed integer values (data type INTEGER).

FLOAT32

Parameter	Unit	Register number ¹⁾ [DEC]	Register address ²⁾ [HEX]
Read register: function code 0x03 / 0x04			
Temperature T	°C, °F ³⁾	26	0x19
Relative humidity RH, Uw	%RH	28	0x1B

1) Register number starts from 1.

2) Register address starts from 0.

3) The choice of measurement units (metric or non-metric) is done at the time of ordering, see the ordering guide in the EE160 data sheet. It is not possible to switch from metric to non-metric or vice versa by means of the PCS.

INT16

Parameter	Unit	Scale ¹⁾	Register number ²⁾ [DEC]	Register address ³⁾ [HEX]
Read register: function code 0x03 / 0x04				
Temperature T	°C, °F ⁴⁾	100	301	0x12C
Relative humidity RH, Uw	%RH	100	302	0x12D

1) Example: For scale 100, reading of 2550 is equivalent to 25.5.

2) Register number starts from 1.

3) Register address starts from 0.

4) The choice of measurement units (metric or non-metric) shall be done in the ordering guide, see datasheet. Switching from metric to non-metric or vice versa using the PCS is not possible.

Tab. 5 EE160 registers for device setup

4.8 Modbus RTU Example

The EE160's Modbus address is 245 [0xF5].

Please refer to

- MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3, chapter 6:
www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf
- E+E Application Note Modbus AN0103 (available at www.epluse.com/ee160)

Read the temperature (FLOAT32) T = 23,290008 °C from register address 0x19:

Master (e.g. PLC)

EE160

Request [Hex]:								
Modbus address	Function code	Starting address Hi	Starting address Lo	Qty. of registers Hi	Qty. of registers Lo	CRC		
F5	03	00	19	00	02	01	0F	

Response [Hex]:								
Modbus address	Function code	Byte count	Register 1 value Hi	Register 1 value Lo	Register 2 value Hi	Register 2 value Lo	CRC	
F5	03	04	51	F0	41	BA	98	10

Tab. 6 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 above):

Modbus response [Hex]			
Register 1 Hi	Register 1 Lo	Register 2 Hi	Register 2 Lo
51	F0	41	BA
MMMMMMMM	MMMMMMMM	SEEEEEEE	EMMMMMMM

Tab. 7 Modbus response

IEEE754			
Register 2 Hi	Register 2 Lo	Register 1 Hi	Register 1 Lo
41	BA	51	F0
0100 0001	1011 1010	0101 0001	1111 0000
SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
Decimal value: 23.290008			

Tab. 8 Data representation according to IEEE754

5 Maintenance and Service

5.1 Cleaning the Sensing Head and Filter Replacement

Cleaning the sensing head:

Use in polluted environment might rise the need for cleaning the sensing head and replacing the filter cap. In such a case refer to "Cleaning Instructions" at www.epluse.com/ee160.

When employed in dusty, polluted environment:

- The filter cap shall be replaced once in a while with an E+E original one. A polluted filter cap causes longer response time of the device.
- If needed, the sensing head can be cleaned. For cleaning instructions refer to www.epluse.com/ee160.

i PLEASE NOTE

While replacing the filter cap take very good care to not touch or rub the sensing element.

5.2 RH and T Adjustment and Calibration

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.

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.

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 see www.epluse.com.
- Handheld Device (e.g. Omniport30), please see www.epluse.com/omniport30.
- Humidity Calibration Kit (e.g. E+E Humidity Standards), please see www.epluse.com/ee160.

6 Accessories

For further information see datasheet [Accessories](#).

Accessories	Code
E+E Product configuration software (Free download: www.epluse.com/pcs10)	PCS10
Power supply adapter	V03
Protection cap for Ø12 mm probe	HA010783
USB configuration adapter for EE160-M1TxJ3 (digital)	HA011066
USB configuration adapter for EE160-MxTxAx (analogue)	HA011069

EE160 configuration with legacy sensing element (see chapter 4.1)

E+E Product configuration software (Free download: www.epluse.com/configurator)	EE-PCS
USB configuration adapter for EE160-M1TxJ3 (digital)	HA011066
Product configuration adapter for EE160-MxTxAx (analogue)	HA011069

7 Technical Data

Measurands

Relative Humidity (RH)

Measuring range	0...100 %RH, non-condensing
Accuracy ¹⁾ (incl. hysteresis, non-linearity and repeatability)	23 °C (0...100 %RH) ±2.5 %RH 0...+40 °C (0...100 %RH) ±3 %RH -20...+60 °C (0...100 %RH) ±4 %RH -40...-20 °C (0...100 %RH) ±5 %RH

1) Traceable to international standards, administrated by NIST, PTB, BEV,...

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).

Temperature (T)

Measuring range	-40...+60 °C (-40...+140 °F)																										
Accuracy	± ΔT [°C] <table border="1"> <caption>Temperature Accuracy Data</caption> <thead> <tr> <th>T [°C]</th> <th>± ΔT [°C]</th> </tr> </thead> <tbody> <tr> <td>-40</td> <td>0.6</td> </tr> <tr> <td>-30</td> <td>0.55</td> </tr> <tr> <td>-20</td> <td>0.5</td> </tr> <tr> <td>-10</td> <td>0.45</td> </tr> <tr> <td>0</td> <td>0.4</td> </tr> <tr> <td>10</td> <td>0.35</td> </tr> <tr> <td>20</td> <td>0.3</td> </tr> <tr> <td>23</td> <td>0.25</td> </tr> <tr> <td>30</td> <td>0.35</td> </tr> <tr> <td>40</td> <td>0.45</td> </tr> <tr> <td>50</td> <td>0.5</td> </tr> <tr> <td>60</td> <td>0.55</td> </tr> </tbody> </table>	T [°C]	± ΔT [°C]	-40	0.6	-30	0.55	-20	0.5	-10	0.45	0	0.4	10	0.35	20	0.3	23	0.25	30	0.35	40	0.45	50	0.5	60	0.55
T [°C]	± ΔT [°C]																										
-40	0.6																										
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30	0.35																										
40	0.45																										
50	0.5																										
60	0.55																										

Outputs

Analogue

RH: 0...100 %, T: see ordering guide	4 - 20 mA (2-wire) 0 - 10 V	$R_L \leq 500 \Omega$ $0 \text{ mA} < I_L < 1 \text{ mA}$	R_L = load resistance I_L = load current
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T Sensor Passive

Type acc. to ordering code	4-wire connection
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Digital

Digital interface	RS485 (EE160 = 1 unit load)
Protocol	Modbus RTU
Factory settings	Baud rate acc. to ordering code, parity even, 1 stop bit, Modbus address 245
Supported baud rates	9 600, 19 200 and 38 400
Data types for measured values	FLOAT32 and INT16
Protocol	BACnet MS/TP
Factory settings	Baud rate acc. to ordering code, parity none, 1 stop bit, BACnet address 2
Supported baud rates	9 600, 19 200, 38 400, 57 600, 76 800 and 115 200

General

Power supply class III  USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	4 - 20 mA (2-wire)	(10 V + R _L * 20 mA) < V+ < 35 V DC		
	0 - 10 V RS485	15 - 35 V DC or 24 V AC ±20%		
Current consumption , typ.		4 - 20 mA output	0 - 10 V output	RS485
	24 V DC supply	max. 40 mA	5 mA	5 mA
	24 V AC supply	-	13 mA _{rms}	15 mA _{rms}
Electrical connection	Screw terminals max. 1.5 mm ² (AWG 16)			
Cable gland	M16x1.5			
Storage conditions	-40...+60 °C (-40...+140 °F)			
Enclosure	Material Protection rating	Polycarbonate (PC), UL94 V-0 approved IP65 / NEMA 4X		
Electromagnetic compatibility	EN 61326-1 FCC Part15 ClassA	EN 61326-2-3 ICES-003 ClassA	Industrial environment	
Conformity	EN 45545-2 (HL3)			

8 Conformity

8.1 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 page at www.epluse.com/ee160 for the Declarations of Conformity.

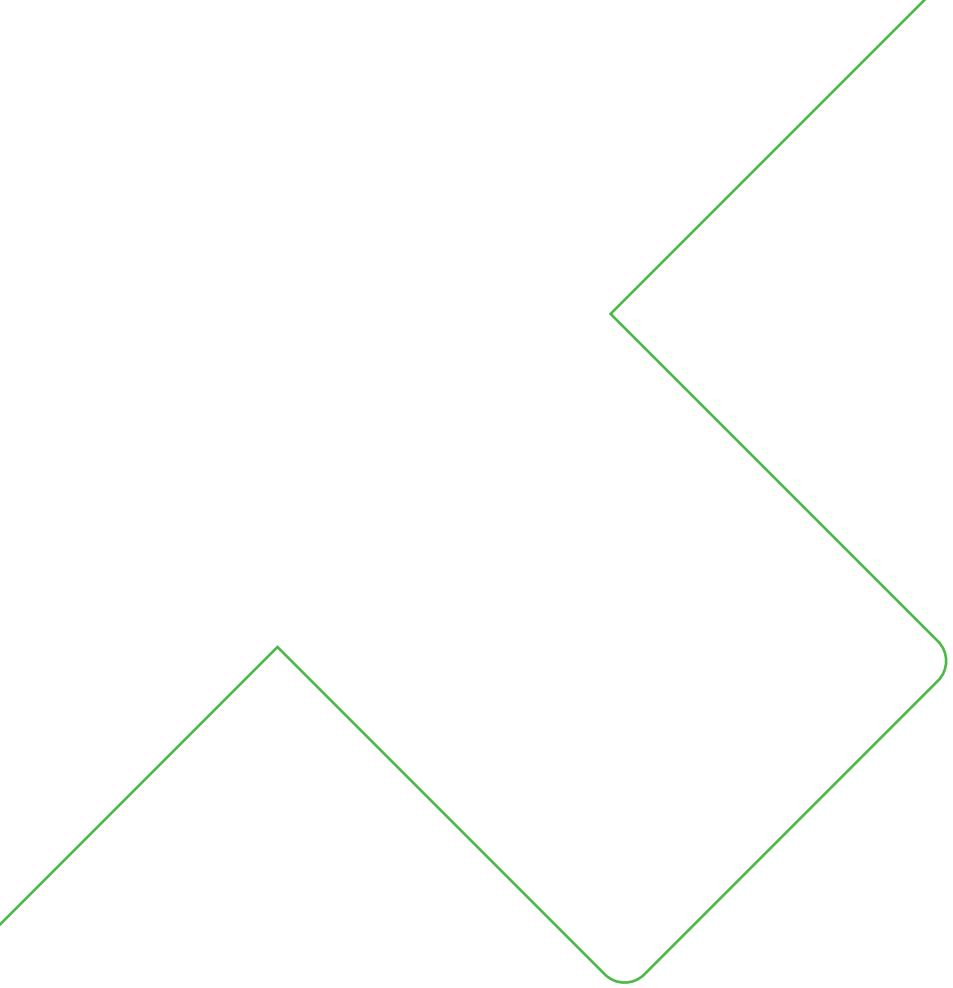
8.2 FCC Part 15 Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

8.3 ICES-003 Compliance Statement

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

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



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