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User Manual EE212

Modular Humidity and Temperature Sensor



Modbus

www.epluse.com

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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.

All information, technical data and diagrams included in this document are based on the information available at the time of writing. It 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 described product(s) and the contents of this document may be changed or improved at any time without prior notice.

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PLEASE NOTE

Find this document and further product information on our website at www.epluse.com/ee212.

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.

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 EE212 enclosure, the sensing probe and the sensing module shall not be exposed to unnecessary mechanical stress.
- Do not apply the supply voltage to the RS485 data lines.
- The EE212 electronics is sensitive to electrostatic discharge (ESD), appropriate protective measures shall be taken when touching it.
- Use the EE212 only as intended and observe all technical specifications.

1.2.2. Intended Use

The EE212 is an humidity / temperature (RH / T) sensor for demanding climate control, such as in pharmaceutical and agricultural industries. It is available for wall or duct mounting as well as outdoor use.

⚠ 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 EE212 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 EE212 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.!

1.2.3. Mounting, Start-up and Operation

The EE212 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 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

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. The failure to do so may damage the device by electrostatic discharges when touching exposed sensitive components.

2 Scope of Supply

- EE212 Modular RH / T Sensor according to ordering guide
- Mounting flange for duct mount version (Type T2)
- Inspection certificate according to DIN EN 10204-3.1
- Test report according to DIN EN 10204-2.2

Additionally for EE212 with RS485 interface:

- Quick Guide - EE212 RS485 Setup
- 1 x cable gland

3 Product Description

3.1 General

The EE212 is a RH / T sensor for demanding applications in climate control, pharmaceutical and agricultural industries. It is available for wall or duct mounting as well as an outdoor version compatible with radiation shield HA010501 (not included in the scope of supply). Besides measuring RH and T, the sensor calculates the following humidity related physical quantities:

- Absolute humidity
- Dew point temperature
- Enthalpy
- Frost point temperature
- Mixing ratio
- Water vapour partial pressure
- Wet bulb temperature

The measured and calculated data is available as analogue output (current or voltage) or on the digital interface (RS485 with BACnet MS/TP or Modbus RTU protocol).

The pluggable sensing module with rapidX technology can easily be exchanged on-site and even during operation without switching off the EE212 sensor (hot-swap). Refer to chapter 6.1 Sensing Module Replacement for details.

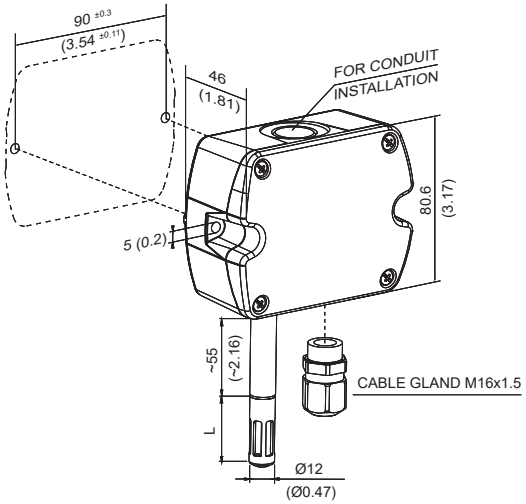
For a setup deviating from default, the EE212 can be configured manually by means of the free PCS10 Product Configuration Software. Refer to chapter 5 Setup and Configuration for details.

The optional display (available for wall or duct mounting option) features backlight and shows up to 3 measurands including the symbol of the physical quantity and the measurement unit. The font size automatically adapts to the number of lines.

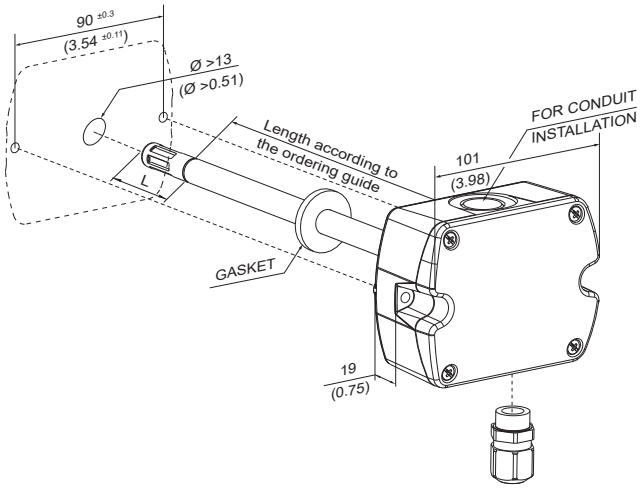
3.2 Dimensions

Values in mm / inch

Type T1

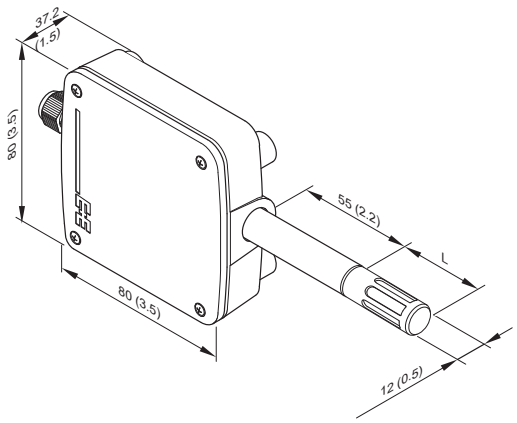


Type T2



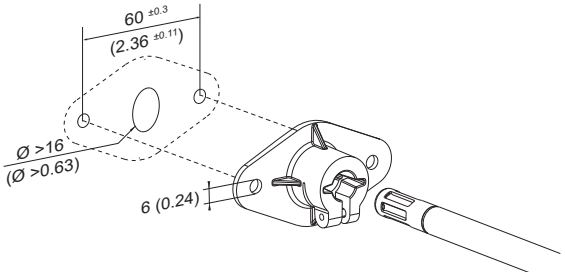
L = filter cap length	mm (inch)
Membrane	34 (1.4)
Stainless steel	33 (1.3)
Metal grid	33 (1.3)

Type T13



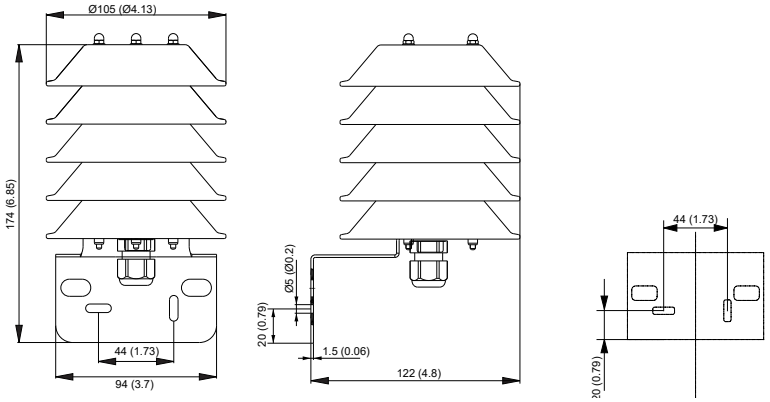
Mounting flange

in the scope of supply for type T2



Radiation shield HA010501 for type T13

(needs to be ordered separately)



3.3 Electrical Connection

EE212 features screw terminals for connecting the power supply and the outputs. The cables are fed into the enclosure through the M16 cable gland.

NOTICE

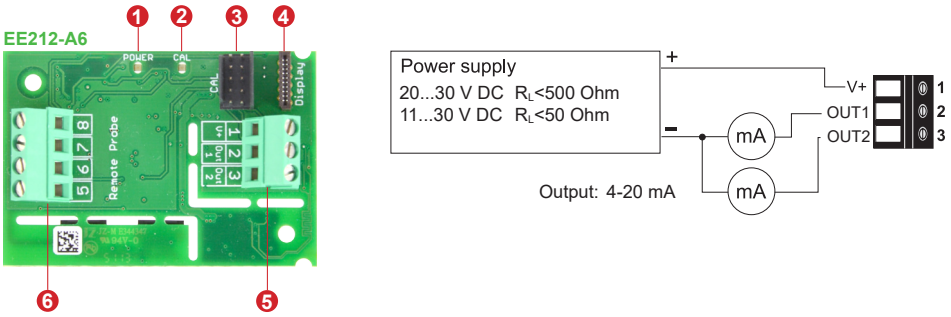
It is important to make sure that the cable glands are closed tightly for the power supply and outputs cable. This is necessary for assuring the IP rating of the enclosure according to EE212 specification, as well as for stress relief at the screw terminals on the EE212 board.

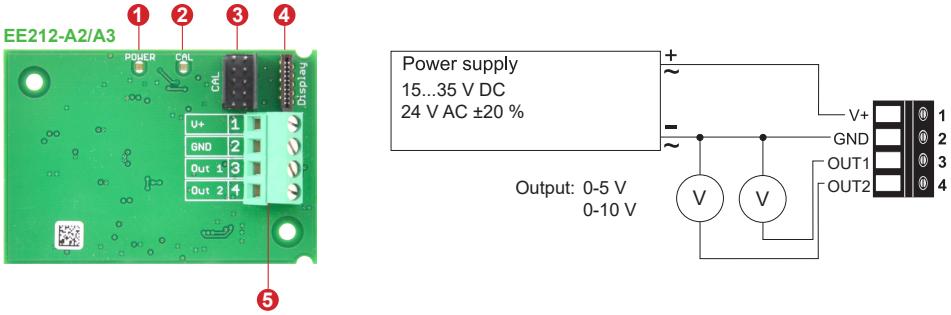
⚠ WARNING

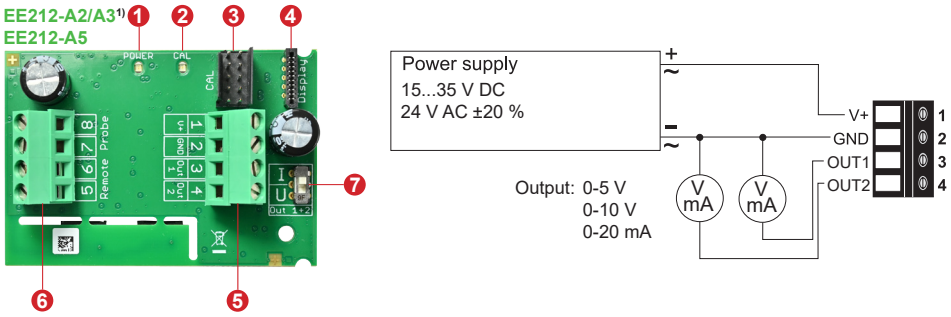
Incorrect installation, wiring or power supply may cause overheating and therefore personal injuries or damage to property.

It is essential that the cables are not under voltage during installation. No voltage must be applied when the product is connected or disconnected. 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.







1) When ordered with option D2 (display with backlight)

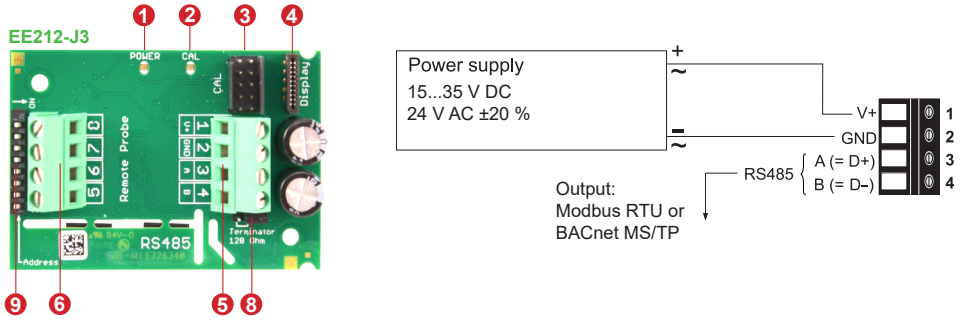


Fig. 1 EE212 connection options

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-C configuration stick HA011070 and the PCS10 Product Configuration Software On USB connection to PC, no communication with PCS10 Flashing communication with PCS10 in progress Off no USB connection to PC
3	Configuration connector (USB configuration adapter)
4	FFC cable socket for the display
5	Screw terminals for power supply and outputs
6	Screw terminals, do not connect
7	Output signal (I / U) selection (refer to chapter 3.3.1 Selection of the Output Signal Voltage or Current
8	Bus termination resistor 120 Ω (jumper)
9	Address DIP switch for RS485 interface

Tab. 1 Parts of the EE212 electronics board types

3.3.1. Selection of the Output Signal Voltage or Current

The factory setup of the output signal and scaling corresponds to the specified order code.

- Display with backlight (D2)
- 0 - 20 mA output (A5, 3-wire)

The output signal voltage (U) or current 3-wire (I) can be selected with the DIP switch on the main electronics board (refer to 3.3 Electrical Connection - EE212-A2/3/5). This does not impact on the scaling of the outputs, which can be changed using the PCS10 Product Configuration Software and the optional USB-C configuration stick HA011070.

Examples

Factory setup: voltage output 0 - 5 V or 0 - 10 V corresponds to 0…100 %RH.
After switching from U to I: current output 4 - 20 mA (3-wire) corresponds to 0…100 %RH.
A change of the current output range for instance to 0 - 20 mA can be made subsequently with the PCS10 Product Configuration Software and the optional USB-C configuration stick HA011070.

Factory setup: current output 0 - 20 mA or 4 - 20 mA (3-wire) corresponds to -10…+50 °C.
After switching from I to U: voltage output 0 - 10 V corresponds to -10…+50 °C.
A change of the voltage output range for instance to 0 - 5 V can be made subsequently with the PCS10 Product Configuration Software and the optional USB-C configuration stick HA011070.

3.4 Display



Fig. 2 EE212 display setup

The optional display is available for wall mount (T1) and duct mount (T2) types. Per factory setup the display shows the two measurands selected for output 1 and output 2 for analogue versions (according to ordering code). For digital output versions the display shows RH and T.

The user can change the display layout to 1, 2 or 3 lines and select the parameters to be displayed. Refer to chapter 5 Setup and Configuration for details.

PLEASE NOTE

The display is available as spare part, intended for replacement only, not for retrofitting an EE212 originally ordered without display.

PLEASE NOTE

The EE212-A6 (4 - 20 mA, 2-wire version) with display operates correctly only if both outputs are connected.

4 Mounting and Installation

4.1 General

For mounting, the cable gland (in the scope of supply) onto the EE212 enclosure use a matching wrench.

When using EE212 with conduit connection for the North American market use a flat screwdriver to knock open the blind at the top of the enclosure, carefully. Take good care to avoid damaging the electronics inside the enclosure. The conduit adapter is not included in the scope of supply. The M16x1.5 opening for the cable gland shall be tightly closed using the blind plug included in the scope of supply (refer to also chapter 3.2 Dimensions).

For best measurement results, the EE212

- must be installed in an environment where the medium to be measured flows sufficiently around the probe.
- shall not be placed near influencing objects such as heating radiators or fan heaters. See also mounting positions of the radiation shield for Type T13.
- self heating effects are compensated. For Type T13 the accuracies are valid at 24 V DC and 250 Ω load resistance for A6 versions.

4.2 Outdoor Installation with Radiation Shield

EE212-T13xxx (outdoor type) can be installed with a radiation shield (ordrer code HA010501). Choose an appropriate place to mount the sensor observing the general mounting instructions and recommended mounting positions of the radiation shield.

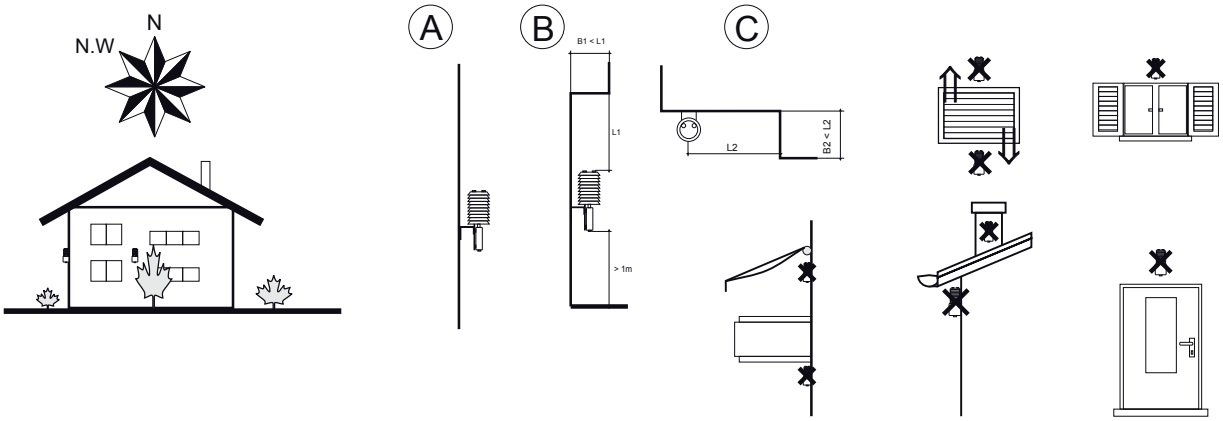


Fig. 3 Mounting position

Follow these steps to mount the EE212 in the radiation shield (refer to Fig. 4):

1. Drill the holes according to the mounting template (refer to chapter 3.2 Dimensions) and mount the radiation shield in a vertical position using the screws and dowels (included in the scope of supply).
2. Fix the EE212 on the mounting plate with four M4x10 screws (included in the scope of supply).
3. Insert the EE212 in the radiation shield and fix the mounting plate with two M4x10 screws on the radiation shield (included in the scope of supply).
4. Connect the power supply and the analogue outputs. Close the cover of the EE212 sensor.

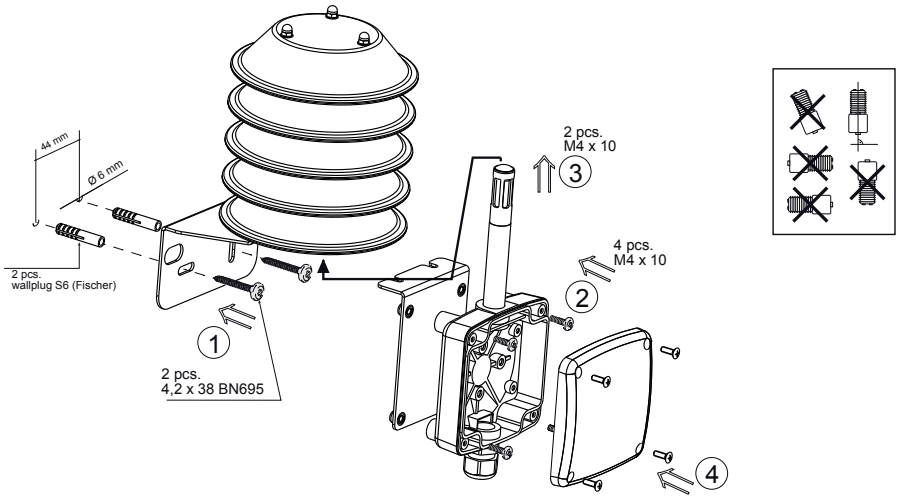


Fig. 4 Mounting instruction

5 Setup and Configuration

The EE212 is ready to use and does not require any configuration by the user. The factory setup of EE212 corresponds to the type number ordered. Please refer to the datasheet at www.epluse.com/ee212. If needed, the user can change the factory setup with the help of the free PCS10 Product Configuration Software and the USB-C configuration stick (HA011070).

The user can change the display settings, the output configuration and perform RH and T adjustment.

5.1 Product Configuration

5.1.1. EE212 Configuration using HA011070

for all types (analogue, digital)

NOTICE

The USB-C configuration stick HA011070 galvanically isolates the USB interface of the PC from the supply voltage of the EE212. When using the USB-C configuration stick the EE212 needs external supply.

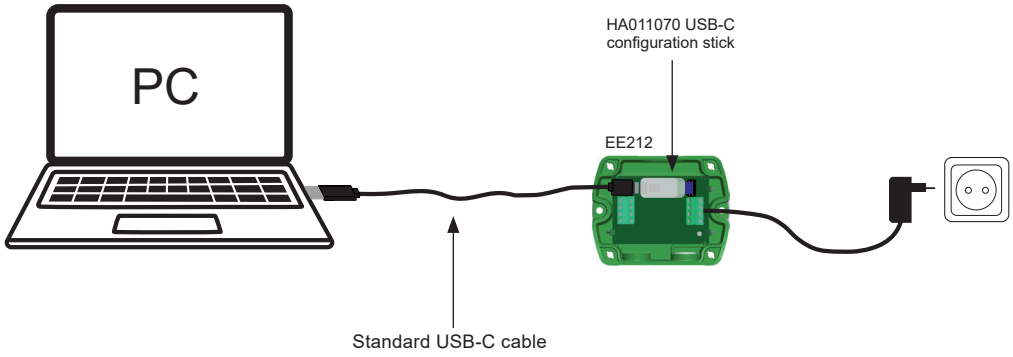


Fig. 5 EE212 configuration using the HA011070 USB-C configuration stick

5.1.2. EE210 Configuration using legacy USB configuration adapter HA011066

(not intended for new designs)

EE212-A2/A3/A5 types (3-wire)

NOTICE

The EE212 may not be connected to any additional power supply when using the USB configuration adapter HA011066.

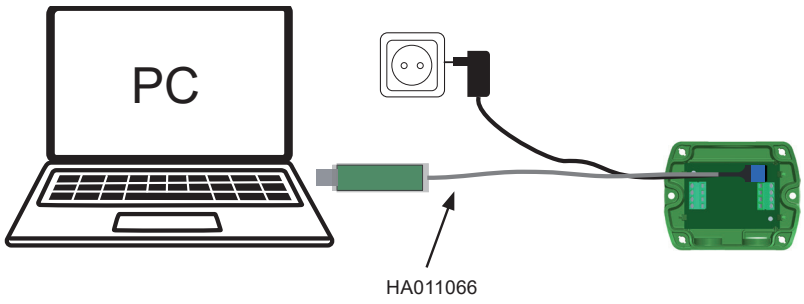


Fig. 6 EE212-A2/A3/A5 types (3-wire) connected to a PC running PCS10

EE212-A6 type (2-wire)

NOTICE

The EE212 must be directly supplied on the electronics board (do not use the power supply from the adapter) when using the configuration adapter HA011066.

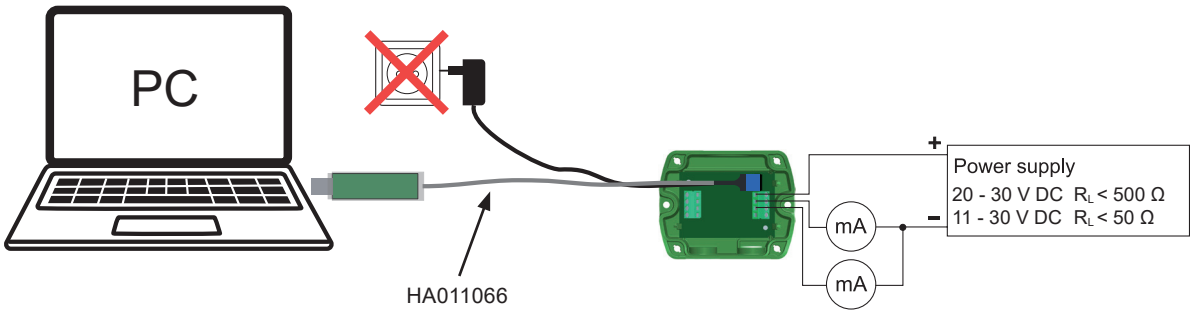


Fig. 7 EE212-A6 type (2-wire) connected to a PC running PCS10

5.2 PCS10 Product Configuration Software

To use the software for changes in settings, please proceed as follows:

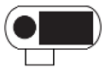
1. Download the PCS10 Product Configuration Software from www.epluse.com/pcs10 and install it on the PC.
2. Connect the EE212 to the PC using the configuration adapter.
3. Start the PCS10 software.
4. Follow the instructions on the PCS10 opening page for scanning the ports and identifying the connected 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.

5.3 RS485 Digital Interface

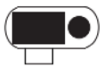
5.3.1. Hardware Bus Termination

For bus termination EE212 features an internal 120 Ω resistor which can be activated using the jumper on the electronics board (refer to also chapter 3.3 Electrical Connection for details).

- Jumper not mounted (right position = factory setup): bus is not terminated

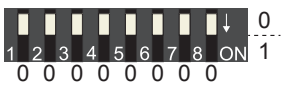


- Jumper mounted (left position): bus is terminated



5.3.2. Device Address

Address Switch



Address setting via PCS10 Product Configuration Software

All DIP switches at position 0 → address has to be set via PCS10

Modbus (slave device): factory setting 46 (permitted values: 1…247).

BACnet (master device): factory setting 46 (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 PCS10
(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).

5.3.3. BACnet Protocol Settings

	Factory settings	User selectable values (via PCS10)
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	46	0…127

Tab. 2 BACnet protocol settings

PLEASE NOTE

The recommended settings for multiple devices in a BACnet MS/TP network are 38 400, 8, none, 1.

The EE212 PICS (Product Implementation Conformance Statement) is available on the E+E website at www.epluse.com/ee212.

BACnet address and baud rate can be set via:
- PCS10 Product Configuration Software and the USB-C configuration stick HA011070.
- BACnet protocol, refer to the PICS.

5.3.4. Modbus RTU Protocol Settings

	Factory settings	User selectable values (via PCS10)
Baud rate	As per type number ordered	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	46	1...247

Tab. 3 Modbus RTU protocol settings

PLEASE NOTE

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

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

- PCS10 Product Configuration Software and the USB-C configuration stick HA011070.
  The PCS10 can be downloaded free of charge from www.epluse.com/pcs10.
- Modbus protocol in the register 1 (0x00) and 2 (0x01).
  Refer to Application Note Modbus AN0103 (available at www.epluse.com/ee212).

The serial number as ASCII-code is located in read-only registers 1 - 8 (0x00 - 0x07, 16 bits per address).

The firmware version is located in register 9 (0x08) (bit 15...8 = major release; bit 7...0 = minor release). The sensor name is located in register address 10 (0x09).

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

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.

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 refer to Application Note Modbus AN0103 (available at www.epluse.com/ee212).

Tab. 4 EE212 registers for device setup

5.4 Modbus Register Map

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

FLOAT 32

Parameter	Unit[1]	Register number[2] [DEC]	Register address[3] [HEX]
Read register: function code 0x03 / 0x04			
Temperature	°C, °F	26	19
Relative humidity	%	28	1B
Water vapour partial pressure	mbar, psi	30	1D
Dew point temperature	°C, °F	32	1F
Wet bulb temperature	°C, °F	34	21
Absolute humidity	g/m^3, gr/ft^3	36	23
Mixing ratio	g/kg, gr/lb	38	25
Specific enthalpy	kJ/kg,BTU/lb	40	27
Frost point temperature	°C, °F	42	29

INT16

Parameter	Unit[1)]	Scale[4)]	Register number[2)] [DEC]	Register address[3)] [HEX]
Read register: function code 0x03 / 0x04				
Temperature	°C, °F	100	301	12C
Relative humidity	%	100	302	12D
Water vapour partial pressure	mbar, psi	100	303	12E
Dew point temperature	°C, °F	100	304	12F
Wet bulb temperature	°C, °F	100	305	130
Absolute humidity	g/m^3, gr/ft^3	100	306	131
Mixing ratio	g/kg, gr/lb	100	307	132
Specific enthalpy	kJ/kg,BTU/lb	100	308	133
Frost point temperature	°C, °F	100	309	134

1) The choice of measurement units (metric or non-metric) must be done according to the ordering guide, refer to the EE212 datasheet. Switching from metric to non-metric or vice versa by using the PCS10 is not possible.
2) Register number (decimal) starts from 1.
3) Register address (hexadecimal) starts from 0.
4) Examples: For scale 100, the reading of 2550 means a value of 25.5. For scale 50, the reading of 2550 means a value of 51.

Tab. 5 EE212 FLOAT32 and INT16 measured data registers

5.5 Modbus RTU Example

The EE212's Modbus address is 46 [0x2E].

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/ee212)

Read the temperature (FLOAT32) T = 25.087642669677734375 °C from register address 0x19:

Master (e.g. PLC) **EE212**

Request [Hex]:

Modbus address	Function code	Starting address Hi	Starting address Lo	Qty. of registers Hi	Qty. of registers Lo	CRC	
2E	03	00	19	00	02	12	53

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	
2E	03	04	B3	7E	41	C8	53	AB

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]			
Byte 3	Byte 4	Byte 1	Byte 2
B3	7E	41	C8
MMMMMMMM	MMMMMMMM	SEEEEEEE	EMMMMMMM

Tab. 7 Modbus response

IEEE754			
Byte 1	Byte 2	Byte 3	Byte 4
41	C8	B3	7E
0100 0001	1100 1000	1011 0011	0111 1110
SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
Decimal value: 25.087642669677734375			

Tab. 8 Data representation according to IEEE754

6 Maintenance and Service

6.1 Sensing Module Replacement

If needed, the EE212M sensing module can be replaced by a new one. Please refer to chapter 6.5 Spare Parts for the order code.

The sensing module with rapidX technology allows a fast and tool-free exchange even during operation. There is no need to switch off the EE212 for this purpose (hot-swap).

PLEASE NOTE

Extreme working conditions such as highly polluted, aggressive and chemically contaminated environment might require periodical maintenance of the device. The maintenance is facilitated by the modular design. The sensing module replacement under above conditions represents a standard maintenance operation, whereby the sensing module is a wear component. A possible measurement drift or the failure of the sensing module caused by harsh working environment are excluded from any warranty claims.

PLEASE NOTE

For a newly ordered EE212M sensing module the inspection certificate according to DIN EN 10204-3.1 is available online only from https://certificates.epluse.com. The serial number is lasered onto the module as a 2D bar code. Please refer to Fig. 8.



Fig. 8 Location of EE212M serial number 2D bar code



Fig. 9 EE212 modular construction

Procedure:

1. Remove the filter cap by turning it counter-clockwise.
2. Remove the sensing module by pulling it straight out from the probe.
3. Plug the new EE212M sensing module into the output unit.
4. Screw the filter cap fingertight onto the probe.

NOTICE

For EE212 sensors using EE212M sensing modules purchased before 31 March 2023, the EE212 supply must be switched off before connecting or disconnecting the sensing module. After an EE212 sensor was successfully equipped with a hot-swap capable EE212M module (purchased after 31 March 2023), further replacement is allowed during operation without switching off the EE212 sensor (hot-swap).

6.2 Filter Cap Exchange

In a dusty, polluted environment it might be necessary to replace the filter cap once in a while. In most of the cases, a clogged filter shows visible contamination or dirt. Longer response time of the measurement also indicates a clogged filter cap. In such cases, replace the filter by a new, original one, refer to the “Accessories” datasheet.

Procedure:

1. Turn the filter cap counter-clockwise for removing it.
2. Install the new filter cap fingertight by turning it clockwise.

6.3 Display Change

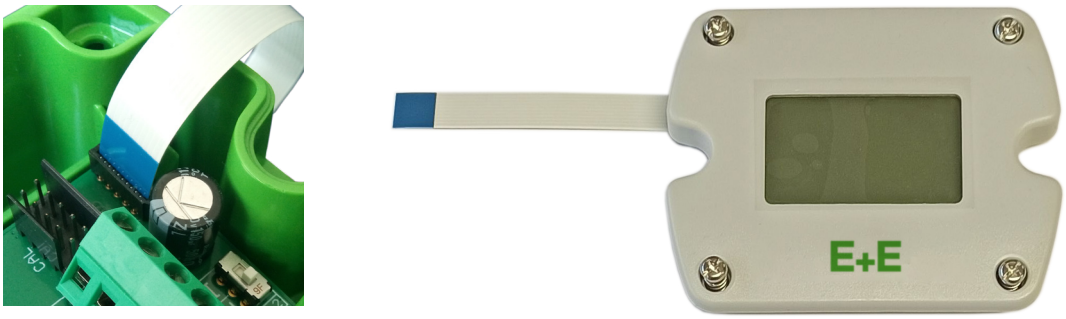


Fig. 10 Display and FFC cable connection on the EE212 electronics board

When connecting the display's FFC cable to the EE212 electronics board, please observe the correct orientation. The blue cable stiffener needs to be on the left side as shown in Fig. 10.

NOTICE

Disconnecting or connecting the display while the EE212 is powered may cause damages to EE212 and to the display.

Always switch off the EE212 before exchanging the display

6.4 Repairs

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

6.5 Spare Parts

Description	Code
Display for EE212[1)]	**D09P**
Sensing Module for EE212	
Single packed	**EE212M-PK4**
Multipackage / Tray[2)]	**EE212M-PK6**

1) For replacement only, not for retrofitting an EE212 without display
2) Minimum order quantity: 10 pcs

For accessories please refer to the EE212 datasheet at www.eplusee.com/ee212 and to the Accessories datasheet.

7 Technical Data

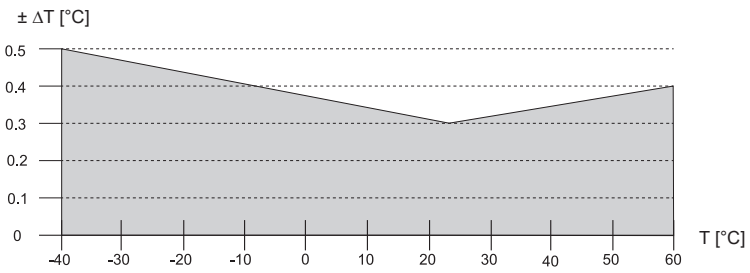
Measurands

Relative humidity (RH)

Measuring range	0...100 %RH
Accuracy[1)]	
incl. hysteresis, non-linearity and repeatability	
@ 23 °C (73 °F)	±(1.5 + 0.005*mv) %RH
-15...+60 °C (5...+140 °F)	±(1.8 + 0.007*mv) %RH
-40...-15 °C (-40...+5 °F)	Additional uncertainty ±0.125 %RH/°C[2)] mv = measured value

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).
For Type T13: @ 24 V DC and RL=250 Ω for A6 Versions
2) Deviating from -15 °C (5 °F)

Temperature (T)

Measuring range	-40...+60 °C (-40...+140 °F)
Accuracy	

Calculated quantities

		from		up to		unit	
Dew point temperature	Td[1)]	-40	(-40)	60	(140)	°C	(°F)
Frost point temperature	Tf[2)]	-40	(-40)	0	(32)	°C	(°F)
Wet bulb temperature	Tw	0	(32)	60	(140)	°C	(°F)
Water vapour partial pressure	e	0	(0)	200	(3)	mbar	(psi)
Mixing ratio	r	0	(0)	160	(1200)	g/kg	(gr/lb)
Absolute humidity	dv	0	(0)	150	(60)	g/m^3	(gr/ft^3)
Specific enthalpy	h	-40	(-10)	500	(200)	kJ/kg	(BTU/lb)

1) Td accuracy according to RH and T uncertainties, please use the E+E Humidity Caclulator for details.
2) Equals Td above 0 °C (32 °F).

Outputs

Analogue

Two freely selectable and scalable outputs	0 - 5 V / 0 - 10 V	-1 mA < I_L < 1 mA	I_L = load current
	4 - 20 mA (2-wire)	R_L ≤ 500 Ω	
		250 ≤ R_L ≤ 500 Ω recommended for Type T13	
	0 - 20 mA (3-wire)	R_L ≤ 500 Ω	R_L = load resistance

Digital

Digital interface	RS485 (EE212 = 1 unit load)
Protocol **Factory settings** **Supported Baud rates** **Data types for measured values**	Modbus RTU Baud rate according to ordering guide, parity even, 1 stop bit, Modbus address 46 9 600, 19 200 and 38 400 FLOAT32 and INT16
Protocol **Factory settings** **Supported Baud rates**	BACnet MS/TP Baud rate according to ordering guide, parity none, 1 stop bit, BACnet address 46 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+ < 30 V DC for Type T13: 24 V DC +/-10 % recommended	
	0 - 5 V / 0 - 10 V **0 - 20 mA (3-wire)** **RS485**	15 - 35 V DC or 24 V AC ±20%	
Current consumption @ 24 V supply voltage			
	Voltage output	DC supply max. 12 mA AC supply max. 34 mA_{rms}	with display max. 23 mA with display max. 49 mA_{rms}
	Current output 2-wire	DC supply max. 40 mA	with display max. 40 mA
	Current output 3-wire	DC supply typ. 33 mA AC supply typ. 65 mA_{rms}	with display max. 44 mA with display max. 84 mA_{rms}
	Digital interface	DC supply typ. 5 mA AC supply typ. 15 mA_{rms}	with display max. 20 mA with display max. 35 mA_{rms}
Electrical connection		Screw terminals max. 1.5 mm^2	
Cable gland		M16x1.5	
Display[1)]		Available for Type T1/T2, 1, 2 or 3 lines, user configurable Optional with backlight	
Temperature ranges		**Without display**	**With display**
	Operation	-40...+60 °C (-40...+140 °F)	-20...+50 °C (-4...+122 °F)
	Storage	-40...+60 °C (-40...+140 °F)	-20...+60 °C (-4...+140 °F)
Enclosure			
	Material	PC (Polycarbonate), UL94 V-0 (with Display UL94 HB) approved	
	Protection rating	IP65 / NEMA 4X	
Electromagnetic compatibility		EN 61326-1:2013 EN 61326-2-3:2013 Industrial environment FCC Part15 Class A ICES-003 A	
Conformity		CE UKCA	

1) For display operation with EE212-xA6 (4 - 20 mA, 2-wire) both outputs must be connected.

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:

CE European directives and standards.

and

UKCA UK statutory instruments and designated standards.

Please refer to the product page at www.epluse.com/ee212 for the Declarations of Conformity.

8.2 Electromagnetic Compatibility

EMC for industrial environment.
Our sensors are group 1 devices and correspond to class A.

⚠ WARNING

This device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.

8.3 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.

8.4 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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