USER'S GUIDE

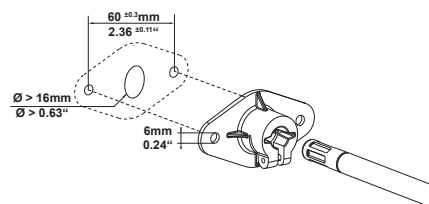## EE210 - Humidity and Temperature Transmitter for demanding Climate Control Applications
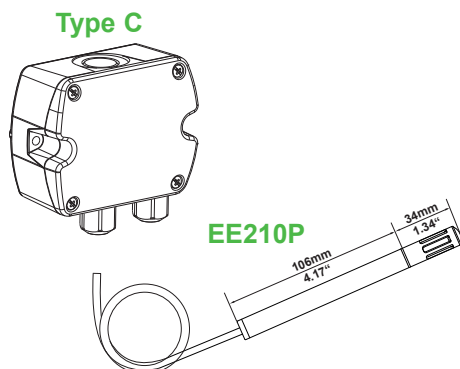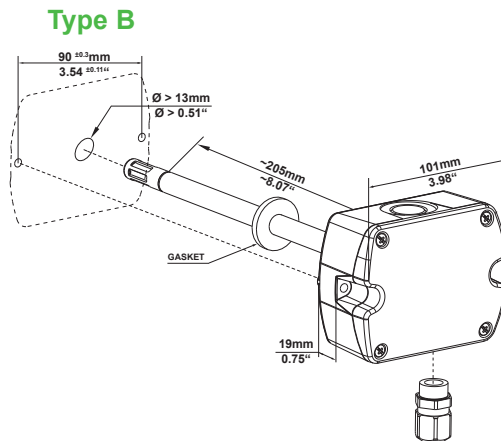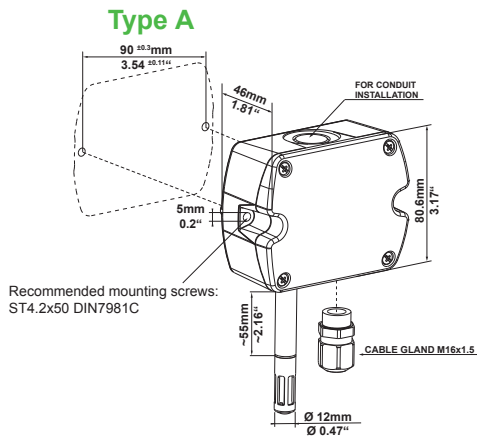
GENERAL

The EE210 transmitter, available for wall or duct mounting as well as with remote probe, is designed for highly accurate measurement of humidity and temperature in demanding climate control applications. The EE210 incorporates the E+E humidity and temperature sensor HCT01.

For use in special applications do not hesitate to contact E+E Elektronik or a local distributor.

CAUTION

• 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 transmitter in a way which creates temperature gradients along the probe.

• The transmitter and mainly the sensing head shall not be exposed to extreme mechanical stress.

• The transmitter must be operated with the filter cap on at all times. Do not touch the sensors inside the sensing head.

• While replacing the filter cap (because of pollution for instance) against an original spare one please take very good care to not touch the sensors.

DIMENSIONS / MOUNTING

Type A

90 ±0.3mm
3.54 ±0.11"
46mm
1.81"
FOR CONDUIT INSTALLATION
5mm
0.2"
80.6mm
3.17"
Recommended mounting screws: ST4.2x50 DIN7981C
~55mm
~2.16"
CABLE GLAND M16x1.5
Ø 12mm
Ø 0.47"

Type B

90 ±0.3mm
3.54 ±0.11"
Ø > 13mm
Ø > 0.51"
~205mm
~8.07"
101mm
3.98"
GASKET
19mm
0.75"

Type C

EE210P

34mm
1.34"
106mm
4.17"

60 ±0.3mm
2.36 ±0.11"
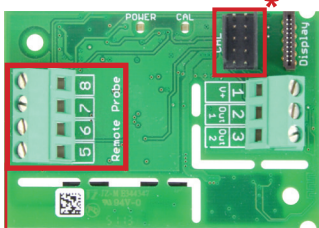Ø > 16mm
Ø > 0.63"
6mm
0.24"

EE210 with cable gland: Use a matching wrench to install the cable gland (in the scope of supply) onto the EE210 enclosure.

EE210 with conduit connection for the North American market: use a flat screwdriver to knock open the blind, carefully, in order 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.
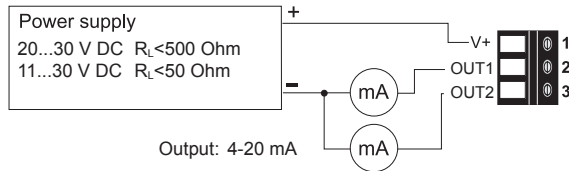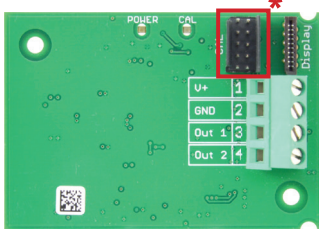
EE210-HT6

ONLY FOR REMOTE PROBE!

EE210-HT6

```
Power supply          +
20...30 V DC  R_L<500 Ohm              V+        1
11...30 V DC  R_L<50 Ohm      ─        OUT1      2
                                       OUT2      3
                         mA
                         mA
        Output: 4-20 mA
```
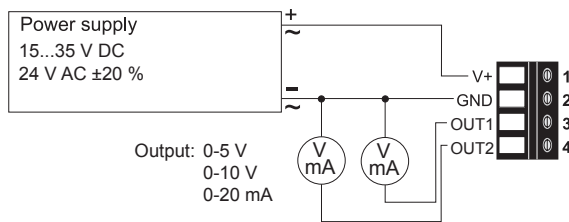
Important: The EE210-HT6 (4...20 mA, two-wire) with display operates correctly only if both outputs are connected.

EE210-HT3

EE210-HT2/3/5
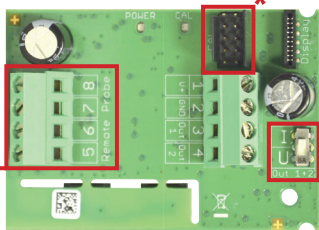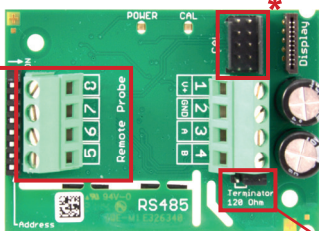
```
Power supply          +
15...35 V DC          ~
24 V AC ±20 %         ─        V+        1
                      ~        GND       2
                               OUT1      3
  Output: 0-5 V                OUT2      4
          0-10 V
          0-20 mA      V    V
                       mA   mA
```
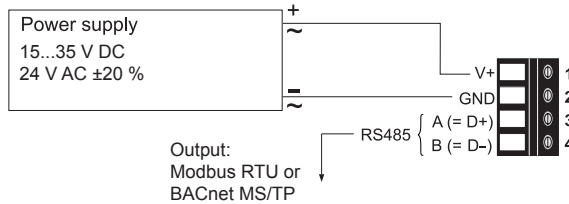
EE210-HT2/3/5

Selection ouput signal U / I

ONLY FOR REMOTE PROBE!

EE210-HTx3

Bus termination resistor 120 Ω (jumper)

EE210-HTx3

```
Power supply          +
15...35 V DC          ~
24 V AC ±20 %         ─        V+          1
                      ~        GND         2
                      RS485  { A (= D+)    3
  Output:                    { B (= D-)    4
  Modbus RTU or
  BACnet MS/TP
```

* configuration connector

EE210P (type C)

The EE210P remote probe for EE210-HTxxP**C** shall be ordered and it is supplied as separate item. EE210P is to be connected to the EE210 by the user.

• Install first the cable gland (included in EE210 scope of supply) onto the EE210 enclosure.

• Before connecting the probe, disconnect the EE210 power supply.

• Insert the EE210P cable through the cable gland and connect it to the screw terminals according to the connection diagram below.


```
8        white
7        green
6        yellow
5        brown
```
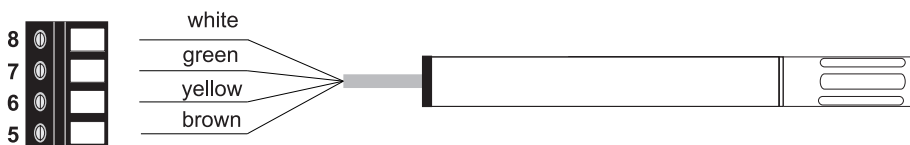
Please note:
EE210P is an intelligent probe with digital output and as such it is interchangeable. In case the probe or its cable gets destroyed or if a longer cable is needed, please order a replacement probe according to EE210 data sheet. The replacement probe shall be installed as described above.

Important:
Make sure that the cable glands are closed tightly for both EE210P probe cable and for the power supply and outputs cable. This is necessary for assuring the protection class (IP class) of the enclosure according to EE210 specification, as well as for stress relief at the screw terminals on the EE210 board.

LED INDICATION

Green LED - information during normal operation:

on	=	everything OK
flashing	=	the main board does not recognize the measurement electronics inside the sensing probe
off	=	no power supply or main board failure

Blue LED - information during setup with the optional E+E Product Configuration Adapter (EE-PCA):

on	=	EE-PCA is powered, no communication in progess
flashing	=	EE-PCA powered, communication in progress
off	=	EE-PCA not connected to the EE210

DISPLAY

Factory Setup:
The display shows the two parameters selected for output 1 and output 2 (according to ordering code). For digital output versions the display shows RH and T.

User Setup:
The user can change the display layout to 1, 2 or 3 lines and select the parameters to be displayed by using EE-PCS Product Configuration Software (free download from www.epluse.com/configurator) and the optional EE-PCA Product Configuration Adapter (not included in the scope of supply).

Important: The EE210-HT6 (4...20 mA, two-wire version) with display operates correctly only if both outputs are connected.

SELECTION OUTPUT SIGNAL U/I

The factory setup of the output signal and scaling corresponds to the type number as ordered.
The output signal (voltage or current 3-wire) can be selected with the DIP switch on the main electronics board (see picture PCB EE210-HT2/3/5). This does not impact on the scaling of the outputs, which can be changed using EE-PCA and EE-PCS.

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 0…20 mA corresponds to 0…100% RH.
A change of the current output range for instance to 4-20 mA (3-wire) can be made subsequently with the EE-PCA and EE-PCS.

Factory setup: current output 0-20 mA 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 EE-PCA and EE-PCS.

SCOPE OF SUPPLY

Model	EE210 Wall mount (Type A)	EE210 Duct mount (Type B)	EE210 Remote version (Type C)*	EE210-P Remote probe* for Type C	Additionally for all EE210 with RS485 interface
EE210 according ordering guide	✓	✓	✓	✓	
Cable gland	✓	✓	✓ (2 pcs.)		✓
Mounting materials	✓	✓	✓		
Mounting flange		✓		✓	
Inspection certificate according to DIN EN10204 - 3.1	✓	✓	✓	✓	
Quick Guide - EE210 RS485 Setup					✓

* EE210-P is not included in the Scope of Supply of the EE210 Type C
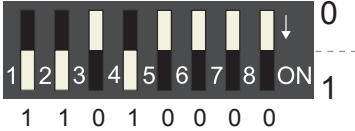
Address Setting

Address Switch

0 0 0 0 0 0 0 0
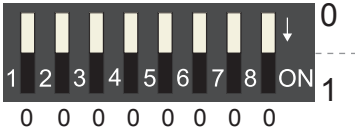
Slave address setting via EE-PCS Product Configuration Software:
All Dip-Switches at position 0 → address has to be set via Product Configuration Software
(factory setting: Modbus...242 / BACnet...1).
Example: Slave address is set via configuration software.

Address Switch

1 1 0 1 0 0 0 0

Slave address setting via Dip-Switch:
Setting the Dip-Switch to any other address than 0 overwrites the slave address set
via configuration software.
Example: Slave address set to 11 (=00001011 binary).

BACnet Setup

BACnet PICS are abvailable for download at www.epluse.com/EE210

Modbus Setup

The measured values are saved as a 32 Bit float value from 0x19 to 0x1F and from 0x23 to 0x29. Additionally the measured values are available as 16 Bit signed integer from 0x12C to 0x12F and from 0x131 to 0x134.

The factory setting for the Slave-ID (Modbus address) is 242 as an integer 16Bit value. This ID can be changed by the user in the register 60001 (0x00), permitted values are 1 - 247 permitted.

The serial number as ASCII-code is located at register address 30001-30008 (16 Bit per address).

The Firmware version is located at register address 30009 (Bit 15...8 = major release; Bit 7...0 = minor release).

The choice of measurement units (metric or not metric) must be done in the ordering guide, see EE210 data sheet.
Switching from metric to non metric or vice versa by using the EE-PCS is not possible.

FLOAT (read register):

Register address	Communication address	Parameter name	
30026	0x19	temperature	[°C], [°F]
30028	0x1B	relative humidity	[%]
30030	0x1D	water vapour partial pressure	[mbar], [psi]
30032	0x1F	dew point temperature	[°C], [°F]
30036	0x23	absolute humidity	[g/m³], [g/ft³]
30038	0x25	mixing ratio	[g/kg], [gr/lb]
30040	0x27	specific enthalpy	[kJ/kg], [BTU/lb]
30042	0x29	frost point temperature	[°C], [°F]

INTEGER (read register):*

Register address	Communication address	Parameter name	
30301	0x12C	temperature	[°C], [°F]
30302	0x12D	relative humidity	[%]
30303	0x12E	water vapour partial pressure	[mbar], [psi]
30304	0x12F	dew point temperature	[°C], [°F]
30306	0x131	absolute humidity	[g/m³], [g/ft³]
30307	0x132	mixing ratio	[g/kg], [gr/lb]
30308	0x133	specific enthalpy	[kJ/kg], [BTU/lb]
30309	0x134	frost point temperature	[°C], [°F]

* Values are stored with a scaling of 1:100 (e.g.: 2550 is equivalent to 25.5°C)

INFO (read register):

Register address	Communication address	Parameter name
30001	0x00	Serial number (as ASCII)
30009	0x08	Firmware version

INTEGER (write register):*

Register address	Communication address	Parameter name
60001	0x00	Slave-ID (modbus addresse)
60002	0x01	Modbus protocol settings*

*For Modbus protocol setting please see Application Note Modbus (www.epluse.com/EE210)

Protocol setting:
Address, baudrate, parity and stop bits can be set via:
1. Product Configurator Software (available on www.epluse.com/EE210)
2. Modbus protocol (please see Application Note Modbus (available on www.epluse.com/EE210)

(Modification rights reserved)

Measured Values

Relative Humidity (RH)

Sensor	E+E Sensor HCT01-00D
Working range	0...100 % RH

RH accuracy (incl. hysteresis, non-linearity and repeatability)

Wall & duct version:

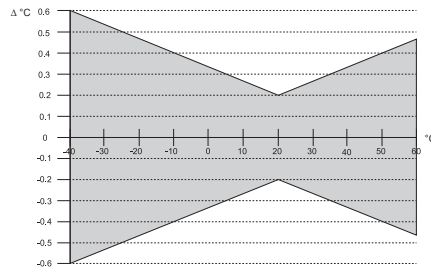|		
-15...40 °C (5...104 °F)	≤90 % RH	±(1.3 + 0.003*measured value) % RH
-15...40 °C (5...104 °F)	>90 % RH	± 2.3 % RH
-40...60 °C (-40...140 °F)		±(1.5 + 0.015*measured value) % RH

Remote probe version

at 20 °C (68 °F)		±2.5 % RH

Temperature (T)

Sensor	Pt1000 (tolerance class B, DIN EN 60751) integrated in HCT01	
T-accuracy	wall & duct	remote probe
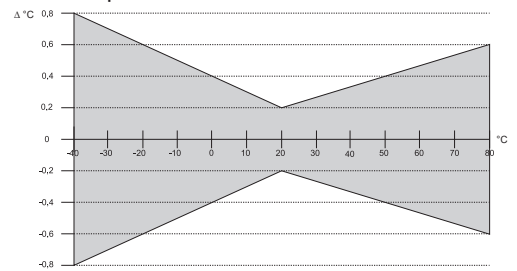
Outputs

Analogue output	0-5 V / 0-10 V	-1 mA < I_L < 1 mA
	4-20 mA (2-wire)	R_L ≤ 500 Ohm
	0-20 mA (3-wire)	R_L ≤ 500 Ohm
Digital output	RS485 (BACnet MS/TP or Modbus RTU), max. 32 EE210 in one bus	

General

Power supply (Class III) ⟨Ⅲ⟩	
for 4-20 mA, 2-wire	10 V + R_L x 20 mA < V+ < 30 V DC
for 0-20 mA, 3-wire	15-35 V DC[1] or 24V AC ±20 %
for 0-5 V / 0-10 V / RS485	

Current consumption at 24 V

Voltage output	DC supply max. 12 mA;	with display max. 23 mA
	AC supply max. 34 mA_{rms};	with display max. 49 mA_{rms}
Current output		
2-wire	DC supply max. 40 mA;	with display max. 40 mA
3-wire	DC supply typ. 33 mA;	with display max. 44 mA
	AC supply typ. 65 mA_{rms};	with display max. 84 mA_{rms}
Digital interface	DC supply typ. 5 mA;	with display max. 20 mA
	AC supply typ. 15 mA_{rms};	with display max. 35 mA_{rms}

Display	1, 2 or 3 lines, user configurable, optional with backlight
Connection	Screw terminals, max. 1.5 mm²
Housing material	Polycarbonate, UL94V-0 (with Display UL94HB) approved
Protection class	IP65 / NEMA 4
Cable gland	M16 x 1.5
Probe cable (type C)	PVC, Ø 4.3 mm, 4 x 0.25 mm², Length: 1.5 or 3 m (4.9 or 9.8 ft)
Sensor protection	E+E Coating
Electromagnetic compatibility	EN61326-1 EN61326-2-3
	Industrial Environment
Temperature ranges	Operating: -40...60 °C (-40...140 °F) (-40...80 °C for remote probe EE210P)
	Storage: -40...60 °C (-40...140 °F)
Temperature ranges with display	Operating: -20...50 °C (-4...122 °F) (-40...80 °C for remote probe EE210P)
	Storage: -20...60 °C (-4...140 °F)

CE

1 USA & Canada: class 2 supply required, max. supply voltage 30 V

SETUP AND ADJUSTMENT

The EE210 transmitter is ready to use and does not require any configuration by the user. The factory setup of EE210 corresponds to the type number ordered. (Ordering guide please see data sheet at www.epluse.com/EE210.)

If needed, the user can change the factory setup by using the optional E+E Product Configuration Adapter (EE-PCA) and the E+E Product Configuration Software (EE-PCS).

One can assign other physical quantities to the analogue outputs, change the scaling of the outputs, set the display and perform one or two point adjustment for humidity and temperature.

For configuration with EE-PCA and EE-PCS both 4-20 mA two-wire outputs must be connected.
For product data sheets EE-PCS and EE-PCA please see www.epluse.com.
The E+E Product Configuration Software (EE-PCS) is free and can be downloaded from www.epluse.com/ee-configurator.

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:
    - Humor 20 Humidity Calibrator, please see www.epluse.com.
    - Omniport30 handheld device, please see www.epluse.com/omniport30.
    - Calibrated salt solutions, please see www.epluse.com/EE210.

Temperature calibration and adjustment:
Due to the outstanding protection of the Pt1000 temperature sensing element integrated in the E+E HCT01 sensor, a drift of the T measurement is rather unlikely. If adjustment seems necessary, although the user can perform a one or two point T adjustment with EE-PCA and EE-PCS against a reference of his choice, it is highly recommended to return the device to the manufacturer for this. The reasons rest on the difficulty of an accurate T calibration in the air. The calibration shall take into account the self-heating of EE210 with closed enclosure, in its real mounting position and in continuous operation, the impact of the output current and of the probe orientation to the self-heating, as well as the cooling effect of the air circulation in a climate chamber possibly used for calibration.

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 please see www.epluse.com/EE210.

A configuration kit allows user setup for the output scaling and for the interface parameters, as well as humidity and temperature adjustment of the sensor. It consists of:

Position 1:
- configuration adapter (incl. USB cable for PC)   EE-PCA

Position 2:
- cable for configuration adapter   HA011062

Position 3:
- configuration software: EE-PCS
  free of charge; download: www.epluse.com/EE210

Position 4 - optional:
- power supply for EE210   V03

USA
FCC notice:

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

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

CANADIAN
ICES-003 Issue 5:
CAN ICES-3 B / NMB-3 B

CE