USER'S GUIDE

EE160 - Humidity and Temperature Transmitter for HVAC Applications

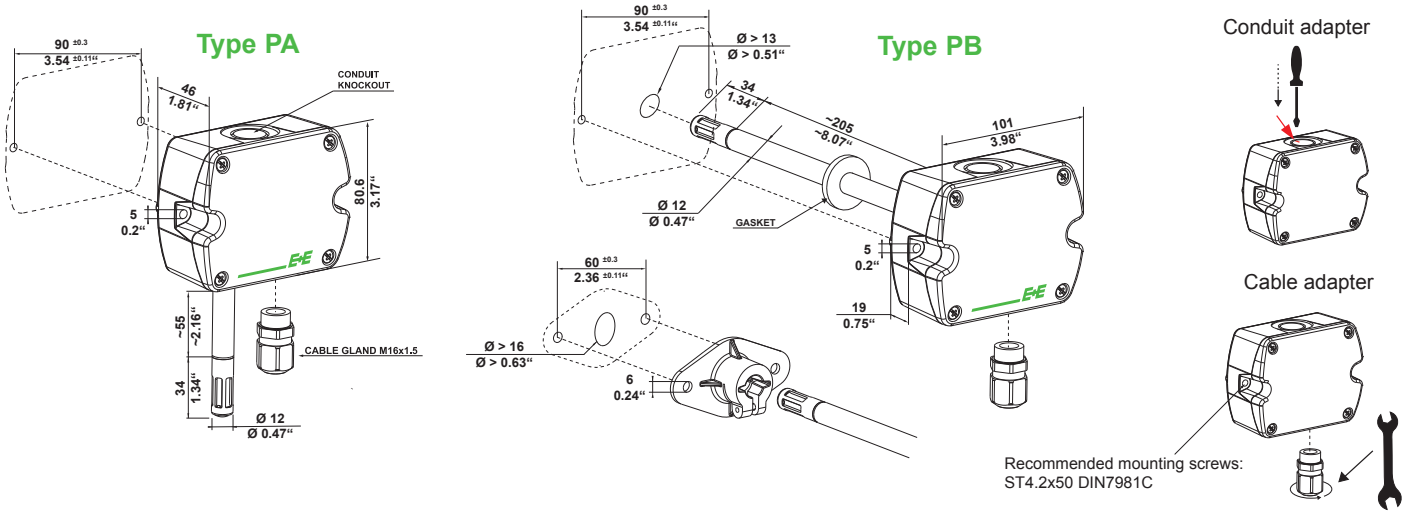
SCOPE OF SUPPLY

Model	EE160 Wall mount (Type PA)	EE160 Duct mount (Type PB)	Additionally for all EE160 with RS485 interface
EE160 Transmitter according ordering guide	✓	✓	
Cable gland	✓	✓	✓
Mounting kit	✓	✓	
Mounting flange		✓	
Inspection certificate according to DIN EN10204 - 3.1	✓	✓	
Quick Guide - EE160 RS485 Setup			✓

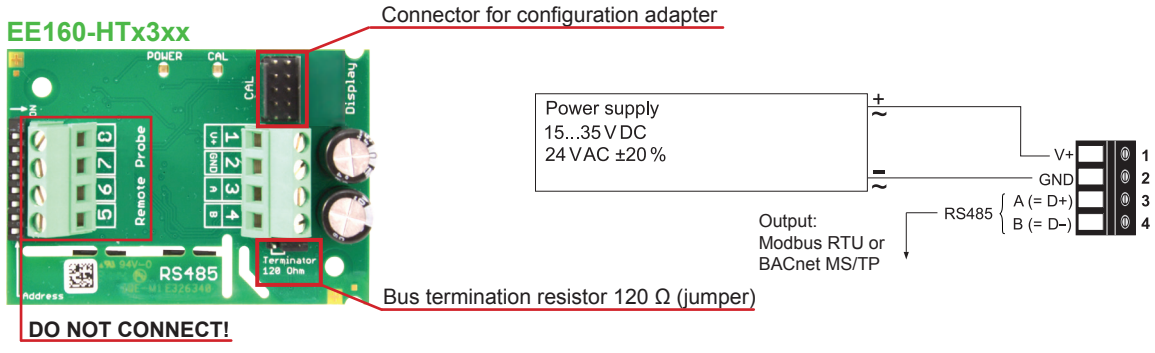
CAUTION

- 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 EE160 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 E+E spare one please take very good care to not touch the sensors.

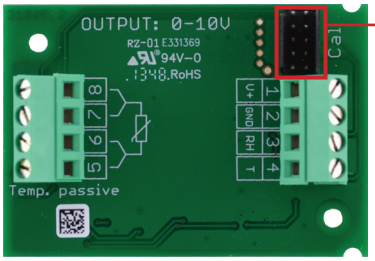
DIMENSIONS IN MM (INCH)



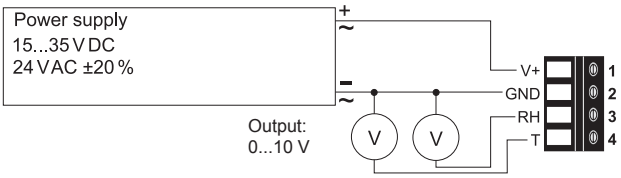
CONNECTION DIAGRAM



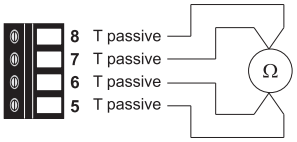
EE160-HT3xxx



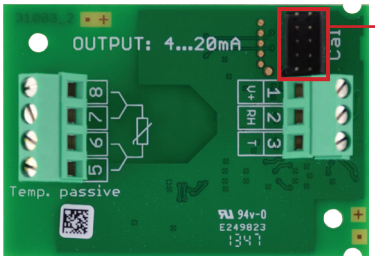
Connector for configuration adapter



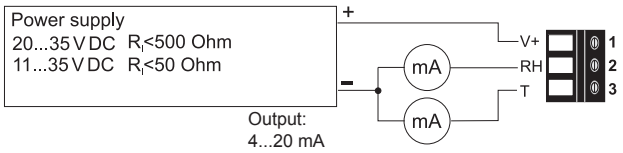
T-passive connection for HT3xxx/HT6xxx



EE160-HT6xxx



Connector for configuration adapter



LED INDICATION (only with RS485)

Green LED - information to normal operation mode:

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

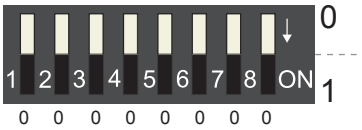
Blue LED - information during setup with EE-PCS Product Configuration Software and the configuration adapter:

on = adapter connected to EE160 and PC, no communication with EE-PCS
flashing = communication in progress with EE-PCS
off = adapter not connected to EE160 and PC

DIGITAL SETTINGS

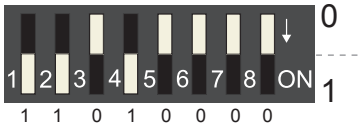
Address Setting

Address Switch



Address setting via EE-PCS Product Configuration Software:
All Dip-Switches at position 0 → address has to be set via Product Configuration Software
Modbus (Slave device): factory setting EE160: 245 (permitted values: 1…247).
BACnet (Master device): factory setting EE160: 2 (permitted values: 0…127).
Example: *Slave address is set via configuration software.*

Address Switch



Address setting via Dip-Switch:
Modbus (Slave device): Setting the Dip-Switch to any other address than 0, overrules the slave address set via configuration software (permitted values: 1…247).
BACnet (Master device): Setting the Dip-Switch to any other address than 0, overrules the slave address set via configuration software.
BACnet Note: permitted values are 0…127. The 8th bit of the Dip-Switch is ignored (ID 127 = 0111 111).
To set address 0 via Dip-Switch, the 8th bit shall be set to 1 (ID 0 = 1000 0000).
Example: *Slave address set to 11 (= 0000 1011 binary).*

BACnet Setup

BACnet PICS are available for download at www.epluse.com/EE160

Modbus Setup

The measured values are saved as a 32 bit float value from 0x19 to 0x1B. Additionally, the measured values can be read as 16-bit signed integer from 0x12C to 0x12D. The EE160 factory setting for the Slave-ID is 245 as an integer 16 bit value. This ID can be customized in the register 60001 (0x00) (value margin 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) shall be done in the ordering guide, see EE160 data sheet. It's not possible to switch from metric to non metric or vice versa with the EE-PCS.

FLOAT (read register):

Function code + Register number (1) [Dec]	Register address (2) [Hex]	Parameter name	
30026	0x19	Temperature	[°C], [°F]
30028	0x1B	relative Humidity	[%]

INTEGER (read register):*

Function code + Register number (1) [Dec]	Register address (2) [Hex]	Parameter name	
30301	0x12C	Temperature	[°C], [°F]
30302	0x12D	relative Humidity	[%]

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

INFO (read register):

Function code + Register number (1) [Dec]	Register address (2) [Hex]	Parameter name
30001	0x00	Serial number (as ASCII)
30009	0x08	Firmware version

(1) = Register number starts from 1
(2) = Register address starts from 0

INTEGER (write register):*

Function code + Register number (1) [Dec]	Register address (2) [Hex]	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/EE160)

MODBUS RTU EXAMPLE

Example of MODBUS RTU command for reading the temperature (float value) T = 23,290008 °C from the register 0x19

Device EE160; slave ID 245 [F5 Hex]
Reference document, chapter 6.3: http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b.pdf

Request [Hex]: F5 03 00 19 00 02 01 0F

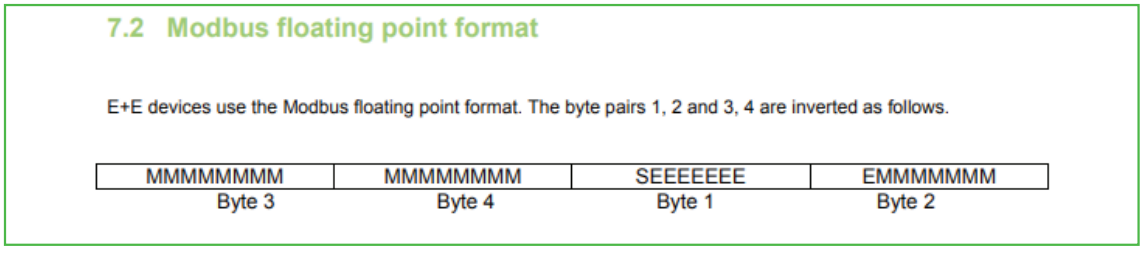
	Modbus ID address	Function code	Starting address Hi	Starting address Lo	No. of register Hi	No. of register Lo	CRC	
Request [Hex]:	F5	03	00	19	00	02	01	0F

Response [Hex]: F5 03 04 51 F0 41 BA 98 10

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

Mobus floating point format

For decoding of float values (according IEEE754 format) , please refer to AN0103, chapter 7 (page 6)



7.2 Modbus floating point format

E+E devices use the Modbus floating point format. The byte pairs 1, 2 and 3, 4 are inverted as follows.

MMMMMMMM	MMMMMMMM	SEEEEEEE	EMMMMMMM
Byte 3	Byte 4	Byte 1	Byte 2

Example:

Response [Hex]	Value in decimal
41 BA 51 F0	23.290008

Protocol setting:
Address, baudrate, parity and stop bits can be set via:
1. Configurator software (available on www.epluse.com/EE160)
2. Modbus protocol (please see Application Note Modbus available on www.epluse.com/EE160)

Bus Termination

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

TECHNICAL DATA

Measured values

Relative Humidity

Sensor	E+E Sensor HCT01-00D
Working range	10...95 % RH
Accuracy[1] at 20 °C	±2.5 % RH
Temperature dependency	typ. ±0.03 % RH/°C

Temperature

Sensor	Pt1000 (tolerance class B, DIN EN 60751)
T-Accuracy at 20 °C	±0.3 °C

Outputs

Analogue output	0-10 V	-1 mA < I_L < 1 mA or
(RH: 0...100%; T: see ordering guide)	4-20 mA (two-wire)	R_L < 500 Ohm
Digital output	RS485 (BACnet MS/TP or Modbus RTU) max. 32 EE160 in one bus	
Passive T-sensor		
4-wire	see ordering guide	

General

Power supply

for 0 - 10 V / RS485	15 - 35V DC or 24V AC ±20 %
for 4 - 20 mA	10V + R_L x 20 mA < U_V < 35V DC

Typical current consumption

	4 - 20 mA output	0 - 10 V output	RS485 output
24V DC supply	max. 40 mA	5 mA	5 mA
24V AC supply	-	13 mA_{rms}	15 mA_{rms}

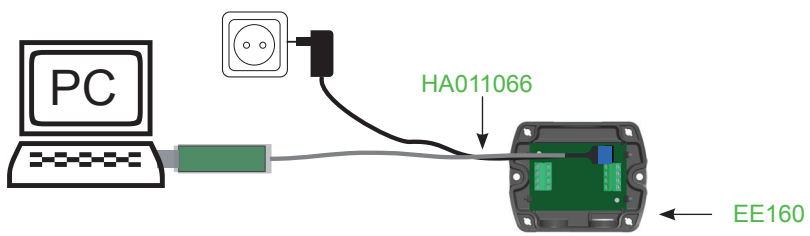
Connection	Screw terminals, max. 1.5 mm²
Housing material	Polycarbonate, UL94V-0 approved
Protection class	IP65 / NEMA 4
Cable gland	M16 x 1.5
Electromagnetic compatibility	EN61326-1 EN61326-2-3
Temperature ranges	Operating temperature: -40...60 °C (-40...140 °F) Storage temperature: -20...60 °C (-4...140 °F)

1) Traceable to intern. 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).

CONFIGURATION AND ADJUSTMENT

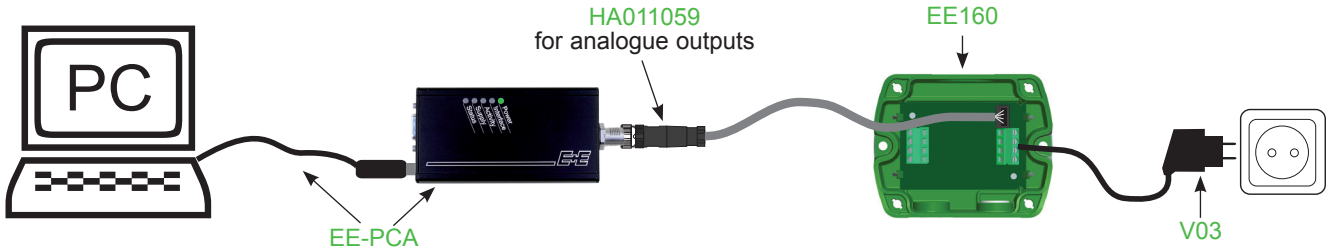
The EE160 as ordered is ready for immediate use and requires no configuration by the user. If needed, the user can change the scaling of the outputs, change the communication settings for digital interface and perform one or two point adjustment for humidity and temperature.

EE160-HTx3 (Digital Output)
Using the USB configuration adapter HA011066 and the EE-PCS Product Configuration Software.



Note: The EE160 may not be connected to any additional power supply when using the USB configuration adapter HA011066.

EE160-HT3x/6x (Analogue Output)
Using the EE-PCA (product configuration adapter) with cable HA011059 and the EE-PCS Product Configuration Software.



Note: The EE160 must be powered when using the EE-PCA kit.

The free E+E Product Configuration Software (EE-PCS) can be downloaded from www.epluse.com/configurator.

MAINTENANCE

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.
  - Certified salt solutions, please see www.epluse.com/EE160.

Cleaning of 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 please see “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 please see www.epluse.com/EE160.

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

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