

USER GUIDE

EE800 - HVAC Room Sensor for CO₂, Temperature and Relative Humidity

GENERAL

EE800 combines CO₂, temperature (T) and relative humidity (RH) measurement in one device with modern design. Additionally, it calculates the dewpoint temperature (Td). EE800 features analogue outputs or digital RS485 interface. At the EE800 with RS485 additional physical quantities are available via Modbus RTU or BACnet MS/TP: absolute humidity (dv), mixing ratio (r), enthalpy (h), frost point temperature (Tf) and water vapor partial pressure (e).

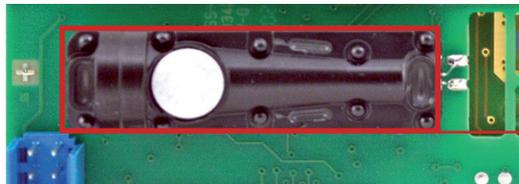
The EE800 incorporates the E+E dual wavelength NDIR CO₂ sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability.

EE800 is available with:

- Three voltage outputs (0 - 5 V or 0 - 10 V) for CO₂, T and RH or Td
- Two analogue outputs (0 - 5 V, 0 - 10 V or 4 - 20 mA) for CO₂ and T
- Modbus RTU or BACnet MS/TP interface, where all physical quantities, as above, are available according to the model ordered.

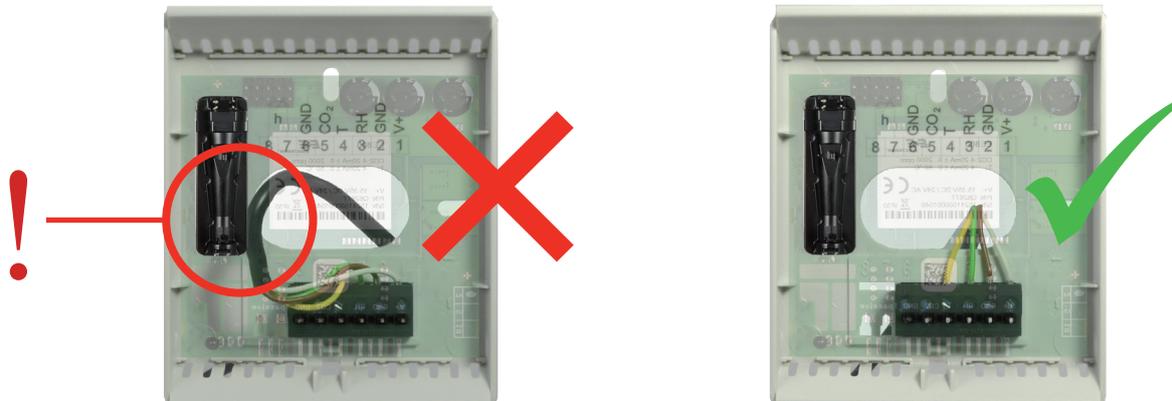
CAUTION

- The device shall not be exposed to extreme mechanical or thermal stress.
- 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 electronics board is an ESD sensitive device, please handle it accordingly and avoid touching it during installation.
- Please allow min. 5 minutes warm up time for the device to reach the specified measurement performance.
- The sensing cell shall not be exposed to any mechanical stress.



CO₂ Sensing Cell

- The wiring shall be positioned so that they do not impact with the sensing cell. Failure to comply with this may lead to relevant measurement errors.

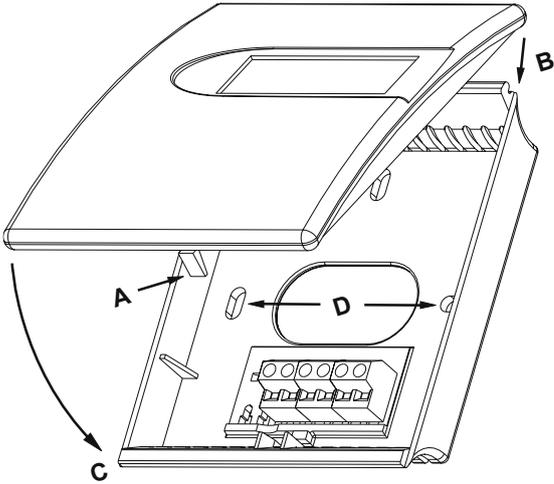


- EE800 features a protection cap for the CO₂ sensing cell. Although this facilitates the handling during installation and diminishes the chances of unintended mechanical impact onto the cell, please observe the wiring guidelines as above. Do not attempt to remove the protection cap.



DIMENSIONS / MOUNTING

The electronics is located in the front cover, which can be easily snapped on/off once the back cover is fixed onto the wall (D = mounting holes) and wired.



OPENING THE ENCLOSURE

Press to release the latch A till the enclosure can be opened. Use a screwdriver or a pen.

CLOSING THE ENCLOSURE

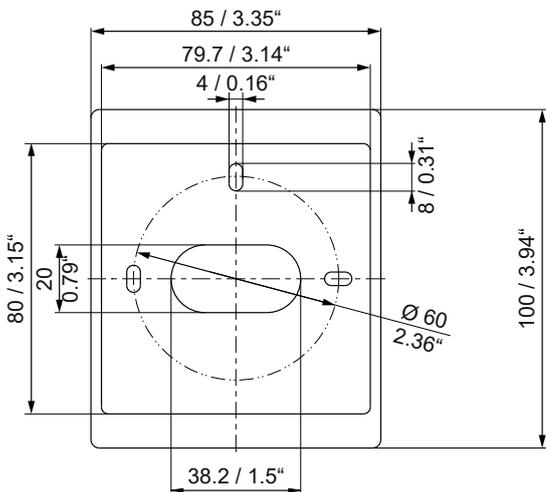
Set the front cover into flute B, rotate it like C and press it onto the back cover till the latch A snaps in.

IMPORTANT

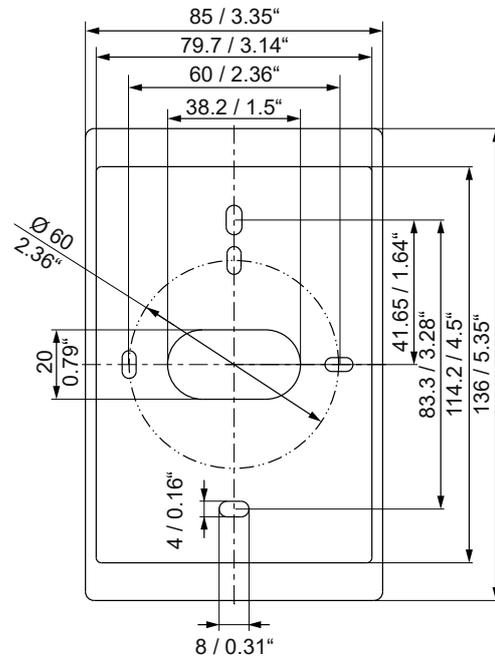
In order to protect the front cover and the electronics from typical construction site pollution (such as painting of the walls) the front cover should be snapped on only after the construction works are completed.

As EE800 is generally mounted onto a conduit box, for accurate measurement results it is important to tighten the conduit box for avoiding false air ingress (along the electrical tubes inside the wall) into the EE800 enclosure.

EU version



US version



CONNECTION DIAGRAM



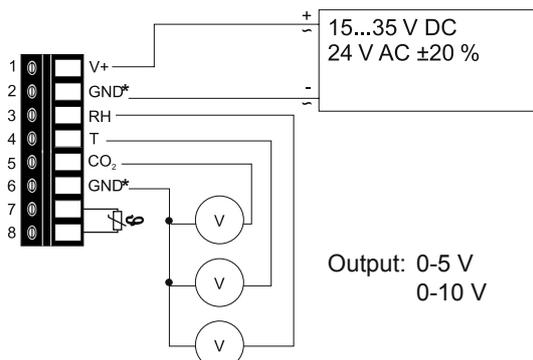
Important note:

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.

EE800 VOLTAGE OUTPUT



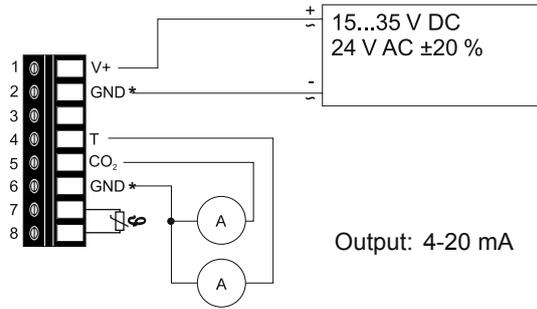
configuration connector



EE800 CURRENT OUTPUT



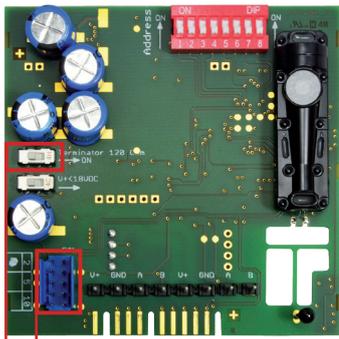
configuration connector



Output: 4-20 mA

* **Very important:** for failure-free operation and performance according to the specs the supply GND and the measurement GND must be wired separately.

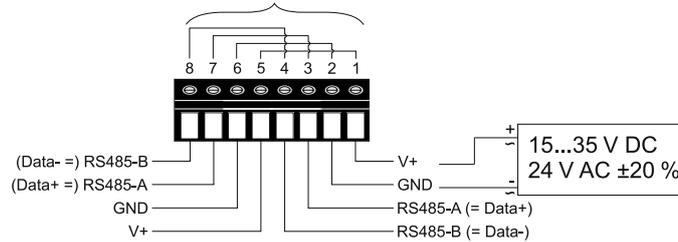
EE800 DIGITAL INTERFACE



configuration connector

termination resistor

Connection on the electronics board.



Screw terminals appropriate for daisy-chain wiring

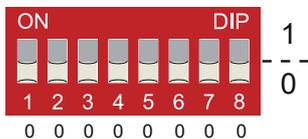
MODBUS AND BACNET

HARDWARE

- The bus termination shall be realized with 120 Ohm resistor by using the switch on the board.
- Very important:** For proper function the power supply must be strong enough to ensure supply voltage within the specified range (see technical data) at any time and at all devices in the bus. This is particularly relevant when using long and thin cables which can cause high voltage drop; please note that a single EE800 draws a peak current of 150 mA.

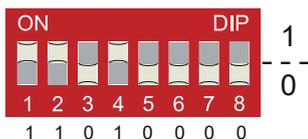
ADDRESS SETTINGS

ADDRESS SWITCH



Address setting via EE-PCS Product Configuration Software:
All switches at position 0 → address has to be set via configuration software (factory setting: 241...Modbus / 3...BACnet).
Example: Address is set via configuration software.

ADDRESS SWITCH



Address setting via DIP switch:
Setting the DIP switch to any other address than 0 overwrites the address set via configuration software.
Example: Address set to 11 (=00001011 binary).

BACNET INFOS

Please see **PICS (Product Implementation Conformance Statement)** - available at www.epluse.com/EE800

MODBUS-MAP

The measured values are saved as a 32 bit float value from 0x19 to 0x2F.

The factory setting for the Modbus address is 241 as an integer 16 bit value. This address can be customised in the register 60001 (0x00) (value margin 1 - 247 permitted).

The serial number as ASCII-code is located at register address 30001-30008.

The firmware version is located at register address 30009.

The required units (metric or non-metric) must be selected according to the „ordering guide“, see EE800 data sheet.

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]
30046	0x2D	CO ₂ Raw*	[ppm]
30048	0x2F	CO ₂	[ppm]

* PLEASE NOTE:

Only for special applications where faster response time is necessary. Please contact your E+E Sales representative.

RS485 settings:

Depending on the protocol, Modbus or BACnet, the address, baudrate, parity and stop bits can be set via:

1. EE-PCS Product Configuration Software (available at www.epluse.com/Configurator)
2. Modbus protocol, refer to Modbus Application Note (available at www.epluse.com/EE800)

INFO (read register):		
Register address	Communication address	Parameter name
30001	0x00	Serial number
30009	0x08	Firmware version

INTEGER (write register):*		
Register address	Communication address	Parameter name
60001	0x00	Modbus address (Slave ID)
60002	0x01	Modbus protocol settings*

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

SETUP AND ADJUSTMENT

The EE800 room sensor is ready to use and does not require any configuration by the user. The factory setup of EE800 corresponds to the type number ordered. For ordering guide please see data sheet at www.epluse.com/EE800.

If needed, the user can change the factory setup by using the optional Configuration Adapter Cable HA011066 and the EE-PCS Product Configuration Software.

The user can assign physical quantities to the analogue outputs, set the scaling of the outputs, change the display settings and perform one or two point adjustment for CO₂, RH and T.

Important:

If deemed necessary, the CO₂ adjustment shall be made against an appropriate, accurate and certified reference. The readjustment based on the assumption that the minimum CO₂ concentration of the environment air is 400 ppm (the principle of the so-called automatic background calibration ABC) may relevantly depreciate the device performance. In continuously occupied buildings like hospitals, the minimum CO₂ concentration will stay higher than 400 ppm, while the concrete carbonation in new buildings can reduce the CO₂ level way below 400 ppm.



Configuration Adapter Cable HA011066

TECHNICAL DATA

Measurands

CO₂	
Measurement principle	Dual Wavelength Non-Dispersive Infrared Technology (NDIR)
Working range	0...2000 / 5000 ppm
Accuracy at 25 °C (77 °F) and 1013 mbar	0...2000 ppm: < ± (50 ppm + 2 % of measuring value) 0...5000 ppm: < ± (50 ppm + 3 % of measuring value)
Response time τ_{63} , typ.	110 s
Temperature dependence, typ.	± (1 + CO ₂ concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113 °F)
Calibration interval ¹⁾	>5 years

Temperature

Accuracy ²⁾ at 20 °C (68 °F)	±0.3 °C (±0.54 °F) RS485 interface or voltage output ±0.7 °C (±1.26 °F) current output
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Relative humidity

Working range	10...90 % RH
Accuracy at 20 °C (68 °F)	±3 % RH (30...70 % RH) ±5 % (10...90 % RH)

Dew point temperature³⁾

Working range	-30...55 °C (-22...131 °F)
Accuracy	< ±2 °C (3.6 °F) for T - Td < 25 °C (45 °F) < ±3 °C (5.4 °F) for T - Td < 30 °C (54 °F)

Outputs

Analogue

0...2000 / 5000 ppm	0 - 5 V / 0 - 10 V -1 mA < IL < 1 mA 4 - 20 mA R _L < 500 Ohm
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Digital interface

Protocol	RS485 (EE800 = 1 unit load) Modbus RTU or BACnet MS/TP
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General

Power supply class III 	24 V AC ±20 % 15 - 35 V DC ⁴⁾
Current consumption, typ.	
Analogue	14 mA + output current
Digital	Peak: 0.3 A for 0.3 s Bias: 11 mA at 15 - 35 V DC 30 mA at 24 V AC ±20 % Peak: 150 mA at 15 - 35 V DC, 24 V AC ±20 %
Enclosure (polycarbonate)	US Version: UL94V-0 approved / EU Version: UL94HB approved
Protection rating	IP30
Display ⁵⁾	LC display: alternating CO ₂ / T / RH or Td
Electrical connection	Screw terminals max. 1.5 mm ² (AWG16)
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 FCC Part 15 ICES-003 Class B
Test report	According to DIN EN 10204-2.2
Working / storage T range	0...90 % RH (non condensing) / -20...60 °C (-4...140 °F)

1 Under normal operating conditions.

2 For supply voltage 24 V DC. Load resistor 250 Ω for version with current output

3 Additional calculated physical quantities available only on the Modbus and BACnet interface: absolute humidity, mixing ratio, enthalpy, frost point temperature and water vapor partial pressure.

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

5 Analogue outputs: The display shows the physical quantities selected for the outputs.
Digital interface: The display shows CO₂ and T for Model M11 and CO₂, T, and RH for Model M12

SCOPE OF SUPPLY

- EE800 Sensor according to ordering guide
- Mounting kit
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN 10204-2.2
- Quick Guide - EE800 with digital interface (only for EE800 with RS485 interface)

ACCESSORIES

USB configuration adapter
Product configuration software

HA011066
EE-PCS (free download: www.epluse.com/configurator)

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 the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CANADA**ICES-003 Issue 5:**

CAN ICES-3 B / NMB-3 B

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