

# USER'S GUIDE

## EE800 - HVAC Room Transmitter for CO<sub>2</sub>, Temperature and Relative Humidity

### GENERAL

EE800 combines CO<sub>2</sub>, temperature (T) and relative humidity (RH) measurement in one device with modern design. Additionally, it calculates the dewpoint temperature (Td). EE800 with analogue outputs features an optional passive T sensor, while at EE800 with RS485 additional physical quantities are available on the Modbus RTU and BACnet MS/TP interface: absolute humidity (dv), mixing ratio (r), enthalpy (h), frost point temperature (Tf) and water vapor partial pressure (e).

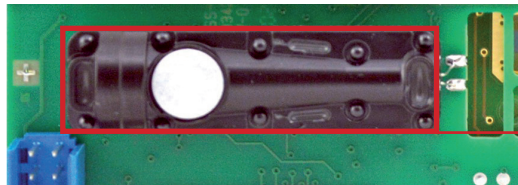
It incorporates the E+E dual wavelength NDIR CO<sub>2</sub> sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability.

### EE800 is available with:

- Three voltage outputs (0-5 V or 0-10 V) for CO<sub>2</sub>, T and RH or Td, with an optional passive T output, or
- Two analogue outputs (0-5 V, 0-10 V or 4-20 mA ) for CO<sub>2</sub> and T, with an optional passive T output, or
- Modbus RTU or BACnet MS/TP interface, where all physical quantities, as above, are available according to the model ordered.

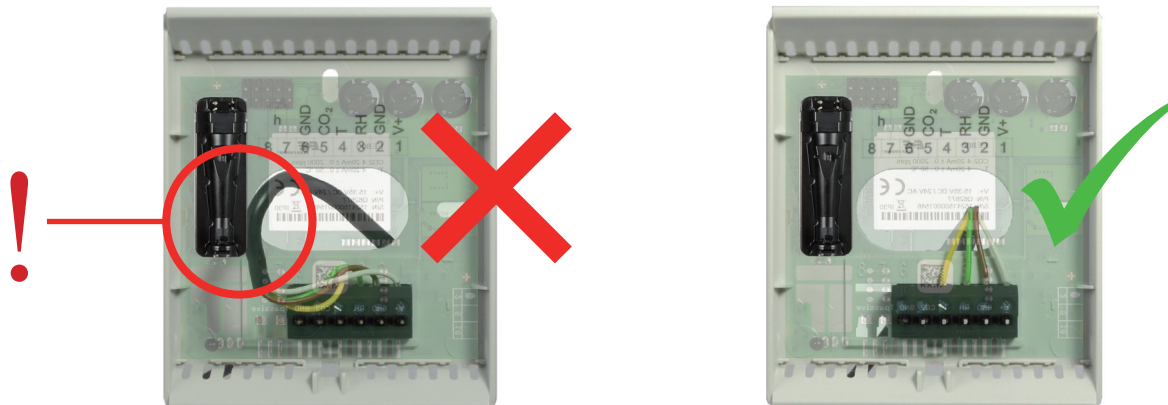
### CAUTION

- 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.

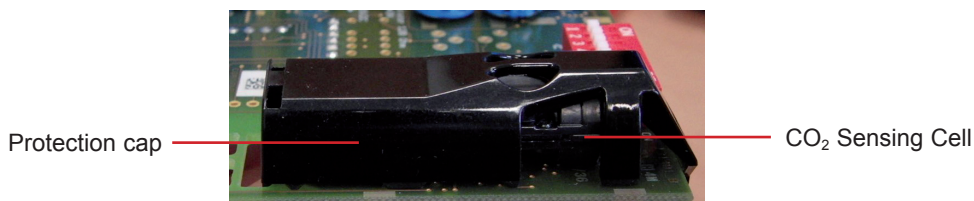


CO<sub>2</sub> Sensing Cell

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

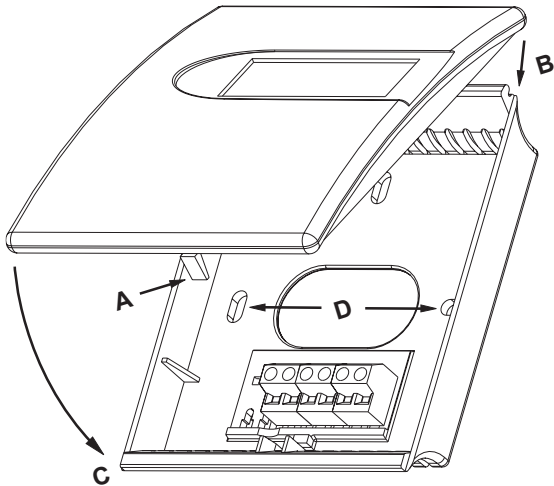


- The latest generation of EE800 (after August 2017) features a protection cap for the CO<sub>2</sub> sensing cell. Although this facilitates the handling during installation and diminishes the chances of unintended mechanical impact onto the cell, please observe the wiring guidelines as above. Do not attempt to remove the protection cap.



## DIMENSIONS / MOUNTING

The electronics of EE800 are 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

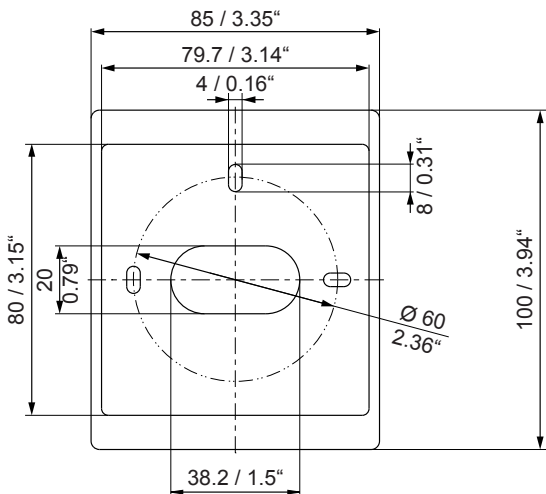
Set the front cover into flute B, rotate it like C and press it onto the back cover till the latch A snaps in.

### IMPORTANT

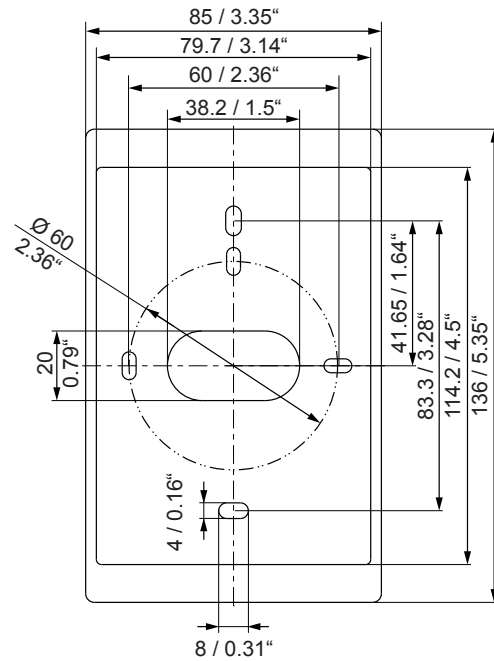
In order to protect the front cover and the electronics from typical construction site pollution (such as painting of the walls) the front cover should be snapped on only after the construction works are completed.

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

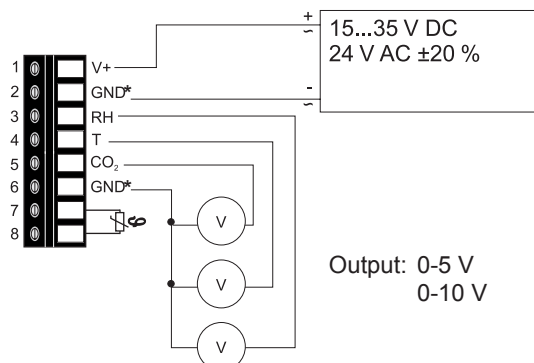


### US version

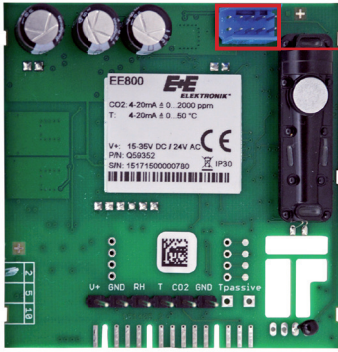


## CONNECTION DIAGRAM

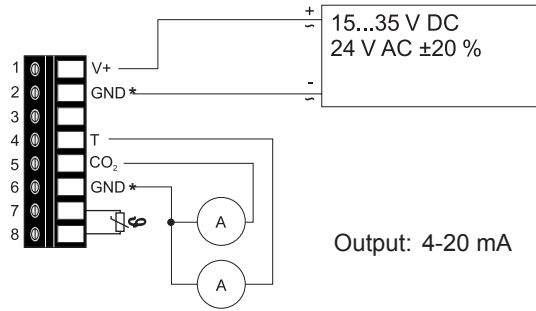
### EE800 VOLTAGE OUTPUT



## EE800 CURRENT OUTPUT



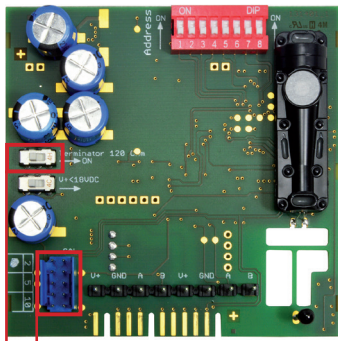
configuration connector



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.

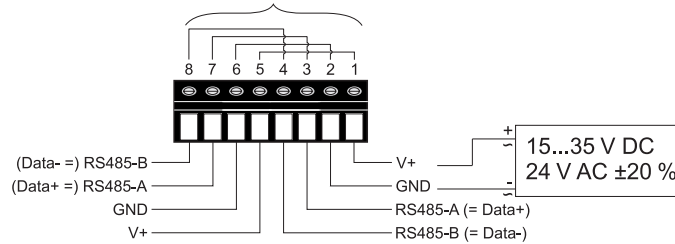
## EE800 DIGITAL INTERFACE



configuration connector

termination resistor

Connection on the electronics board.



Screw terminals appropriate for daisy-chain wiring

## MODBUS AND BACNET

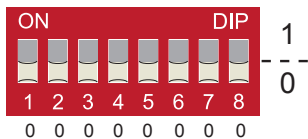
### HARDWARE

- The bus termination shall be realized with 120 Ohm resistor, 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 requires peak current of 150 mA.

### ADDRESS SETTINGS

#### ADDRESS SWITCH

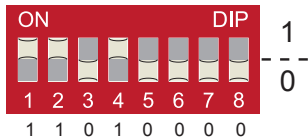


#### Slave address setting via EE-PCS Product Configuration Software:

All switches at position 0 → address has to be set via configuration software (factory setting: 241...Modbus / 3...BACnet).

Example: Slave address is set via configuration software.

#### ADDRESS SWITCH



#### 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 INFOS

Please see **PICS (Product Implementation Conformance Statement)** - available on [www.epluse.com/EE800](http://www.epluse.com/EE800)

## MODBUS-MAP

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

The factory setting for the Slave-ID is 241 as an integer 16Bit value. This ID 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 firmwareversion is located at register address 30009.

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

<b>FLOAT (read register):</b>			
Register address	Communication address	Parameter name	
30026	0x19	temperature	[°C], [°F]
30028	0x1B	relative humidity	[%]
30030	0x1D	water vapour partial pressure	[°C], [°F]
30032	0x1F	dew point temperature	[°C], [°F]
30036	0x23	absolute humidity	[g/m³], [g/ft³]
30038	0x25	maxing ratio	[g/kg], [gr/lb]
30040	0x27	specific enthalpy	[kJ/kg], [BTU/lb]
30042	0x29	frost point temperature	[°C], [°F]
30046	0x2D	CO <sub>2</sub> Raw*	[ppm]
30048	0x2F	CO <sub>2</sub>	[ppm]

### \* PLEASE NOTE:

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

### Protocol setting:

Address, baudrate, parity and stop bits can be set via:

1. Configurator software (available on [www.epluse.com/](http://www.epluse.com/))
2. Modbus protocol (please see Application Note Modbus (available on [www.epluse.com/](http://www.epluse.com/)))

## SETUP AND ADJUSTMENT

The EE800 transmitter 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](http://www.epluse.com/EE800).

If need, the user can change the factory setup by using the optional Configuration Adapter Cable HA011066 and the E+E Product Configuration Software (EE-PCS).

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 CO<sub>2</sub>, RH and T.

### Important:

If deemed necessary, the CO<sub>2</sub> adjustment shall be made against an appropriate, accurate and certified reference. The readjustment based on the assumption that the minimum CO<sub>2</sub> 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 CO<sub>2</sub> concentration will stay higher than 400 ppm, while the concrete carbonation in new buildings can reduce the CO<sub>2</sub> level way below 400 ppm.

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

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

<b>INTEGER (write register):*</b>		
Register address	Communication address	Parameter name
60001	0x00	Slave-ID (modbus address)
60002	0x01	Modbus protocol settings*

\*For Modbus protocol setting please see Application Note Modbus ([www.epluse.com](http://www.epluse.com))



Configuration Adapter Cable HA011066

## TECHNICAL DATA

(Modification rights reserved)

### Measured values

#### CO<sub>2</sub>

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 $\tau_{63}$	typ. 110 s
Temperature dependence	typ. ± (1 + CO <sub>2</sub> concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113 °F)
Calibration interval <sup>1)</sup>	>5 years

#### Temperature

Accuracy <sup>2)</sup> at 20 °C (68 °F)	±0.3 °C (±0.54 °F) RS485 digital interface; ±0.3 °C (±0.54 °F) 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)

### Calculated values

#### Dewpoint temperature<sup>3)</sup>

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 <sub>L</sub> < 500 Ohm
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#### Digital Interface

Protocol	RS485 with max. 32 devices on one bus Modbus RTU or BACnet MS/TP
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#### Temperature passive

	please see ordering guide (only in combination with analogue outputs)
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### General

Supply voltage	24 V AC ±20 %    15-35 V DC
Current consumption	
Analogue	typ. 14 mA + output current; peak 0.3 A for 0.3 s
Digital	bias:    typ. 11 mA at 15...35 V DC typ. 30 mA at 24 V AC ±20 % peak: 150mA at 15...35 V DC, 24 V AC ±20 %
Housing (polycarbonate)	US Version: UL94V-0 approved / EU Version: UL94HB approved
Protection class	IP30
Display <sup>4)</sup>	LC display: alternating CO <sub>2</sub> / T / RH or Td
Electrical connection	screw terminals max. 1.5 mm <sup>2</sup> (AWG16)
Electromagnetic compatibility	EN61326-1    EN61326-2-3
FCC Part 15	ICES-003 ClassB
Working / Storage T-range	0...90 % RH (non condensing) / -20...60 °C (-4...140 °F)

1 Under normal operating conditions.

2 U<sub>v</sub> = 24 V DC and R<sub>L</sub> = 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 Analogue outputs: The display shows the physical quantities selected for the outputs.

Digital interface: The display shows CO<sub>2</sub> and T for Model M11 and CO<sub>2</sub>, T, and RH for Model M12

## SCOPE OF SUPPLY

- EE800 Transmitter according to ordering guide
- Mounting kit
- Two self-adhesive labels for configuration changes (see user guide at [www.epluse.com/relabeling](http://www.epluse.com/relabeling))
- Test report according to DIN EN10204 - 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](http://www.epluse.com/configurator))

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**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.

**CANADIAN****ICES-003 Issue 5:**

CAN ICES-3 B / NMB-3 B

**INFORMATIONEN****+43 7235 605 0 / [info@epluse.com](mailto:info@epluse.com)**

Langwiesen 7 • A-4209 Engerwitzdorf  
Tel: +43 7235 605-0 • Fax: +43 7235 605-8  
[info@epluse.com](mailto:info@epluse.com) • [www.epluse.com](http://www.epluse.com)

LG Linz Fn 165761 t • UID-Nr. ATU44043101  
Place of Jurisdiction: A-4020 Linz • DVR0962759

