# EE871

## Modbus $CO_2$ Probe for Demanding OEM Applications

The E+E $CO_2$ probe EE871 is designed for use in harsh, demanding OEM applications. A multiple point $CO_2$ and temperature adjustment procedure leads to excellent $CO_2$ measurement accuracy over the entire temperature working range, ideal for use in agriculture or outdoors. EE871 incorporates the dual wavelength NDIR $CO_2$ sensor, which automatically compensates for ageing effects and is highly insensitive to pollution.

The IP65 enclosure and replaceable PTFE filter offer excellent protection in harsh, polluted environments. The compact size, the M12 connector and the optional mounting flange allow for fast probe installation or replacement. With the optional radiation shield EE871 can be also used outdoors.

The measured data range of up to 10000 ppm is available on the Modbus or the E2 digital interface.

An optional kit facilitates easy configuration and adjustment of EE871. The measurement interval can be set according to the application requirements, by this the average current consumption can be reduced to 120 µA for battery-operated devices.

## Typical Applications

**Greenhouses and livestock barns**
**Fruit and vegetable storage**
**Hatchers and incubators**
**Outdoor $CO_2$ monitoring**
**Data loggers and handhelds**

## Key Features

**Autocalibration**
**Outstanding long-term stability**
**Temperature compensation**
**Very low current consumption**
**IP65 enclosure**
**Easy installation**

## Technical Data

### Measured values

**$CO_2$**

| | |
|---|---|
| Measuring principle | E+E dual wavelength non-dispersive infrared technology (NDIR) |
| Measurement range | 0...2000 / 5000 / 10000 ppm |
| Accuracy at 25°C and 1013mbar [1] | 0...2000 ppm: < ± (50 ppm +2 % from the measured value) |
| (77°F...14,69psi) | 0...5000 ppm: < ± (50 ppm +3 % from the measured value) |
| 0...10000 ppm: | < ± (100 ppm +5 % from the measured value) |
| Response time $t_{90}$ | 105 s with measured data averaging (smooth output) |
| | 60 s without measured data averaging |
| Temperature dependency | typ. 1 ppm $CO_2$/°C (-20...45 °C) (-4...113 °F) |
| Measurement interval | adjustable from 15 s to 1 h (Factory setting 15 s) |

### General

| | |
|---|---|
| Digital interface | Modbus or E2 (details: www.epluse.com) |
| Supply voltage | 4.75 - 7.5 VDC |
| Average current consumption [2] | 120 µA (at 1 h measurement interval)...4.3 mA (at 15 sec. measurement interval) |
| Current peak | max. 350 mA for 0.05 s |
| Housing / Protection class | Plastic PC / Housing IP65 |
| Electrical connection | Connector M12 x 1 |
| Cable length E2 interface | max. 10 m (32.8 ft) |
| Electromagnetic compatibility | EN61326-1 |
| (Industrial enviroment) | EN61326-2-3 |
| Operating conditions | -40...60 °C (-40...140 °F) 0...100 % RH (non-condensing) 85...110 kPa (12,33...15,95 psi) |
| Storage conditions | -40...60 °C (-40...140 °F) 0...100 % RH (non-condensing) 70...110 kPa (10,15...15,95 psi) |

1) For averaging output
2) The average current consumption depends on the measurement interval


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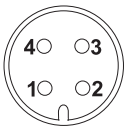
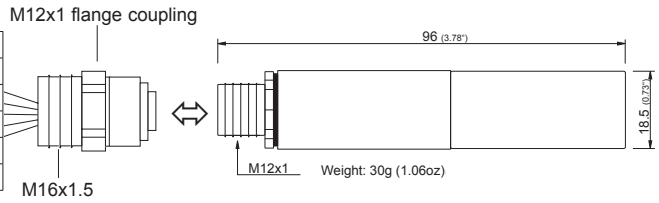
## Connection




| | Modbus | E2 |
|---|---|---|
| 1... | +UB | GND |
| 2... | B-RS485 | +UB |
| 3... | A-RS485 | DATA |
| 4... | GND | CLOCK |

| Modbus | E2 | |
|---|---|---|
| +UB | GND | brown |
| B-RS485 | +UB | white |
| A-RS485 | DATA | blue |
| GND | CLOCK | black |
| Shielding | | grey |

## Dimensions (mm/inch)




## Modbus Map

The measured values are saved as a 32Bit *float* value from 0x2D to 0x30. The factory setting for the Slave-ID is 246 as an *integer* 16Bit value. This ID can be customised in the register 0x00 (permitted values 1 - 247).

### *FLOAT (read register):*

| *Register address* | *Communication address* | *Parameter name* |
|---|---|---|
| 30046 | 0x2D | $CO_2$ Response time = 60s |
| 30048 | 0x2F | $CO_2$ Response time = 105s |

### *INTEGER (write register):*

| *Register address* | *Communication address* | *Parameter name* |
|---|---|---|
| 60001 | 0x00 | Slave-ID |
| 60002 | 0x01 | RS485 Setting |
| 60003 | 0x02 | Measuring time interval |

For Modbus protocol setting please see Application Note (www.epluse.com/EE871).

## Ordering Guide

| MEASUREMENT RANGE | | TYPE | | OUTPUT | | FILTER | |
|---|---|---|---|---|---|---|---|
| 0...2000ppm | (02) | $CO_2$ | (C) | E2 interface | (2) | PTFE-Filter | (E) |
| 0...5000ppm | (05) | | | RS485* | (3) | | |
| 0...10000ppm | (10) | | | | | | |
| | | | | | | | |
| EE871- | | | | | | | |

***Interface parameters - RS485**

| PROTOCOL | | BAUDRATE | | PARITY | | STOPBITS | |
|---|---|---|---|---|---|---|---|
| Modbus | (1) | 9600 | (A) | odd | (O) | 1 stopbit | (1) |
| | | 19200 | (B) | even | (E) | 2 stopbits | (2) |
| | | 38400 | (C) | no parity | (N) | | |

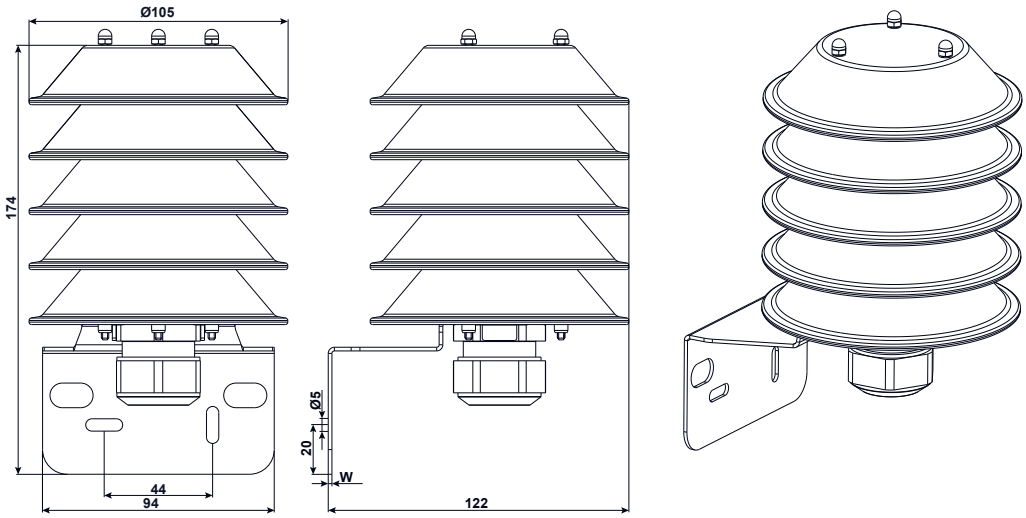
## Ordering Example

**EE871-02C3E-1AE2**

| | |
|---|---|
| Measurement range: | 0...2000 ppm |
| Type: | $CO_2$ |
| Output: | RS485 |
| Filter: | PTFE-Filter |
| | |
| Protocol: | Modbus |
| Baudrate: | 9600 |
| Parity: | even |
| Stopbits: | 2 |

## Operation outdoors

For outdoor applications EE871 must be used with the radiation shield order no. HA010507, which protects the device against rain, snow, ice, and solar radiation.




## Accessories (For further information, see data sheet “Accessories”)

| | |
|---|---|
| Mounting flange | HA010212 |
| M12x1 flanged coupling with 50mm (1,97") stranded wire | HA010705 |
| Modbus configuration adapter | HA011012 |
| E2 Test and configuration adapter | HA011010 |
| E+E Product configuration software | EE-PCS (Download: www.epluse.com/Configurator) |
| Connecting cable M12 - flying leads | HA0108**19/20/21** |
| T-Coupler M12 - M12 | HA030204 |
| M12 Connector for self assembly | HA010707 |
| PTFE Filter Cap | HA010116 |
| Radiation shield | HA010507 |
| Protection cap for M12 female cable connector | HA010781 |
| Protection cap for M12 male probe connector | HA010782 |

## Scope of Supply

| Model | EE871 |
|---|---|
| EE871 probe according ordering guide | ✓ |
| Test report according to DIN EN10204 - 2.2 | ✓ |

## Support Literature

www.epluse.com/EE871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