

## EE871

## Digital CO<sub>2</sub> Probe for Demanding Applications

The E+E CO<sub>2</sub> probe EE871 is designed for use in harsh, demanding OEM applications. A multiple point CO<sub>2</sub> and temperature adjustment procedure leads to excellent CO<sub>2</sub> measurement accuracy over the entire temperature working range, ideal for use in agriculture or outdoors. EE871 incorporates the dual wavelength NDIR CO<sub>2</sub> sensor, which automatically compensates for ageing effects and is highly insensitive to pollution.

The IP65 enclosure and the replaceable filter offer excellent protection in harsh, polluted environment. With a special filter cap, the EE871 can be employed in applications with periodical H<sub>2</sub>O<sub>2</sub> sterilization. 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 5 % CO<sub>2</sub> (50,000 ppm) is available on E2 digital interface and up to 1 % CO<sub>2</sub> (10,000 ppm) is available on Modbus RTU 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<sub>2</sub> monitoring  
 Data loggers and handhelds  
 Pharma, Biotech (H<sub>2</sub>O<sub>2</sub> sterilization)

### Key Features

Auto-calibration  
 Outstanding long-term stability  
 Temperature compensation  
 Very low current consumption  
 IP65 enclosure  
 Modbus RTU or E2 interface

### Technical Data

#### Measured values

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

|   |  |
|---|--|
| Measuring principle   | Dual wavelength (non-dispersive infrared technology) NDIR                                  |
| Measurement range   | 0...2000 ppm: < ± (50 ppm + 2 % from the measured value)                                   |
| Accuracy at 25 °C and 1013 mbar <sup>1)</sup> (77 °F...14,69 psi) | 0...5000 ppm: < ± (50 ppm + 3 % from the measured value)                                   |
|   | 0...10,000 ppm: < ± (100 ppm + 5 % from the measured value)                                |
|   | 0...3 %: < ± (1,5 % from full scale + 2 % from the measured value)                         |
|   | 0...5 %: < ± (1,5 % from full scale + 2 % from the measured value)                         |
| Response time t <sub>63</sub>                                     | 105 s with measured data averaging (smooth output)<br>60 s without measured data averaging |
| Temperature dependency (-20...45 °C) (-4...113 °F)                | 0...2000 ppm: typ. ± (1 + CO <sub>2</sub> concentration [ppm] / 1000) ppm/°C               |
|   | 0...5000 ppm: typ. ± (1 + CO <sub>2</sub> concentration [ppm] / 1000) ppm/°C               |
|   | 0...10,000 ppm: typ. -0,3 % from the measured value/°C                                     |
| Measurement interval  | adjustable from 15 s to 1 h (Factory setting: 15 s)  |

#### General

|                   |   |
|-------------------|---|
| Digital interface | Modbus RTU or E2 (details: <a href="http://www.epluse.com">www.epluse.com</a> ) |
| Supply voltage    | 4.75 - 7.5 VDC  |

1) For averaging output

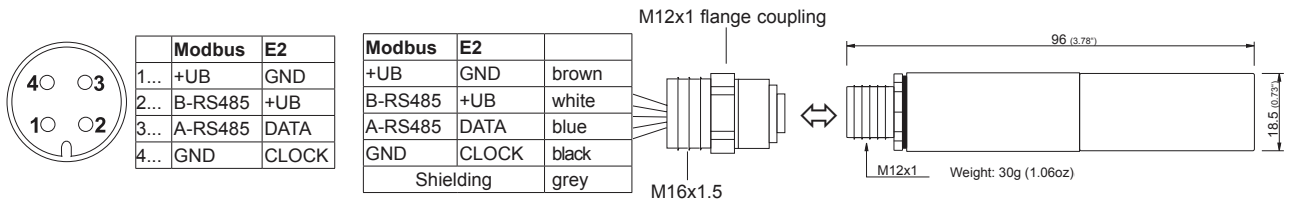
|   |   |
|---|---|
| Average current consumption <sup>2)</sup> | 120 $\mu$ A (at 1 h measurement interval)...4.3 mA (at 15 sec. measurement interval)      |
| Current peak                              | max. 350 mA for 0.05 s  |
| Housing / Protection class                | Plastic PC / Housing IP65   |
| Electrical connection                     | Connector M12 x 1   |
| Cable length E2 interface                 | max. 10 m (32.8 ft)   |
| Electromagnetic compatibility             | EN61326-1   |
| (Industrial environment)                  | 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) |



2) The average current consumption depends on the measurement interval

## Connection

## 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):

| Coil / Register Numbers | Data-Addresses | Parameter name                       |
|-------------------------|----------------|--------------------------------------|
| 30046                   | 0x2D           | CO <sub>2</sub> Response time = 60s  |
| 30048                   | 0x2F           | CO <sub>2</sub> Response time = 105s |

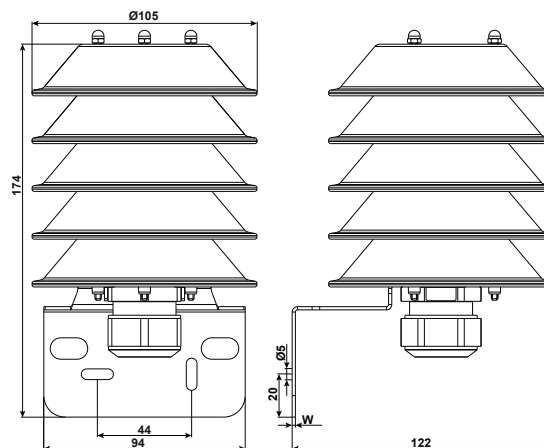
### INTEGER (write register):

| Coil / Register Numbers | Data-Addresses | 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](http://www.epluse.com/EE871)).

## 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.



## Scope of Supply

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

## Ordering Guide

|                        |                                  | EE871   |
|------------------------|----------------------------------|---------|
| CO <sub>2</sub> Range  | 0...2000 ppm                     | HR2000  |
|                        | 0...5000 ppm                     | HR5000  |
|                        | 0...10,000 ppm                   | HR1     |
|                        | 0...3 % (only with E2 Interface) | HR3     |
|                        | 0...5 % (only with E2 Interface) | HR5     |
| Digital Output         | E2 Interface                     | J2      |
|                        | Modbus RTU                       | no code |
| Filter cap             | PTFE                             | no code |
|                        | H <sub>2</sub> O <sub>2</sub>    | F12     |
| Baudrate <sup>1)</sup> | 9600                             | no code |
|                        | 19200                            | BD6     |
|                        | 38400                            | BD7     |
| Parity <sup>1)</sup>   | no parity                        | PY0     |
|                        | odd                              | no code |
|                        | even                             | PY2     |
| Stopbits <sup>1)</sup> | 1 stopbit                        | no code |
|                        | 2 stopbits <sup>2)</sup>         | BT2     |

1) Only for Modbus RTU

2) Only in combination with „no parity“

## Ordering Example

### EE871-HR5J2

CO<sub>2</sub> range: 0...5 %  
 Digital Output: E2 Interface  
 Filter cap: PTFE

### EE871-HR2000F12PY2BT2

CO<sub>2</sub> range: 0...2000 ppm  
 Digital Output: Modbus RTU  
 Filter cap: H<sub>2</sub>O<sub>2</sub>  
 Baudrate: 9600  
 Parity: even  
 Stopbits: 2

## 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<br>(Download: <a href="http://www.epluse.com/Configurator">www.epluse.com/Configurator</a> ) | EE-PCS         |
| Connecting cable M12 - flying leads (1.5 m (59.06") / 5 m (196.85") / 10 m (393.70"))   | HA010819/20/21 |
| T-Coupler M12 - M12   | HA030204       |
| M12 Connector for self assembly   | HA010707       |
| PTFE filter cap   | HA010116       |
| H <sub>2</sub> O <sub>2</sub> filter cap  | HA010122       |
| Radiation shield  | HA010507       |
| Protection cap for the M12 cable socket   | HA010781       |
| Protection cap for the M12 plug of EE871  | HA010782       |

## Support Literature

[www.epluse.com/EE871](http://www.epluse.com/EE871)