

# EE872

## Modular Probe for CO<sub>2</sub>, Humidity, Temperature and Ambient Pressure

The EE872 probe, with a measurement range up to 5 % CO<sub>2</sub> (50000 ppm), is suitable for use in harsh and demanding environment in agriculture, life stock barns, hatchers, incubators, green houses or outdoors.

### Outstanding Accuracy

A multi-point CO<sub>2</sub> and temperature (T) adjustment procedure leads to excellent CO<sub>2</sub> measurement accuracy over the entire T working range of -40...60 °C (-40...140 °F), which is ideal for agriculture or outdoor use.

### Long Term Stability

EE872 incorporates the E+E dual wavelength NDIR CO<sub>2</sub> sensor, which automatically compensates for ageing effects and is highly insensitive to pollution. The RH sensing element with E+E proprietary coating is suitable even for aggressive and corrosive environment.

### Pressure and Temperature Compensation

The active compensation with on-board sensors leads to best CO<sub>2</sub> measurement accuracy independently of temperature, altitude or weather conditions.

### 4 in 1

Beside CO<sub>2</sub>, the EE872 measures also relative humidity (RH), temperature and ambient pressure (p). Additionally, the devices calculated also the dew point temperature (Td).

### Reliable in Harsh and Condensing Environment

The heated version of EE872 is suitable for high humidity and condensing environment. The IP65 enclosure and the replaceable filter offer excellent protection in polluted environment. With a special filter cap, the EE872 is also appropriate for applications with periodical H<sub>2</sub>O<sub>2</sub> sterilization.

### Analogue Output or RS485 Interface

The CO<sub>2</sub> measured data is available simultaneously on the analogue voltage and current outputs. Depending on the EE872 version, the RS485 interface with Modbus RTU or BACnet MS/TP protocol offers also the RH, T, p, or Td data.

### User Configurable and Adjustable

The free PCS10 Product Configuration Software together with an optional adapter cable facilitates the configuration and adjustment of the EE872.



## Features

### Interchangeable Sensing Module

- » E+E dual wavelength NDIR, auto-calibration
- » T and p compensation with on-board sensors
- » Heated versions for preventing condensation
- » RH sensing element protected by E+E coating
- » T range -40...60 °C (-40...140 °F)
- » User configurable and adjustable

### Filter Cap

- » PTFE
- » Catalytic for H<sub>2</sub>O<sub>2</sub> sterilisation
- » Replaceable



### Supply and Output Module

- » CO<sub>2</sub> voltage and current output
- » Modbus RTU or BACnet MS/TP (CO<sub>2</sub>, T, RH, p, Td)
- » IP65 protection rating
- » Stainless steel or plastic enclosure
- » M12 stainless steel connector
- » User configurable

### Test Report

- » According DIN EN 10204-2.2



## Protective Sensor Coating

The E+E proprietary sensor coating is a hygroscopic layer applied to the active surface of the RH sensing element. The coating substantially extends the life-time and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). Additionally, it improves the sensor's long term stability in dusty, dirty or oily applications by preventing stray impedances caused by deposits on the active sensor surface.

## E+E Modular Sensor Platform

The EE872 is compatible with the Sigma 05 host device of the E+E Modular Sensor Platform. Together they become a versatile, plug-and-play CO<sub>2</sub>/RH/T/p modular sensor with analogue outputs and optional display. Besides EE872, Sigma 05 accommodates also other E+E intelligent sensing probes. See [www.epluse.com/Sigma05](http://www.epluse.com/Sigma05) for further details.



## Technical Data

### Measurands

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

Measurement principle	Dual wavelength non dispersive infrared (NDIR)
Measurement range	0...2000 ppm: $< \pm (50 \text{ ppm} + 2 \% \text{ mv})$ <span style="float: right;"><i>mv = CO<sub>2</sub> measured value</i></span>
Accuracy at 25 °C (77 °F) and 1013 mbar (14,69 psi)	0...5000 ppm: $< \pm (50 \text{ ppm} + 3 \% \text{ mv})$ 0...10000 ppm: $< \pm (100 \text{ ppm} + 5 \% \text{ mv})$
	0...3 %: $< \pm (1.5 \% \text{ from full scale} + 2 \% \text{ mv})$ 0...5 %:
Response time $t_{63}^{(1)}$	90 s
T dependence, typ. (-20...45 °C) (-4...113 °F)	$\pm (1 + \text{mv} [\text{ppm}] / 1000) \text{ ppm}/^\circ\text{C}$ , for CO <sub>2</sub> <10000 ppm -0.3 % mv / °C, for CO <sub>2</sub> > 10000 ppm
Residual pressure dependence <sup>2)</sup> (-20...45 °C) (-4...113 °F)	0.014 % mv / mbar (ref. to 1013 mbar)
Measurement interval	15 s (user adjustable from 15 s to 1 h)
Long term stability, typ. at 0 ppm CO <sub>2</sub>	20 ppm / year

#### Relative humidity

Working range	0...100 % RH, with enabled heating 0...95 % RH (non-condensing), with disabled heating
Accuracy <sup>3)</sup> at 25 °C (77 °F)	$\pm 3 \% \text{ RH}$ (20...80% RH) $\pm 5 \% \text{ RH}$ (0...95% RH)

#### Pressure

Working range	700...1100 mbar (10.15...15.95 psi)
Accuracy at 25 °C (77 °F), typ.	$\pm 2 \text{ mbar}$
Temperature dependence	$\pm 0.016 \text{ mbar/K}$ , 0...60 °C (0...140 °F)


#### Temperature

Working range	-40...60 °C (-40...140 °F)
Accuracy <sup>3)</sup> at 5...60 °C (41...140 °F), typ.	$\pm 0.5 \text{ °C}$ ( $\pm 0.9 \text{ °F}$ )

## Outputs

<b>Analogue (CO<sub>2</sub> only)</b>	0 - 5 V / 0 - 10 V	-1 < I <sub>L</sub> < 1 mA
	0 - 20 mA / 4 - 20 mA (3-wire)	Load resistance ≤ 500 Ohm
<b>Digital interface (CO<sub>2</sub>, RH, T, p, Td)</b>	RS485 (EE872 = 1/10 Unit Load)	
	Protocol Modbus RTU	
	Default settings <sup>4)</sup> Parity even, 1 stop bit, Modbus address 237	
	Protocol BACnet MS/TP	
Default settings BACnet address 6		

## General

Power supply class III 	15 - 35 V DC <sup>5)</sup> for current output 12 - 30 V DC for voltage output and RS485 interface
Average current consumption at 24 V DC and 15 s measurement interval	37 mA for 20 mA output current 17 mA for voltage output and RS485 interface
Peak current, max.	200 mA
Enclosure material	Plastic (PET), UL94HB approved or Stainless steel 1.4404
Filter cap material	PTFE, UL94V-0 approved
Protection rating	IP65
Electrical connection	M12x1, stainless steel 1.4404
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial Environment FCC Part15 Class A ICES-003 Class A
Storage conditions	-40...60 °C (-40...140 °F) 700...1 100 mbar (10.15...15.95 psi) 0...95 % RH non-condensing



- 1) With data averaging algorithm for smooth output signal. Faster response time available upon request.  
 2) Pressure dependence of a device without pressure compensation: 0.14 % mv/mbar.  
 3) At 24 V DC supply, air flow min. 0.3 m/s, probe horizontal or with sensing head downwards, excl. hysteresis.  
 4) More details about communication setting and the Modbus map: See User Manual and Modbus Application Note at [www.epluse.com/EE872](http://www.epluse.com/EE872).  
 5) USA & Canada class 2 supply required, max. supply voltage 30 V DC

## Ordering Guide

		EE872-	
<b>Hardware Configuration</b>	<b>Model</b>	CO <sub>2</sub> (default: heated) CO <sub>2</sub> + T + RH + p (default: not heated)	M10   M13
	<b>CO<sub>2</sub> range</b>	0...2000 ppm	HV1
		0...5000 ppm	HV2
		0...1 % (10000 ppm)	HV3
		0...3 % (30000 ppm)	HV5
0...5 % (50000 ppm)		HV6	
<b>Probe material</b>	Plastic	no code	
	Stainless steel	PM2	
<b>Filter</b>	PTFE	no code	
	Catalytic for H <sub>2</sub> O <sub>2</sub> sterilisation	F12	
<b>Software Setup</b>	<b>Output</b>	Output 1: 0 - 10 V    Output 2: 4 - 20 mA	GA7   P1
		Output 1: 0 - 5 V    Output 2: 0 - 20 mA	GA11   P1
		Modbus RTU	P3   P3
		BACnet MS/TP <sup>1)</sup>	
	<b>Baud rate</b>	9600 19200 38400 57600 <sup>2)</sup> 76800 <sup>2)</sup> 115200 <sup>2)</sup>	no code BD6 BD7 BD8 BD9 BD10

- 1) The BACnet MS/TP Product Implementation Conformance Statement (PICS) is available at [www.epluse.com/EE872](http://www.epluse.com/EE872).  
 2) With BACnet MS/TP only.

## Ordering Examples

### EE872-M10HV1GA7

Model: CO<sub>2</sub>  
 CO<sub>2</sub> range: 2000 ppm  
 Probe material: plastic  
 Filter: PTFE  
 Output: 0 - 10 V  
 4 - 20 mA

### EE872-M13HV6PM2F12P1

Model: CO<sub>2</sub> + RH + T + p  
 CO<sub>2</sub> range: 0...5 %  
 Probe material: stainless steel  
 Filter: H<sub>2</sub>O<sub>2</sub>  
 Output: Modbus RTU  
 Baud rate: 9600  
 Parity: even  
 Stop bits: 1

## Ordering Guide EE872S Sensing Module (Spare Part)

		EE872S-
Model	CO <sub>2</sub> (default: heated)	M10
	CO <sub>2</sub> + T + RH + p (default: not heated)	M13
CO <sub>2</sub> range <sup>1)</sup>	0...2000 ppm	HV1
	0...5000 ppm	HV2
	0...1 % (10000 ppm)	HV3
	0...3 % (30000 ppm)	HV5
	0...5 % (50000 ppm)	HV6

1) The CO<sub>2</sub> range of the EE872S must be the same as of the original EE872 probe.

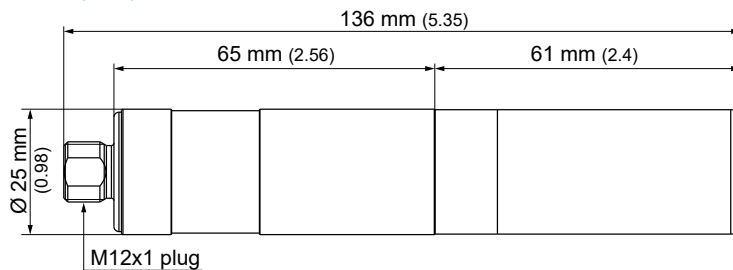
## Ordering Example Sensing Module

### EE872S-M13HV1

Model: CO<sub>2</sub> + T + RH + p  
 CO<sub>2</sub> range: 2000 ppm

## Dimensions

Values in mm (inch)



## Accessories

(for further information, see data sheet "Accessories")

Mounting flange	HA010226
Wall mounting clip Ø 25 mm	HA010227
Radiation shield	HA010510
M12x1 flanged coupling with 50 mm (1.97") stranded wire	HA010705
Modbus configuration adapter	HA011018
E+E Product Configuration Software	PCS10
Connection 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
M12x1 connector, 5 pole, for self assembly	HA010708
Protection cap / calibration adapter	HA010785
Protection cap for the M12 cable socket	HA010781
Protection cap for the M12 plug of EE872	HA010782

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