

# + Datasheet EE872

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



# 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> (50 000 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 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 weather conditions, altitude or temperature.

### 4 in 1

Beside CO<sub>2</sub>, the EE872 measures also relative humidity (RH), temperature (T) and ambient pressure (p). Additionally, the device calculates 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, 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 model, EE872 with RS485 interface with Modbus RTU also provides the values for RH, T, p and Td.

### Configurable and Adjustable

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



Stainless steel probe with PTFE filter



Polycarbonate probe with H<sub>2</sub>O<sub>2</sub> filter

# 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 sensor coating
- T range -40...+60 °C (-40...+140 °F)
- Configurable and adjustable

## Filter Cap

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



## Supply and Output Module

- CO<sub>2</sub> voltage and current output
- Modbus RTU (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 to DIN EN 10204-2.2

# Features

## Protective Sensor Coating

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

## Device Protection During Site Cleaning

If the probe remains on the measuring site during cleaning operations, the optional calibration adapter can be used for protection. For this purpose, both nipples are closed with the rubber caps supplied. In case the probe is removed from the site, it is recommended to apply the protection caps for the M12 cable socket and the EE872 M12 plug.

## E+E Modular Sensor Platform

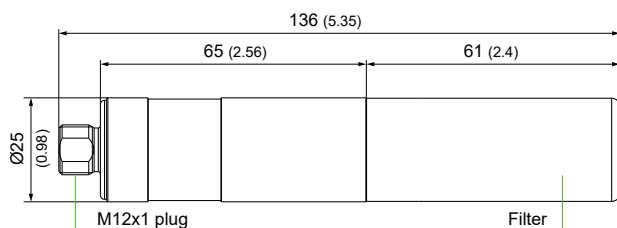
The EE872 is compatible with the Sigma 05 host device of the E+E Modular Sensor Platform. Together they become a versatile, plug-and-play CO<sub>2</sub>/RH/T/p modular sensor with analogue outputs and optional display. Besides EE872, Sigma 05 accommodates also other E+E intelligent sensing probes. See [www.epluse.com/sigma05](http://www.epluse.com/sigma05) for further details.



Sigma 05 with EE872

# Dimensions

Values in mm (inch)



# Technical Data

## Measurands

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

<b>Measurement principle</b>	Dual wavelength non-dispersive infrared technology (NDIR)		
<b>Measuring range</b>	0...2 000 ppm / 5 000 ppm / 10 000 ppm / 3 % / 5 %		
<b>Accuracy</b> @ 25 °C (77 °F) and 1 013 mbar (14.7 psi)	<b>0...2 000 ppm</b> <b>0...5 000 ppm</b> <b>0...10 000 ppm</b> <b>0...3 %</b> <b>0...5 %</b>	$< \pm(50 \text{ ppm} + 2 \% \text{ mv})$ $< \pm(50 \text{ ppm} + 3 \% \text{ mv})$ $< \pm(100 \text{ ppm} + 5 \% \text{ mv})$ $< \pm(1.5 \% \text{ of full scale} + 2 \% \text{ mv})$ $< \pm(1.5 \% \text{ of full scale} + 2 \% \text{ mv})$	mv = measured value
<b>Temperature dependency</b> in the range of -20...+45 °C (-4...+113 °F)	<b>&lt; 10 000 ppm</b> <b>&gt; 10 000 ppm</b>	$\pm(1 + \text{mv} / 1 000) \text{ ppm}/^\circ\text{C}$ $-0.3 \% \text{ of mv}/^\circ\text{C}$	$\pm 0.556 \cdot (1 + \text{mv} / 1 000) \text{ ppm}/^\circ\text{F}$ $-0.167 \% \text{ mv}/^\circ\text{F}$ mv = measured value
<b>Residual pressure dependency<sup>1)</sup></b> in the range of -20...+45 °C (-4...+113 °F), related to 1 013 mbar (14.7 psi)		0.014 % of mv/mbar	0.965 % of mv/psi mv = measured value
<b>Long-term stability, typ.</b> @ 0 ppm CO <sub>2</sub>	20 ppm/year		
<b>Response time t<sub>63</sub>, typ.<sup>2)</sup></b>	90 s		
<b>Measuring interval</b>	15 s (user adjustable from 15 s to 1 h)		

- 1) Pressure dependency of a sensor without pressure correction: 0.14 % of mv/mbar.  
 2) With data averaging algorithm for smooth output signal. Faster response time available on request.

### Relative Humidity (RH)

<b>Measuring range</b>	<b>Heating enabled</b> <b>Heating disabled</b>	0...100 %RH 0...95 %RH (non-condensing)
<b>Accuracy<sup>1)</sup></b> @ 25 °C (77 °F)	<b>20...80 %RH</b> <b>0...95 %RH</b>	$\pm 3 \% \text{ RH}$ $\pm 5 \% \text{ RH}$

- 1) With 24 V DC supply, air flow min. 0.3 m/s, probe horizontal or with sensing head downwards, excl. hysteresis

### Pressure (p)

<b>Measuring range</b>	700...1 100 mbar (10.15...15.95 psi)
<b>Accuracy, typ.</b> @ 25 °C (77 °F)	$\pm 2 \text{ mbar} (\pm 0.03 \text{ psi})$
<b>Temperature dependency</b> in the range of 0...60 °C (32...140 °F)	$\pm 0.016 \text{ mbar/K} (0.00013 \text{ psi}/^\circ\text{F})$

### Temperature (T)

<b>Measuring range</b>	-40...+60 °C (-40...+140 °F)
<b>Accuracy, typ.<sup>1)</sup></b> in the range of 5...60 °C (41...140 °F)	$\pm 0.5 \text{ }^\circ\text{C} (\pm 0.9 \text{ }^\circ\text{F})$

- 1) With 24 V DC supply, air flow min. 0.3 m/s, probe horizontal or with sensing head downwards, excl. hysteresis.

### Calculated parameters

Calculated parameters		Unit
<b>Dew point temperature</b>	Td	°C
		°F
		°K

# Technical Data

## Outputs

### Analogue




<b>CO<sub>2</sub></b>	0 - 5 V / 0 - 10 V 0 - 20 mA / 4 - 20 mA (3-wire)	0 < I <sub>L</sub> < 1 mA R <sub>L</sub> ≤ 500 Ω	I <sub>L</sub> = load current R <sub>L</sub> = load resistance
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### Digital

<b>Digital interface</b>	RS485 (EE872 = 1/10 unit load)
<b>Protocol</b> <b>Factory settings<sup>1)</sup></b> <b>Supported Baud rates</b> <b>Measured data types</b>	Modbus RTU Baud rate acc. to order code, parity even, 1 stop bit, Modbus address 237 9600, 19200 and 38400 FLOAT32 and INT16

1) 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).

## General

<b>Power supply</b> class III  USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	
<b>Current output</b> <b>RS485 interface and voltage output</b>	15 - 35 V DC 12 - 30 V DC
<b>Current consumption</b> @ 24 V DC/AC and 15 s measurement interval <b>20 mA current output</b> <b>RS485 interface and voltage output</b>	37 mA 17 mA
<b>Peak current, max.</b>	200 mA
<b>Electrical connection</b>	M12x1 5 poles, stainless steel 1.4404
<b>Filter</b>	PTFE (Polytetrafluoroethylene), UL94 V-0 approved
<b>Storage conditions</b>	-40...+60 °C (-40...+140 °F) 700...1 100 mbar (10.15...15.95 psi) 0...95 %RH, non-condensing
<b>Enclosure material</b>	Stainless steel 1.4404 PET (Polyethyleneterephthalate), UL94HB approved
<b>Protection rating</b> probe body	IP65
<b>Electromagnetic compatibility</b>	EN 61326-1      EN 61326-2-3      Industrial environment FCC Part15 Class A      ICES-003 Class A
<b>Conformity</b>	 

# Ordering Guide

## Probe

	Feature	Description	Code		
Hardware Configuration			EE872-		
	Model	CO <sub>2</sub> (default: heated)	M10		
		CO <sub>2</sub> + T + RH + p (default: not heated)		M13	
	CO <sub>2</sub> measuring range	0...2000 ppm		HV1	
		0...5000 ppm		HV2	
		0...10000 ppm		HV3	
		0...3 % (30000 ppm)		HV5	
		0...5 % (50000 ppm)		HV6	
Probe material	PET (Polyethyleneterephthalate)		No code		
	Stainless steel		PM2		
Filter	PTFE (Polytetrafluoroethylene)		No code		
	Catalytic for H <sub>2</sub> O <sub>2</sub> sterilization		F12		
Software Setup	Output	Output 1: 0 - 10 V      Output 2: 4 - 20 mA	GA7		
		Output 1: 0 - 5 V      Output 2: 0 - 20 mA	GA11		
		Modbus RTU	P1	P1	
	Baud rate	9600	No code		
		19200	BD6		
		38400	BD7		

## Sensing Module (Spare Part)

	Feature	Description	Code		
Hardware Configuration			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...10000 ppm		HV3	
		0...3 % (30000 ppm)		HV5	
0...5 % (50000 ppm)			HV6		

1) The sensing module's CO<sub>2</sub> range must match that of the originally ordered EE872 probe.

# Order Examples

## Sensor EE872-M10HV1GA7

Feature	Code	Description
Model	M10	CO <sub>2</sub>
CO <sub>2</sub> range	HV1	0...2000 ppm
Probe material	No code	PET (Polyethyleneterephthalate)
Filter	No code	PTFE (Polytetrafluoroethylene)
Output signal	GA7	Output 1: 0 - 10 V Output 2: 4 - 20 mA

## Sensor EE872-M13HV6PM2F12P1

Feature	Code	Beschreibung
Modell	M13	CO <sub>2</sub> + T + RH + p
CO <sub>2</sub> range	HV6	0...5 %
Probe material	PM2	Stainless steel
Filter	F12	Catalytic for H <sub>2</sub> O <sub>2</sub> sterilization
Protocol	P1	Modbus RTU
Baud rate	No code	9600
Parity	No code	Even
Stop bit	No code	1

## Sensing Module EE872S-M10HV1

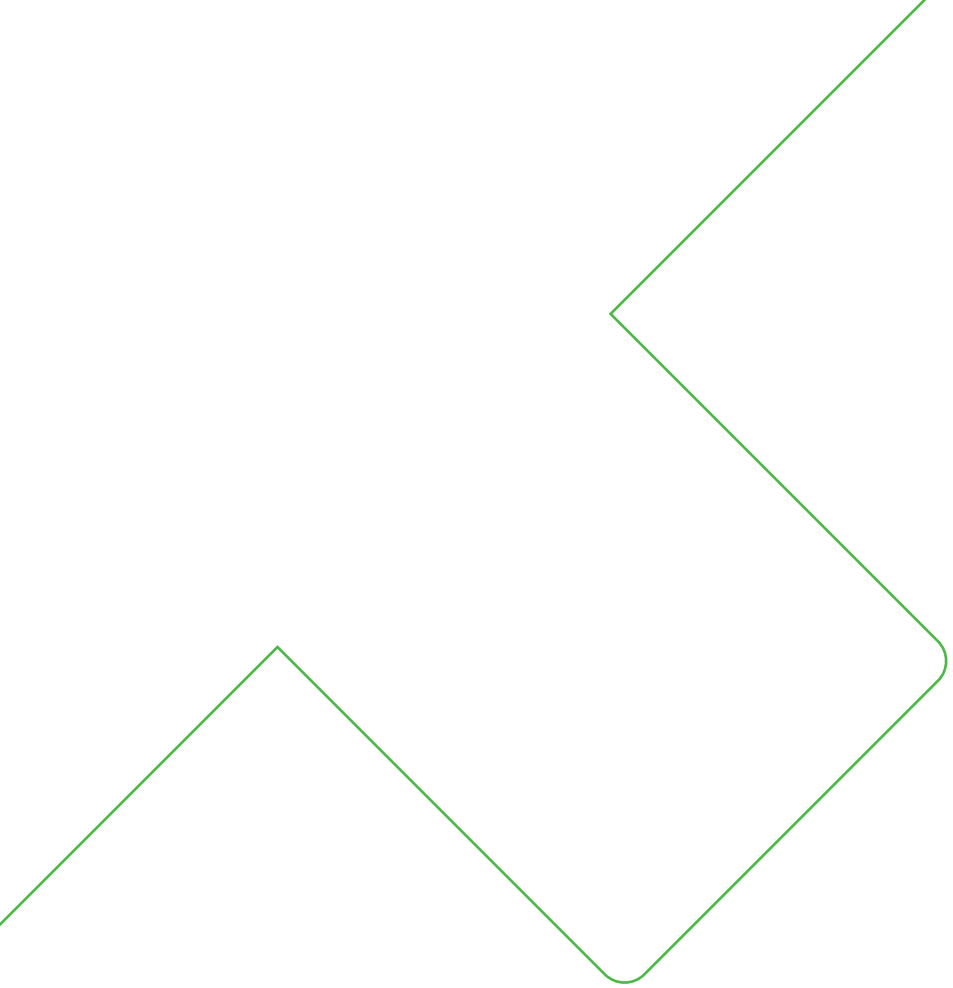
Feature	Code	Beschreibung
Model	M10	CO <sub>2</sub> + T + RH + p
CO <sub>2</sub> range	HV1	0...2000 ppm



# Accessories

For further information see datasheet [Accessories](#).

Description	Code
Mounting flange stainless steel	HA010226
Wall mounting clip Ø25 mm	HA010227
Radiation shield	HA010510
M12x1 flanged coupling with 50 mm (1.97") stranded wires	HA010705
Modbus configuration adapter	HA011018
E+E Product Configuration Software (Free download from <a href="http://www.epluse.com/pcs10">www.epluse.com/pcs10</a> )	PCS10
Connection cable M12x1 socket 5 poles / free ends	1.5 m (4.9 ft) HA010819 5 m (16.4 ft) HA010820 10 m (32.8 ft) HA010821
Y-style splitter M12 - M12	HA030204
M12x1 connector, 5 poles, for self assembly	HA010708
Protection cap / calibration adapter	HA010785
Protection cap for M12 socket	HA010781
Protection cap for M12 plug	HA010782



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