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Datasheet EE872

Modular Probe for CO_2, Humidity, Temperature and Ambient Pressure

Modbus

www.epluse.com

EE872

Modular Probe for CO_2, Humidity, Temperature and Ambient Pressure

The EE872 probe, with a CO_2 measurement range of up to 5 % (50 000 ppm), is designed for use in harsh and demanding environments such as agricultural facilities, lifestock barns, hatchers, incubators, greenhouses and outdoor areas.

Outstanding Accuracy

A multi-point CO_2 and temperature adjustment procedure ensures excellent CO_2 measurement accuracy across the entire temperature working range of -40…+60 °C (-40…+140 °F), making the EE872 ideal for agricultural and outdoor applications.

Long-Term Stability

The EE872 utilises the E+E dual-wavelength NDIR CO_2 sensor, which automatically compensates for ageing effects and offers exeptional resistance to contamination. The relative humidity sensing element, featuring E+E's proprietary coating, ensures reliable performance even in aggressive or corrosive environments.

Pressure and Temperature Compensation

Active compensation with on-board sensors ensures highly accurate CO_2 measurements, regardless of weather conditions, altitude or temperature variations.

4-in-1

In addition to CO_2, the EE872 also measures relative humidity (RH), temperature (T) and ambient pressure (p). The probe further calculates the dew point temperature (Td), providing a comprehensive set of environmental parameters in a single probe.

Reliable in Harsh and Condensing Environment

The heated version of the EE872 is designed for operation in areas with high humidity and condensation. Its robust IP65 enclosure and replaceable filter provide excellent protection in polluted or dust-laden environments. With a special filter, the EE872 is also suitable for applications requiring periodic H_2O_2 sterilisation.

Analogue Output or RS485 Interface

The CO_2 measured data is simultaneously available as voltage and current signals at the analogue outputs. Depending on the model, the EE872 with RS485 interface and Modbus RTU additionally supplies values for RH, T, p and Td.

Configurable and Adjustable

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

Stainless steel probe with PTFE-filter

PET (Polyethyleneterephthalate) probe with H_2O_2 filter

PET (Polyethylenterephtalat) probe with PTFE (Polytetrafluoroethylene) membrane filter cap

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_2O_2 sterilisation
- PTFE membrane
- Replaceable

Supply and Output Module

- CO_2 voltage and current output
- Modbus RTU (CO_2, 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_2/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 for further details.

Sigma 05 with EE872

Accredited Traceable Calibration Certificate

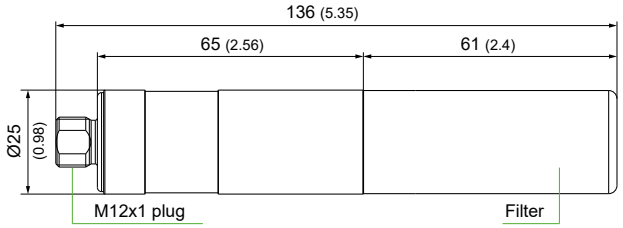
Internationally recognised certificates for the calibration of measuring instruments from accredited laboratories document the traceability of the measurements to the International System of Units (SI). The E+E Elektronik calibration laboratory offers two levels of traceable calibrations.

- As a Designated Institute (DI) of the Republic of Austria, the E+E calibration laboratory maintains Austria's national measurement standards for humidity, dew point temperature, air velocity and CO_2. This authorises the E+E calibration laboratory to issue calibration certificates at the level of a National Metrological Institute (NMI).
- The E+E calibration laboratory is accredited by Akkreditierung Austria in accordance with DIN EN ISO/IEC 17025 with the identification number 0608. This allows the laboratory to issue ISO 17025 certificates for the measurands humidity, temperature, dew point temperature, air velocity, flow, pressure and CO_2.

Visit www.eplusecal.com for detailed information on calibration and to enquire a certificate of accredited traceable calibration for the EE872 from the Designated Institute.

Dimensions

Values in mm (inch)



Technical Data

Measurands

CO_2

Measurement principle	Dual wavelength non-dispersive infrared technology (NDIR)		
Measuring range	0...2 000 ppm / 5 000 ppm / 10 000 ppm / 3 % / 5 %		
Accuracy[1)] @ 25 °C (77 °F) and 1 013 mbar (14.7 psi) **0...2 000 ppm** **0...5 000 ppm** **0...10 000 ppm** **0...3 %** **0...5 %**	 <±(40 ppm + 1.8 % of mv) <±(40 ppm + 2.2 % of mv) <±(70 ppm + 2.5 % of mv) <±(450 ppm + 1.8 % of mv) <±(750 ppm + 1.8 % of mv)		 mv = measured value
Factory calibration uncertainty[1)] @ 25 °C (73 °F) **0...2 000 / 5 000 / 10 000 ppm** **0...3 % / 0...5 %**	 ±2.6 % of mv, min ±20 ppm ±0.38 % of mv, min ±60 ppm		 mv = measured value
Temperature dependency in the range of -20...+45 °C (-4...+113 °F) **0...2 000 / 5 000 / 10 000 ppm** **0...3 % / 0...5 %**	 ±(1 + mv / 1 000) ppm/°C -0.3 % of mv/°C	 ±0.556*(1 + mv / 1 000) ppm/°F -0.167 % mv/°F	 mv = measured value
Residual pressure dependency[2)] 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
Long-term stability, typ. @ 0 ppm CO_2	±20 ppm/year		
Response time t_{63}, typ.[3)]	90 s[4)]		
Measuring interval	15 s (user adjustable from 15 s to 1 h)		

1) Defined with a coverage factor k=2, corresponding to a confidence level of 95 %.
2) Pressure dependency of a sensor without pressure correction: 0.14 % of mv/mbar.
3) With data averaging algorithm for smooth output signal. Faster response time available on request.
4) With PTFE standard filter cap.

Technical Data

Measurands

Relative Humidity (RH)

Measuring range	
Heating enabled	0...100 %RH
Heating disabled	0…95 %RH (non-condensing)
Accuracy[1)] @ 25 °C (77 °F)	
20...80 %RH	±3 %RH
0...95 %RH	±5 %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)

Measuring range	700…1 100 mbar (10.15...15.95 psi)
Accuracy, typ. @ 25 °C (77 °F)	±2 mbar (±0.03 psi)
Temperature dependency in the range of 0...60 °C (32...140 °F)	±0.016 mbar/K (0.00013 psi/°F)

Temperature (T)

Measuring range	-40...+60 °C (-40...+140 °F)
Accuracy, typ.[1)] in the range of 5...60 °C (41...140 °F)	±0.5 °C (±0.9 °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		Unit
Dew point temperature	Td	°C
		°F
		°K

Outputs

Analogue

CO_2	0 – 5 V / 0 – 10 V	0 < I_L < 1 mA	I_L = load current
	0 – 20 mA / 4 – 20 mA (3-wire)	R_L ≤ 500 Ω	R_L = load resistance

Digital

Digital interface	RS485 (EE872 = 1/10 unit load)
Protocol	Modbus RTU
Factory settings[1)]	Baud rate acc. to order code, parity even, 1 stop bit, Modbus address 237
Supported Baud rates	9 600, 19 200 and 38 400
Measured data types	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.

Technical Data

General

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

Ordering Guide

Probe

	Feature	Description		Code	
				EE872-	
Hardware Configuration	Model	CO_2 (default: heated)		M10	
		CO_2 + T + RH + p (default: not heated)			M13
	CO_2 measuring range	0...2 000 ppm		HV1	
		0...5 000 ppm		HV2	
		0...10 000 ppm		HV3	
		0...3 % (30 000 ppm)		HV5	
		0...5 % (50 000 ppm)		HV6	
	Probe material	PET (Polyethyleneterephtalate)		No code	
		Stainless steel		PM2	
	Filter	PTFE (Polytetrafluoroethylene)		No code	
		Catalytic for H_2O_2 sterilisation		F12	
		PTFE (Polytetrafluoroethylene) membrane		F21	
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	9 600		No code	
		19 200		BD6	
		38 400		BD7	
	Accredited Traceable Calibration Certificate in accordance with DIN EN ISO/IEC 17025			see www.eplusecal.com	

Sensing Module (Spare Part)

	Feature	Description	Code
			EE872S-
Hardware Configuration	Model	CO_2 (default: heated)	M10
		CO_2 + T + RH + p (default: not heated)	M13
	CO_2 range[1)]	0...2 000 ppm	HV1
		0...5 000 ppm	HV2
		0...10 000 ppm	HV3
		0...3 % (30 000 ppm)	HV5
		0...5 % (50 000 ppm)	HV6

1) The sensing module's CO_2 range must match that of the originally ordered EE872 probe.

Order Examples

Sensor EE872-M10HV1GA7

Feature	Code	Description
Model	**M10**	CO_2
CO_2 range	**HV1**	0...2 000 ppm
Probe material	**No code**	PET (Polyethyleneterephtalate)
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_2 + T + RH + p
CO_2 range	**HV6**	0...5 %
Probe material	**PM2**	Stainless steel
Filter	**F12**	Catalytic for H_2O_2 sterilisation
Protocol	**P1**	Modbus RTU
Baud rate	**No code**	9 600
Parity	**No code**	Even
Stop bit	**No code**	1

Sensing Module EE872S-M10HV1

Feature	Code	Beschreibung
Model	**M10**	CO_2 + T + RH + p
CO_2 range	**HV1**	0...2 000 ppm

Accessories

For further information see datasheet Accessories.

Description	Code
E+E Product Configuration Software (Free download from www.epluse.com/pcs10)	**PCS10**
Stainless steel mounting flange, Ø25 mm (0.98")	**HA010226**
Wall mounting clip, Ø25 mm (0.98")	**HA010227**
Radiation shield	**HA010510**
Flange socket, M12x1 ↔ 50 mm (1.97") stranded wire, 5 poles, M16x1 screw-in thread	**HA010705**
Modbus configuration adapter, M12 4 poles ↔ USB	**HA011018**
Sensor connection cable, shielded, 5 poles, M12x1 socket ↔ wire ferrules **1.5 m (4.9 ft)** **5 m (16.4 ft)** **10 m (32.8 ft)**	 **HA010819** **HA010820** **HA010821**
Y-style splitter, M12x1, 1 plug ↔ 2 sockets, 5 poles	**HA030204**
Connector, M12x1 socket, 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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