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# + Datasheet CDS201

Room Sensor for CO<sub>2</sub>, Temperature and  
Relative Humidity



# CDS201

## Room Sensor for CO<sub>2</sub>, Temperature and Relative Humidity

The CDS201 is optimized for demand controlled ventilation and building automation in residential and commercial applications.

### Versatile

The CDS201 combines CO<sub>2</sub>, temperature (T) and relative humidity (RH) measurement in one device with modern design and state-of-the-art technology.

### Outstanding Measurement Performance

The CDS201 incorporates the E+E dual wavelength NDIR CO<sub>2</sub> sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long-term stability. A multiple point CO<sub>2</sub> and T factory adjustment procedure leads to excellent CO<sub>2</sub> measurement accuracy over the entire T working range.

### Outputs and Digital Interface

CDS201 features analogue outputs or RS485 interface. Beside CO<sub>2</sub>, RH and T, the dewpoint temperature Td is also available via Modbus RTU or BACnet MS/TP.

### Functional Design, Cost-saving Installation

The elegant enclosure is available in two sizes according to regional standards and features an optional display. The back cover contains just the push-in spring terminals, it can be mounted and wired without the front cover containing the electronics. Thus, the active part of the device is not exposed to construction site pollution and can be simply snapped onto the back cover right before commissioning. Besides, the active part can be replaced without tools within seconds.

### Configuration

The digital version with RS485 interface can be set up and configured via PC with the free PCS10 Product Configuration Software and an optional configuration adapter.



CDS201-M11 with display in US format



CDS201 without display in EU format

# Features

## Measurement performance

- High CO<sub>2</sub>/RH/T accuracy
- Excellent long term stability
- State-of-the-art E+E sensing elements
  - CO<sub>2</sub>: NDIR dual wavelength
  - RH/T:
    - Protected by E+E proprietary coating
    - Patented sensor technology

## Enclosure and connection

- Innovative design avoids false air ingress
- Time saving installation and wiring
  - Snap-on without tools
  - Push-in spring terminals
  - All electronics inside the front cover
- Smooth cover surface
  - Dust repellent
  - Easy cleaning
- EU and US format
- UL94HB approved enclosure material



## Outputs

- Three analogue outputs
  - 0 – 10 V
  - 4 – 20 mA
- RS485 interface with
  - Modbus RTU
  - BACnet MS/TP
- Large graphic display

## Inspection certificate

Available via [E+E certificate service](#)

# Features

## Protective Sensor Coating

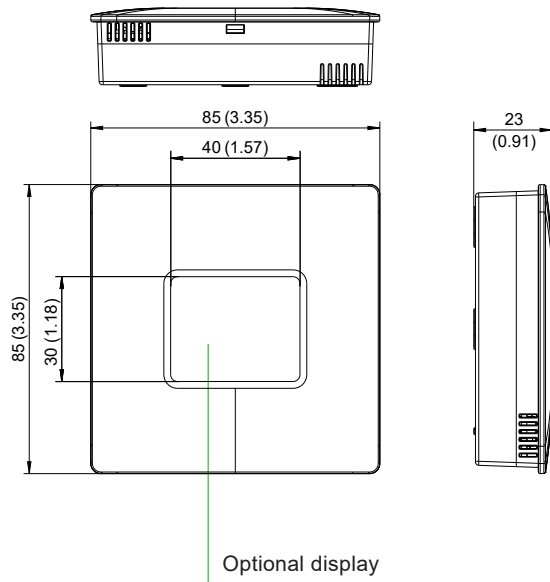
The E+E proprietary sensor coating is a protective layer applied to the active surface of the RH/T sensing element. The coating substantially extends sensor lifetime and ensures optimal measurement performance in corrosive environment (salts, off-shore applications). Additionally, it improves the sensors' long term stability in dusty, dirty or oily applications by preventing stray impedance caused by deposits on the active sensor surface.

# Dimensions

Values in mm (inch)

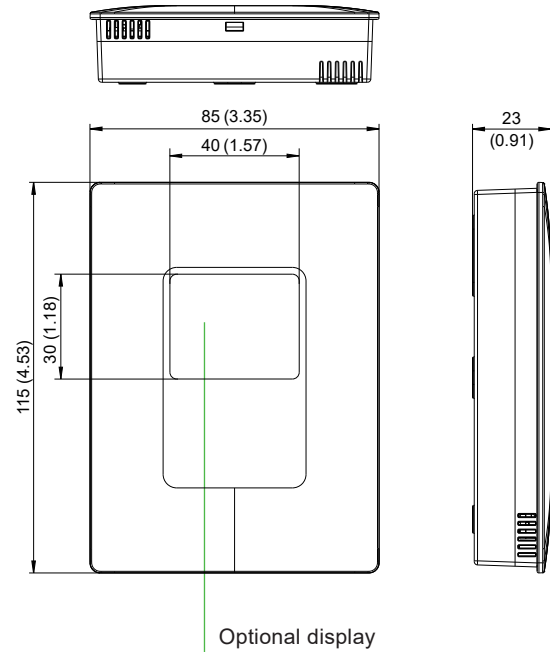
## Enclosure

EU format



## Enclosure

US format



# Technical Data

## Measurands

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

<b>Measurement principle</b>	Dual wavelength non-dispersive infrared technology (NDIR)
<b>Measuring range</b>	0...2000/5000 ppm
<b>Accuracy<sup>1)</sup></b>  <div style="display: flex; justify-content: space-between;"> <div style="text-align: right;"> <b>0...2000 ppm</b>  <b>0...5000 ppm</b> </div> <div> <math>&lt; \pm(60 \text{ ppm} + 2 \% \text{ of measured value})</math>  <math>&lt; \pm(60 \text{ ppm} + 3 \% \text{ of measured value})</math> </div> </div>	
<b>Temperature dependency, typ.</b>	$\pm(1 + \text{CO}_2 \text{ concentration [ppm]} / 1000) \text{ ppm}/^\circ\text{C}$ $\pm(1 + \text{CO}_2 \text{ concentration [ppm]} / 1800) \text{ ppm}/^\circ\text{F}$
<b>Residual pressure dependency</b> in the range of -20...45 °C (-4...113 °F), related to 1013 mbar	0.14 % of measured value/mbar
<b>Long-term stability</b> under normal operating conditions in a typical building automation environment	<20 ppm/year
<b>Response time t<sub>63</sub>, typ.</b>	<180 s

1) @ 20 °C (68 °F), with supply voltage 24 V DC, 0.2 m/s (39.4 ft/min) circulation and load resistor 250 Ω for version with current output.

### Relative Humidity (RH)

<b>Measuring range</b>	0...100 %RH, non-condensing
<b>Accuracy<sup>1)</sup></b> incl. hysteresis, non-linearity and repeatability  <div style="display: flex; justify-content: space-between;"> <div style="text-align: right;"> <b>0...80 %RH</b>  <b>&gt;80...100 %RH</b> </div> <div> <math>\pm(2.8 + 0.003 * \text{mv}) \%RH</math>  <math>\pm 4.1 \%RH</math> </div> <div style="text-align: right;">                     mv = measured value                 </div> </div>	
<b>Temperature dependency of electronics, typ.</b>	0.008 % RH/°C (0.004 %RH/°F)
<b>Factory calibration uncertainty<sup>2)</sup></b> @ 23 °C (73 °F)  <div style="display: flex; justify-content: space-between;"> <div style="text-align: right;"> <b>0...90 %RH</b>  <b>90...100 %RH</b> </div> <div> <math>\pm(0.7 + 0.003 * \text{mv}) \%RH</math>  <math>\pm 1 \%RH</math> </div> <div style="text-align: right;">                     mv = measured value                 </div> </div>	

1) Defined against E+E calibration reference at 23 °C (73 °F). With supply voltage 24 V DC, 0.2 m/s (39.4 ft/min) medium flow and load resistor 250 Ω for version with current output.

2) Defined with an enhancement factor k=2, corresponding to a confidence level of 95 %.

### Temperature (T)

<b>Measuring range</b>	-30...+60 °C (-22...+140 °F)
<b>Accuracy<sup>1)</sup></b>  <div style="display: flex; justify-content: space-between;"> <div style="text-align: right;"> <b>0- 10 V, RS485</b>  <b>4 - 20 mA</b> </div> <div> <math>\pm 0.35 \text{ }^\circ\text{C} (\pm 0.63 \text{ }^\circ\text{F})</math>  <math>\pm 0.7 \text{ }^\circ\text{C} (\pm 1.26 \text{ }^\circ\text{F})</math> </div> </div>	
<b>Temperature dependency of electronics, typ.</b>	0.006 K/K
<b>Factory calibration uncertainty<sup>2)</sup></b> @ 23 °C (73 °F)	$\pm 0.1 \text{ }^\circ\text{C} (\pm 0.18 \text{ }^\circ\text{F})$

1) Defined @ 23 °C (73 °F) against E+E calibration reference. With supply voltage 24 V DC, 0.2 m/s (39.4 ft/min) medium flow and load resistor 250 Ω for version with current output.

2) Defined with an enhancement factor k=2, corresponding to a confidence level of 95 %.

### Calculated Physical Quantity

		from	up to	unit
<b>Dew point temperature</b>	Td	-30 (-22)	60 (140)	°C (°F)

# Technical Data

## Outputs

### Analogue




CO <sub>2</sub> : 0...2 000 / 5 000 ppm T: acc. to ordering guide RH: 0...100 %	0 - 10 V 4 - 20 mA (3-wire)	-1 mA < 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

Digital interface	RS485 (CDS201 = 1 unit load)
Protocol Factory settings Supported Baud rates <sup>1)</sup> Measured data type	Modbus RTU Baud rate according to ordering guide, 8 data bits, parity even, 1 stop bit, Modbus address 45 9 600, 19 200 and 38 400 FLOAT32 and INT16
Protocol Factory settings Supported Baud rates <sup>1)</sup>	BACnet MS/TP BACnet address 45 9 600, 19 200, 38 400, 57 600, 76 800 and 115 200

1) Ex works: see ordering guide.

## General

Power supply class III  USA & Canada: Class 2 supply necessary, max. voltage 30 V DC	15 - 35 V DC or 24 V AC ±20 %	
Current consumption, typ.	@ 24 V DC	@ 24 V AC
	0 - 10 V	6 mA      14 mA <sub>rms</sub>
	4 - 20 mA	Acc. to output current
	RS485	5 mA      12 mA <sub>rms</sub>
Electrical connection	Push-in spring terminals max. 1.5 mm <sup>2</sup> (AWG 16)	
Display	1.8" LCD, dot-matrix, 2 or 3 lines, visible area 38 x 31 mm (1.5" x 1.2")	
Humidity range	Operation	0...100 %RH non-condensing
	Storage	0...95 %RH non-condensing
Temperature range, operation and storage	without display	-30...+60 °C (-22...+140 °F)
	with display	-20...+60 °C (-4...+140 °F)
Enclosure	Material	PC (Polycarbonate), RAL 9003 (signal white), UL94 HB approved
	Protection rating	IP30
Electromagnetic compatibility	EN 61326-1      EN 61326-2-3      Industrial environment FCC Part15 Class B      ICES-003 Class B	
Shock and vibration	Tested according to EN 60068-2-64 and EN 60068-2-27	
Conformity	 	
Configuration <sup>1)</sup>	PCS10 Product Configuration Software ( <a href="#">free download</a> ) and optional configuration adapter	

1) With digital versions only.

# Ordering Guide

Feature	Description	Code				
Hardware Configuration		<b>CDS201-</b>				
	Model	CO <sub>2</sub> + T	<b>M11</b>			
		CO <sub>2</sub> + T + RH		<b>M12</b>		
	CO <sub>2</sub> measuring range	0...2000 ppm	<b>HV1</b>			
		0...5000 ppm	<b>HV2</b>			
	Output	0 - 10 V	<b>A3</b>		<b>A3</b>	
		4 - 20 mA (3-wire)	<b>A6</b>		<b>A6</b>	
		RS485		<b>J3</b>		<b>J3</b>
Display	Without display	<b>No code</b>				
	With display	<b>D1</b>				
Design	EU format	<b>No code</b>				
	US format	<b>RG2</b>				
Setup Analogue	Output 1 measurand	CO <sub>2</sub> scaling acc. to selected "CO <sub>2</sub> measuring range" as above	<b>No code</b>		<b>No code</b>	
	Output 2 measurand	Temperature T [°C]	<b>No code</b>		<b>No code</b>	
		Temperature T [°F]	<b>MB2</b>		<b>MB2</b>	
	Output 2 scaling low	0	<b>No code</b>		<b>No code</b>	
		Value <sup>1)</sup>	<b>SBLValue</b>		<b>SBLValue</b>	
	Output 2 scaling high	50	<b>No code</b>		<b>No code</b>	
		Value <sup>1)</sup>	<b>SBHValue</b>		<b>SBHValue</b>	
	Output 3 measurand	Relative humidity [%]			<b>No code</b>	
	Output 3 scaling low	0			<b>No code</b>	
		Value			<b>SCLValue</b>	
Output 3 scaling high	100			<b>No code</b>		
	Value			<b>SCHValue</b>		
Setup Digital Interface	Protocol	Modbus RTU <sup>2)</sup>	<b>P1</b>		<b>P1</b>	
		BACnet MS/TP <sup>3)</sup>	<b>P3</b>		<b>P3</b>	
	Baud rate	9600 (common for Modbus)	<b>BD5</b>		<b>BD5</b>	
		19200	<b>BD6</b>		<b>BD6</b>	
		38400 (common for BACnet)	<b>BD7</b>		<b>BD7</b>	
		57600 (for BACnet MS/TP only)	<b>BD8</b>		<b>BD8</b>	
		76800 (for BACnet MS/TP only)	<b>BD9</b>		<b>BD9</b>	
		115200 (for BACnet MS/TP only)	<b>BD10</b>		<b>BD10</b>	
	Units	Metric (SI)	<b>No code</b>		<b>No code</b>	
		Non-metric (US/GB)	<b>U2</b>		<b>U2</b>	

1) -35 °C (-31 °F) < T scaling low < 20 °C (68 °F). 25 °C (77 °F) < T scaling high < 70 °C (158 °F). T scaling high - T scaling low > 20 °C (36 °F).

2) Factory setting: Even parity, 1 stop bit. Modbus Map see User Manual at [www.epluse.com/cds201](http://www.epluse.com/cds201).

3) Factory setting: No parity, 1 stop bit. Product Implementation Conformance Statement (PICS) available at [www.epluse.com/cds201](http://www.epluse.com/cds201).

Regardless of the model (M11 or M12), RH and Td are also always activated and are available on the BACnet interface.

# Order Examples

## CDS201-M12HV1A6MB2SBL23SBH140

Feature	Code	Description
Model	M12	CO <sub>2</sub> + T + RH
CO <sub>2</sub> measuring range	HV1	0...2000 ppm
Output	A6	4 - 20 mA (3-wire)
Display	No code	Without display
Design	No code	EU format
Output 1 measurand	No code	CO <sub>2</sub> scaling according to selected "CO <sub>2</sub> measuring range", 0...2000 ppm in this case
Output 2 measurand	MB2	T [°F]
Output 2 scaling low	SBL23	23
Output 2 scaling high	SBH140	140
Output 3 measurand	No code	Relative humidity [%]
Output 3 scaling low	No code	0
Output 3 scaling high	No code	100

## CDS201-M12HV2J3D1RG2P3BD7U2

Feature	Code	Description
Model	M12	CO <sub>2</sub> + T + RH
CO <sub>2</sub> measuring range	HV2	0...5000 ppm
Output	J3	RS485
Display	D1	With display
Design	RG2	US format
Protocol	P3	BACnet MS/TP
Baud rate	BD7	38400
Units	U2	Non-metric (US/GB)

# Accessories

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

Description	Code
E+E Product Configuration Software (Free download from <a href="http://www.epluse.com/pcs10">www.epluse.com/pcs10</a> )	PCS10
USB Configuration Adapter for CDS201 digital	HA011066





Company Headquarters &  
Production Site

**E+E Elektronik Ges.m.b.H.**  
Langwiesen 7  
4209 Engerwitzdorf | Austria  
T +43 7235 605-0  
F +43 7235 605-8  
info@epluse.com  
www.epluse.com

Subsidiaries

**E+E Sensor Technology (Shanghai) Co., Ltd.**  
T +86 21 6117 6129  
info@epluse.cn

**E+E Elektronik France SARL**  
T +33 4 74 72 35 82  
info.fr@epluse.com

**E+E Elektronik Deutschland GmbH**  
T +49 6171 69411-0  
info.de@epluse.com

**E+E Elektronik India Private Limited**  
T +91 990 440 5400  
info.in@epluse.com

**E+E Elektronik Italia S.R.L.**  
T +39 02 2707 86 36  
info.it@epluse.com

**E+E Elektronik Korea Ltd.**  
T +82 31 732 6050  
info.kr@epluse.com

**E+E Elektronik Corporation**  
T +1 847 490 0520  
info.us@epluse.com

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