CD2

Veris Industries
Stratford Park 5
Telford TF3 3BL
United Kingdom

⚠ WARNING

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions can result in death, serious injury or equipment damage.

This product is intended for use in HVAC and building environmental control applications.
It is not intended for direct medical monitoring of patients.
It is not intended for life-safety applications.
Read and understand these instructions before installing this product.
The installer is responsible for all applicable codes.
If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired. No responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

CD2 Analog Series

Duct Mount Air Quality Sensors

Product Overview

CD2 Series Air Quality Sensors are duct mount all-in-one sensors for monitoring air quality. The device combines CO_2, temperature, humidity, VOC and particulate matter (PM) sensing in a single unit to ensure a building's optimum air quality and energy efficiency.

Each device is an active sensor that converts a measurement into 4-20 mA, 0 to 5 Vdc or 0 to 10 Vdc output.

Different models are available based on application requirements for lower-cost installations. CD2 is available with an LCD display option on select models. See the Product Identification section below for details.

Product Identification

Model	LCD	2% RH Sensor	Temperature	NDIR CO2	VOC	PM
CD2LAXAVP	X		Temp Transmitter	X	X	X
CD2LAXAVX	X		Temp Transmitter	X	X	
CD2LAXAXP	X		Temp Transmitter			X
CD2XA2AVX		X	Temp Transmitter	X	X	
CD2XA2BCX		X	100 PT RTD	X		
CD2XA2CCX		X	1000 PT RTD	X		
CD2XA2DCX		X	10K T2	X		
CD2XA2HCX		X	10K T3	X		
CD2XA2KCX		X	10K Curve G/11K	X		
CD2XA2MCX		X	20K NTC	X		
CD2XA2NCX		X	1.8K	X		
CD2XAXAVX			Temp Transmitter	X	X	
CD2XAXBCX			100 PT RTD	X		
CD2XAXCCX			1000 PT RTD	X		
CD2XAXDCX			10K T2	X		
CD2XAXHCX			10K T3	X		
CD2XAXKCX			10K Curve G/11K	X		
CD2XAXMCX			20K NTC	X		
CD2XAXNCX			1.8K	X		

Note: Replaceable RH and temperature modules available to be ordered separately per table below.

Replaceable RH Elements & Temperature and Humidity Calibration Modules

Model	Description	Temp. Calibration	RH Calibration
HS1N	Replaceable RH sensor, 1% with NIST certificate	N/A	2-point calibration
HS2N*	Replaceable RH sensor, 2% with NIST certificate	N/A	2-point calibration
HS2X	Replaceable RH sensor, 2%	N/A	2-point calibration
TS2**	Replaceable temperature module with 2-point calibration certificate	2-point calibration	N/A
THS2**	Replaceable temperature and humidity module with 2-point calibration certificate	2-point calibration	2-point calibration

**Not for use with HO2 Series outdoor humidity sensors. **For use on temperature transmitter models only.*
Note: For instructions on installing replaceable elements, see Z208535-0x, Replacement Humidity and Temperature Sensors Installation Guide.

Specifications

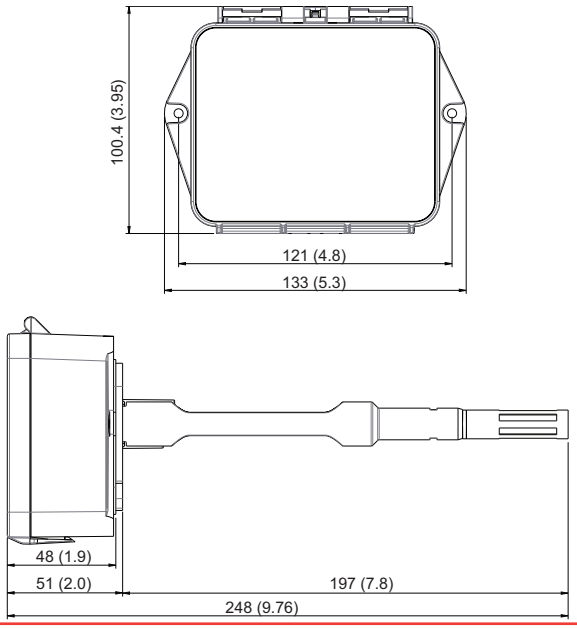
OPERATING / STORAGE ENVIRONMENT		
Operating Temp. Range	0 to 50 °C (32 to 122 °F)	
Operating Humidity Range	0 to 95% RH (non-condensing)	
Storage Temp. Range	-25 to 70 °C (-13 to 158 °F)	
Storage Humidity Range	0 to 95% RH (non-condensing)	
Power Supply	3-wire volt mode: 20 to 30 Vdc, 24 Vac, 50 to 60 Hz	
Output	Selectable 4 to 20 mA, 0 to 5 Vdc, 0 to 10 Vdc	
Power Consumption	See Maximum Power Consumption table, page 8	
Tube Length	200 mm	
Medium	Neutral gas, air	
Housing Material	Polycarbonate; flammability rating UL 94 V0	
Mouting Location	For indoor use only. Not suitable for wet locations.	
IP Rating	IP65	
Protection Class	Class III	
CO_2 SENSOR		
Sensor Type	Non-dispersive infrared (NDIR), diffusion sampling	
Output Range	0 to 2000/5000 ppm (selectable)	
Accuracy	±30 ppm ±3% of measured value	
Repeatability	±20 ppm ±1% of measured value	
Response Time	<60 seconds for 90% step change	
Calibration	Field calibration support	
VOC SENSOR OPTION		
Sensor Type	Solid state	
Output Range	0 to 100% AQI for VOC	
Accuracy	±15% sensor-to-sensor variation	
	Level	**Ventilation Recommendation**
AQI Table	>61%	Greatly increased
	20 to 61%	Significantly increased
	10 to 20%	Slightly increased
	5 to 10%	Average
	0 to 5%	Target value
RH SENSOR OPTION		
Sensor Type	Solid state capacitive, replaceable	
Accuracy*	±2% from 10 to 80% RH @ 25 °C (77 °F) ±1%, ±2% replaceable models	
Hysteresis	1.5% typical	
Linearity	Included in accuracy specification	
Stability	±1% @ 20°C (68 °F) annually for 2 years	
Output Range	0 to 100% RH	
Temperature Coefficient	±0.1% RH/°C above or below 25 °C (77 °F) typical	
TEMPERATURE SENSOR OPTION		
Sensor Type	Solid state, integrated circuit	
Temp. Sensing Element	See Product Identification section on page 1 for list of available temp. sensing elements	
Time Constant	Air velocity 1.5 m/s. approx. 72 s; Air velocity 3.0 m/s. approx. 52 s	

Specifications (cont.)

Accuracy**	±0.2 °C (±0.4 °F) typical at 25 °C
Resolution	0.1 °C (0.1 °F)
Range	0 to 50 °C (32 to 122 °F)
PM SENSOR OPTION	
Sensor Type	Laser-scatter
Particulate Size	PM1.0, PM2.5, PM4.0, PM10
Resolution	±1 µg/m^3
Mass Concentration Range	±1 µg/m^3
Accuracy	PM1 and PM2.5: 0 to 100 µg/m^3 +/-[5µg/m^3+5% m.v.], 100 to 1000 ug/m^3 +/-[10% m.v.] PM4 and PM10:*** 0 to 100 µg/m^3 +/-[25µg/m^3], 100 to 1,000 µg/m^3 +/-[25% m.v.] (sensor-to-sensor deviation)
DISPLAY MODELS	
LCD Type	Positive display with backlight
Measurement Values Displayed	CO_2: ppm, Temp: °C or °F, Humidity: % RH, VOC: % AQI, PM: µg/m^3
Display Resolution	CO_2: 1 ppm, Temp: 0.1 °C or °F, Humidity: 0.1% RH, VOC: 1% AQI, PM: 1 µg/m^3
WIRING TERMINALS	
Terminal Blocks	Screwless terminal block with spring actuator, 16-24 AWG
WARRANTY	
Limited Warranty	5 years
COMPLIANCE INFORMATION	
Agency Approvals	UL 916 European Conformance CE: EN 60730-1, EN 61000-6-2, EN 61000-6-3, EN 61000 Series - Industrial Immunity, EN 61326-1 FCC Part 15 Class A, REACH, RoHS, RoHS 2 (China), RCM (Australia), ICES-003 (Canada), UKCA (UK)

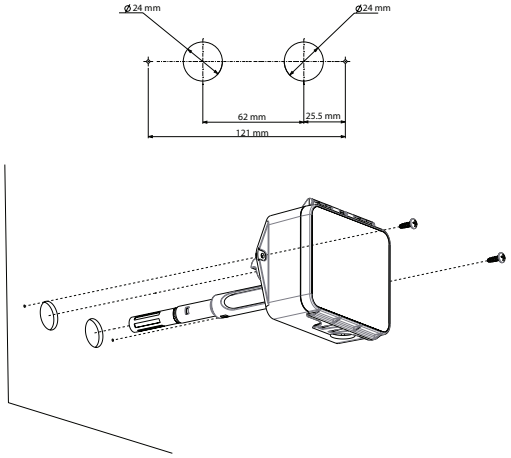
** Humidity sensor measurement uncertainty should include: accuracy, hysteresis, temperature coefficient and stability.*
*** ±0.5 °C over full operating range*
**** PM4 and PM10 output values are calculated based on the distribution profile of all measured particles.*

Dimensions mm (in.)

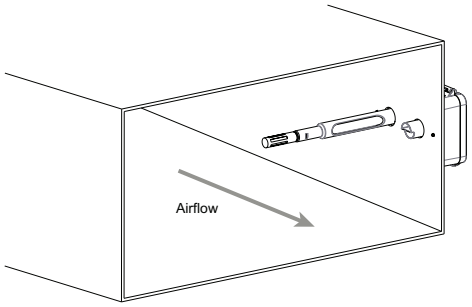


Installation

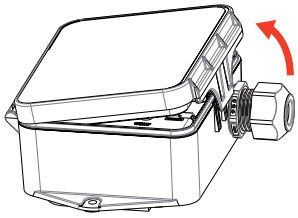
1. Prepare the duct for installation by drilling holes to accommodate the probe tubes for the PM sensor and CO_2/VOC intake. Ensure the gasket on the back is depressed to prevent leakage between the product and the duct. Do not over-tighten the screws.

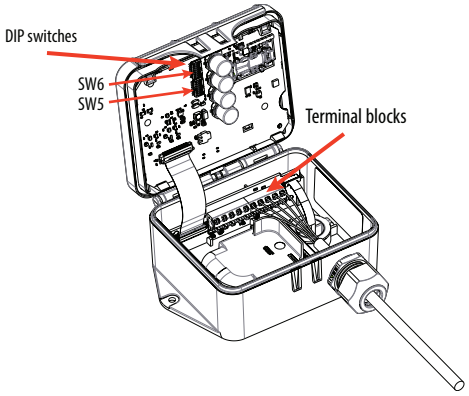


2. Ensure the probes are installed in the direction of the air flow. Install the probe in the middle of the duct and away from any restrictions to allow proper air flow.



3. Release the latch on the lid to access the DIP switches and terminal block.





Installation (cont.)

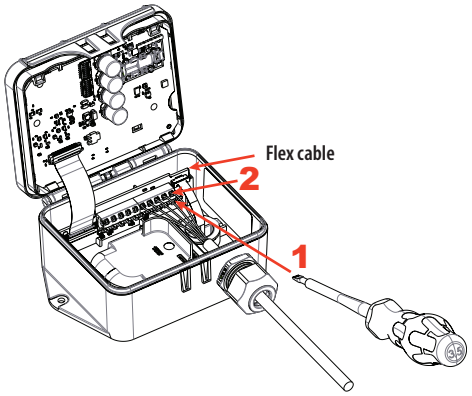
4. Wire the connections per the diagrams in the Wiring section below. This device features spring terminals for screwless termination. Open the terminal point by inserting a screwdriver, then insert the wire above. Release the screwdriver to hold the wire in place. Details on wiring and configuration are contained in the next sections of this document.

NOTICE

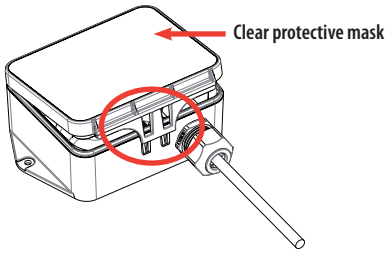
MISSING TEMPERATURE AND HUMIDITY READINGS

- Ensure flex cable is in place after wiring.

Failure to follow these instructions can result in no temperature or humidity readings.



5. Secure the latch-on cover in the closed position and remove the clear protective mask on the front label of the device.



Wiring

NOTICE

PRODUCT DAMAGE DUE TO ELECTRO-STATIC DISCHARGE

Circuit boards and components can be damaged by static electricity or electro-static discharge (ESD). Observe the following electro-static precautions when handling this product and cables and components connected to the product.

- Keep static-producing material such as plastic, upholstery, carpeting, etc. out of the immediate work area
- Store the product in ESD-protective packaging when it is not installed in the panel
- When handling the product or a conductive cable/ESD-sensitive component connected to the product, wear a conductive wrist strap connected to ground through a minimum of 1 MΩ resistance
- Do not touch exposed conductors and component leads with skin or clothing

Failure to follow these instructions can result in equipment damage.

NOTICE

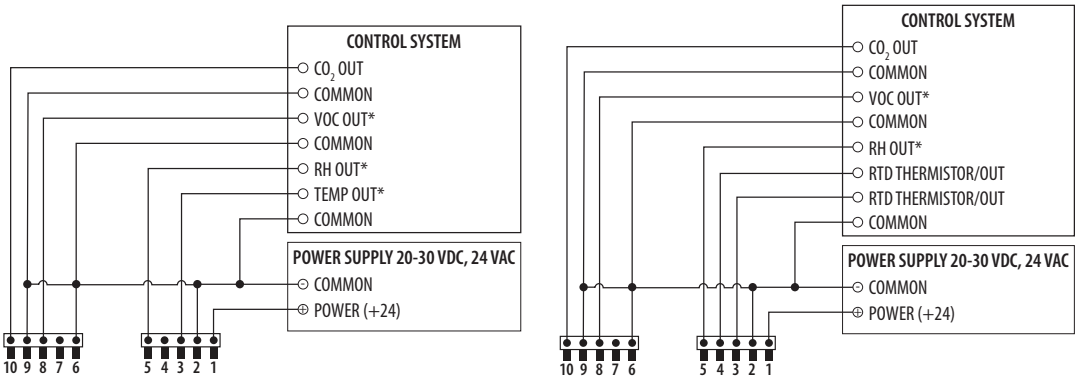
INACCURATE READINGS

- Do not run wiring in the same conduit as AC power wiring. Close proximity to AC power may influence accuracy.

Failure to follow these instructions can result in reduced accuracy.

Wiring (cont.)

Wiring Diagrams



**Used when related sensor is available on the selected model.*

DIP Switch Configuration

Set the DIP switches (SW5). See the Installation section, Step 3 for the location of the DIP switches.

White squares indicate switch position.

Switch	Description	OFF	ON
1	Output Mode	Voltage	Current
2	Voltage Range	10 V	5V
3	CO_2 Range	5000 ppm	2000 ppm
4	ABC Enable	OFF	ON
5*	Temp Units	°C	°F
6*, 7*	PM Selection	00 - PM2.5, 01 - PM1, 10 - PM4, 11 - PM10	
8	Not Used	Not Used	Not Used

**Used when related sensor is available on the selected model.*
Note: For models with PM sensors, use DIP switches 6 and 7 to designate the 2-digit code for PM selection. OFF = 0 and ON = 1.
Example: PM4.0 code = '10'. Switch 6 must be set in the ON position ('1') and Switch 7 in the OFF position ('0').

PM Sensor Negative Output Values in Current Mode

In certain circumstances where the atmosphere is very clean (approaching 0 µg/m3) and there is inherent noise in the measurement, negative values can be observed as reported by the PM sensor when used in current output mode.

Please note that in such specific conditions, the occurrence of negative values does not necessarily indicate an error. Instead, it can be a valid representation of the sensor's response to very low particulate levels combined with measurement noise.

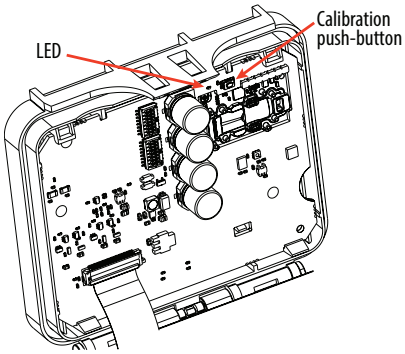
Our sensor is designed to account for these nuances in environmental conditions, and the occasional observation of negative values within the specified range does not signify a malfunction.

CO_2 Sensor Calibration

There are two methods for CO_2 calibration available: 400 ppm baseline calibration and automatic baseline calibration (ABC).

400 ppm Baseline Calibration

400 ppm baseline calibration allows the sensor to be set at 400 ppm. Push and hold the calibration button for 3 to 5 seconds. The LED will flash green. Once the button is released, calibration is complete and the LED switches off.



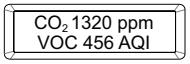
Automatic Baseline Calibration (ABC)

The ABC mode addresses the 400 ppm calibration. It allows turning on or off a background correction/recovery mode that will minimize any calibration error that has been caused by shock during handling and transportation or is caused by a long term shift in measurement. The ABC algorithm constantly keeps track of the sensor's lowest reading over a preconfigured time interval and slowly corrects for any long-term drift detected as compared to the expected fresh air value of 400 ppm. After initial startup, it is expected that the sensor reaches specified accuracy after 7 to 21 days.

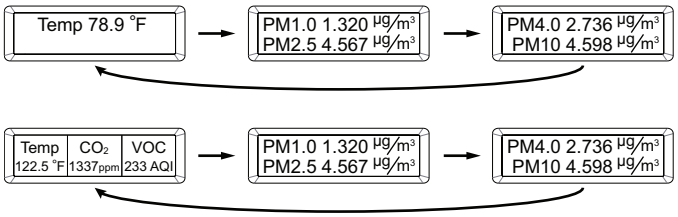
LCD Operation

The screen displays sensor values for CO_2, PM, VOC (if equipped), RH (if equipped), temperature and Celsius/Fahrenheit.

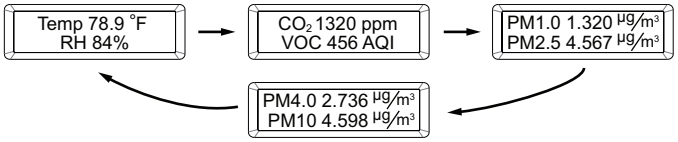
Single-Screen Operation



3-Screen Operation



4-Screen Operation



Maximum Power Consumption

Series	LCD	CO_2/VOC	PM	Temp/RH	Max. Power
CD2 Analog	Yes	Yes	Yes	Yes	9VA @24VAC
	Yes	Yes	No	Yes	8VA @24VAC
	Yes	No	Yes	Yes	7VA @24VAC
	No	Yes	No	Yes	6VA @24VAC
	No	Yes	No	No	4VA @24VAC

Thermistor Table

Standard RTD and Thermistor Values - Ohms (Ω)

°C	°F	100 Ohm RTD (PTC)	1000 Ohm RTD (PTC)	1800 Ω (NTC) Thermistor (NTC)	10k Type2 Thermistor (NTC)	10k Type 3 Thermistor (NTC)	20k NTC Thermistor (NTC)
-50	-58	80.306	803.06	63,880	670,600	441,300	1,267,600
-40	-40	84.271	842.71	35,680	336,600	239,800	643,800
-30	-22	88.222	882.22	20,720	177,000	135,200	342,000
-20	-4	92.16	921.6	12,460	97,120	78,910	189,080
-10	14	96.086	960.86	7,733	55,340	47,540	108,380
0	32	100	1,000.00	4,940	32,660	29,490	64,160
10	50	103.903	1,039.03	3,240	19,900	18,790	39,440
20	68	107.794	1,077.94	2,177	12,490	12,260	24,920
25	77	109.735	1,097.35	1,800	10,000	10,000	20,000
30	86	111.673	1,116.73	1,496	8,058	8,194	16,144
40	104	115.541	1,155.41	1,049	5,326	5,592	10,696
50	122	119.397	1,193.97	749.7	3,602	3,893	7,234
60	140	123.242	1,232.42	545.3	2,488	2,760	4,992
70	158	127.075	1,270.75	403.1	1,751	1,990	3,512
80	176	130.897	1,308.97	302.5	1,256	1,458	2,516
90	194	134.707	1,347.07	230.2	916	1,084	1,833
100	212	138.506	1,385.06	177.5	679.2	816.8	1,356
110	230	142.293	1,422.93	138.6	510.8	623.6	1,016
120	248	146.068	1,460.68	109.5	389.4	481.8	770
130	266	149.832	1,498.32	87.4	300.6	376.4	591
Sensor Codes		B	C	N	D	H	M

Note: Sensor Code K includes a 10K Curve 9 (Sensor Code R) in parallel with an 11kΩ resistor.

China RoHS Compliance Information

Environment-Friendly Use Period (EFUP) Table

部件名称 Part Name	有害物质 - Hazardous Substances 铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电子件 Electronic	X	O	O	O	O	O

本表格依据SJ/T11364的规定编制。
O: 表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。
（企业可在此处，根据实际情况对上表中打“X”的技术原因进行进一步说明。）

This table is made according to SJ/T 11364.
O: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.
X: indicates that concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572

Z000057-0B