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CWL   CWE

CE *

*The CE mark indicates RoHS2 compliance. Please refer to the CE Declaration of Conformity for additional details.

CW Series
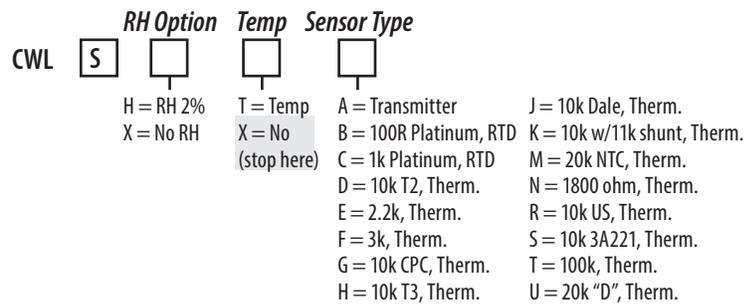## *Wall Mounted Environmental CO_2 Sensors*

Product Overview

CW Series wall mount CO_2 sensors measure the levels of CO_2, RH (if equipped), and temperature (if equipped) of air inside a duct. The CO_2 sensor operates within accuracy specifications for an interval of five years and can be field calibrated. The temperature element is warranted to meet accuracy specifications for a period of five years. RH equipped models feature a replaceable HS Series humidity element that is warranted to meet accuracy specifications for a period of one year. To maintain accuracy, all vents must remain clear and free of dust, debris, etc.

Product Identification

WALL DELUXE MODELS:
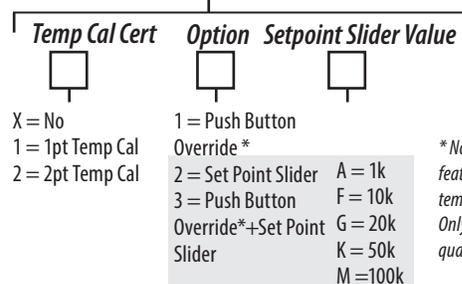
CWL [S] | *RH Option* | *Temp* | *Sensor Type*

H = RH 2%   T = Temp
X = No RH   X = No
                  (stop here)

A = Transmitter   J = 10k Dale, Therm.
B = 100R Platinum, RTD   K = 10k w/11k shunt, Therm.
C = 1k Platinum, RTD   M = 20k NTC, Therm.
D = 10k T2, Therm.   N = 1800 ohm, Therm.
E = 2.2k, Therm.   R = 10k US, Therm.
F = 3k, Therm.   S = 10k 3A221, Therm.
G = 10k CPC, Therm.   T = 100k, Therm.
H = 10k T3, Therm.   U = 20k "D", Therm.

Options Available

Temp Cal Cert   *Option*   *Setpoint Slider Value*

X = No
1 = 1pt Temp Cal
2 = 2pt Temp Cal

1 = Push Button Override *
2 = Set Point Slider
3 = Push Button Override*+Set Point Slider

A = 1k
F = 10k
G = 20k
K = 50k
M = 100k

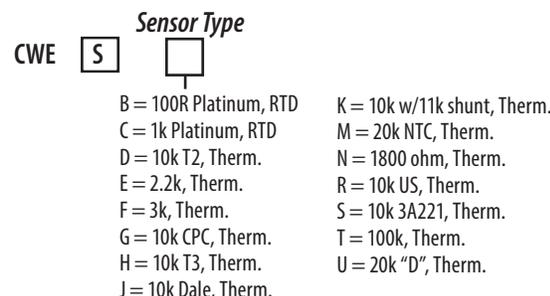** Note: the Pushbutton Override feature is not available with temperature transmitter models. Only resistive temperature models qualify for this feature.*

WALL ECONOMY MODELS:

CWE [S] | *Sensor Type*

B = 100R Platinum, RTD   K = 10k w/11k shunt, Therm.
C = 1k Platinum, RTD   M = 20k NTC, Therm.
D = 10k T2, Therm.   N = 1800 ohm, Therm.
E = 2.2k, Therm.   R = 10k US, Therm.
F = 3k, Therm.   S = 10k 3A221, Therm.
G = 10k CPC, Therm.   T = 100k, Therm.
H = 10k T3, Therm.   U = 20k "D", Therm.
J = 10k Dale, Therm.

Specifications

Input Voltage	Class 2; 20 to 30 Vdc, 24 Vac
Analog Output	CWL: 4 to 20 mA (clipped and capped)/0-5 Vdc/0-10Vdc (selectable) CWE: 4 to 20 mA (clipped and capped)/0-10Vdc (selectable)
Sensor Current Draw	100 mA max.
Operating Temperature Range	No humidity option: 0 to 50 °C (32 to 122 °F) With humidity option**: 10 to 35 °C (50 to 95 °F)
Operating Humidity Range	0 to 95% (non-condensing)
Housing Material	High impact ABS plastic
CO_2 TRANSMITTER	
Sensor Type	Non-dispersive infrared (NDIR), diffusion sampling
Output Range	CWL: 0 to 2000 ppm or 0 to 5000 ppm, user selectable; CWE: 0 to 2000 ppm
Accuracy	±30 ppm ±2% of measured value*
Repeatability	±20 ppm ±1% of measured value
Response Time	<60 seconds for 90% step change
RH TRANSMITTER*	
HS Sensor	Digitally profiled thin-film capacitive (32-bit mathematics); U.S. Patent 5,844,138
Accuracy	±2% from 10 to 80% RH @ 25°C; Multi-point calibration NIST
Hysteresis	1.5% typical
Linearity	Included in Accuracy spec.
Stability	±1% @ 20 °C (68 °F) annually for two years
Output Range	0 to 100% RH
Temperature Coefficient	±0.1% RH/°C above or below 25 °C (typical)
TEMPERATURE (TRANSMITTER)*	
Sensor Type	Thermistor
Accuracy	±0.5 °C (±1 °F) typical
Resolution	0.1 °C (0.2 °F)
Output Range	10 to 35 °C (50 to 95 °F)
RELAY CONTACTS*	
1 Form C (on models without setpoint slider option)	1 A@30 Vdc, resistive; 30 W max.

Specified accuracy with 24 Vdc supplied power with rising humidity. RTD/Thermistors in wall packages are not compensated for internal heating of product.

EMC Conformance: EN 61000-6-3:2007 Class B, EN 61000-6-1:2007

EMC Special Note: Connect this product to a DC distribution network or an AC/DC power adaptor with proper SURGE PROTECTION (EN 61000-6-1:2007 specification requirements)

* Measured at NTP

** Not available on CWE

Note: Rough handling and transportation may cause a temporary reduction of CO_2 sensor accuracy. With time, the ABC function will tune the readings back to the correct accuracy range. The default tuning speed is limited to 30 ppm per week.

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Dimensions

FRONT VIEW

4.75"
(121 mm)

3.50"
(89 mm)

1.15"
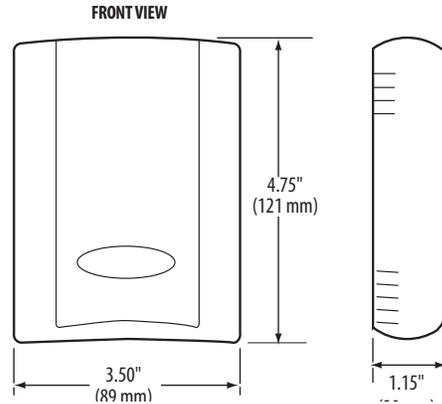
Installation

1. Remove the cover by pressing the tab at at the top of the sensor while pulling outward from the top of the cover.

Observe precautions for handling static sensitive devices to avoid damage to the circuitry that is not covered under the factory warranty.

ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

2. Remove the backplate by unfastening the sensor from the bottom of the backplate and pivoting the sensor outward.

3. Punch out desired wire openings in the backplate.

All optional connector blocks are shown here for clarity.
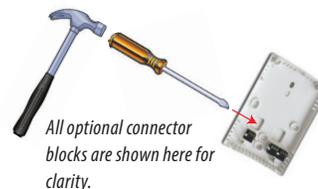
4. Position the sensor vertically on the wall, 4-1/2 feet above the floor. Locate away from windows, vents, and other sources of draft. If possible, do not mount on an external wall, as this might cause inaccurate temperature readings.
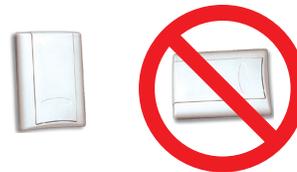
5. Mount the backplate onto the wall using the screws provided.
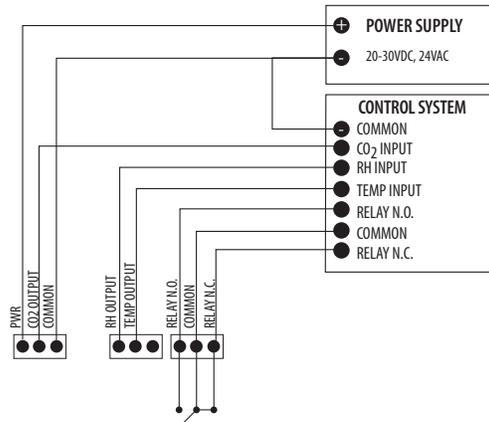
Five screwholes available; use a minimum of two for secure mounting.
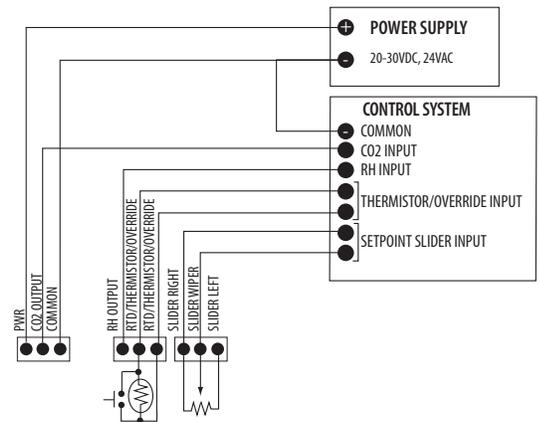
All optional connector blocks are shown here for clarity.

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Installation (cont.)

6. Wire the backplate.

CWL with RH and Temperature Transmitter Options

POWER SUPPLY
20-30VDC, 24VAC

CONTROL SYSTEM
COMMON
CO_2 INPUT
RH INPUT
TEMP INPUT
RELAY N.O.
COMMON
RELAY N.C.

PWR
CO2 OUTPUT
COMMON

RH OUTPUT
TEMP OUTPUT

RELAY N.O.
COMMON
RELAY N.C.

CWL with RH, Thermistor/RTD, Pushbutton Override, and Setpoint Slider Options

POWER SUPPLY
20-30VDC, 24VAC

CONTROL SYSTEM
COMMON
CO2 INPUT
RH INPUT
THERMISTOR/OVERRIDE INPUT
SETPOINT SLIDER INPUT

PWR
CO2 OUTPUT
COMMON

RH OUTPUT
RTD/THERMISTOR/OVERRIDE
RTD/THERMISTOR/OVERRIDE

SLIDER RIGHT
SLIDER WIPER
SLIDER LEFT

CWE

POWER SUPPLY
20-30VDC, 24VAC

CONTROL SYSTEM
COMMON
CO2 INPUT
THERMISTOR/OVERRIDE INPUT

PWR
CO2 OUTPUT
COMMON

RTD/THERMISTOR/OVERRIDE
RTD/THERMISTOR/OVERRIDE
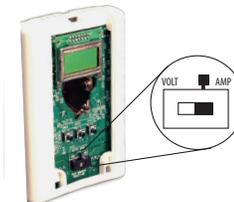
7. Install the sensor onto the backplate.

8. Use the switch to select voltage or current output. For CWL model, see Configuration section.

VOLT   AMP

9. When installation is complete, install the cover and snap into place.

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Installation (cont.)

10. Programmable override button

Override button

Note: the Pushbutton Override feature is not available with temperature transmitter models. Only resistive temperature models qualify for this feature.

11. Programmable setpoint slider

Setpoint slider

ABC Calibration Algorithm

ABC (Automatic Baseline Calibration) is a patented self-calibration feature that automatically adjusts the CO_2 sensor to compensate for drift. When ABC is enabled, the sensor records the lowest reading within every 24-hour interval and compares these values over a running 7-day or 28-day period. If a statistically significant amount of drift is detected, the ABC applies an automatic correction factor. This enables the sensor to operate within specifications for the 5-year calibration interval.

ON POSITION. Recommended Setting. Use the ON setting for applications where the building is unoccupied within a 24-hour timeframe.
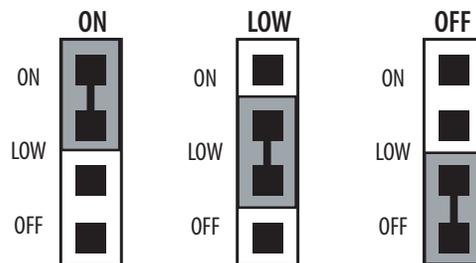
LOW POSITION. Use the LOW setting for buildings occupied 24 hours a day.

OFF POSITION. Not Recommended.

NOTE: After changing the ABC settings, power cycle the unit for changes to take effect.

To set the ABC mode for CWL models, refer to the Configuration section of this document.

To set the ABC mode for CWE models, position the ABC jumper as shown:

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Output Scaling

CO_2 - Carbon Dioxide Sensor

Output scaling: 0 to 2000 ppm

	CO_2 PPM	0 to 5 V Output	0 to 10 V Output	mA Output
Outside	30 to 500	0.75 to 1.25	1.5 to 2.5	6.4 to 8
Over Ventilated	Under 600	Under 1.5	Under 3	Under 8.8
Ideal Ventilation	600 to 900	1.5 to 2.25	3 to 4.5	8.8 to 11.2
Under Ventilated	Over 900	Over 2.25	Over 4.5	Over 11.2

RH - Relative Humidity Sensor

Output scaling: 0 to 100%

T - Temperature Transmitter

Output scaling: 10° to 35°C (50° to 95°F)

To determine temperature from output reading:

1. Compute Total Span from Temperature Range:
    Maximum range - Minimum range = Total span
    ex. 10° to 35°C range: 35 - 10 = 25 Total span

2. Compute Output % of Span from Reading:
    (Reading - Minimum Output) / (Maximum output - Minimum output)
    ex. 11.10 mA reading on 4-20 mA output: (11.10-4) / (20-4) = 7.10 / 16 = 0.444 = 44.4%
    ex. 4.44v reading on 0-10 V output: (4.44-0) / (10-0) = 4.44 / 10 = 0.444 = 44.4%

3. Compute Temperature:
    (Total span x Output % of Span) + Minimum range
    ex. 44.4% Output, Total Span = 45, range = 50/95: (0.444 x 45) + 50 = 20 + 50 = 70°

Example outputs for selected temperatures:

Temperature	4 to 20 mA	0 to 10 V	0 to 5 V
65	9.33 mA	3.33 V	1.67 V
70	11.10 mA	4.44 V	2.22 V
75	12.89 mA	5.56 V	2.78 V

Configuration - CWL Only

RUN MODE:

P	P	M		1	0	0	0
C	0	2					

CO_2 ONLY MODEL
*INDICATES RELAY STATUS

P	P	M		1	0	0	0
%	R	H		5	0	.	0

CO_2/RH COMBO MODEL

P	P	M		1	0	0	0
º	F			7	0	.	0

CO_2/T COMBO MODEL

P	P	M		1	0	0	0
X	X	X		X	X	.	X

CO_2/RH/T COMBO MODEL
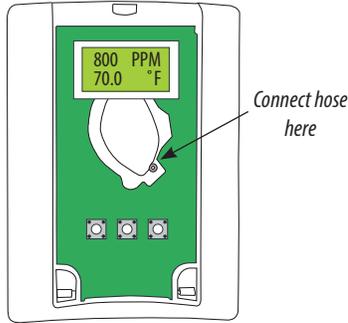*TOGGLE %RH AND DEGREES*

*NOTE: This product is factory calibrated. The typical CO_2 sensor calibration interval is 5 years, depending on specific site installation factors. As of the date of this document, compliance with ANSI/ASHRAE 62-2001 requires minimum on-site accuracy verification intervals of 6 months or per the building operation and maintenance manual. Verify accuracy using a comparison to a known reference or the CO_2 gas calibration kit available from Veris Industries as AA01.

WARNING: CO_2 sensor calibration requires gas calibration kit. Performing calibration without gas kit or at an incorrect gas flow rate will cause erroneous readings.

CONFIGURATION MODE:

PRESS ENTER FOR CONFIGURATION MODE.
PRESS PLUS OR MINUS TO CHANGE SETTING.

S	E	T	P	O	I	N	T
C	0	2			8	0	0

RANGE 500 TO 1500
50 PPM INCREMENT

D	E	A	D	B	A	N	D
C	0	2			1	0	0

RANGE 10 TO 500
5 PPM INCREMENT

R	A	N	G	E			
C	0	2		X	X	X	

OPTIONS ARE 2000 OR 5000

A	B	C		M	O	D	E
–		X	X	X			+

OPTIONS ARE ON, LOW, OFF
SEE PREVIOUS PAGE FOR EXPLANATION

U	N	I	T	S			
–			º	X			+

(TEMP MODELS ONLY)
OPTIONS ARE °F or °C

	O	U	T	P	U	T	
–	0	–	1	0	V		+

(VOLTAGE MODE ONLY)
OPTIONS: 0 to 10 V OR 0 to 5 V
DEFAULT IS 0 to 10 V

	O	U	T	P	U	T	
	4	–	2	0	m	A	

(mA MODE ONLY)

CALIBRATION MODE*:

PUSH AND HOLD PLUS AND MINUS FOR 5 SECONDS TO ENTER MODE. PRESS ARROW TO CHANGE OPTION. PUSH ENTER FOR NEXT SELECTION.

	S	E	R	I	A	L	
X	X	X	X	X	X	X	X

DISPLAYS SERIAL NUMBER

		X	X	X			
	X	X	X	X			

DISPLAYS MODEL NUMBER

O	F	F	S	E	T		
º	C				X	.	X

RANGE IS -5 TO 5 °C, 0.1 °C INCREMENT
(CO_2/temp combo models)

O	F	F	S	E	T		
%	R	H			X	X	.	X

RANGE -10 TO 10%, 0.1% INCREMENT
(CO_2/temp combo models)

C	0	2		C	A	L	?
–			X	X			+

OPTIONS ARE YES, NO

C	A	L		G	A	S	?
–			X	X	X		+

OPTIONS ARE NONE, 0, 400

W	O	R	K	I	N	G	
	*			5	:	0	0

Unit will automatically return to run mode when calibration is complete.

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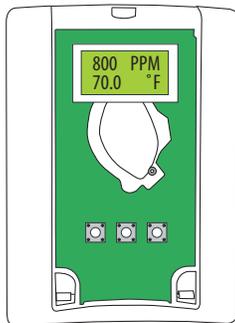# Calibration Process

CWL Models:

1. Remove cover and connect gas cylinder hose to the plastic port located on sensing module. Note: only connect one sensor to the calibration gas cylinder at a time.

800 PPM
70.0 °F

Connect hose here

2. Start flowing nitrogen gas (0 ppm CO_2). Use a flow rate of 0.3 to 0.5 liter/minute.


Regulator Valve

NITROGEN GAS
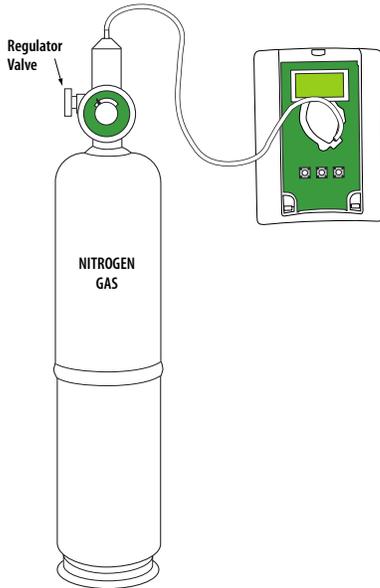
3. Calibrate for 5 min. Unit will return to working display when finished.

800 PPM
70.0 °F

4. When unit returns to working display, remove hose from calibration port and enter Calibration mode as described in the Installation section.

CWE Models:

1. Remove cover and connect gas cylinder hose to the plastic port located on sensing module. Note: only connect one sensor to the calibration gas cylinder at a time.

LED indicator

Connect hose here

2. Start flowing nitrogen gas (0 ppm CO_2). Use a flow rate of 0.3 to 0.5 liter/minute.

Regulator Valve
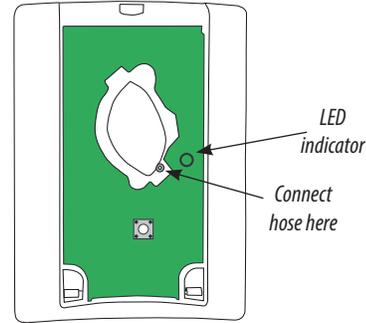
NITROGEN GAS
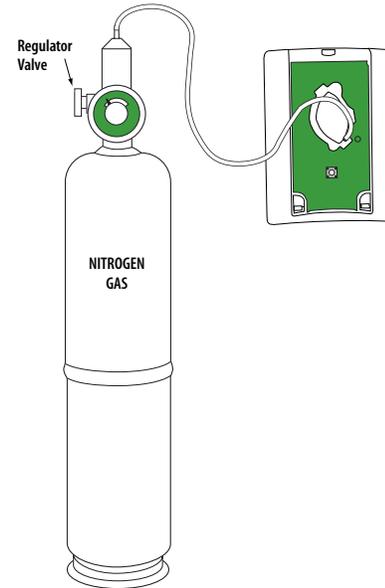
3. Push and hold down calibration button until the LED illuminates.

LED indicator

Connect hose here

Calibration button
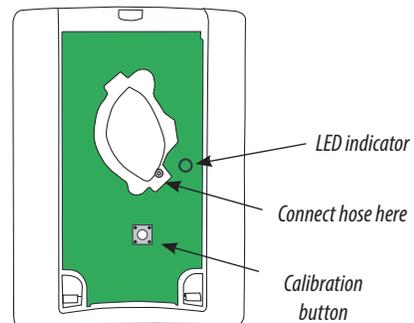
4. Continue flowing gas through the sensor until the LED is off. Estimated calibration time is 5 minutes. Remove hose from calibration port when complete.

*For more complete calibration instructions using the
AA01 Calibration Kit, see the AA01 Installation Guide.*