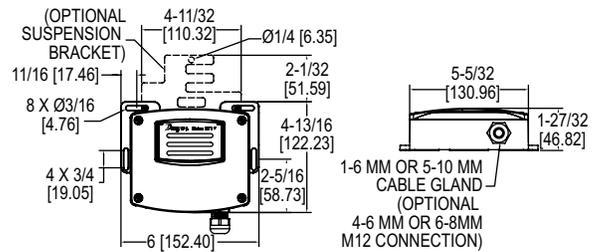# Dwyer®

Series CDWP Carbon Dioxide Transmitter

Specifications - Installation and Operating Instructions

The **Series CDWP Carbon Dioxide Transmitter** accurately monitors the CO_2 concentration in industrial and indoor environments to help achieve energy savings. For increased sensor life and accuracy, a single-beam dual-wavelength non-dispersive infrared (NDIR) sensor is used to eliminate light source aging effects. The single-beam dual-wavelength sensor technology provides the highest level of accuracy compared to Automatic Baseline Correction methods, which can unintentionally shift the calibration based on CO_2 levels and barometric pressure conditions.

Universal outputs allow users to select the transmitter output to be 4-20 mA, 0-5 VDC, or 0-10 VDC to work with virtually any building management controller or programmable logic controller.

The CDWP utilizes a rugged IP54 aluminum housing with an exterior gray finish coat that was tested to withstand a 168 hour salt spray corrosion test. This ruggedized housing helps to protect the sensor from splashing liquid and airborne dust or debris making the Series CDWP a great fit for animal husbandry applications and confined feeding operations.

Single-beam dual-wavelength sensor advantages:
• Automatically corrects for aging effects in occupied and unoccupied spaces
• Measures actual unfiltered light intensity directly
  • Eliminates error from incorrect assumptions of gas concentration in theoretical logic assumption methods

INSTALLATION

⚠ WARNING Disconnect power supply before installation to prevent electrical shock and equipment damage

Make sure all connections are in accordance with the job wiring diagram and in accordance with national and local electrical codes. Use copper conductors only.

CAUTION Use electrostatic discharge precautions (e.g., use of wrist straps) during installation and wiring to prevent equipment damage.

CAUTION Do not exceed ratings of this device, permanent damage not covered by warranty may result.

NOTICE Upon powering the transmitter, a warm up period of 30 minutes is required for the transmitter to adjust to the current CO_2 concentration.

SPECIFICATIONS

Sensor: Single beam, dual-wavelength NDIR.
Range: CO_2: 0 to 2000, 0 to 5000, or 0 to 10000 PPM (depending on model).
Accuracy: CO_2: ±40 PPM ±3% of reading.
Temperature Dependence: ±8 PPM/°C at 1100 PPM.
Non-Linearity: 16 PPM.
Pressure Dependence: 0.13% of reading per mm of Hg.
Response Time: 300 s (τ_{63}).
Temperature Limits: 32 to 122°F (0 to 50°C).
Humidity Limits: 10 to 95% RH (non-condensing).
Power Requirements: 16-35 VDC or 19-28 VAC.
Power Consumption: Average: 2 W; Peak: 3.75 W.
Output: Current: 4-20 mA (max. 500 Ω); Voltage: 0-5 VDC or 0-10 VDC (min. 500 Ω).
Enclosure Rating: IP54.
Mounting Orientation: Vertically, with electrical connection pointing downwards.
Weight: 26.24 oz (744 g).
Agency Approvals: CE.

SUSPENSION MOUNTING

To suspend the CDWP from the ceiling, loop the end of the power cord and feed it through the hole at the base of the bracket and hook the loop on the prong.

Figure 1: CDWP suspension bracket

M12 Connector Option
The M12 Connection option allows for easy removal of the CDWP before site cleaning operations.
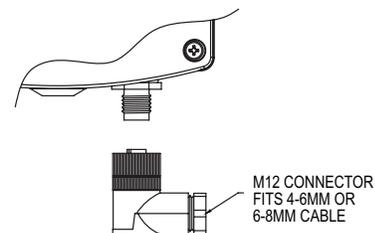

Figure 2: Diagram of M12 connector

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Power Supply
Choose a power supply with a voltage and current rating sufficient to meet the power specifications under all operating conditions. If the power supply is unregulated, make sure the output voltage remains within the required voltage range under all power line conditions.

CURRENT / VOLTAGE OUTPUTS
The transmitter may be wired for current or voltage output for CO_2.

WIRING
Use a minimum of 22 AWG to maximum 18 AWG wire for wiring to terminal blocks. Refer to Figure 3 for wiring Information.
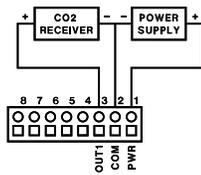

Figure 3: Active output wiring diagram

DIP SWITCH SETTINGS
To access the DIP SWITCH, remove the cover of the unit as shown in Figure 4. The DIP SWITCH is located on the circuit board.

Figure 4: Diagram of circuit board

DIP Switch Position 1: CO₂ Output Selection
ON: Output set to voltage output
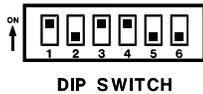OFF: Output set to current output

Figure 5: Diagram of DIP SWITCH

DIP Switch Position 2: Not Used in this product
DIP Switch Position 3 & 4: Current or Voltage Output Range Selection

Output Range	DIP Switch 3 Position	DIP Switch 4 Position
2-10 V 4-20 mA	ON	OFF
0-10 V 0-20 mA	OFF	OFF
0-5 V 0-10 mA	OFF	ON
1-5 V 2-10 mA	ON	ON

Dip Switch Position 5: Menu Access
ON: Menu Enabled
OFF: Menu Disabled

DIP Switch Position 6: Not used in this product

Remote Display
The Series CDWP menu parameters can be set up and configured using a remote display tool, A-449. The mini USB plug of the remote display plugs into the receptor at the lower right hand corner of the PCBA when the cover is removed.

EDITING MENU PARAMETERS
Before any adjustment can be made to the transmitter, the Menu Lockout Dip Switch must be set to the ˝On˝ position (see DIP switch #5)
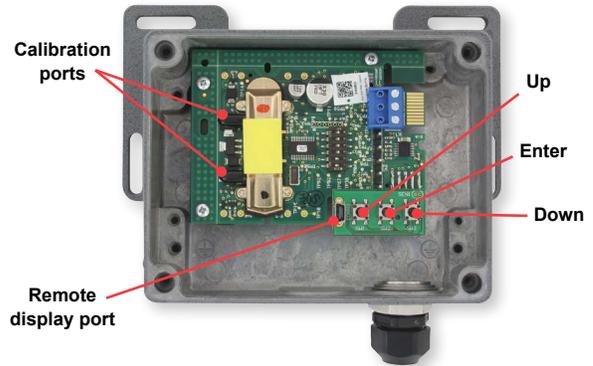

Figure 6: Button board inside of housing

ACCESSING MENU PARAMETERS

Step 1: To enter the menu structure, press Up button and Down button simultaneously for 5 seconds (display will show RON parameter).

Step 2: Press Up button or Down button to cycle between menu items.

Step 3: Press Enter to edit the value for the displayed menu item (SET will appear on display).

Step 4: Press Up button or Down button to adjust the value of the menu item.

Step 5: Press Enter button to save the changes (SET will disappear).

Step 6: Repeat Steps 2 through 5 for each of the parameters.

Step 7: To exit the menu at any time, press and hold Up button and Down button simultaneously for 5 seconds or wait 10 seconds without pushing any buttons.

Menu Descriptions

RON Relay on set point
Sets the CO_2 concentration which the optional relay is energized.

Low limit:	0 PPM
Factory setting:	1000 PPM
High limit:	2000/5000 PPM (depending on model)

ROF Relay off set point
Sets the CO_2 concentration which the optional relay is de-energized. Setting value lower than RON provides direct action for detecting high concentrations of CO_2. Setting value higher than RON provides indirect action for detecting low concentrations of CO_2. Up button and Down button on the LCD display will be lit to indicate when the relay is energized.

Low limit:	0 PPM
Factory setting:	950 PPM
High limit:	2000/5000 PPM (depending on model)

DSP Display configuration
Determines the LCD display configuration during normal operation. The LCD display can indicate the CO_2 concentration, temperature, relative humidity (Series CDTR only) and CO_2 concentration combined with temperature or relative humidity (Series CDTR only).

CH CO_2 concentration and relative humidity (Series CDTR only)
CT CO_2 concentration and temperature
TH Temperature and relative humidity (Series CDTR only)
C CO_2 concentration only
T Temperature only
H Relative humidity only (Series CDTR only)

UNI Units selection
Temperature and barometric pressure measurements can be displayed in US engineering units or SI engineering units. The factory default is to display US engineering units.

US units °F for temperature and in Hg for barometric pressure
SI units °C for temperature and hPa for barometric pressure

COL CO_2 low output range
Sets the CO_2 concentration for the lowest output (4 mA or 0 VDC).

Low limit:	0 PPM
Factory setting:	0 PPM
High limit:	2000/5000 PPM (depending on model)

COH CO_2 high output range
Sets the CO_2 concentration for the highest output (20 mA, 5 VDC or 10 VDC). When COH is set above COL, the transmitter is direct acting and the output will increase with an increase in CO_2 level. When COH is below COL, the transmitter is reverse acting and the output will increase with a decrease in CO_2 level.

Low limit:	0 PPM
Factory setting:	2000/5000 PPM (depending on model)
High limit:	2000/5000 PPM (depending on model)

AAC Average Atmospheric Carbon Dioxide value
Sets the value at which the sensors automatic background calibration will reference. Factory setting derived from research from the National Oceanic and Atmospheric Administration (NOAA).

Low limit:	200 PPM
Factory setting:	Current NOAA value
High limit:	9999 PPM

HOL Humidity low output range (Series CDTR only)
Sets the humidity for the lowest output (4 mA or 0 VDC).

Low limit:	0.0%
Factory setting:	0.0%
High limit:	100.0%

HOH Humidity high output range (Series CDTR only)
Sets the humidity for the highest output (20 mA, 5 VDC or 10 VDC). When HOH is set above HOL, the transmitter is direct acting and the output will increase with an increase in humidity. When HOH is below HOL, the transmitter is reverse acting and the output will increase with a decrease in humidity.

Low limit:	0.0%
Factory setting:	100.0%
High limit:	100.0%

BAR Barometric pressure
Sets the typical barometric pressure for the location where the transmitter is mounted. The factory setting is for standard pressure at sea level. Adjusting the barometric pressure gives a more accurate measurement, especially at higher elevations. Refer to the elevation charts in Figure 7 for typical barometric pressures at a given elevation.

Low limit:	20.0 in Hg / 677 hPa
Factory setting:	29.9 in Hg / 1013 hPa
High limit:	32.0 in Hg / 1084 hPa

CAL Calibration
Calibrates the carbon dioxide sensor to a known gas value. Read calibration instructions before using this feature. Hold Enter button for 5 seconds.

RST Reset to Factory Defaults
Resets all menu settings to their default value, and clears zero and span.

YES - Press & hold -- button for several seconds to reset settings
NO - Press -- button to exit this menu item without resetting

CALIBRATING SENSOR

To calibrate the sensor please follow the below steps in conjunction with Figure 6.

Note: Calibration requires display accessory A-449 which must be plugged into the port left of the switches.

Step 1: Remove the unit's cover.
Step 2: Remove one of the gas nipple covers on the CO_2 sensor and attach tubing from the gas pressure regulator to the nipple.
Step 3: Attach the terminal block accessory to the circuit board so that the power wires line up with terminals 1 and 2. Plug in the power supply to power up the transmitter. Allow 30 minutes for the transmitter to warm up.
Step 4: Hold housing so that the sensor is in the vertical plane.
Step 5: Flow zero reference gas at 0.3 SLPM for 5 minutes.
Step 6: Press and hold the SW1 (Up) and SW3 (Down) buttons simultaneously for 5 seconds to enter the menu parameters. The "RON" parameter will display on your A-449 accessory.
Step 7: Use the SW1 (Up) or SW3 (Down) buttons to access the calibration parameter menu which will display as "CAL".
Step 8: Press the SW2 (Enter) button. "SET" will then appear on the display.
Step 9: Press the SW3 (Down) arrow for 3 seconds. All dashes will appear on the display, then release the button. Then after 10 seconds "SET" will disappear.
Step 10: Exit the parameter menu by pressing and holding the SW1 (Up) and SW3 (Down) buttons simultaneously for 5 seconds or wait 10 seconds.
Step 11: Flow the full scale reference gas at 0.3 SLPM for 5 minutes.
Step 12: Repeat steps 6 through 8.
Step 13: Press the SW1 (Up) arrow for 3 seconds. All dashes will appear on the display, then release the button. Then after 10 seconds "SET" will disappear.
Step 14: Exit the parameter menu by pressing and holding the SW1 (Up) and SW3 (Down) buttons simultaneously for 5 seconds or wait 10 seconds.
Step 15: Disconnect the power supply from the power source and remove the terminal block from the circuit board.
Step 16: Remove tubing from sensor and re-attach the gas nipple covers to the sensor.
Step 17: Re-attach the cover.

MAINTENANCE/REPAIR

Upon final installation of the Series CDWP, no routine maintenance is required. The Series CDWP is not field serviceable and it is not possible to repair the unit. Field repair should not be attempted and may void warranty.

This symbol indicates waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or retailer for recycling advice.

WARRANTY/RETURN

Refer to "Terms and Conditions of Sale" in our catalog and on our website. Contact customer service to receive a obtain a Return Materials Authorization number (RMA) before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

US Customary Units		SI Units	
ft	in Hg	m	hPa
0	29.92	0	1013
400	29.50	100	1002
800	29.10	200	990
1200	28.69	300	979
1600	28.29	400	968
2000	27.90	500	957
2400	27.51	600	946
2800	27.13	700	935
3200	26.76	800	924
3600	26.39	900	914
4000	26.02	1000	904
4400	25.66	1100	893
4800	25.30	1200	883
5200	24.95	1300	873
5600	24.60	1400	863
6000	24.26	1500	853
6400	23.93	1600	844
6800	23.60	1700	834
7200	23.27	1800	824
7600	22.94	1900	815
8000	22.63	2000	806
8400	22.31	2100	797
8800	22.00	2200	787
9200	21.70	2300	779
9600	21.40	2400	770
10000	21.40	2500	761

Figure 7: Elevation chart