The Series CDTV Carbon Dioxide / Volatile Organic Compound (VOC) Transmitter reduces energy cost in buildings by lowering the amount of conditioned air based on the occupancy of the space. By detecting both CO₂ and VOC, the transmitter can also detect fumes that may need to be exhausted during lower occupancy periods. Combining both measurements in one transmitter reduces both labor and material costs by only having to install one CDTV-VOC unit, instead of separate CO₂ and VOC transmitters.

Carbon dioxide measurements are taken using our proven Single-Beam Dual-Wavelength Non-Dispersive Infrared (NDIR) sensor. Our sensor allows users to get accurate measurements without waiting for the settling / correction periods of other logic based sensors. Transmitters can be used in buildings and applications that have 24 hour occupancy and can be calibrated on site to match environmental conditions for improved accuracy.

The VOC measurement is a single value derived from the presence of substances including alcohols, aldehydes, aliphatic hydrocarbons, amines, aromatic hydrocarbons, CO, CH₄, LPG, ketones, and organic acids. Although a standard unit of measure is not currently defined, the VOC measurement unit “ppm CO₂ equivalent” used by the device is commonly used in the industry. The VOC measurement does not actually measure CO₂, but instead senses and indicates an air quality value that approximately correlates perceived comfort levels to similar concentrations of CO₂ in the environment.

**Single-beam dual-wavelength sensor advantages:**
- Automatically corrects for aging effects in occupied and unoccupied buildings
- Perfect for hospitals and manufacturing plants that are occupied 24 hours per day
- Measures actual unfiltered light intensity directly
- Eliminates error from incorrect assumptions of gas concentration in theoretical logic assumption methods...

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Range:</th>
<th>CO₂: 0 to 2000 or 0 to 5000 PPM (depending on model); VOC: 0 to 2000 PPM CO₂ equivalent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy:</td>
<td>CO₂: ±40 PPM +3% of reading.</td>
</tr>
<tr>
<td>Temperature Dependence:</td>
<td>CO₂: ±8 PPM / °C at 1100 PPM.</td>
</tr>
<tr>
<td>Pressure Dependence:</td>
<td>CO₂: 0.13% of reading per mm of Hg.</td>
</tr>
<tr>
<td>Response Time:</td>
<td>CO₂: 2 min for 99% step change; VOC: 5 min.</td>
</tr>
<tr>
<td>Power Requirements:</td>
<td>16-35 VDC / 19-28 VAC.</td>
</tr>
<tr>
<td>Weight:</td>
<td>4.4 oz (125 g).</td>
</tr>
</tbody>
</table>

**DWYER INSTRUMENTS, INC.**
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A. Phone: 219/879-8000 Fax: 219/872-9057 www.dwyer-inst.com e-mail: info@dwyermail.com
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** Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present.

**CAUTION** Do not exceed ratings of this device. Permanent damage not covered by warranty may result.

**NOTICE** Upon powering the transmitter, the firmware version will flash on the display. A warm up period of 30 minutes is required for the transmitter to adjust to the current CO₂ concentration.

**NOTICE** Self calibration feature of the transmitter requires exposure to normal outdoor equivalent carbon dioxide level once every thirty days.

MOUNTING

1. Push tab on top and bottom of cover and lift cover from back plate (See Figure 1).
2. Select the mounting location, away from diffusers, lights or any external influences.
3. Mount receiver on a vertical surface to a standard electrical box using the two #6 M2C type screws provided.
4. Pull wires through sub base hole and make necessary connections.
5. Reattach cover to base plate.

WIRING

Use maximum 18 AWG wire for wiring to terminals. Refer to Figure 4 for wiring information.

DIP SWITCH SETTINGS

To access the DIP SWITCH, remove the cover of the unit as shown in Figure 2. The DIP SWITCH is located on the back of the circuit board.

![DIP Switch Setting Diagram](image)

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

**DIP Switch Position 2: VOC Output Selection**
- **ON**: Output set to voltage output
- **OFF**: Output set to current output

**DIP Switch Positions 3 & 4: Current or Voltage Output Range Selection**

<table>
<thead>
<tr>
<th>Output Range</th>
<th>DIP Switch 3 Position</th>
<th>DIP Switch 4 Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-10 V 4-20 mA</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>0-10 V 0-20 mA</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>0-5 V 0-10 mA</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>1-5 V 2-0 mA</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

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

**Current / Voltage Outputs**

The transmitter may be wired for current or voltage output for both carbon dioxide and VOC. The transmitter can be powered with either 16 or 35 VDC or 19-28 VAC. Wire the transmitter according to Figure 4.

![Active Output Wiring Diagram](image)

**NOTICE** Optional relay can be used as either a dry contact or low voltage switched circuit up to 2 A at 30 VDC.

**Thermistor and RTD Outputs**

Thermistor and RTD passive outputs are located on terminals 7 and 8 and do not require any power. Passive temperature outputs are not polarity sensitive.

**Remote Display**

Remote display Model A-449 can be used to display the VOC or carbon dioxide. The mini USB plug of the remote display plugs into the receptor on the side of the housing. After a short warm up time, the display will begin to show the VOC or carbon dioxide measurements.

**CAUTION** Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present.

**CAUTION** Do not exceed ratings of this device. Permanent damage not covered by warranty may result.

**NOTICE** Self calibration feature of the transmitter requires exposure to normal outdoor equivalent carbon dioxide level once every thirty days.

LEED® is a registered trademark of the U.S. Green Building Council.
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 Figure 3)

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
ROC Define which output relay will be configured.
CO2 default
VOC Max CO2 / VOC

RON Relay set point
Sets the CO2 or VOC concentration which the optional relay is energized.
Low limit: 0 PPM
Factory setting: 1000 PPM
High limit: 2000 PPM (CO2 or VOC), 5000 PPM (only CO2)

ROF Relay off set point
Sets the CO2 or VOC concentration which the optional relay is de-energized.
Setting value lower than RON provides direct action for detecting high concentrations of CO2. Setting value higher than RON provides indirect action for detecting low concentrations of CO2 or 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 PPM (CO2 or VOC), 5000 PPM (only CO2)

DSP Display configuration
Determines the LCD display configuration during normal operation. The LCD display can indicate the CO2 concentration or VOC concentration.
C CO2 concentration only
V VOC only

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

COL CO2 low output range
Sets the CO2 concentration for the lowest output (0 V, 1 V, 2 V, 0 mA, 2 mA, 4 mA).
Low limit: 0 PPM
Factory setting: 0 PPM
High limit: 2000 PPM (CO2 or VOC), 5000 PPM (only CO2)

COH CO2 high output range
Sets the CO2 concentration for the highest output (10 mA or 5 V, 20 mA or 10 V). When COH is set above COL, the transmitter is direct acting and the output will increase with an increase in CO2 level. When COH is below COL, the transmitter is reverse acting and the output will increase with a decrease in CO2 level.
Low limit: 0 PPM
Factory setting: 2000 PPM (CO2 or VOC), 5000 PPM (only CO2)
High limit: 2000 PPM (CO2 or VOC), 5000 PPM (only CO2)

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

VOL VOC low output range
Sets the VOC for the lowest output (0 V, 1 V, 2 V, 0 mA, 2 mA, 4 mA). To configure output for 450 PPM equal 0V, set VOL to 450 PPM. Even if power is lost the VOL setpoint will remain in memory.
Low limit: 0 PPM
Factory setting: 0 PPM
High limit: 2000 PPM CO2 equivalent

VOH VOC high output range
Sets the VOC level for the highest output (10 mA or 5 V, 20 mA or 10 V). When VOH is set above VOL, the transmitter is direct acting and the output will increase with an increase in VOC level. When VOH is below VOL, the transmitter is reverse acting and the output will increase with a decrease in VOC level.
Low limit: 450 PPM
Factory setting: 2000 PPM CO2 equivalent
High limit: 2000 PPM CO2 equivalent

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 / 600 hPa
Factory setting: 29.9 in Hg / 1013 hPa
High limit: 32.0 in Hg / 1100 hPa

CAL Calibration
Calibrates in carbon dioxide sensor to a known gas valve. Read calibration instructions before using this feature. Hold for 5 seconds.
CALIBRATING CO2 SENSOR

Step 1: Remove the cover as shown in Figure 1.

Step 2: Remove one of the gas nipple covers on the CO2 sensor and attach tubing from the gas pressure regulator to the nipple (See Figure 6).

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.

Step 4: Hold housing so that the sensor is in the vertical plane as shown in Figure 6.

Step 5: Follow the steps in the accessing parameter section to access the calibration parameter (CAL).

Step 6: Press the Enter button.

Step 7: Flow zero reference gas at 0.3 SLPM for 5 minutes.

Step 8: Press and hold the Down button for 3 seconds.

Step 9: Flow the full scale reference gas at 0.3 SLPM for 5 minutes.

Step 10: Press and hold the Up button for 3 seconds.

Step 11: Exit the parameter menu.

Step 12: Disconnect the power supply from the power source and remove the terminal block from the circuit board.

Step 13: Remove tubing from sensor and re-attach the gas nipple cover to the sensor.

Step 14: Re-attach the cover to the back plate.

Figure 6: Wall mount calibration

MAINTENANCE/REPAIR

Upon final installation of the Series CDTV, no routine maintenance is required. The Series CDTV is not field serviceable and should be returned if repair is needed. 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 Sales” in our catalog and on our website. Contact customer service to 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.

RESISTANCE VS TEMPERATURE TABLE

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Resistance Curves (in Ohms)</th>
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<td>°C</td>
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</tbody>
</table>

Figure 7: Elevation chart

Figure 8: Resistance vs. temperature table

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