

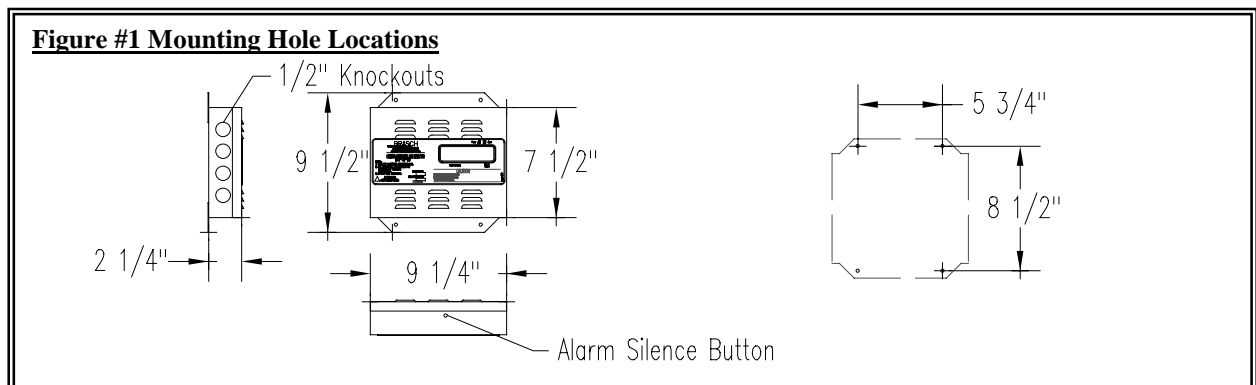
## 1.0 Installation Procedures

### 1.1 MOUNTING:

The Nitrogen Dioxide/Carbon Monoxide Detector must be mounted indoors and kept dry at all times. This detector should be mounted in a well-populated area, and placed so the display can be easily seen. The unit should be mounted at breathing height that is generally between 5 to 7 feet above the floor. Figure #1 shows the mounting hole locations. Mount the detector to a rigid surface using #10 hardware.

#### **CAUTION:**

**Leave a minimum of 2" clearance to other surfaces, and under no circumstances should the ventilation louvers in the cover be blocked. Be sure that metal shavings and other contaminants are removed from inside the detector.**

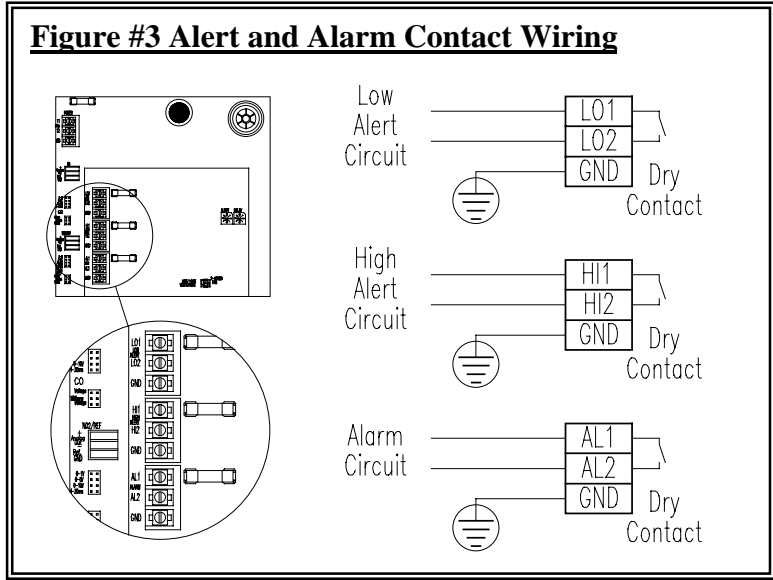
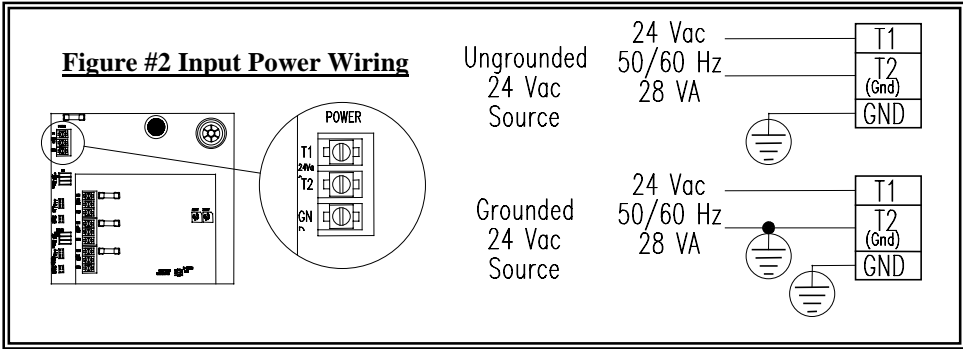


### 1.2 WIRING:

#### 1.21 Input Power Wiring

**Use only qualified personnel for the installation of this detector. All wiring should be done in accordance with local codes and the latest edition of the National Electrical Code (ANSI/NFPA 70).**

This detector requires an input voltage of 24 VAC, 50/60 Hz at a load rating of 28 VA. If a grounded 24 VAC supply voltage is supplied, then the hot line should be wired to terminal T1 and the grounded line should be wired to T2. Brasch Manufacturing Co., Inc. can provide a step-down transformer for changing 208-240 VAC or 120 VAC at 50/60 Hz to 24 VAC at 50/60 Hz. See the 6.0 Accessories Section (Page 8) for the transformer part numbers. The supply circuit must include a disconnect device or switch located close to the detector and marked as the disconnect device for the detector. This will assure continued operation without interruption from remote failures. To provide noise suppression the input power must be wired, as shown in Figure #2 (Page 2), with the ground connected. Use copper conductors only, rated for a minimum of 250 volts, 14 AWG.

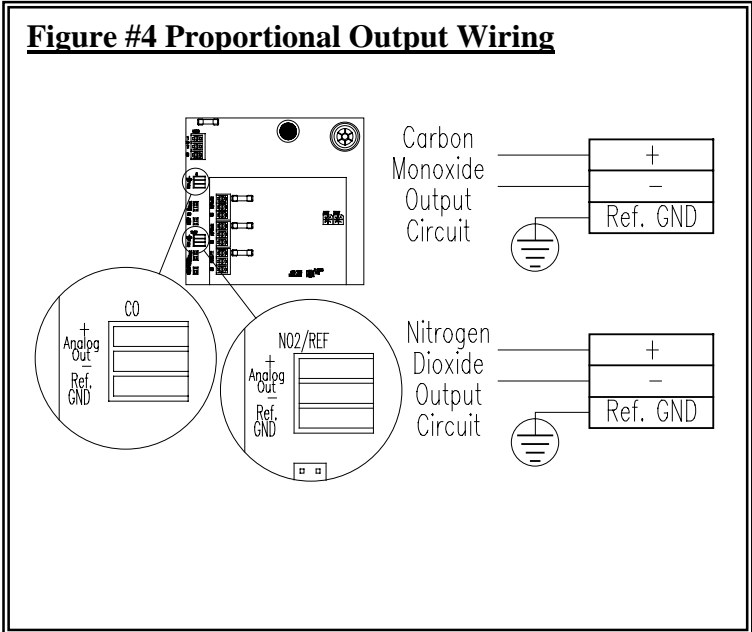


**1.22 Alert and Alarm Contact Wiring:**

See the 4.0 Specification Section (Page 6) for the ratings on the alarm and alert relay contacts. Use copper conductors only, rated for a minimum of 250 volts, 14 AWG. Figure #3 shows the wiring for the alarm and alert contacts. This detector was designed so that the low alert and alarm relay contacts close when power is lost to the detector. This will attempt to keep the zone ventilated until power is restored to the detector.

**1.23 Proportional Output Wiring**

The BGS-NCM-STD has two proportional output signals. The Carbon Monoxide and Nitrogen Dioxide each have their own mA/DC or VDC output signal. See the 4.0 Specification Section (Page 6) for minimum/maximum loads for the proportional outputs. The wiring of the proportional output signals is done by lifting the white lever, inserting the signal wire and pressing the white lever flat. Use copper conductors only, rated for a minimum of 250 volts, with a minimum wire size of 26 AWG (22 AWG maximum). Figure #4, Proportional Output Wiring shows the wiring to a remote DDCS or BMS.



## **2.0 Unit Operation**

When power is applied to the Nitrogen Dioxide Carbon Monoxide Gas Detector the green power LED will illuminate. This LED will stay ON as long as power is supplied to the detector. If the power ON LED should go out, see the 5.0 Troubleshooting Section (Page 7) for help.

This Nitrogen Dioxide Carbon Monoxide Gas Detector has ten modes of operation (Normal, Pre-Low Alert, Low Alert, Post-Low Alert, Pre-High Alert, High Alert, Post-High Alert, Alarm, Sensor Failure and Purge). Upon the application of power the unit will enter the Purge mode and remain in this mode for 5 minutes.

In the Purge mode the green power LED illuminates and the yellow sensor LED will flash on and off. In this mode the gas detector cleans and prepares the sensors for operation. Upon the completion of this mode the detector will turn off the yellow sensor indicator entering the Normal mode.

In the Normal mode the detector monitors the concentration of nitrogen dioxide (NO<sub>2</sub>) and carbon monoxide (CO), generates the proportional output signal and displays the concentration in Parts Per Million (PPM). The display alternates from NO<sub>2</sub> to CO and turns on a yellow LED that corresponds to the gas being displayed. If the concentration of NO<sub>2</sub> and CO remains below the adjustable low alert level, output relays will remain off. If the concentration of NO<sub>2</sub> or CO exceeds the adjustable low alert level, the detector will enter the Pre-Low Alert mode. If the concentration of NO<sub>2</sub> exceeds 1.0 PPM or the concentration of CO exceeds 100 PPM, the detector will enter the Pre-High Alert mode.

In the Pre-Low Alert mode the red low alert LED will flash on and off being off for a longer time than on. If the concentration of NO<sub>2</sub> stays between the adjustable low alert level and 1.0 PPM or the concentration of CO stays between the adjustable low alert level and 100 PPM, for the adjustable time delay, the detector will enter the Low Alert mode.

In the Low Alert mode the red low alert LED will turn on and the low alert output relay contacts will close. If the concentration of NO<sub>2</sub> and CO decreases below the low alert level, the detector will enter the Post-Low Alert mode. If the concentration of NO<sub>2</sub> increases and exceeds 1.0 PPM or concentration of CO increases and exceeds 100 PPM the detector will enter the High Alert mode.

In the Post-Low Alert mode the red low alert LED will flash on and off being off for a shorter time than on. If the concentration of NO<sub>2</sub> and CO stays below the low alert level for the adjustable time delay, the detector will enter the Normal mode.

In the Pre-High Alert mode the red high alert LED will flash on and off being off for a longer time than on. If the concentration of NO<sub>2</sub> stays above 1.0 PPM or the concentration of CO stays above 100 PPM, for the adjustable time delay, the detector will enter the High Alert mode. The selected time delay for the High alert mode is identical to the selected time delay for the Low alert mode.

In the High Alert mode the red high alert LED will turn on and the high alert output relay contacts will close. If the concentration of NO<sub>2</sub> and CO decreases to below the adjustable low alert level, the detector will enter the Post-High Alert mode. If the concentration of NO<sub>2</sub> decreases to between the adjustable low alert level and 1.0 PPM and the concentration of CO decreases to between the adjustable low alert level and 100 PPM, the detector will enter the Low Alert mode. If the concentration of NO<sub>2</sub> remains above 1.0 PPM or the concentration of CO remains above 100 PPM for a fixed 15 minutes, the detector will enter the Alarm mode.

In the Post-High Alert mode the red high alert LED will flash on and off being off for a shorter time than on. If the concentration of NO<sub>2</sub> and CO stays below the low alert level for the adjustable time delay, the detector will enter the Normal mode.

In the Alarm mode the red high alert LED and the red alarm LED will be on, the internal audible alarm will sound and the alarm relay contacts will close. Pressing the alarm silence switch located on the bottom of the unit will silence the internal audible alarm. The detector will remain in the Alarm mode until the level of NO<sub>2</sub> falls below 1.0 PPM and the level of CO falls below 100 PPM. The internal audible alarm circuit will be activated as soon as the NO<sub>2</sub> level drops below 1.0 PPM and the CO level drops below 100 PPM. Brasch Manufacturing Company, Inc. can supply the optional external alarm. See the 6.0 Accessories Section (Page 8) for associated part numbers.

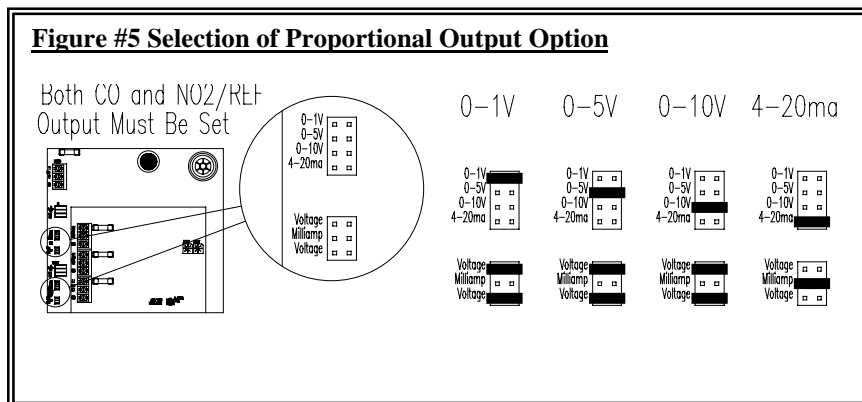
An additional safety feature of the detector is a continual internal CO sensor test. Should something cause the CO sensor to malfunction the detector will enter the Sensor Failure mode. Upon entering this mode the detector will turn on the yellow sensor LED, display the word “HELP”, generates a 0 proportional output signal for the CO output circuit, turns on the red low alert LED and closes the low alert relay contacts. This will keep the zone ventilated until the sensor malfunction is corrected.

### 3.0 Operational Settings

#### 3.1 PROPORTIONAL OUTPUT OPTIONS

The gas detector has four different proportional output options that are selectable on the transmitter board. The four options are 4 – 20 maDC current loop, 0 – 1 VDC voltage output, 0 – 5 VDC voltage output and 0 – 10 VDC voltage output. Any of the four options can be connected to a Direct Digital Control System (DDCS) or Building Management System (BMS). See 4.0 the Specification Section (Page 6) for the input impedance for each of the proportional outputs.

The output option is selected using a jumper and pin combination. See Figure #5 for location on the transmitter board. To change the setting, **turn off the power to the unit** and remove the cover. Place jumpers in the proper locations for the desired proportional output. Replace the cover and restore power to the detector.

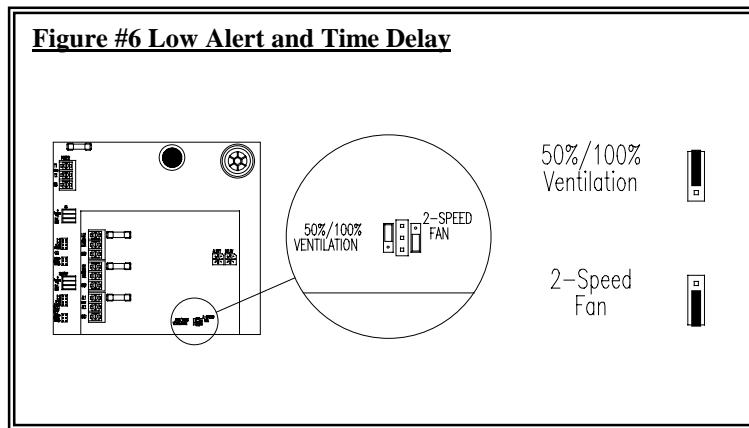


Each proportional output is controlled by the concentration of nitrogen dioxide or carbon monoxide (See Table #1, Page 5). If at any time a value of 0 maDC or 0 VDC is measured at the output, the gas detector has had a power or sensor failure (See 5.0 Troubleshooting, Page 7).

**TABLE #1 Proportional Output Values**

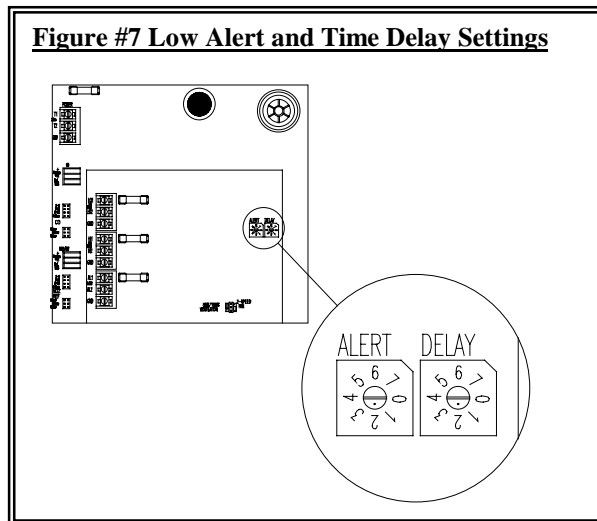
Nitrogen Dioxide PPM	Carbon Monoxide PPM	4 – 20 maDC Output Level	0 – 1 VDC Output Level	0 – 5 VDC Output Level	0 – 10 VDC Output Level
0.0	0	4.0	0.20	1.0	2.0
0.2	20	5.6	0.28	1.4	2.8
0.4	40	7.2	0.36	1.8	3.6
0.6	60	8.8	0.44	2.2	4.4
0.8	80	10.4	0.52	2.6	5.2
1.0	100	12.0	0.60	3.0	6.0
1.2	120	13.6	0.68	3.4	6.8
1.4	140	15.2	0.76	3.8	7.6
1.6	160	16.8	0.84	4.2	8.4
1.8	180	18.4	0.92	4.6	9.2
2	200	20.0	1.00	5.0	10.0

**3.2 FAN OUTPUT OPTIONS**



The gas detector can be configured to operate a 2 speed fan or 50%/100% ventilation equipment. The 50%/100% system is intended to be used in a ventilation system that employs more than one fan. On low alert the gas detector will turn on ½ the fans and when in the high alert mode all fans will come on. Either one of the options can be field selected on the output board. The output option is selected using a jumper and pin combination. See Figure #6 for location on

the output board. To change the setting, **turn off the power to the unit** and remove the cover. Place jumpers in the proper locations for the desired fan output option. Replace the cover and restore power.



**3.3 LOW ALERT SETTING:**

The factory setting for the low alert is set at 0.4 PPM of nitrogen dioxide and 35 PPM of carbon monoxide. The nitrogen dioxide can be adjusted from 0.1 to 0.8 PPM in increments of 0.1 PPM and the carbon monoxide can be adjusted from 20 to 55 PPM in increments of 5 PPM. Table #2 (Page 6) presents the switch settings and the detection level (PPM) of nitrogen dioxide and carbon monoxide. The alert rotary switch is located on the output board (see Figure #7). To change the setting, **turn off the power to the unit** and remove the cover. Rotate the alert rotary switch to the required low alert level PPM per Table #2 (Page 6). Replace the cover

and restore power to the detector.



Low/high operation is field selectable.

Proportional Outputs:	4 – 20 maDC	250Ω Maximum
	0 – 1 VDC	1000Ω Minimum
	0 – 5 VDC	1000Ω Minimum
	0 – 10 VDC	1000Ω Minimum

Separate proportional output for NO<sub>2</sub> and CO  
Proportional outputs are field selectable.

Calibration: The main transmitter module should be re-calibrated at the factory every two years. Contact the factory for re-calibration information and pricing.

Ratings:	Input Power:	24 VAC, 50/60 Hz, 28 VA
	Humidity:	10% to 90% (Non-Condensing)
Temperature:	Storage:	-50°C to 120°C (-58°F to 248°F)
	Operating:	-15°C to 40°C (5°F to 104°F)

Installation Category: II (local level, over-voltage transients less than 500 volts)

Indicators (LED Type):	Green LED:	Power ON
	Yellow LED:	Sensor Failure
	Red LED:	Low Alert
	Red LED:	High Alert
	Red LED:	Alarm
	Yellow LED:	NO <sub>2</sub> PPM
	Yellow LED:	CO PPM

Numeric Display: 4-Digit seven-segment display. Character height is 0.56 inches.

Dimensions: 7 5/8”H x 9 1/8”W x 2 1/4”D

Weight: 4 pounds

Fuse Rating:	Main Supply:	5x20MM, Time-Lag, 1.25 Amps
	Switching Relays:	5x20MM, Time-Lag, 5.0 Amps

## **5.0 Troubleshooting**

### **CAUTION:**

**Only qualified personnel should attempt to service this equipment. All power sources must be disconnected before removing the cover of this detector.**

1. Power LED not on:
  - A. Check for 20.4-26.4 VAC at terminals T1 & T2 (see Figure #2, Page 2).
  - B. Check circuit board fuse for continuity. If the fuse needs to be replaced use only the rated fuse listed in the 4.0 Specifications Section (Page 6).
  - C. Consult the factory.
2. Sensor failure light is on:
  - A. Remove CO sensor and reinstall noting correct terminal markings.
  - B. Replace transmitter board (includes sensor and calibration).
  - C. Consult the factory.

3. Unit calls for Low alert, High alert or Alarm but remotely connected devices don't respond.
  - A. Check all remote wiring and remote power sources for correctness.
  - B. Check the Relay fuses located next to Output and Alarm terminals for continuity. If the fuse needs to be replaced use only the rated fuse listed in the 4.0 Specifications Section (Page 6).
  - C. Consult the factory.
4. For any other situation please consult the factory.

## 6.0 Accessories

### Transformers:\*

120 VAC to 24 VAC @ 36VA	36T120N1
120 VAC to 24 VAC @ 75VA	75T120N1
208-240 VAC to 24 VAC @ 36VA	36T240N1
208-240 VAC to 24 VAC @ 75VA	75T240N1

Other voltage levels are available upon request.

\* Transformers supplied in a NEMA 1 enclosure intended for indoor use.

### External Alarms:

4" x 4" Electro-mechanical vibrating horn. Rated for at least 94 Decibels at 10 feet. The alarms are available in different input voltages, and are listed below.

24 VAC @ 0.9 amps	AL350F24AC
120 VAC @ 0.2 amps	AL350F120AC

**Sensor Re-calibration:** Factory re-calibration of the transmitter board including new sensor.

Contact factory for complete information and pricing.

**Brasch Manufacturing Company, Inc.**  
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 (314)291-0440  
 fax: (314)291-0646

### Limited Warranty

Brasch Manufacturing Co., Inc warrants gas transmitters, gas detectors, gas detector control panels and accessories for a period of one year from the date of shipment against defects in material or workmanship. Should any evidence of defects in material or workmanship occur during the warranty period, Brasch Manufacturing Co., Inc will repair or replace at its own discretion, without charge. The company shall not be held responsible for any charges in connection with removal or replacement of allegedly defective equipment, nor for incidental or consequential damages.