
CARBON DIOXIDE SENSOR DIESEL EXHAUST GAS DETECTOR

MODEL GVU-CO₂

TYPICAL INSTALLATIONS:

Parking Garages
Bus Garages
Fire Stations
Warehouses
Car Dealers

Vehicle Maintenance & Storage
Highway Departments
Utilities
Public Works
Tunnels

GENERAL DESCRIPTION:

The model GVU-CO₂ Carbon dioxide sensor is designed to interface with TOXALERT International GVU series control unit. The sensor/transducer consists of a patented solid state infrared CO₂ monitor housed in an attractive plastic case. The GVU-CO₂ has a new state-of-the-art lithium tantalite detector, updated electronics and unique auto-zero function. This results in very stable, calibration and longer trouble-free operation in the field. The new IR source is more rugged, operated at 10X derated power and has a life expectancy of 10 years. The new lithium tantalite detector enhances stability, has less ambient temperature sensitivity and faster response time. The GVU-CO₂ has a range of 0 to 2000 ppm with a repeatability of +/-20ppm. The enclosure has louvres to allow free passage of air to the sensing cell inside.



MODEL GVU-CO₂

STANDARD FEATURES:

- Microprocessor based
 - Power on indication
 - 10 year sensing element life
 - One calibration gas instead of two
 - State-of-the-art infrared Security
 - High CO₂ indication
 - Low voltage class two (2) wiring
 - Operating range meets OSHA standard
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BACKGROUND

The composition of diesel exhaust gases vary with the type of engine and with the rate of operation of these diesel engines. The prominent noxious gases of diesel engines are NOX [which is made up of NO (nitric oxide) and NO₂ (nitrogen dioxide)], followed by CO (carbon monoxide), SO₂ (sulfur dioxide) and SO₄ (sulfates).

Carbon monoxide (CO) sensors do a good job of detecting gasoline engine exhaust fumes, but because diesel engines output a smaller amount of carbon monoxide, (less than 1%) CO detection is not recommended for sensing diesel exhaust. There are no stable, inexpensive, or easy to maintain sensors for sensing nitric oxide or nitrogen dioxide which are the poisonous and the dominant diesel exhaust emissions. An investigation R18884*, done by the U.S. Department of Interior, Bureau of Mines shows that the carbon dioxide (CO₂) in diesel exhaust is relative to all the noxious gas contained within the diesel exhaust.

The Bureau report states "CO₂ is present in the diesel exhaust gases in the highest concentration of any of the pollutants," (13%). It further states "CO₂ is the only stable and nonreactive pollutant in the exhaust that is unaffected, to any appreciable extent, by time, emission control devices, or engine wear." For these reasons CO₂ is chosen to be the surrogate gas to be sensed to indicate dangerous levels of the noxious gases contained in diesel exhaust.

The report "established an estimate level of CO₂ -0.133 pct (percent) at which the other diesel pollutants are considered below harmful levels." The 0.133 percent would be equivalent to 1330 ppm of CO₂. Therefore if the CO₂ in environments where diesel exhaust is present is kept at or below 1300 ppm, a safe environment will be maintained.

* Report of Investigation 8884: Diesels in Underground Mining. A review and an Evaluation of an Air Quality Monitoring Methodology by J. Harrison Daniel, JR., Staff Engineer, Division of Health & Safety, Bureau of Mines, Washington, D.C.

SPECIFICATIONS

- **Operating Principal:** Non Dispersive Infrared
- **Gas Sampling method:** Diffusion
- **Range:** 0 to 2000 ppm
- **Response Time:** Less than 1 minute
- **Accuracy:** +/-5% of reading or +/- 75ppm, which ever is greater
- **Resolution:** 0.1 ppm
- **Operating Temperature:** 32° to 122°
(0°C to 50°C)
- **Relative Humidity:** 0 to 90% RH non-condensing
- **Dimension:** 5.2" x 3.2" x 1.4"
- **Weight:** 14.2 oz
- **Repeatability:** +/- 20 ppm
- **Typical Drift (per year):** +/- 75 ppm (@1200 ppm)
- **Storage Temperature:** -22°F to 140°F
(-30°C to 60°C)
- **Input Power:** 20-30 VAC (provided from GVV Control Unit)
- **Power Consumption:** Less than 2W @ 24VAC

INSTALLATION INSTRUCTIONS

1. INSTALLATION: *(For specific details see sensor manual)*

Locate a mounting location away from direct fresh air intakes, and mount vertically on wall or support column approximately 3 to 6 feet above floor. Refer to figures 1 and 2; Table 1 and 2 and installation instructions in GVU series control unit data sheet and install the GVU-CO₂ sensor as follows.

2. COVER REMOVAL:

To open the Model GVU-CO₂, use a coin in the slot on the bottom to release the snap. Lift the cover up slightly to disengage the closure and remove cover with a downward motion to clear the catch at the top of the unit.

3. MOUNTING

The model GVU-CO₂ is designed for flush mounting with two fasteners. The locations of the mounting points (shown in Figure 1) allow direct mounting on a standard simplex (single circuit) junction box. There is a wiring cutout in the center of the unit near the terminal strips.

4. SENSOR WIRING

WARNING: To prevent fire or shock hazard turn off power source to control unit before making connections. Comply with all local building codes and ordinances.

NOTE: Refer to Figure 2 and Tables 1 and 2. use shield cable to interconnect sensor and control unit if metal conduit is not used, or if conduit also contains AC wiring.

- 1.) Measure distance between sensing unit and control unit and select proper wire or larger wire from Table 1.
- 2.) Run wiring between control and sensing unit and into enclosure through access holes. Connect wires from terminal blocks in sensing unit to control unit per Table 2 and GVU series control unit data sheet.

Figure 1:
Model GVU-CO₂ Mounting Dimensions

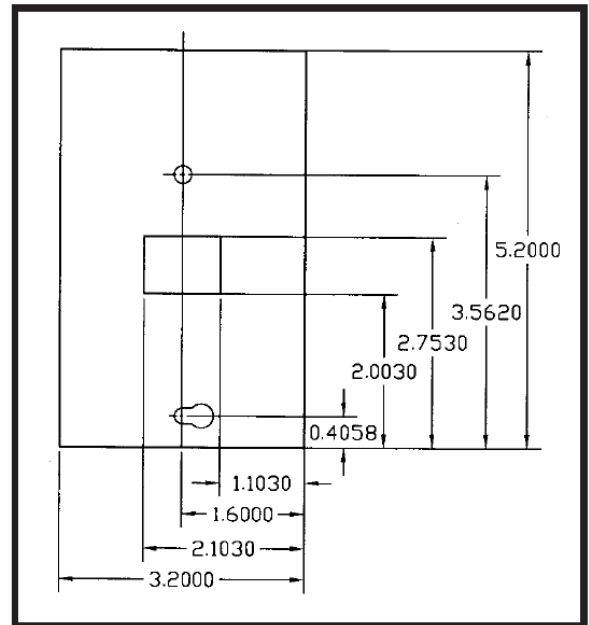


FIG. 2
Model GVU-CO₂ Component Locations

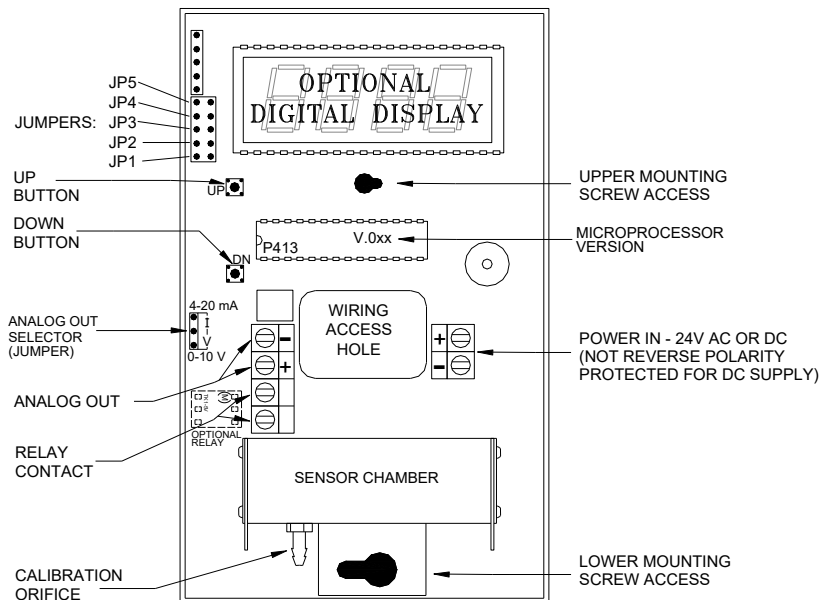


TABLE 1

AWG	DO NOT EXCEED
# 22 Wire	500 Ft. Sensor to Controller
# 20 Wire	800 Ft. Sensor to Controller
# 18 Wire	1300 Ft. Sensor to Controller
# 16 Wire	2000 Ft. Sensor to Controller

TABLE 2 WIRING CONNECTIONS

GVU-CO2	GVU-1	GVU-3 Expansion Board
Power In (+)	TB11-24 VAC	TB3-H (24VAC)
Power In (-)	TB11-24 VAC	TB3-N (24VAC)
Relay Contact	TB2-1	TB1-A1,B1,C1
Relay Contact	TB2-7	TB1-A7,B7,C7
**	TB2-5	TB1-A5,B5,C5

** Shield of cable (if used) should be connected at control unit only. Make sure sensor end is taped and isolated from terminals or metal.

5. START-UP

Reference Installation Manual

1. Verify all wiring connection are correct
2. Cover Replacement—Engage the top center of the cover under the latch at the top of the base, then press the bottom of the cover onto the bottom of the case until it latches.
3. Apply Power
4. Green power LED should light
5. Allow 5 minutes for warm-up

GVU SERIES PRODUCTS

CONTROLLERS

GVU-1	Control unit for use with one sensor
GVU-3	Control unit for use with one to three remote sensors
GVU-6	Control unit for use with one to six remote sensors
GVU-12	Control unit for use with one to twelve remote sensors
GVU-18	Control unit for use with one to eighteen remote sensors

REMOTE SENSORS

GVU-CO	Remote carbon monoxide sensor
GVU-CO ₂	Remote carbon dioxide sensor
GVU-NO ₂	Remote nitrogen dioxide sensor
GVU-VOC	Remote smoke/air quality sensor

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