

**GREYSTONE**  
ACCURACY BY DESIGN



## GAS DETECTORS



### INSTALLATION AND OPERATING INSTRUCTIONS

### PRODUCTS

**FGD Series – Refrigerant Detectors**  
**AGD Series – Toxic Gas Detectors**  
**CGD Series – Combustible Gas Detectors**

(All transmitters are factory set and calibrated)

**NOTE:**

This document provides the necessary information for the use and operation of Greystone gas detectors. Greystone Energy Systems Inc. reserves the right to make design modifications without prior notice.

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## INTRODUCTION

Greystone gas detectors are available in two (2) basic configurations; Analog or Relay. Each of these configurations are available in two (2) different sensor types with optional accessories for mounting and control.

## ANALOG SERIES

Each gas detector comes with a standard 4-20mA output signal and can be powered by AC or DC. This device has available, as options, one (1) DPDT relay, audible alarm, LCD and mounting enclosures (Nema 1 ABS standard). Note the FGD series, NDIR model, is also standard with a 0-10Vdc output.

## RELAY SERIES

Each gas detector comes standard with two (2) DPDT relays and audible alarm. This device has available, as options, an LCD and mounting enclosures. (Nema 1 ABS is standard)

**WARRANTY:** Greystone Energy Systems Inc. will repair, or replace, any product it deems a manufacturers' defect for a period of one year beyond invoice date, at no charge to the customer (calibration excluded). If a failed product is requested in advance of evaluation, and/or repair, the customer will be invoiced for a new product and the repaired product will be returned to that customer.

**NOTE:** Always confirm, prior to installation of the device (s), that the applications and configurations are as they were intended and suited for.  
Please note, calibration will be required annually and may be necessary more frequently depending on the nature of the application.

# SENSOR TECHNOLOGIES AND RANGES

DETECTOR SERIES	SENSOR TYPE	GAS DETECTED	DETECTION RANGE & ALARM LEVEL 1) Low 2) High
<b>CMD Series</b>	Solid State	Carbon Monoxide (CO)	0-250 ppm 1)35 2)200
	Electrochemical	Carbon Monoxide (CO)	0-500 ppm 1)35 2)200
<b>FGD Series</b>	Solid State	R11, R12, R22, R134a, R143a, & R502	250-2000 ppm R-11 1)1000 2)2000 Other 1)250 2)500
	Non-dispersive infra-red	As above, including R123	0-1000 ppm 1)30 2)600
<b>AGD Series</b>	Solid State	Ammonia (NH3) Diesel fuel Detector	0-100 ppm 1)25 2)35 0-10 ppm 1)0.72 2)2
	Electrochemical	Ammonia (NH3) Nitrogen Dioxide (NO2)	0-100 ppm 1)25 2)35 0-10 ppm 1)0.72 2)2
<b>CGD Series</b>	Solid State	Propane (C3H8)	0-100% LEL 1)25% 2)50%
		Hydrogen (H2)	0-2.5 % LEL 1) 1% 2)2%
	Catalytic Combustion	Propane (C3H8)	0-100% LEL 1)25% 2)50%
		Hydrogen (H2)	0-100% LEL 1)25% 2)50%

## DETECTOR MOUNTING HEIGHTS AND LOCATION

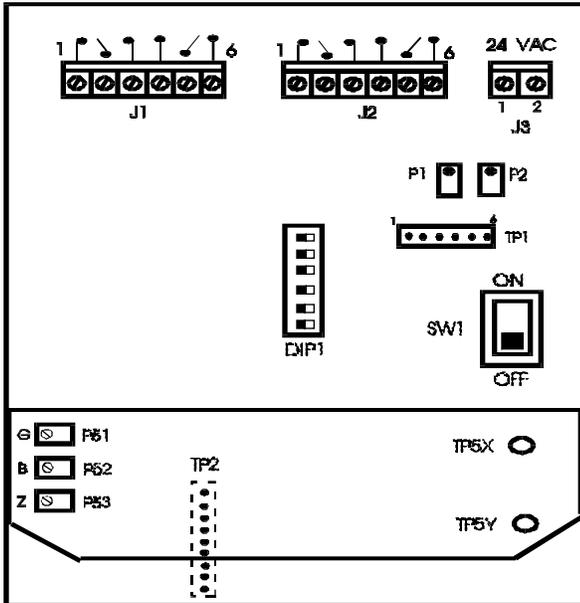
Please ensure that all sensors are installed 15 meters (50 feet) from a wall and must be kept away from fans, doors, air intakes, outlets, and etc.

**NOTE:** Standard enclosure (ABS Nema 1) mounts directly to 2" x 4" utility box.

GAS DETECTED	AREA COVERED	MOUNTING HEIGHT	MOUNTING LOCATION
Carbon Monoxide	700 sq. meters (7500 sq. ft.)	1.0 to 1.5 meters (3 to 5 feet)	Above floor (duct optional)
Refrigerants	160 sq. meters (1500 sq. ft.)	30 centimeters (1 foot)	Above floor
Ammonia	160 sq. meters (1500 sq. ft.)	30 centimeters (1 foot)	Below ceiling (duct optional)
Nitrogen Dioxide	700 sq. meters (7500 sq. ft.)	30 cm to 1 meter (1-3 feet)	Below ceiling (duct optional)
Methane	160 sq. meters (1500 sq. ft.)	30 centimeters (1 foot)	Below ceiling (duct optional)
Hydrogen	160 sq. meters (1500 sq. ft.)	30 centimeters (1 foot)	Below ceiling (duct optional)
Propane	160 sq. meters (1500 sq. ft.)	30 centimeters (1 foot)	Above floor (duct optional)

# RELAY SERIES

## PCB LAYOUT



## INSTALLATION AND OPERATION

To mount the unit, first remove the cover casing by removing the screws. Next mount the bottom to the wall, or junction box, using the holes provided (height and locations as per page 3).

Connect power to the unit (ensure SW1 is in the off position) 24Vac or Vdc required at J3.

Connect the outputs on the first level relay (J1) and to (J2), if required.

Relay Rating: 1/8 HP @ 240Vac and 5 amp @ 24Vdc.

### Example:

Inductive load (motor): 150VA rating or Resistive load (heater): 24Vac or 24Vdc @ 5 amps.

Turn switch (SW1) to ON position and replace top casing. After the initial power up sequence the green LED will be energized indicating the unit is operating.

The red LEDs indicate the level of gas concentration being read. If the first alarm level is reached, the second LED begins to flash and the first level (J1) is activated. When the concentration of gas that is being detected reaches the second alarm level (J2), the first LED blinks and the relay is activated. At this point, the audible alarm is energized.

One of the red LED's represent 10% of the reading (scale). Therefore, if three of the LEDs are lit, then 30% of the scale has been reached.

If the concentration of gas exceeds 110% of the scale, all the red LEDs are turned off and then turned on, one by one.

# OPERATION SETTINGS

## ALARM DELAYS

- 1) Turn switch SW1 off
- 2) Set dip switches to correspond to time
  - Dip 4, 5 & 6 - off = 0 minutes
  - Dip 4, 6 off & 5 on = 1 minute
  - Dip 4 on & 5 & 6 off = 5 minutes
  - Dip 4, 5 on & 6 off = 10 minutes
- 3) Turn switch SW1 on

## HIGH OR LOW AUDIBLE ALARM

- 1) Turn switch SW1 off
- 2) Low level alarm activation
  - Dip 2, 6 - off & 1 - on or Dip 1, 6 - off & 2 - on for High level alarm activation.
- 3) Turn switch SW1 on.

## ALARM SETTINGS

$$V_{pot} = \text{Calr} \times 4 / C_{max}$$

Where: Calr = Level of alarm to be set  
Cmax = Scale of reading of unit

Low alarm level -Connect a voltmeter on TP1 @ pin 3 (+) & pin 6 (-). Adjust P1 to get Vpot

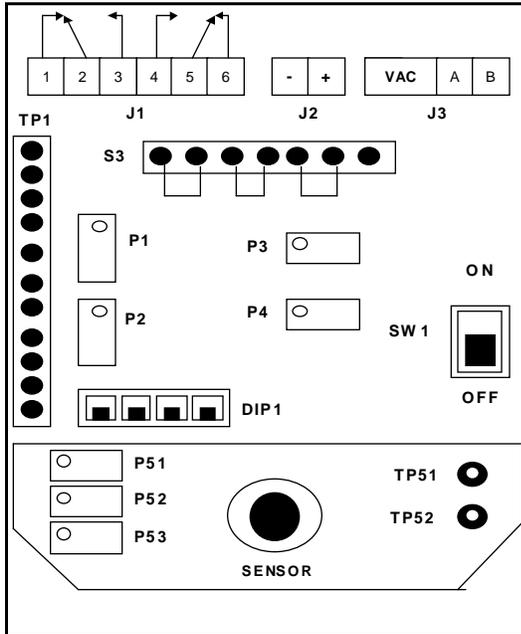
High level alarm – Connect a voltmeter on TP1 @ pin 2 (+) & pin 6 (-). Adjust P2 to get Vpot

### Example:

$$V_{pot} = 25 \times 4 / 250 = .40 \text{ Vdc}$$

# ANALOG SERIES

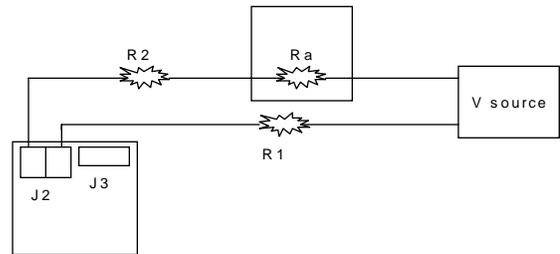
## PCB LAYOUT



## INSTALLATION & OPERATION

To mount the unit, first remove the cover casing by removing the screws. Next, mount the bottom casing, housing the PCB to the wall or junction box using the holes provided (height and location as per page 3)

**NOTE:** Transmitters are not loop-powered devices.



**WARNING** - Considerable damage may be caused if wiring examples are not strictly followed.

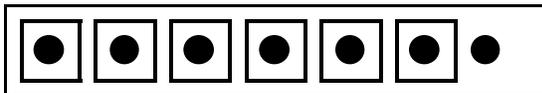
Before you start to connect your wiring, ensure that switch **SW1** is in the **off** position.

**Power requirements** - Each transmitter requires 17.0 to 27.0 Vac or 24.0 to 38.0 Vdc at terminal J3 (+1 & -2) Please note that terminals A & B (3 & 4) are for optional networking.

**Output** – All transmitters have a 4-20mA output and/or optional DPDT relay at terminal J1. (NDIR refrigerant sensors are also standard with 0-10Vdc output). The 4-20mA signal **must** respect the following loop conditions where:  $12 \leq V \text{ source} \leq 30 \text{ Vdc}$  and where the resistance must follow the following equation:  
 Total resistance  $\leq \frac{(V \text{ source} - 4 \text{ volts})}{20 \text{ mA}}$  **SEE ABOVE DIAGRAM.**

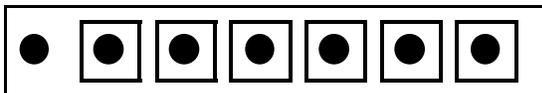
Total resistance = R1 + R2 + Ra (R1 & R2 is cable res. & Ra is sense res.)

**S3 JUMPER SETTINGS:** All transmitters are factory shipped in the **Passive** configuration.



S3 jumper settings – **Passive**

**Passive configuration** requires separate 24Vdc supply to power 4-20mA @ J2.

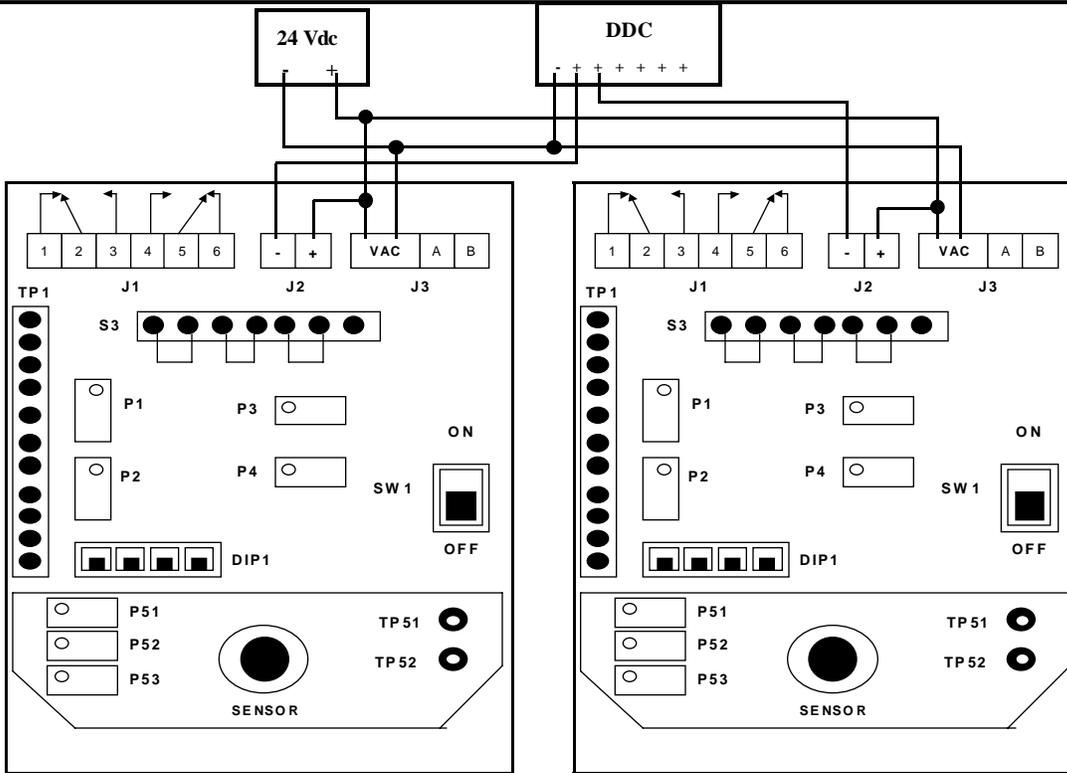


S3 jumper settings - **Active**

**Active configuration** requires a **SEPARATE POWER SUPPLY** for each transmitter. **Severe damage may be caused.** See page 6 for wiring example.

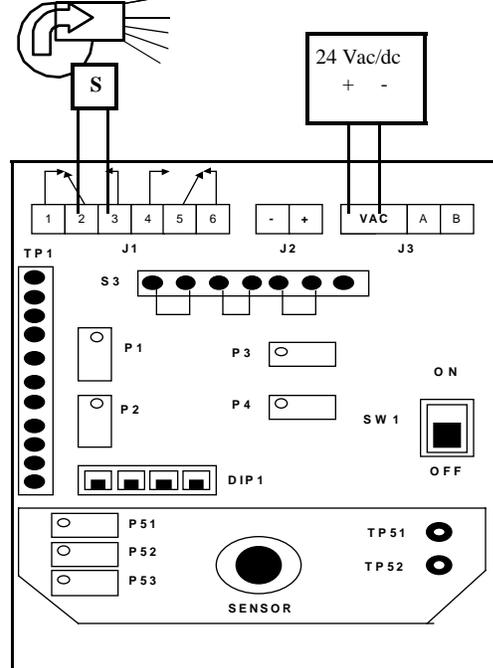
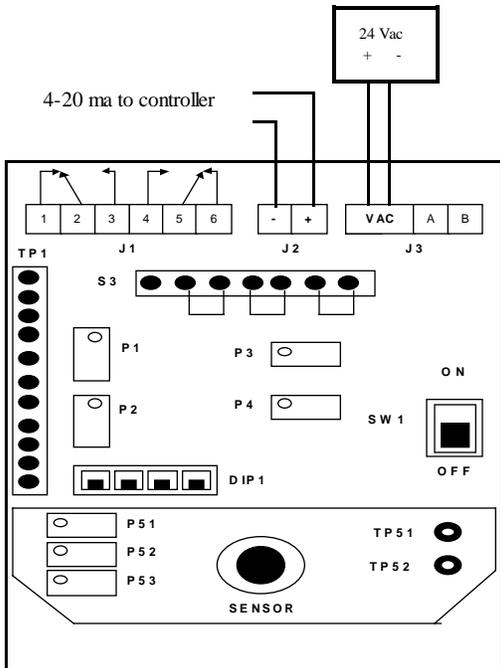
# ANALOG WIRING DIAGRAMS

24 Vdc supply, 4-20mA output in a **PASSIVE** 3-wire multiple or single unit configuration.



24 Vac supply, 4-20 mA output, **ACTIVE** configuration, and **dedicated power supply**

24 Vac/dc supply, and relay activated to turn on exhaust fan at desired level



# ANALOG OPERATION SETTINGS

PCB DESIGNATIONS	RELAY ADJUSTMENT
<p>J1 - DPDT relay (optional)                      J2 - 4-20mA output                      J3 - 1 &amp; 2-Power supply (Vac/dc)                      - 3 &amp; 4 (A&amp;B) RS-485                      S3 - Passive/Active 4-20 jumper                      SW1 - On/Off switch                      P1 - Alarm reset pot                      P2 - Alarm set pot                      P3 - 4mA set pot                      P4 - 20mA set pot                      TP1 - Test point header pins                      P51 - Calibration pot                      P52 - Calibration pot                      P53 - Calibration pot                      DIP1 - Dip switch</p>	<p><b>Relay on</b> – Connect voltmeter at Pin 11 (-) &amp; Pin 9 (+) on TP1. Adjust P2 to read the alarm level (Vr).</p> <p><b>Relay off</b> – Connect voltmeter at Pin 11(-) &amp; Pin 8 (+) on TP1. Adjust P1 to read the alarm level (Vr).  <i>Where : Vr = 2.5 x Calr / Cmax.    Where :</i>                      Calr = Gas concentration for alarm and                      Cmax = Scale of detector range</p> <p><b><u>Example:</u></b> CO sensor, solid state on at 40ppm</p>
	<b>4-20 mA ADJUSTMENT</b>
	<p>Disconnect all wires from 4-20mA terminal (J2), set S3 to active mode and connect current meter to 4-20mA terminal (J2). Short pins 11 &amp; 7 on TP1 and adjust P3 to read 4mA. Short pins 6 &amp; 7 and adjust P4 to read 20mA. Configure S3 to original position.</p>

# DUCT SAMPLING ENCLOSURE

## PLACING THE SAMPLING ENCLOSURE

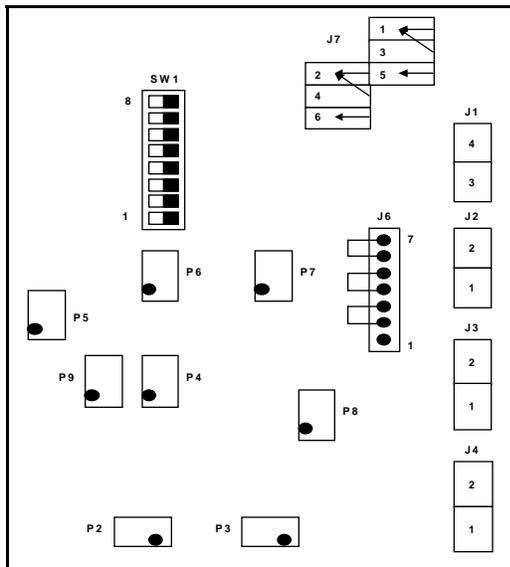
This enclosure system is used to sample the air flowing through ventilation ducts. This unit is suitable where the air velocity is between 500 and 4000 feet per minute and is generally installed in the main return ventilation duct. It is the installer's responsibility to follow all local and federal regulated codes to ensure proper positioning of the enclosure. It is recommended that the unit be installed, in straight duct, at least three (3) feet from any curve or obstruction.

## INSTALLATION

1. Remove cover to expose sensor PCB or enclosure. Remove PCB/enclosure from the sampling unit.
2. Place the sampling unit against the duct at the desired location. Mark the eight (8) holes in the back of the enclosure with an ink pencil, or equivalent, then remove.
3. Pre-drill the six (6) small holes to accept No. 8 screws. The two (2) larger holes are to be cut to accept the 1/2" conduit tubing.
4. Affix the sampling unit to the duct.
5. The sampling tubes can now be inserted. For proper sampling tube operation, the holes of the inlet sampling tube (3-foot piece) should be open to the airflow. The exhaust tube (1-foot piece) should be away from the airflow. If the inlet tube is longer than the duct, penetrate the tube through the other side to stabilize the tube. Seal the end of the tube with an airlock or plug and also any perforations outside the duct. It is not necessary to seal the tube if it is inside the duct. Make sure to tighten the two (2) retaining screws to hold the sampling tubes.
6. Enter your wiring through the conduit holes provided, remount PCB/enclosure, wire as shown in diagrams and replace cover for proper operation.
7. Before mounting the cover of the sampling unit box, start the ventilation feeding fan and check if there is any leakage.

# FGD-NDIR Wiring

## PCB LAYOUT

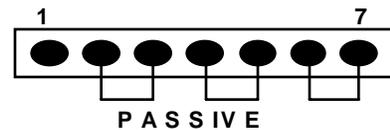
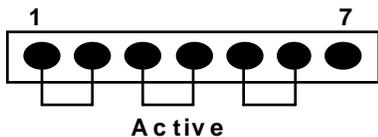


## PCB DESIGNATIONS

- J1 - RS-485 (+3 & -4)
- J2 - 0-10Vdc output (+1 & -2)
- J3 - 4-20ma output (+1 & -2)
- J4 - Power Supply (24-38 Vdc, 17-27Vac)
- J6 - Passive/Active 4-20mA output jumper
- J7 - DPDT relay output
- P2 - Zero adjustment of 0-10Vdc out
- P3 - Span adjustment of 0-10Vdc out
- P4 - Min "A" of the alarm
- P5 - Zero adjustment of infra-red cell
- P6 - Span adjustment of infra-red cell
- P7 - Span adjustment of 4-20ma output
- P8 - Zero adjustment of 4-20ma output
- P9 - Max "A" of the alarm
- SW1 - Dip switch (1 - 8)

# WIRING INFORMATION

**4-20mA OUTPUT** - Wiring examples as per page 6. Please ensure that J6 (on NDIR) is configured correctly as shown below to be **PASSIVE** or **ACTIVE**.



**0-10Vdc OUTPUT** is available through the J2 Terminal.

**CAUTION: DO NOT** attempt to connect any power source to the 0-10VDC output.

# OPERATION SETTINGS

## STAND ALONE AND LCD SETUP

Set SW1: 1-off, 2-off, 3-on, 4-off, 5-off, 6-off, 7-off and 8-off. If equipped with LCD set 2-on.

## RELAY ADJUSTMENT

**Relay on** – Connect voltmeter at J2 (0-10Vdc)  
Configure SW1; - - off off - off off on  
Adjust P9 to read the alarm level (Vr)

**Relay off** – SW1; - - off off - off off off  
Adjust P4 to read alarm level (Vr)  
Where: Vr = {10 volt x (C)} / 2000  
(C) = level of concentration

Example: 1000 ppm = (C)     $10 \text{ volt} \times (C) = (V) = 5 \text{ volts}$

## OUTPUT CALIBRATION

Disconnect all wires from 4-20mA (J3) and 0-10Vdc (J2). Configure J6 to ACTIVE mode.

**4-20mA** - Set SW1; - - off off - on on off.  
Connect voltmeter on J3 and adjust P8 to attain 4mA. Set SW1; - - off off - on on on.  
Adjust P7 to attain 20mA. Return all settings to original position.

**0-10Vdc** - Set SW1; - - off off - on on off.  
Connect voltmeter on J2 and adjust P2 to attain 0 Vdc. Set SW1; - - off off - on on on . Adjust P3 to attain 10 Vdc.