# Optio V


# Operations

# &

# Safety Manual

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## Warranty & Disclaimer Information

Due to Conspec Controls Inc.'s continuous effort to produce the highest quality monitoring equipment possible, products described in this manual are subject to change at any time without notice. While every effort has been made in preparing this manual to include all information pertinent to the installation, maintenance, and calibration of the product, Conspec Controls Inc. assumes no responsibility for errors, omissions, or any loss due to said errors or omissions.

A gas monitoring system alone cannot prevent hazardous conditions from occurring. The reliability of a gas monitoring system, and the resultant safety level is dependent on, and the responsibility of the user. The user's responsibilities include, but are not limited to:

*Insuring that the correct equipment is specified for conditions at the particular site

*Following recommended installation and wiring guidelines

*Meeting all applicable safety and electrical codes

*Scheduling regular calibrations and servicing

*Replacing inoperative or questionable parts or units

## Warranty

Conspec Controls Inc. provides warranty service for one (1) year from the shipping date on all electronic and mechanical components. Sensor elements are considered a consumable part subject to varying conditions which can affect their expected life. Sensor elements are covered under warranty for a period of six (6) months. Damage to sensor elements due to overexposure of the target gas, poisoning, or other factors beyond Conspec's control are not covered under warranty. Warranty service is limited to defects in materials and workmanship on units which fail under normal use. Conspec will repair or replace any unit found to have failed due to defects in materials or workmanship. This warranty is voided if the unit has been misused, damaged due to incorrect wiring, or altered before return to the factory. Warranty claims that are denied will be billed at the standard rate. Expedited shipping is not covered under warranty.

No other warranty is authorized other than the above. Before returning a product for service, call Conspec Controls Inc. for a Return Authorization Number (RA#) at (800) 487-8450. Returned units should be packaged securely as damages incurred during shipping are not covered under warranty.

## OPTIO V System Overview

The Optio V is a stand-alone microprocessor based multi-gas detector in a NEMA 4X enclosure. This detector has optional 120VAC/24VAC/24VDC input power with maximum current consumption of 50mA. The onboard dry relay contacts are rated at 2A @ 220VDC/250VAC. Two (2) scalable 4-20mA outputs (optional) and Modbus communications (optional) can be used alone or in conjunction with the relay outputs if needed. Both CO and NO2 sensors are of the electrochemical type. Sensors are pre-calibrated from the factory and pre-programmed with alarm levels. The Optio V has a 2”x1” LCD that displays concentration levels and alarm status. An infrared remote (optional) is used for menu navigation and calibration.

**Purpose:**

The Optio V CO/NO2 detector is intended for ventilation control in enclosed parking spaces such as parking garages, vehicle maintenance facilities, warehouses, etc. Dry contact relays with programmable alarm points are provided for fan control and can be used in conjunction with external relays for louvre/damper control. Upon a preset alarm (Default: 25ppm CO / 1ppm NO2) the relays will change state to initiate the fan(s). Once the concentration drops below a preset level (Default: 15ppm CO / 0.7ppm NO2) a 5-minute timer will begin for fan shutdown. This prevents short cycling and possible damage to the fan motor. Modbus communications (optional) can be used for monitoring with a building automation system (BAS) and (2) optional 4-20mA outputs can be used to send a signal to variable frequency drive (VFD) controlled fans. The detector can support remote cable extension of carbon monoxide or nitrogen dioxide sensors (optional) at a distance of up to 100ft. The Optio V is a stand-alone unit and can be wired together with multiple units to create a system.

## Specifications

### INPUT POWER OPTIONS

- 12 – 24 VDC
- 24 - 120VAC 50/60Hz

### POWER CONSUMPTION

- Max 50mA @ 24 VDC

### TEMPERATURE & HUMIDITY RANGE

- -20 to +50°C
- 15-90% RH non-condensing

### IO CAPABILITIES

- 6 Digital input/output (0-5.0V)
- 6 Relay Ports (250VAC-220VDC, 2A) with Failsafe or Normal operation. Can be linked to Alarm states or controlled via Modbus.
- 2 channels 4-20mA outputs

### COMMUNICATION INTERFACES

- Modbus RTU (RS485)

### User Interface

- IR remote control

### CONFIGURATION

- Local Menu Display via graphical LCD
- Modbus Register Map

### MENU & DISPLAY

- Intuitive menu navigation via LCD
- Password protected (User or Admin)
- Quick Review screens show additional diagnosis and Monitor Settings
- Real-time gas readings on screen
- Dimmable RGB backlight and Contrast
- Backlight color indicates monitor status

### ALARMS

- 4 Alarms with hysteresis and hold times
- Sensor Fail-High and Fail-Low
- Ability to link Alarm states to Relays

## Sensor Specifications

Detectable Gas: Carbon Monoxide (CO)

- Detection Range: 0-500 ppm
- Expected Lifetime: 7 years
- Operating Temperature: -20 to +50 degrees C
- Humidity Range: 15-90% RH

Detectable Gas: Nitrogen Dioxide (NO2)

- Detection Range: 0-20 ppm
- Expected Lifetime: 2 years
- Operating Temperature: -20 to +50 degrees C
- Humidity Range: 15-90% RH

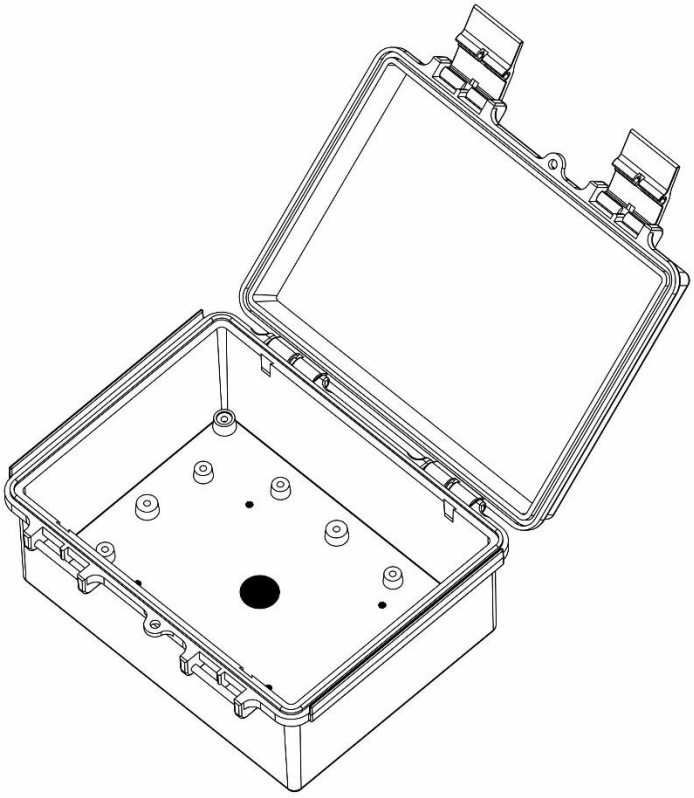
## Passwords

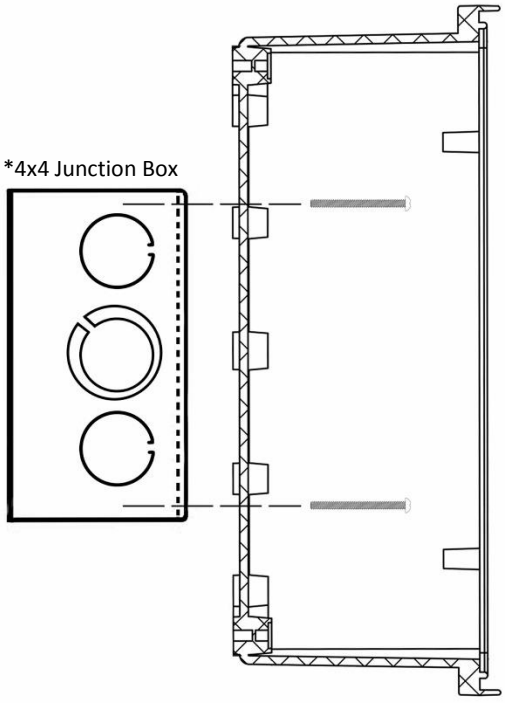
- User: 123 (This password has limited access to system configurations and calibration)
- Admin: 321 (This password has more access to system configurations and calibration)

## Installation and Wiring Instructions

**Mounting Location:** Select locations to mount the monitor(s) to best suit the needs of the room or facility. Generally, near the middle of the room, between the exhaust fan and the fresh air inlets is most preferable. In most situations, the monitor should be mounted approximately 5 feet above the floor in an area where air movement is present.

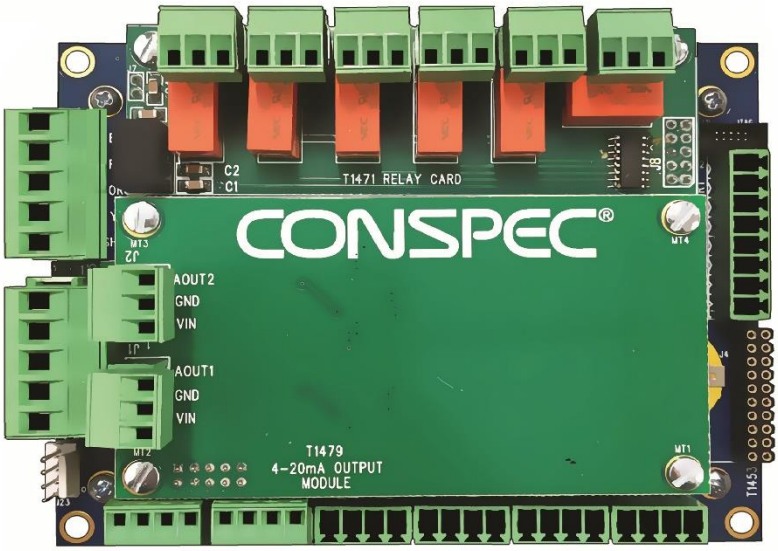
**Mounting Instructions:** The Optio V enclosure comes with four pre-drilled mounting holes. Hole placement is designed for quick and easy mounting to any standard 4x4 junction box.





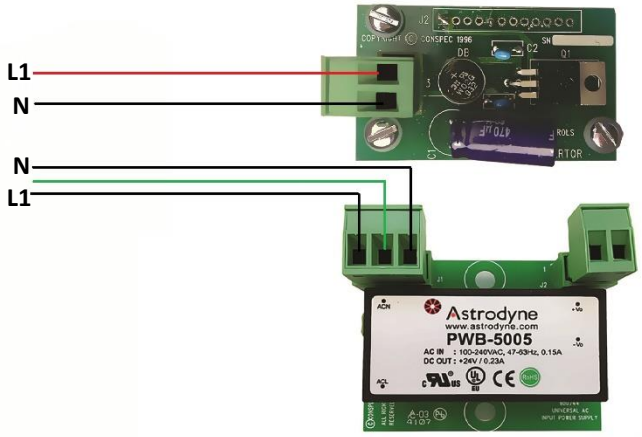
**Wiring Instructions:**

**Input power wiring options: 120 VAC and 24 VAC**



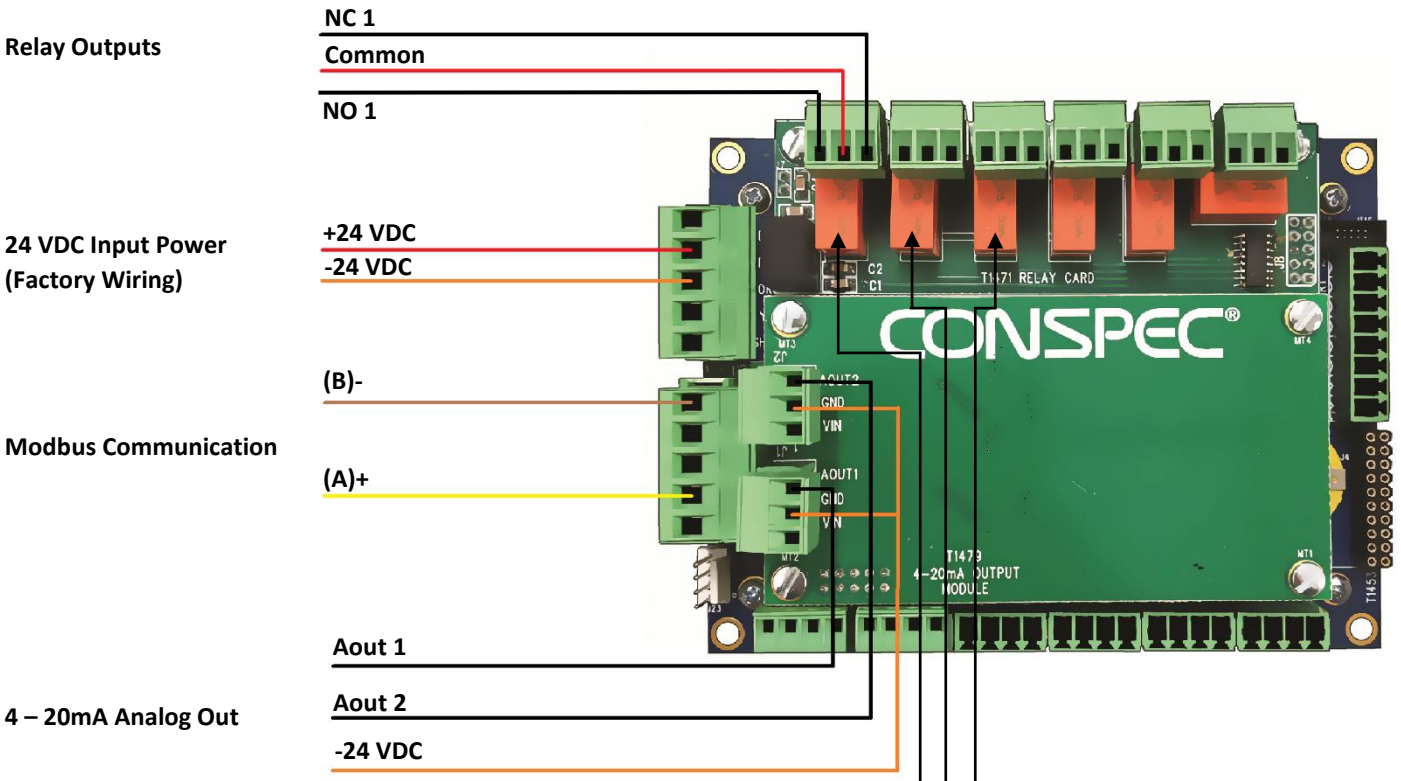

**24 VAC Input Power**

**120 VAC Input Power**



The Optio V monitor is capable of handling multiple different output types. Below is the field wiring for each option:

(Board below consists of all possible output options; your board may appear different)




## Relay Descriptions

### Fan Control Relay (Failsafe Operation)

When the gas concentration value reaches the desired set point the relay coil will de-energize. Used to turn on an exhaust fan for the purpose of clearing an enclosed space. As an added safety feature, after the gas value has dropped below the desired set point this relay will remain de-energized (e.g. fan remains on) for a period of five minutes. This is to ensure complete removal of hazardous gases and prevent relay from short cycling.

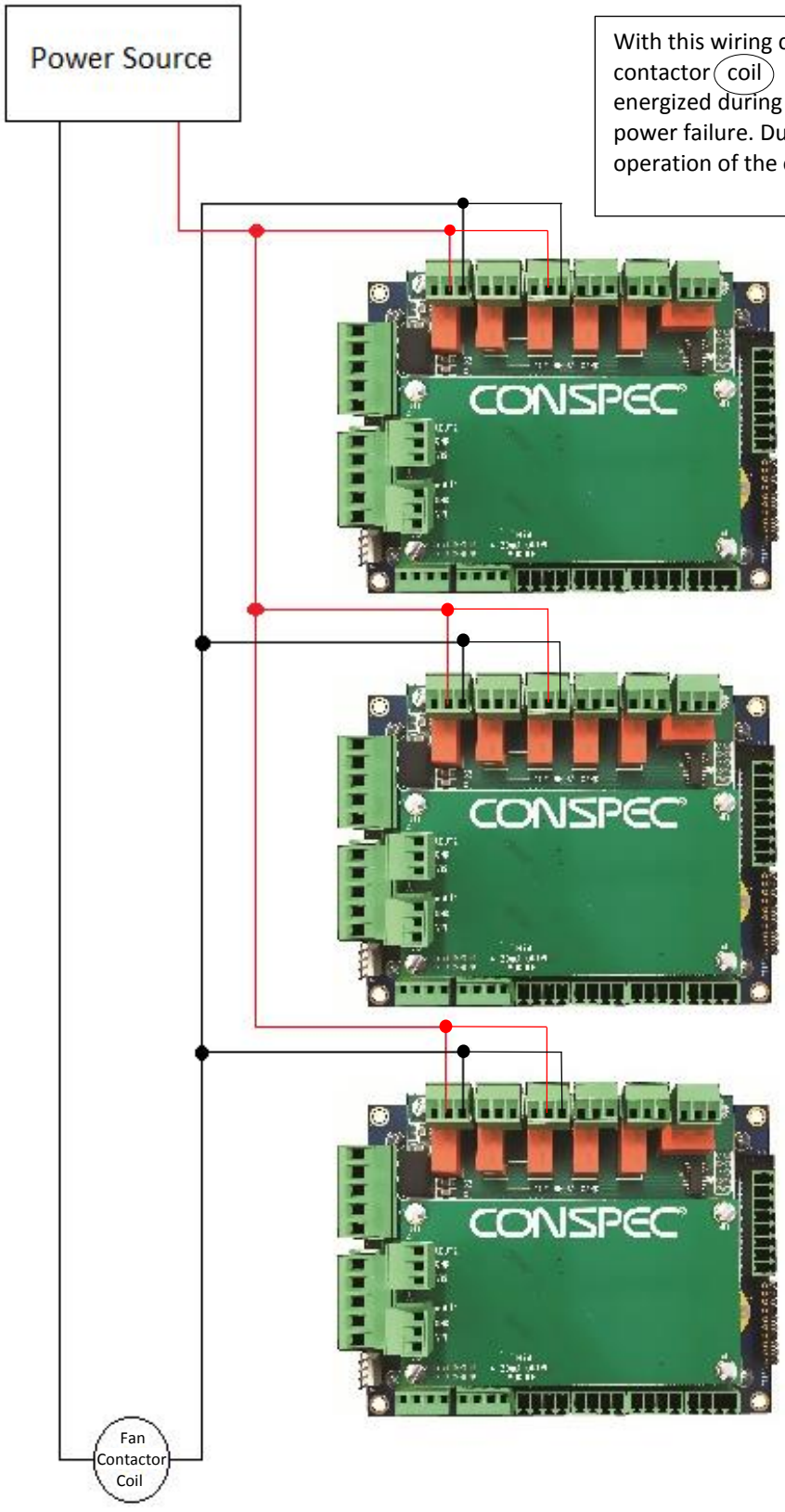
### Alarm Relay (Normal Operation)

When the gas concentration value reaches the desired set point the relay coil will energize. It is used to activate audible and/or visual indicators at a remote location.

### Trouble Relay (Failsafe Operation)

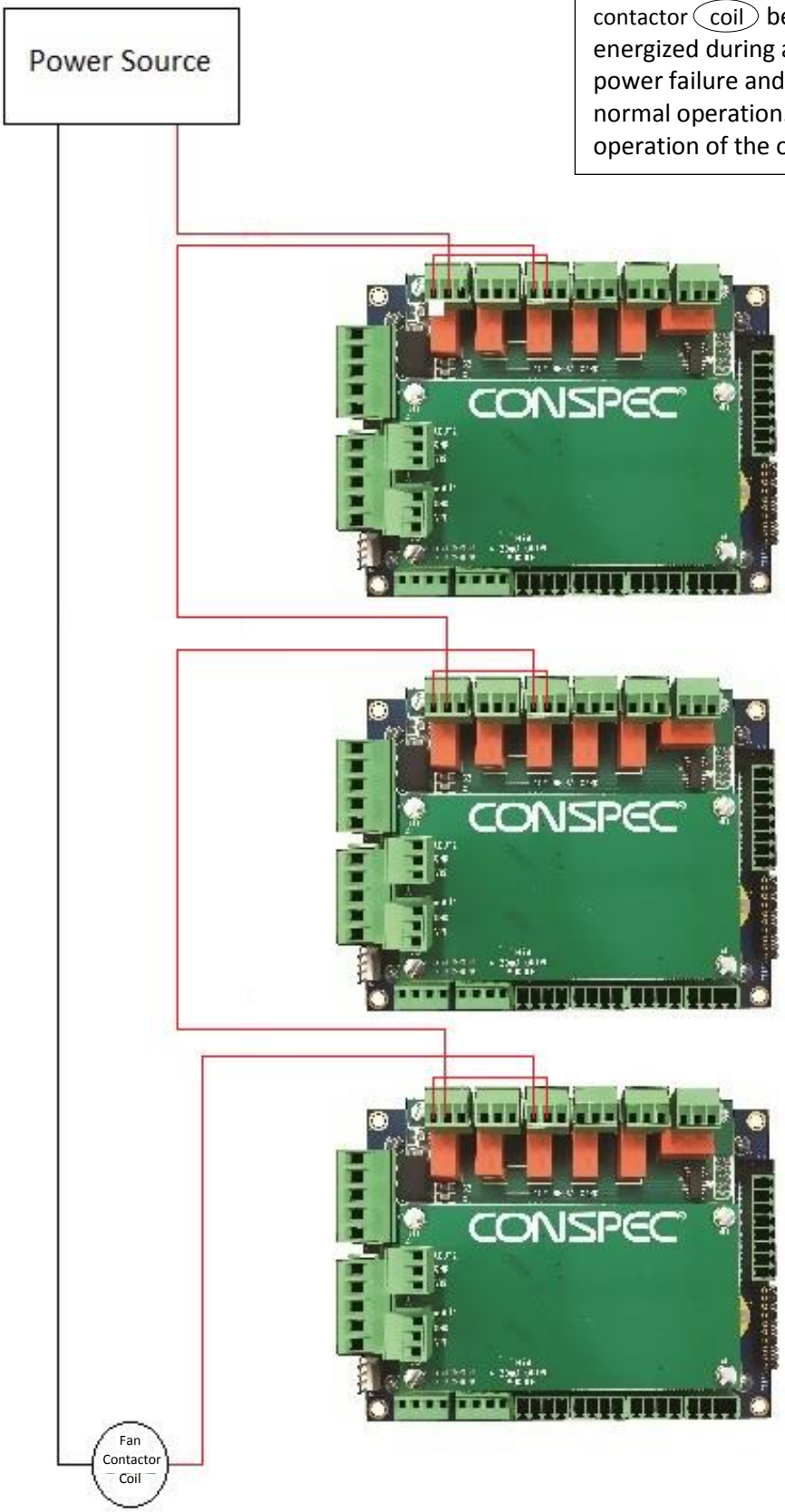
Relay coil will de-energize if the monitor losses communication with the sensors or recognizes that it has drifted either above or below its capabilities.

## System wiring using relay outputs

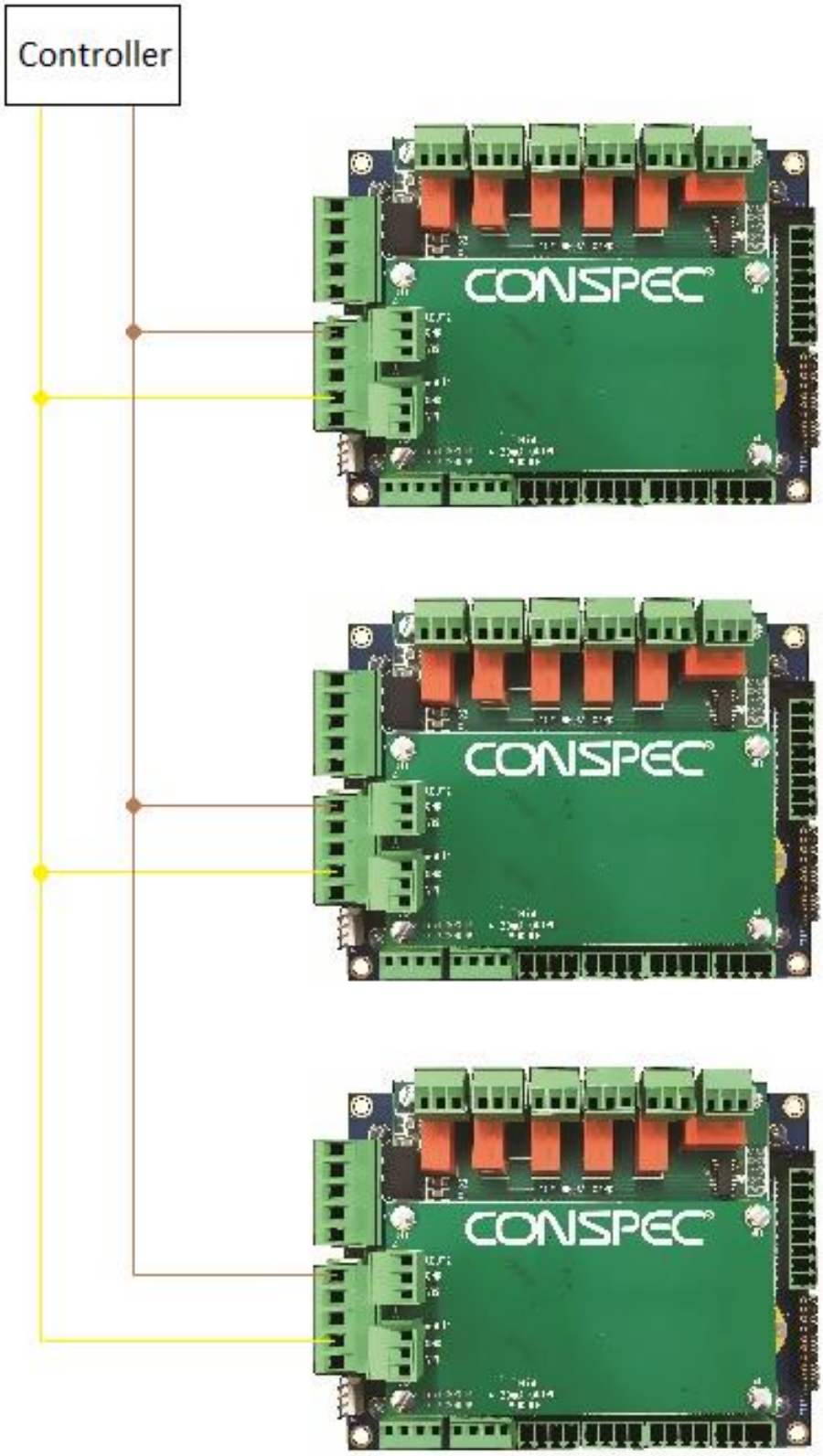


With this wiring configuration, the fan contactor (coil) below becomes de-energized during an alarm state or power failure and is energized under normal operation. Due to the fail-safe operation of the on-board relays.

*Factory installed jumper must be moved for this configuration

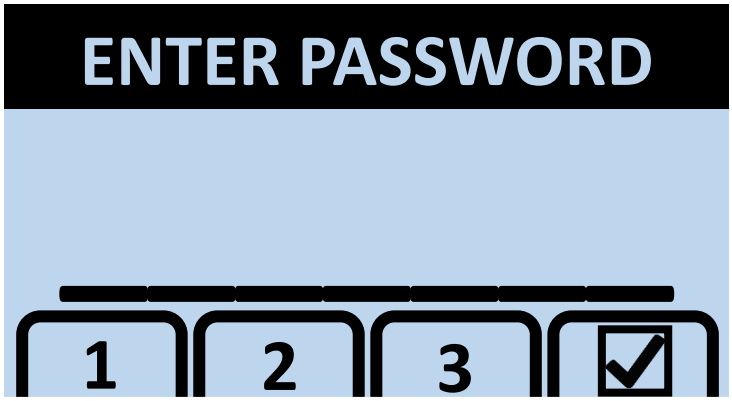


**Typical system wiring using Modbus communication**

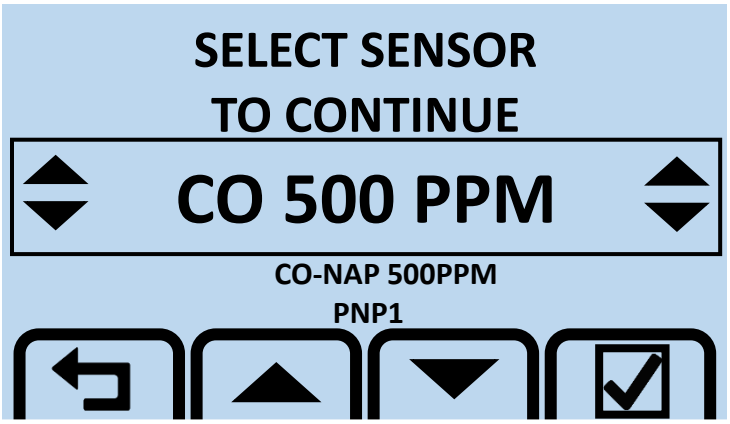


## Sensor Calibration

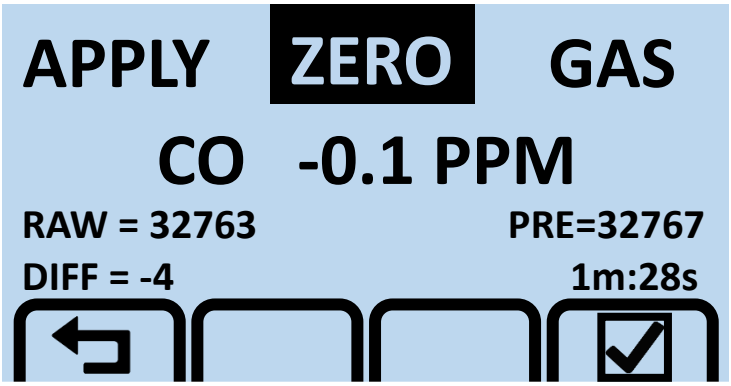
The first screen will ask for a password entry:




The default user password is “123”. Once the password has been entered successfully, select the “ Gas Calibration” tab, and from there you will pick which of the two sensors you would like to calibrate, using the up and down arrows on the IR remote to toggle between the sensors, and press the enter button to begin calibration.

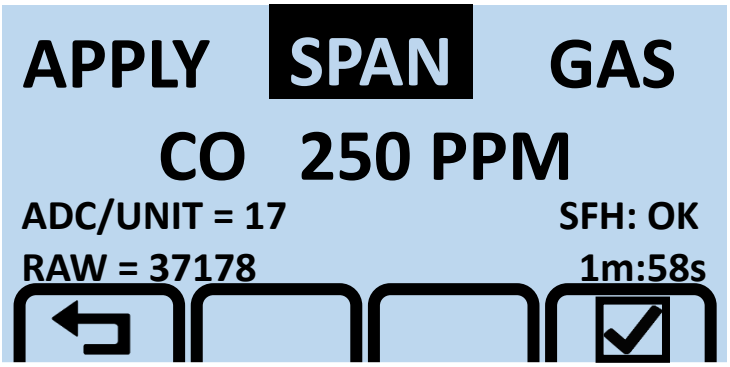


## 1. Zero Gas Calibration:




Apply zero gas (20.9% by volume oxygen) for a minimum of two minutes. After the two-minute time period, press the enter button to proceed to the span gas calibration.

## 2. Span Gas Calibration:



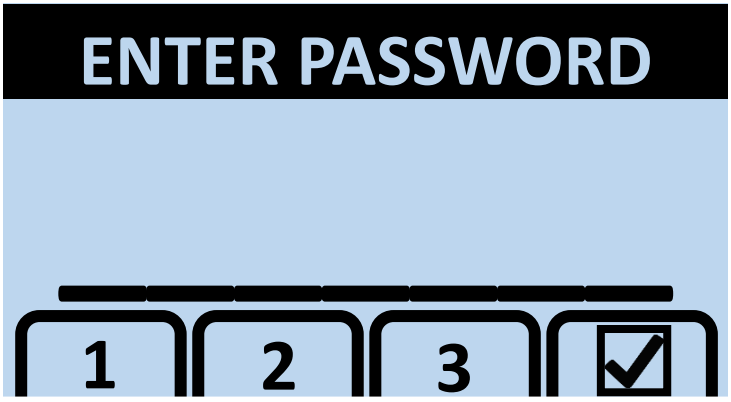

Apply span gas (250 ppm carbon monoxide (CO), or 10 ppm nitrogen dioxide (NO2), depending on which sensor you are calibrating) for a minimum of two minutes. The Span gas value will be shown on the screen and must match the value on the gas tank. After the two-minute time period, press the enter button to complete the calibration.

If the calibration is successful and passes all the internal checks, a window will be displayed indicating the calibration was successful. The user needs to press enter to save the calibration. After the calibration has been successfully saved, there is a purge period that allows the user to purge the monitor. During the purge period, no alarms will be set. If the user exists the purge screen without flushing out the calibration gas, then the alarm(s) and relay(s) will be set.

However, if the calibration had failed, the user will be notified that the calibration failed and will be offered an opportunity to redo the calibration.

## 4-20mA Calibration

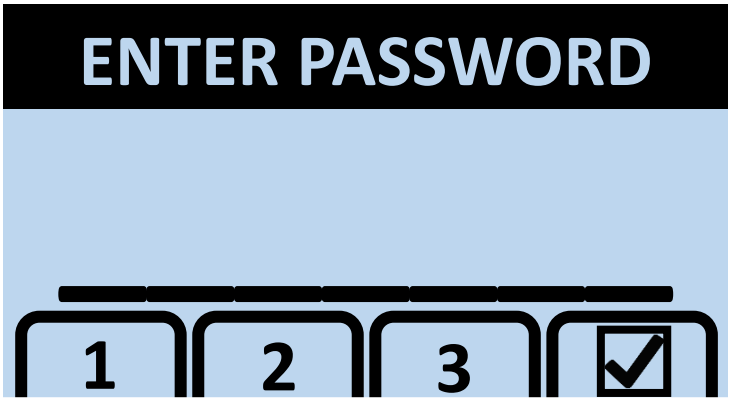
The first screen will ask for a password entry:




The default admin password is “321”, this password is different from the above sensor calibration password. (It is recommended that only users with admin rights have access to this password) Once the password has been entered successfully, select the” 4-20mA Setup” tab. From there the user will choose either channel 1 or 2 depending upon what 4-20mA output is being calibrated. Channel 1 is the output for the carbon monoxide (CO) sensor and channel 2 is the output for the nitrogen dioxide (NO2) sensor. After picking the channel, proceed to pick the “4-20mA calibrate” tab. Using a multimeter, verify the 4mA then the 20mA output, using the up and down arrows on the IR remote to change the value. If the calibration is successful and passes all the internal checks, a window will be displayed indicating the calibration was successful. The user needs to press enter to save the calibration.

## Modbus Configuration

The first screen will ask for a password entry:



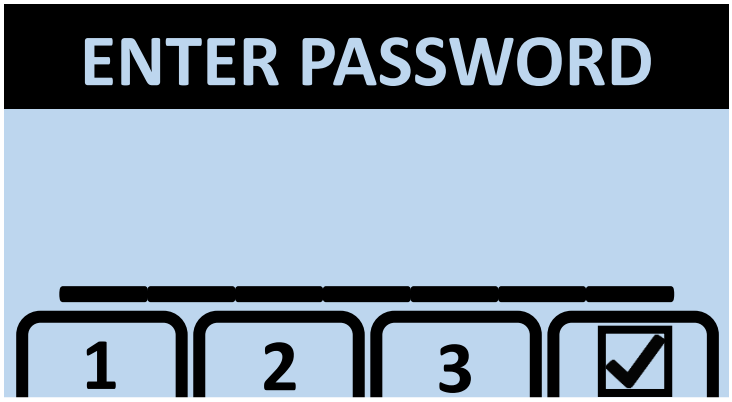

The default user password is “123”. Once the password has been entered successfully, select the “ Serial Setup” tab, this option allows the user to change the serial communication configurations.

a. **Address:** The Modbus address of the device
b. **Serial Input:** These can be either TRUNK/RS232/RS485
   ***Serial input must be set to RS485
c. **Baud Rate:** The baud rate of the device, select one of the options:
   1200/2400/4800/9600/19200/38400/57600
d. **Stop Bits:** The number of stop bits
e. **Parity Bit:** The parity bit, EVEN/ODD/NONE

If using Modbus communication, please contact Conspec Controls for full register map 1-800-487-8450

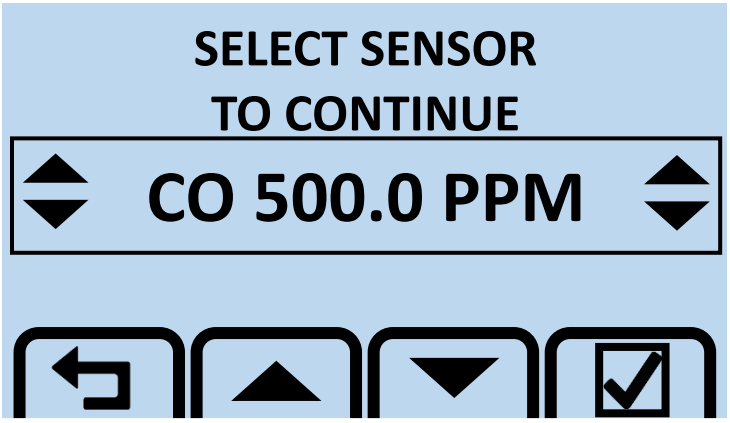
## Alarm Settings

The first screen will ask for a password entry:




The default user password is “123”. Once the password has been entered successfully, select the “ Alarm Setup” tab, the user will be allowed to change the alarm settings for a specific sensor input.

If more than one sensor is present, the user will be asked to select a sensor:



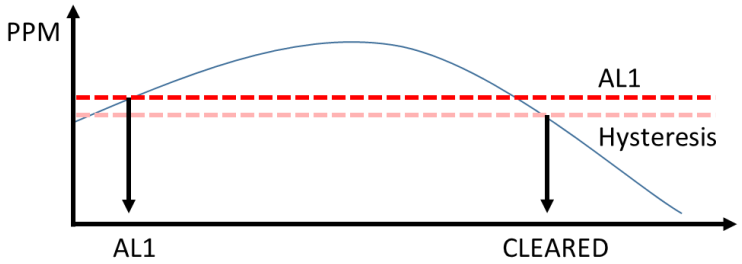

The user will then be required to select which alarm to configure by scrolling using the up/down keys. The alarm options in the menu are:

| | | | | |
|---|---|---|---|---|
| | Sensor Fail High | | | Alarm 2 |
| | Sensor Fail Low | | | Alarm 3 |
| | Alarm 1 | | | Alarm 4 |

Once the user has selected which Alarm is being configured, they will be taken to another screen that allows the user to determine which specific aspect of the alarm that can be configured. The options are:

a. **Alarm Level**: An option to set the numerical value of the alarm. The window will indicate on top the current set value.

b. **Hysteresis Level**: This can also be referred to as the dead band to clear alarm. When the sensor is in alarm, the reading must fall below the alarm level and an extra hysteresis level to clear the alarm.




c. **Alarm Hold Delay**: The delay time that needs to elapse before a status is changed. For example, if the delay hold time is set to 3 seconds, if the value goes into an alarm state, it needs to stay in that state for a minimum of 3 seconds before the state is changed from normal to alarm. This is used to prevent nuisance alarms.

d. **Alarm Enabled/Disabled**: The option to Enable or Disable certain alarms. Users may only want to use only two alarms rather than four, so this will allow them to disable alarms three and four.

e. **Alarm Direction**: There are two basic options for this; rising and falling. Certain alarms are dangerous as the values increase, such as CO. In a situation like that you would select the rising condition. Other gases such as O2, it is more dangerous to have lower values. In that situation, you would use a falling condition. Also, all Sensor Fail Low (SFL) alarms are falling type alarms because Electrochemical sensors drift down in reading as they age, and requires a recalibration to restore normal operation.

## Maintenance and Repairs

### Maintenance

This Gas Detection Monitor requires evaluation every thirty (30) days to ensure accuracy. The Monitor should be checked for accuracy by applying a known concentration of the target gas that exceeds the programmed alarm levels. The displayed gas value will stabilize as the gas fills the calibration chamber within the sensor head. When the programmed alarm levels are breached, the alarm output for that level would be activated subsequently to the programmed alarm delay duration. The displayed target gas value should match that of the concentration of test gas. Any warning or control devices connected to the alarm outputs should remain connected during this test to ensure proper operation of the entire gas detection system. Replace any inoperative or questionable parts immediately. This gas detection monitor requires calibration every ninety (90) days to ensure accuracy and to correct sensor drift. The gas detection "cell" located within the sensor housing is in most cases, a consumable part with an expected life. The cell's output decreases slowly as it nears the end of its expected life. The rate at which the output decreases depends greatly on the concentration and presence of target gas. This must be corrected by calibrating the monitor often to ensure an accurate reading and dependable alarming and control of connected devices. Conspec recommends that no modifications be made to this monitor without first consulting Conspec Technical Services. Modifying this equipment without consulting the factory could result in unsafe operation and/or unsafe atmospheric conditions. Modifying this equipment will void any warranty authorized by Conspec Controls Inc.

### Repairs

Any monitor found to be defective or questionable should be returned to Conspec Controls for evaluation and repair. Conspec requires any returned equipment to first be issued a Return Authorization Number (R.A.#) by calling Conspec at (800) 487-8450 Mon.-Fri. 8am-5pm est. Conspec also offers on-site Repair and Start-up service for Conspec Gas Detection Equipment.

### Replacement Parts

Damaged or questionable parts should be replaced immediately upon detection. Damaged or inoperative parts could contribute to hazardous and/or unsafe conditions. Any consumable parts should be replaced if the reliability is questionable or within the part's specific expected life. Consumable parts include any filters, pump motors, sensors…. etc.

Questions / Technical Support…… (800) 487-8450 Mon-Fri 8am-5pm Est
Conspec Sales…… (800) 487-8450 Mon-Fri 8am-5pm Est
Fax…… (724) 489-9772
E-mail……sales.usa@conspec-controls.com
Web site……www.conspec-controls.com

Please contact Conspec for an accurate timeframe of how often the monitors and sensors require calibration. Failure to adhere to a strict calibration schedule can result in improper readings and monitor malfunction. Spare parts can be stored under conditions that fall within the limits of the operation specifications. Please note, time frames for storing replacement sensor cells should be followed based on the manufacturer specifications.

## Replacement Parts and Manufacturer Part Numbers

Main Board: T1453

4-20mA card: T1479

Relay card: T1471

Modbus card: T1469

24VAC Converter: P2634

120VAC Converter: 900744-ASBY-24

CO Sensor: PNP0352-32

NO2 Sensor: PNP0921-33

Calibration Kit: P1879-CO/NO2-250/10

Calibration Gas: P1880-Z (Zero Gas)

P1880-CO-250

P1880 NO2-10

IR Remote: 911118-CPM