

# CONSPEC

## P2065

### Environmental Gas Monitor Series - User Manual



**Table Of Contents**

0.0 Warranty Information.....3

1.0 Introduction & Specifications.....4

2.0 Mechanical Installation.....5

3.0 Electrical Installation.....6

4.0 Keypad Layout & Key Functions.....7

5.0 Configuration Start-Up.....8

6.0 CONFIG Mode.....8-9

7.0 Details of CONFIG Functions.....9-14

8.0 Calibration of the Monitor.....15

    8.1 Calibrate Gas Input.....15

        8.1.1 Manual Calibration Procedure.....16

        8.1.2 Auto-Calibration.....17

    8.2 Calibrate Analog Output.....18

    8.3 Remote Sensor Loop Calibration.....19

    8.4 Auto-Calibration for a Remote Sensor.....20

9.0 Gas Sensor Replacement.....20-21

Appendix A Glossary.....22

Appendix B Options & Spare Parts List.....22

Appendix C Locations.....23

Appendix D Production Notes.....24

**Field Wiring**

**Internal Wiring Diagram (Integral Sensor)**

**Internal Wiring Diagram (Remote Sensor)**

**Remote Sensor Field Wiring**

**\*\* PLEASE READ BEFORE CONTINUING \*\***

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:

- \*Inuring 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 tampered with 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 (724) 489-8450. Returned units should be packaged securely as damages incurred during shipping are not covered under warranty.

**Catalytic Bead Sensor Disclaimer:**

The following statements made about the operational conditions and restrictions of the catalytic bead sensor have been taken directly from the manufacturers operations manual.

**High Gas Concentration**

In certain conditions the detectors may be required to operate in high gas concentrations for short periods. Test have shown that for periods up to about 2 minutes, 10 second bursts of 8%, 10%, and 80% methane air have had no adverse effect. Prolonged exposure can result in zero drift, which may be reversible by operation for a short period in air or low methane concentration (about 1%). Exposure to 40% concentration for longer periods will begin to destroy the detector surface altering the zero reading and reducing the sensitivity. Whenever an instrument is exposed to high concentrations of combustible gas the calibration should be rechecked as soon as possible.

**Poisons and Inhibitors**

The performance of the catalyst may be temporarily impaired by operation in the presence of substances, which are described as inhibitors. These are usually volatile substances containing halogens and the detectors may recover after a short period of operation in clean air. Whenever the substance produces a permanent effect on the catalyst with a catastrophic reduction in sensitivity the detector is said to be poisoned; examples are silicone oils and greases, anti knock petrol additives, phosphate esters. Activated carbon filters will provide adequate protection from poisoning in the majority of cases.

Care should be taken in the choice of materials from which mounting blocks, gas sampling systems, pipe work, pumps, etc, are manufactured. Plastic materials or metals machined using cutting fluids may leave volatile residues trapped in the system. It is essential therefore that all component parts of a gas system are scrupulously clean and that plastic items do not operate at high temperatures so evolving inhibitors or poisoning agents.

A few examples of substances considered catalytic bead poisons:

Silicones: Silicone based grease, lubricants, floor wax

Mercaptans: Used as odorant for natural gas

Sulphur containing gas compounds: ex. Hydrogen Sulphide and Sulphur Dioxide

Lead containing compounds: ex. Tetraethyl Lead



**1.0 Introduction & Specifications**

The Conspec P2065 Single Channel Gas Controllers were designed for use with either an integral or remote mounted toxic, combustible or oxygen sensor. The gas monitor is a "smart" device utilizing and internal programmable micro-controller. The P2065 is shipped factory preprogrammed and calibrated to minimize installation time and costs.

<b>Enclosure:</b>	NEMA 4X Non-metallic High Density UV Stabilized Thermoplastic
<b>Dimensions:</b>	11.5 x 7.75 x 4.375 in or 13.5 x 9.75 x 6.625 in (with relays) HWD
<b>Mounting:</b>	4 Holes 11 x 4 inches or 13 x 6 inches (with relays) MHMW
<b>Operating Voltage:</b>	120 VAC or (12 VDC to 28 VDC) standard, 240 VAC optional
<b>Current Consumption:</b>	35 mA
<b>Operating Temperature:</b>	0 to 40° C, optional heater required for under 0° C use
<b>Humidity:</b>	10 to 80% RH
<b>Memory:</b>	EEPROM for parameter storage
<b>Display:</b>	3 digit ½" Liquid Crystal Display
<b>Password Protection:</b>	3 digit (user defined)
<b>Keypad:</b>	5 button labelled touch pad
<b>Input Signal:</b>	Voltage or Current
<b>Output Signal:</b>	4-20 mA or 0-5 VDC (user selectable)
<b>Total Alarms:</b>	Four (4) System Fail, Sensor Fail, Alarm Point 1 and Alarm Point 2)
<b>Alarm Points:</b>	Two (2) User Defined (Alarm Point 1 and Alarm Point 2)
<b>Alarm Outputs:</b>	Four (4) Open Collector Transistor, Relays Optional
<b>Calibration:</b>	EZ-CAL One Person Automatic Calibration
<b>Restart:</b>	100% Automatic Hands Free after Power Failure
<b>Weight:</b>	6 Pounds



**2.0 Mechanical Installation**

Figure 3.1 shows the outline and mounting dimensions of the monitor. The monitor must be mounted with the sensing head facing downward. Care should be taken to select a location that will protect the monitor from accidental damage. Do not locate the monitor in an area that allows water to continuously drip or run on the unit.

If a remote sensor is used it should also be mounted at this time. After mounting is completed connections to the monitor are made via the cable entry shown in Figure 3.1.

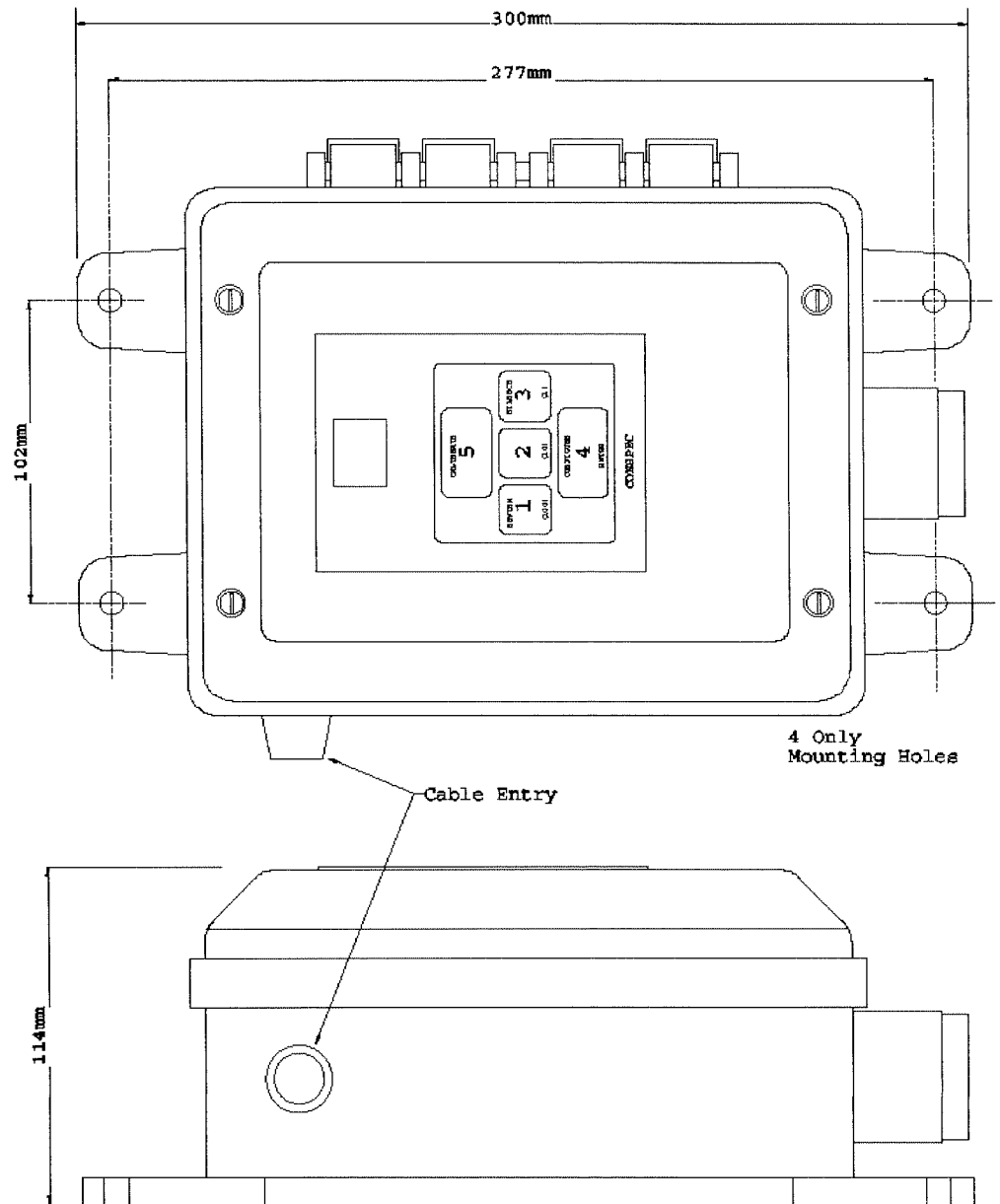


Figure 3.1



**3.0 Electrical Installation**

Below is a typically description of the electrical field wiring of a P2065 Single Channel Gas Controller. Please also refer to the Production Notes Appendix.

<u>120VAC Power Input</u>	<b>(L) Load-----To Power Supply</b> <b>(N) Neutral-----To Power Supply</b> <b>(G) Ground-----To Power Supply</b>
---------------------------	--

The installer is not required to connect an outside power source to monitors containing a power supply. The 110 VAC power supply has an output of .7A @ 15 VDC to power monitor and options.

**Analog Output (4-20mA Current Source)**

Common-----	(COM)-----	P2065 (J5 COM)
4-20mA Signal-----	(SIG)-----	P2065 (J5 SIG)
15-30 VDC-----	(V+)-----	P2065 (J5 +V)

**Remote 4-Wire Sensor (18-22AWG)**

<u>Terminal Block</u>	<u>Remote Sensor</u>
TB1-----	J1-1
TB2-----	J1-2
TB3-----	J1-3
TB4-----	J1-4

**Remote 5-Wire Sensor (18-22AWG)(Note Wiring Cross-Over)**

<u>Terminal Block</u>	<u>Remote Sensor</u>
TB1-----	J1-1
TB2-----	J1-2
TB3-----	J1-4
TB4-----	J1-5
TB5-----	J1-3

**Control Outputs (Optional)**

Device 1 (Strobe) (+)-----	(V+)
Device 1           ( - )-----	(P2065 J3 (Out 4)/ 1 <sup>st</sup> Alarm
Device 2 (Horn)   (+ )-----	(V+)
Device 2           ( - )-----	(P2065 J3 (Out 3)/ 2 <sup>nd</sup> Alarm

**NOTE:** The Control Outputs are open-collector transistors limited to 100mA @30VDC. In use, the load's positive terminal is connected to the P2065-1's V+ terminal and the load's negative terminal is connected to the J3 connector on the P2065 card (Out 4 for the First Alarm or Out 3 for the Second Alarm). When the P2065-1 is in normal condition the open collector transistors are turned off and the load is inactive. When the programmed alarm level is reached the open collector transistor turned on providing a path to common, activating the load.

#### 4.0 Keypad Layout & Key Functions

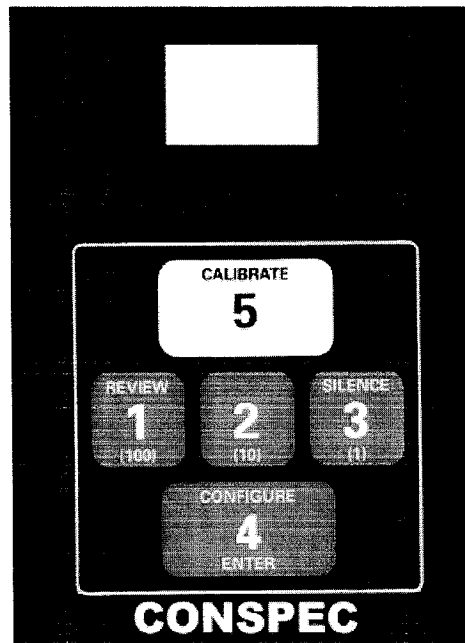


Figure 5.1

Key Functions When In Normal Gas Monitoring Mode		
Key Name	Action	Note
1 Review	Review Configuration & Calibration Data	(Hold 2 Seconds)
2		
3 Silence	Silence Hi-Hi Alarm Output	
4 Config	Enter Configuration Mode	(Hold 2 Seconds)
5 Calibrate	Initialize Auto-Calibration	(Hold 2 Seconds)

Figure 5.2

Key Name	Action
1 (Review)	Increment/Decrement The 100th Digit
2	Increment/Decrement The 10th Digit
3 (Silence)	Increment/Decrement The Last Digit
4 (Configure)	Confirm Or Toggle Increment/ Decrement Mode Or Press Twice To Accept Data
5 (Calibrate)	No Use

Figure 5.3

---

## 5.0 Configuration Start-Up

---

After the monitor has been powered up, there is a one minute idle start-up time during which there will be no display on the LCD, no communication to the central computer and no valid Analog output.

After the idle start-up time, the monitor will be in Normal Gas Monitoring Mode. It is recommended to go through each configurable function (see **CONFIG Mode** section) to ensure all the parameters and settings are correct for your application. A manual calibration should be performed (see **Calibration Of The Monitor** section) after the initial installation.

---

## 6.0 CONFIG Mode

---

The CONFIG MODE allows the user to access and if necessary change the factory set configuration of the monitor. The following is a list of all available CONFIG functions. For detailed information about each CONFIG function please see the sections that follow.

### CONFIG Mode Functions

Code	Function
001	Exit To Normal Gas Monitoring Mode
002	Change Address
003	Change Monitoring Range
004	Change Calibration Gas Value In Percent
005	Change Auto-Calibration Duration
006	Change Alarm Level 1
007	Change Alarm Level 2
008	Change Alarm Quiet Duration
009	Change Sensor-Fail Alarm Output Option
010	Change Alarm Latch Option
011	Manually Calibrate Gas Input
012	Not Used
013	Manually Calibrate Analog Output
014	Not Used
015	View Raw ADC Data
016	Reset Monitor
017	Change Access Code
018	Test EPROM (Conspec Personnel Use Only)
019	Test Timer (Conspec Personnel Use Only)
020	Fail Safe Enable

All other codes (including 012 and 014) will cause the monitor to return to the beginning of the CONFIG MODE where the message "CONSPEC VER#" continuously scrolls across the LCD. If no key is pressed for two minutes while the message "CONSPEC VER#" is scrolling across the LCD, the monitor will return to the Normal Gas Monitoring Mode automatically.

Follow the instructions below to gain access to the CONFIG Mode:

- While in Normal Gas Monitoring Mode, press Key [4-CONFIGURE] and hold down for two seconds until the message "ENTER ACCESS CODE" scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays "000", waiting for the operator to enter a valid access code.
- Enter the Access Code using the Keys [1], [2] or [3]. (Key [4] pressed once can be used to toggle the increment / decrement mode).
- When the access code is correct, press Key [4] twice to accept.
- The message "CONSPEC VER#" continuously scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays "000", waiting for the operator to select the desired CONFIG function.

## 7.0 Details Of CONFIG Functions

Below are detailed descriptions for each of the CONFIG Functions:

### 001 EXIT TO GAS MONITORING MODE

Monitor Type	Validation Performed	
Carbon Monoxide (CO)	HI-HI Alarm level is greater than HI alarm level	
Hydrogen (H <sub>2</sub> )		
Hydrogen Sulfide (H <sub>2</sub> S)		
Hydrogen Chloride (HCl)		
Chlorine (Cl <sub>2</sub> )		
Carbon Dioxide (CO <sub>2</sub> )		
Ammonia (NH <sub>3</sub> )		
Nitric Oxide (NO)		
Nitrogen Dioxide (NO <sub>2</sub> )		
Methane (CH <sub>4</sub> )		
Sulfur Dioxide (SO <sub>2</sub> )		
Oxygen (O <sub>2</sub> ) H-N-L		HI Alarm level is greater than LO alarm level
Oxygen (O <sub>2</sub> ) LL-L-N		LO Alarm level is greater than LO-LO alarm level

When this function is selected, the monitor will validate the alarm settings depending on the gas monitor type. If the specific validation is not met, previous alarm levels will be restored. Then the monitor will perform a save function to store all the parameters and settings into the on board EEPROM. When complete the monitor will return to the Normal Gas Monitoring Mode.

**002 CHANGE ADDRESS**

When this function is selected, the message "ENTER ACCESSOR ADDRESS" continuously scrolls across the LCD. Press Key [4] to confirm, the LCD will then show the current address. Use Keys [1], [2] or [3] to increment / decrement the address setting, Key [4] pressed once, can be used to toggle the increment / decrement mode. When finished, press Key [4] twice to accept. The monitor will then return to the beginning of the CONFIG MODE where the message "CONSPEC VER#" continuously scrolls across the LCD.

**003 CHANGE MONITOR RANGE**

When this function is selected, the message "ENTER INPUT RANGE" or "ENTER INPUT RANGE IN PERCENTAGE" continuously scrolls across the LCD. Press Key [4] once to confirm, the LCD will then show the current monitoring range. Use Keys [1], [2] or [3] to increment / decrement the monitoring range setting, Key [4] pressed once can be used to toggle the increment / decrement mode. When finished, press Key [4] twice to accept. The monitor will then return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

**004 CHANGE CALIBRATION GAS VALUE IN PERCENT**

When this function is selected, the message "ENTER CALIBRATE INPUT" continuously scrolls across the LCD. Press Key [4] once to confirm, the LCD will then show the current calibration input percentage. Use the Keys [1], [2] or [3] to increment / decrement the calibration gas percentage setting, Key [4] pressed once can be used to toggle the increment / decrement mode. When finished, press Key [4] twice to accept. If an invalid value is entered (i.e. calibration gas value greater than 100%), the message "BAD INPUT" will scroll across the LCD once. The monitor will then return to the beginning of the CONFIG MODE where the message "CONSPEC VER#" continuously scrolls across the LCD.

**005 ENTER AUTO-CALIBRATION DURATION**

When this function is selected, the message "ENTER AUTO-CALIBRATION DURATION" continuously scrolls across the LCD. Press Key [4] once to confirm, the LCD will then show the current auto-calibration duration. Use the Keys [1], [2] or [3] to increment / decrement the auto-calibration duration, Key [4] pressed once can be used to toggle the increment / decrement mode. When finished, press Key [4] twice to accept. The monitor will then return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

**006 ENTER ALARM LEVEL 1 ( Local Output )**

Monitor Type	Message
Carbon Monoxide (CO)	ENTER HI ALARM
Hydrogen (H2)	
Hydrogen Sulfide (H2S)	
Hydrogen Chloride (HCl)	
Chlorine (CL2)	
Carbon Dioxide (CO2)	
Ammonia (NH3)	
Nitric Oxide (NO)	
Nitrogen Dioxide (NO2)	
Methane (CH4)	
Sulfur Dioxide (SO2)	
(Other Gases)	
Oxygen (O2) H-N-L	ENTER HI ALARM
Oxygen (O2) LL-L-N	ENTER LO-LO ALARM

When this function is selected, depending on the gas monitored, one of the above messages will continuously scrolls across the LCD. Press Key [4] once to confirm, the LCD will then show the current HI alarm level. Use the Keys [1], [2] or [3] to increment / decrement the HI Alarm, Key [4] pressed once can be used to toggle the increment / decrement mode. When finished, press Key [4] twice to accept. If an invalid value is entered i.e. HI-Alarm level is greater than the monitor range, the message "BAD INPUT" will scroll across the LCD once and the old HI-Alarm level will be restored. The monitor will then return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

**007 ENTER ALARM LEVEL 2 ( Local Output )**

Monitor Type	Message
Carbon Monoxide (CO)	ENTER HI HI ALARM
Hydrogen (H2)	
Hydrogen Sulfide (H2S)	
Hydrogen Chloride (HCl)	
Chlorine (CL2)	
Carbon Dioxide (CO2)	
Ammonia (NH3)	
Nitric Oxide (NO)	
Nitrogen Dioxide (NO2)	
Methane (CH4)	
Sulfur Dioxide (SO2)	
(Other Gases)	
Oxygen (O2) H-N-L	ENTER LO ALARM
Oxygen (O2) LL-L-N	ENTER LO ALARM

When this function is selected, depending on the gas monitored, one of the above messages will continuously scroll across the LCD. Press Key [4] once to confirm, the LCD will then show the current alarm level value. Use Keys [1], [2] or [3] to increment / decrement the alarm level value, (Key [4]

pressed once can be used to toggle the increment / decrement mode). When finished, press Key [4] twice to accept. If an invalid value is entered (for example, the alarm setting is inconsistent with the monitor range), the message "BAD INPUT" will scroll across the LCD once and the old alarm level will be restored. The monitor will then return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

### 008 CHANGE ALARM "QUIET" DURATION

Monitor Type	Message
Carbon Monoxide (CO)	ENTER HI-HI QUIET DURATION
Hydrogen (H2)	
Hydrogen Sulfide (H2S)	
Hydrogen Chloride (HCl)	
Chlorine (CL2)	
Carbon Dioxide (CO2)	
Ammonia (NH3)	
Nitric Oxide (NO)	
Nitrogen Dioxide (NO2)	
Methane (CH4)	
Sulfur Dioxide (SO2)	
Oxygen (O2)	H-N-L ENTER ALARM QUIET DURATION
Oxygen (O2)	LL-L-N ENTER LO-LO QUIET DURATION

When the monitor goes into an alarm condition, it will turn on the local alarm output (which can be used to turn on a horn or other alert). Pressing Key [3-SILENCE] once will temporary disable the alarm output. The duration of the silence time can be entered by selecting this CONFIG function. When this function is selected, depending on the gas monitored, one of the above messages will continuously scroll across the LCD. Press Key [4] once to confirm, the LCD will show the current value. Use the Keys [1], [2] or [3] to increment / decrement the quiet duration, Key [4] pressed once can be used to toggle the increment / decrement mode. If "000" is entered as the quiet duration, when Key [3-SILENCE] is pressed, alarm output will be silenced as long as the monitor remains in the alarm condition. If the value entered is between "001" and "255", the Alarm output will stay quiet for that number of minutes when Key [3 - SILENCE] is pressed. After this duration, if the monitor is still in Alarm, the Alarm output will be turned ON again. If the monitor returns to a NORMAL or "out of alarm" condition before the quiet duration expires, the internal timer will be reset. When finished entering the quiet duration, press Key [4] twice to accept. The monitor will return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

### 009 CHANGE SENSOR FAIL ALARM OUTPUT OPTION

This option is used to enable or disable the monitor from turning ON the alarm output in the case of a sensor-fail. A sensor-fail condition is established when the detected gas is 1 PPM (0.01% for Methane) below the Zero Gas reading for 30 seconds or longer. When this function is selected, the message "SENSOR FAIL ENABLE 1:YES 0:NO" continuously scrolls across the LCD. Press Key [4] once to confirm, the



LCD will show the current setting. Use Key [3] to increment / decrement the setting, Key [4] pressed once can be used to toggle the increment / decrement mode. If "000" is entered, a sensor fail condition will not trigger the alarm output. If "001" is entered, a sensor fail condition will cause the monitor to turn ON the alarm output. When finished entering the desired option, press Key [4] twice to accept. The monitor will then return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

**010 CHANGE ALARM LATCH OPTION**

Monitor Type	Message
Carbon Monoxide (CO)	HI-HI LATCH ENABLE 1:YES 0:NO
Hydrogen (H2)	
Oxides of Nitrogen (NOx)	
Hydrogen Sulfide (H2S)	
Hydrogen Chloride (HCl)	
Chlorine (CL2)	
Carbon Dioxide (CO2)	
Ammonia (NH3)	
Nitric Oxide (NO)	
Nitrogen Dioxide (NO2)	
Methane (CH4)	
Sulfur Dioxide (SO2)	
Oxygen (O2)	H-N-L LATCH ENABLE 1:YES 0:NO
Oxygen (O2)	LL-L-N LO-LO LATCH ENABLE 1:YES 0:NO

This option is used to enable or disable the latching of the alarm output. When this function is selected, depending on the gas monitored, one of the above messages will continuously scroll across the LCD. Press Key [4] once to confirm, the LCD will then show current the setting. Use Key [3] to increment / decrement the setting. Key [4] pressed once can be used to toggle the increment / decrement mode. If "000" is entered, the HI-HI alarm output will not be latched, i.e. when the monitor returns to a HI Alarm or a Normal condition, the HI-HI alarm output will be turned off automatically. If "001" is entered, the alarm output will be latched ON. Only pressing Key [3-SILENCE] will turn Off the alarm output. When finished setting this option, press Key [4] twice to accept, the monitor will then return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

**011 MANUALLY CALIBRATE GAS INPUT**

Please refer to section MANUAL CALIBRATION for details.

**013 MANUALLY CALIBRATE ANALOG OUTPUT**

Please refer to section CALIBRATE ANALOG OUTPUT for details.

**015 VIEW RAW ADC DATA**

When this function is selected, the LCD will display the Raw ADC data. Press Key [4] once when finished to return to the beginning of the CONFIG Mode.

**016 RESET MONITOR**

When this function is selected, the monitor will save all the current parameters into the on board EEPROM, then reset the monitor to its idle start-up state.

**017 CHANGE ACCESS CODE**

When this function is selected, the message "CHANGE ACCESS CODE" continuously scrolls across the LCD. Press Key [4] once to confirm, the LCD will then show the current User Access Code. Use Keys [1], [2] or [3] to increment / decrement the Access Code. Key [4] can be used to toggle the increment / decrement mode. When finished, press Key [4] twice to accept. If an invalid Access Code is entered, i.e. Access Code greater than 255, the message "BAD INPUT" will scroll across the LCD once and the old Access Code is restored. The monitor will then return to the beginning of the "CONFIG Mode" where message "CONSPEC VER#" continuously scrolls across the LCD.

**018 TEST EPROM**

This function is used for testing the EEPROM. (**Conspec personnel use only**).

**019 TEST TIMER**

This function is used for testing the internal timer. (**Conspec personnel use only**).

**020 FAIL SAFE ENABLE**

This option is used to select the mode of the local alarm outputs. When this function is selected, the message "FAIL SAFE ENABLE 1:YES 0:NO" continuously scrolls across the LCD. Press Key [4] once to confirm, the LCD will then show current setting. Use Key [3] to increment / decrement the setting, Key [4] pressed once can be used to toggle the increment / decrement mode. If "000" is entered, the local alarm outputs will be de-energized when not in an alarm condition and energized when in an alarm condition. If "001" is entered, the local alarm outputs will be energized when not in an alarm condition and de-energized when in an alarm condition. When finished setting this option, press Key [4] twice to accept, the monitor will then return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

**Note:**

**Whenever an invalid entry is encountered and the message "BAD INPUT" is displayed, any new entry will be discarded and the old data setting will be restored.**



---

**8.0 Calibration Of The Monitor**

---

**8.1 Calibrate Gas Input**

To ensure the monitor is performing gas detection correctly a regular gas calibration is required. It is recommended to perform a gas calibration at least once every 90 days or whenever the sensor is suspected to have drifted from its actual reading.

To perform a gas calibration two calibration gas cylinders are needed: ZERO GAS and SPAN GAS. ZERO GAS is a certified calibration gas cylinder that contains 20.9% Oxygen. SPAN GAS is a calibration gas cylinder that contains a known value (i.e. 10ppm Chlorine). ***Please note that Oxygen and Carbon Dioxide use Nitrogen (N<sub>2</sub>) as their zero gas.***

A 1.0 Liter per minute flow regulator should be used with all Hydrogen, Combustible, Chlorine, Nitrogen Dioxide, and Ethylene Oxide gas sensors. All other sensors require a 0.5 Liter per minute flow regulator.

There are two ways to calibrate the monitor: Manual Calibration and Auto-Calibration. An Auto-Calibration will be sufficient most of the time. If the sensor is suspected to be defective, or if the sensor has been replaced, then a Manual Calibration may be required.

### 8.1.1 Manual Calibration

Follow the instructions below to perform a Manual Calibration:

- Have calibration gas cylinders with the appropriate flow regulators attached to the cylinders. Attached the proper calibration adapter to the hole in the bottom of the sensor housing. Using the supplied tubing connect the flow regulator to the calibration adapter
- While in Normal Gas Monitoring Mode, press Key [4-CONFIGURE] and hold down for two seconds until the message "ENTER ACCESS CODE" scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays "000", waiting for the operator to enter a valid access code.
- Enter the access code using Keys [1], [2] or [3]. (Key [4] pressed once can be used to toggle the increment / decrement mode).
- When the access code is correct, press Key [4] twice to accept.
- The message "CONSPEC VER#" continuously scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays "000", waiting for the operator to select a CONFIG function.
- Use Keys [2] and [3] to select function "011".
- Press Key [4] twice to accept.
- The message "ZERO INPUT" continuously scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays the current ADC data. Inject the Zero Gas into the monitor through the correct calibration fitting at the appropriate flow rate. Note the ADC data displayed on the LCD may start to decrease. Wait for the ADC data displayed on the LCD to become stable (approximately 2-3 minutes).
- Press Key [4] once to accept this reading as the ZERO SCALE GAS reading.
- The message "SCALE INPUT" and "FULL SCALE INPUT" continuously scrolls across the LCD.
- Depending on whether SPAN GAS or FULL GAS is being used for calibration, press Key [4] once as the required message is scrolling across the LCD.
- The LCD displays the current ADC data. Inject the SPAN GAS (or FULL SCALE SPAN GAS) into the monitor through the correct calibration fitting at the appropriate flow rate. Note the ADC data displayed on the LCD will start to rise. Wait for the ADC data displayed on the LCD to become stable (approximately 2-3 minutes).
- Press Key [4] once to accept this reading as the SPAN GAS reading (or Full Gas reading).
- The manual calibration of the monitor is now complete and the monitor will return to the beginning of the CONFIG Mode where the message "CONSPEC VER#" continuously scrolls across the LCD.

### 8.1.2 Auto-Calibration (Integral Sensor)

Follow the instructions below to perform an Auto-Calibration on a P2065 monitor that has an integrally mounted sensor.

- Have calibration gas cylinders with the appropriate flow regulators attached to the cylinders. Attached the proper calibration adapter to the hole in the bottom of the sensor housing. Using the supplied tubing connect the flow regulator to the calibration adapter
- While in Gas Monitoring Mode, press Key [5-CALIBRATE] and hold down for two seconds until the message "ENTER ACCESS CODE" scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays "000", waiting for the operator to enter a valid access code.
- Enter the access code using Keys [1], [2] or [3]. (Key [4] pressed once can be used to toggle the increment / decrement mode.)
- When the access code is correct, press Key [4] twice to accept.
- The Message "SCALE INPUT" continuously scrolls across the LCD.
- Inject SPAN GAS into the monitor through the correct calibration fitting at the appropriate flow rate of 500cc per minute.
- Maintain the flow of SPAN GAS into the monitor for as long as the message "SCALE INPUT" scrolls across the LCD. (The duration that was set in the CONFIG function "005").
- When the message "ZERO INPUT" starts scrolling across the LCD, remove the SPAN GAS from the monitor and inject Zero Gas into the monitor through the correct calibration fitting at the appropriate flow rate of 500cc per minute.
- Maintain the flow of Zero Gas into the monitor for as long as the message "ZERO INPUT" scrolls across the LCD.
- After the pre-set calibration duration, the calibration process is completed.
- If the calibration is valid, the monitor will return back to the Normal Gas Monitoring Mode after saving the new calibration data into the EEPROM.
- If the new calibration data is found to be more than 25% different from the previous calibration data, the message "BAD INPUT" will scroll across the LCD. The new calibration data will be discarded, and the stored calibration data will be restored. Then the monitor will return to the Normal Gas Monitoring Mode.

**Note:** A bad calibration is typically caused by:

Incorrect Calibration Gas is being used for calibration, or the calibration gas is being used in the wrong order.

OR

The cell became defective since the last calibration and is providing less than 75% of the previous calibration data.

## 8.2 Calibrate Analog Output

When a monitor is initially installed, it is necessary to calibrate the Analog output ranges if this feature is to be used. The Analog output ranges represents the Zero scale and the Full-SPAN GAS reading. Follow the instructions below for calibrating the Analog output:

- While in Normal Gas Monitoring Mode, press Key [4-CONFIGURE] and hold down for two seconds until the message "ENTER ACCESS CODE" scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays "000", waiting for the operator to enter a valid access code.
- Enter the access code using the Keys [1], [2] or [3]. (Key [4] pressed once can be used to toggle the increment / decrement mode).
- When the access code is correct, press Key [4] twice to accept.
- The message "CONSPEC VER#" continuously scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD displays "000", waiting for the operator to select the CONFIG function.
- Use Keys [2] and [3] to select function "013".
- Press Key [4] twice to accept.
- The message "CALIBRATE ZERO SCALE ANALOG OUTPUT" continuously scrolls across the LCD.
- Press Key [4] once to confirm.
- The LCD will display the current Zero Scale Analog output setting.
- Connect an ammeter with the RED probe to connector TB3-PURPLE (J5 PIN 1) and the BLACK probe to connector TB3-ORANGE (J5 PIN 3).
- Note the ammeter will show the Analog output that corresponds to the current setting.
- Use Keys [1], [2] or [3] to increment / decrement the Zero Scale Analog output setting, Key [4] pressed once can be used to toggle the increment / decrement mode. Note the change of reading on the ammeter as the setting is changed.
- When the ammeter shows the desired Analog output which represents the Zero Gas reading, press Key [4] twice to accept.
- The message "CALIBRATE FULL SCALE ANALOG OUTPUT" continuously scrolls across the LCD.
- Press Key [4] once to confirm, the LCD displays the current setting for the Full Scale Analog output.
- Use Keys [1], [2] or [3] to increment / decrement the Full Scale Analog output setting, Key [4] pressed once can be used to toggle the increment / decrement mode. Notice the change of reading on the ammeter as the setting is changed.
- When the ammeter shows the desired Analog output which represents the Full Scale reading, press Key [4] twice to accept.
- The monitor will then return to the beginning of the CONFIG Mode where the operator can select other CONFIG functions as required.

### 8.3 Remote Sensor Loop Calibration

Conspec Smart Gas Monitors equipped with remote sensors may require an initial adjustment to the P2273 Remote Cell Interface Card to compensate for the length of interconnecting cable between the Smart Gas Monitor and the Remote Gas Sensor. This adjustment only affects the operation of the Auto-Calibration L.E.D. and switch, and does not change the calibration of the gas sensor. This operation need not be repeated as long as the cable length is unchanged.

- **WITH POWER OFF:** Connect the Remote Sensor to the Smart Gas Monitor according to the field-wiring diagram. *Damage due to incorrect wiring is not covered under warranty.*
  - Apply power to the P2065-1 Smart Gas Monitor.
  - Open the P2065 enclosure and locate the P2273 Remote Cell Interface Card. Locate the switch (shunt) on the bottom right side of the P2273.
  - Move the switch or shunt to the right or to the two pins closest to the Red L.E.D. marked "CAL SWITCH".
  - Locate trim pot labelled "PT1" on the bottom left side of the P2273 card. Turn the trim pot marked "PT1" counter-clockwise until the Red L.E.D. turns on.
  - Turn the trim pot "PT1" clockwise until the Red L.E.D. just turns off.
  - Turn the trim pot "PT1" counter clockwise one-half ( $\frac{1}{2}$ ) turn. The P2273 is now adjusted for the length of interconnecting cable being used. Check the adjustment by having an assistance initiate the calibration switch on the Remote Sensor. Each time the switch is activated the L.E.D. should light. *The calibration switch on a NEMA 4X Remote sensor is located on the right side of the grey sensor housing, use a device with a point to press and then release this switch. For an Explosion Proof remote sensor, hold the supplied calibration magnet to the front glass cover of the enclosure over the white switch in the center of the window.*
  - Move the jumper back to the two pins away from the L.E.D. Activating the Auto-Calibration Switch on the Remote Sensor will now start the auto-calibration sequence when desired.
- **NOTE:** If the Auto-Calibration switch doesn't activate the Auto-Calibration sequence, "PT1" is turned too far clockwise. If the Auto-Calibration sequence activates continuously, "PT1" is turned too far counter-clockwise.

#### 8.4 Auto Calibration for A Remote Sensor

In the case where the sensor is installed remotely from the monitor, follow the instructions below to perform an auto-calibration.

- Locate and initiate the calibration switch. The calibration switch on a NEMA 4X Remote sensor is located on the right side of the grey sensor housing, use a device with a point to press and hold for 2 seconds, then release the switch. For an Explosion Proof remote sensor, place the supplied calibration magnet to the front glass cover of the enclosure over the white switch in the center of the window for 2 seconds and then remove.
- The bi-color LED will be turned ON (after the push-button has been pressed and released or the magnet has been placed and removed) and show a "RED" color. If the LED did not turn "RED" after the push-button has been released, press the push-button again and or hold the magnet over the switch for a longer period of time for a longer period of time.
- While the LED is showing "RED" color, inject the SPAN GAS into the sensor head through the correct calibration fitting at the appropriate flow rate (500 cc per minute).
- Maintain the flow of the SPAN GAS into the sensor head for as long as the LED is showing "RED" color.
- When the monitor has completed the SPAN GAS calibration, the bi-color LED will turn to show "GREEN" color.
- Replace the SPAN GAS bottle and inject the Zero gas into the sensor head through the correct calibration fitting at the appropriate flow rate of 500cc per minute.
- Maintain the flow of the Zero gas into the sensor head for as the LED shows "GREEN" color.
- After the preset calibration duration has expired, The "GREEN" L.E.D. indicator will turn off and the auto calibration process is completed.
- If the calibration is found to be valid, the new data will be stored in the EEPROM and the monitor will automatically return back to Normal monitoring mode.
- If the new calibration data is found to be more than 25% different from the previous calibration data, the message "BAD INPUT" will scroll across the LCD once and the new calibration data will be discarded. The old calibration data will be restored to the monitor and it will return to Normal monitoring mode.

---

**Appendix: Replacing a Gas Sensor****1. Replacing an Integral Oxygen or Toxic Gas Sensor**

- Using a flathead screwdriver loosen the four (4) front facing screws on the enclosure door and open the enclosure.
- On the back of the enclosure door locate the J4 connector (bottom right side of P2065 circuit card) and unplug connector.
- Firmly grip the gray sensor housing protruding from the bottom of the enclosure. Turn this gray cylinder shaped housing counterclockwise while firmly grasping the gray sensor housing and circuit card inside of the enclosure.
- Take the new replacement sensor and unscrew the bottom of the gray sensor housing, as in the previous step.
- Place the gray sensor housing with the connected circuit card through the hole in the bottom of the enclosure, take the sensor housing without the attached circuit card and screw it to the above sensor housing.
- Connect the wires to J4 on the P2065 circuit card.
- Close and secure the enclosure door and calibrate the monitor.

**2. Remote NEMA 4X Gas Sensor Replacement**

- Using a screwdriver loosen the four (4) front facing screws on the enclosure door and open the enclosure.
- Disconnect the brown connects for Pins labeled J2 (left side of card) and J3 (bottom center of card).
- Firmly hold locking washer inside of enclosure and turn complete gray sensor housing counterclockwise. Discard old sensor.
- Feed both sets of wires from the new sensor through the hole in the bottom of the enclosure.
- Hold locking washer inside of enclosure and completely turn gray sensor housing clockwise. The LED indicator should be facing forward.
- Plug brown connector labeled J2 into the pins labeled J2, Plug brown connector labeled J3 into the pins labeled J2.
- Secure enclosure and calibrate the sensor.

**3. Remote Explosion Proof Toxic and Oxygen Gas Sensor Replacement**

- Loosen setscrew on sensor housing.
- Unscrew sensor housing and disconnect the old sensor.
- Align pins and insert new sensor.
- Tighten the sensor housing.
- Tighten the setscrew and calibrate the unit.

**3. Remote Combustible & Hydrogen Gas Sensor Replacement**

- Remove Power from P2065-1 Controller.
- Remove glass cover housing from remote gas sensor.
- Remove the 2 flathead screws from the faceplate.
- Locate the "J3" terminal block (lower left side of P2588 card).
- Disconnect the three-wire connector.

- Firm grip the sensor head protruding from the bottom of the enclosure with Channel Lock pliers, turn counter clockwise and remove the sensor head.
- Feed the wires from the new replacement sensor through the hole in the bottom of the Explosion Proof Enclosure
- Grip the new sensor head and turn it clockwise until it is tight.
- Plug in new connector to terminal block "J3"
- Insert the 2 flathead screws back through the faceplate and into the stand-offs. Tighten screws.
- Replace the glass faceplate cover on the remote Explosion Proof enclosure.
- Turn power on to the unit and calibrate.

### Appendix A: Glossary

Term	Description
<b>ADC</b>	Analog To Digital Converter
<b>Full Gas</b>	Calibration Gas Exactly Equal To Monitor Range With A Synthetic Air Balance
<b>LED</b>	Light Emitting Diode
<b>LCD</b>	Liquid Crystal Display
<b>SPAN GAS</b>	Calibration Gas Less Than Monitor Range With A Synthetic Air Balance
<b>VDC</b>	Volts D.C
<b>Zero Gas</b>	Oxygen 18% to 21% Balance Nitrogen

### Appendix B: Options & Spare Parts Listing

Part Number	Description
P1907	SPDT Relay 240VAC @ 10A
P1907-1	DPDT Relay 240VAC @ 10A
P2065	Smart Card
P2063-3	90db Horn w/ Reset
P1643-2	Remote Mount Horn & Strobe in NEMA 4 Enclosure
P2100	Enclosure (8"x6"x3")
P1879	Calibration Kits
P1880	Replacement Gas Cylinders
P3013	Calibration Plug
P9027	8000 CP Halogen Strobe



**Appendix C: Conspec Controls Worldwide Locations & Addresses**



**Conspec Controls Incorporated  
6 Guttman Blvd.  
Charleroi, Pennsylvania 15022  
United States**

Phone : **1-724-489-8450**  
Fax : **1-724-489-9772**  
Toll Free : **1-800-487-8450**  
[sales.usa@conspec-controls.com](mailto:sales.usa@conspec-controls.com)  
[support.usa@conspec-controls.com](mailto:support.usa@conspec-controls.com)

**Conspec Controls Incorporated  
9056 Marshall Court  
Westminster, Colorado 80031  
United States**

Phone : **1-303-650-1699**  
Fax : **1-303-650-0041**  
Toll Free : **1-800-338-9484**  
[sales.usa@conspec-controls.com](mailto:sales.usa@conspec-controls.com)  
[support.usa@conspec-controls.com](mailto:support.usa@conspec-controls.com)

## XI) FIELD WIRING DIAGRAM

### Remote Sensors

*NOTE WIRING CROSSOVER BETWEEN REMOTE 5-WIRE SENSORS*

<u>P2065-1</u>	<u>Remote 5-Wire Sensor</u>
TB1-1	J1-1
TB1-2	J1-2
TB1-3	J1-4
TB1-4	J1-5
TB1-5	J1-3

### REMOTE 4-WIRE SENSORS

<u>P2065-1</u>	<u>Remote 4- Wire Sensor</u>
TB1-1	J1-1
TB1-2	J1-2
TB1-3	J1-3
TB1-4	J1-4

### Analog Output

Common ----- TB1 (COM) ----- P2065 (J5 COM)  
4-20mA Signal ----- TB1 (SIG) ----- P2065 (J5 SIG)  
15-30VDC ----- TB1 (+V) ----- P2065 (J5 +V)

**NOTE:** The standard configuration for the P2065-1 includes a 110VAC power supply with an output of .7A @ 15VDC to power the monitor and options. The positive terminal of the power supply is connected to TB1(+) and the negative terminal to TB1(COM).

**The installer is not required to connect an outside power source to TB1 on monitors containing a power supply.** The Analog Output is a 4-20mA Current Source.

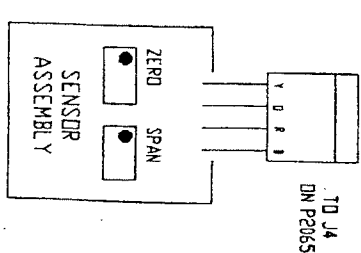
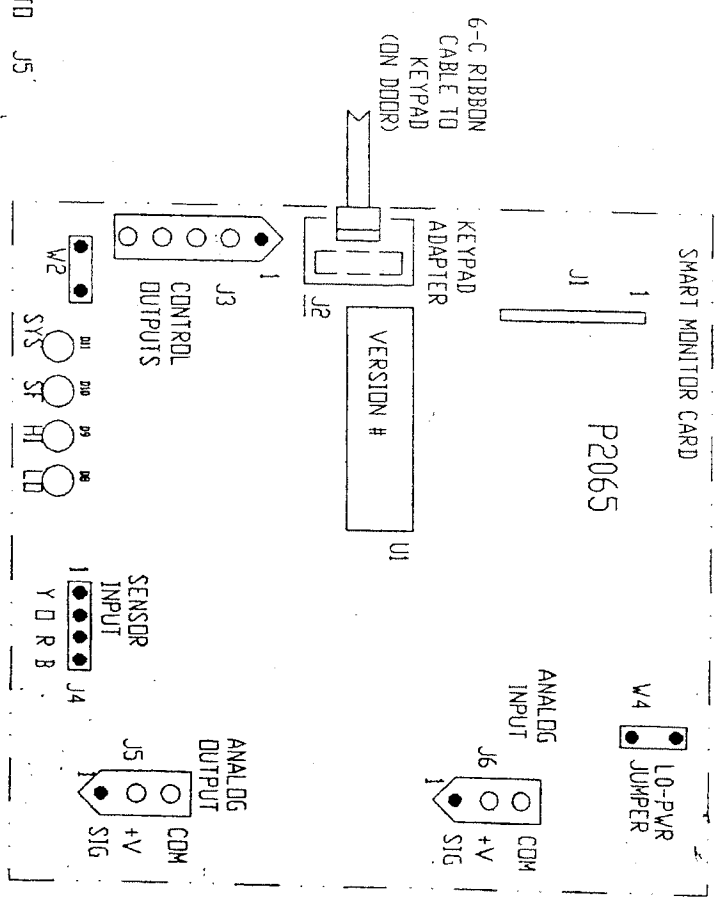
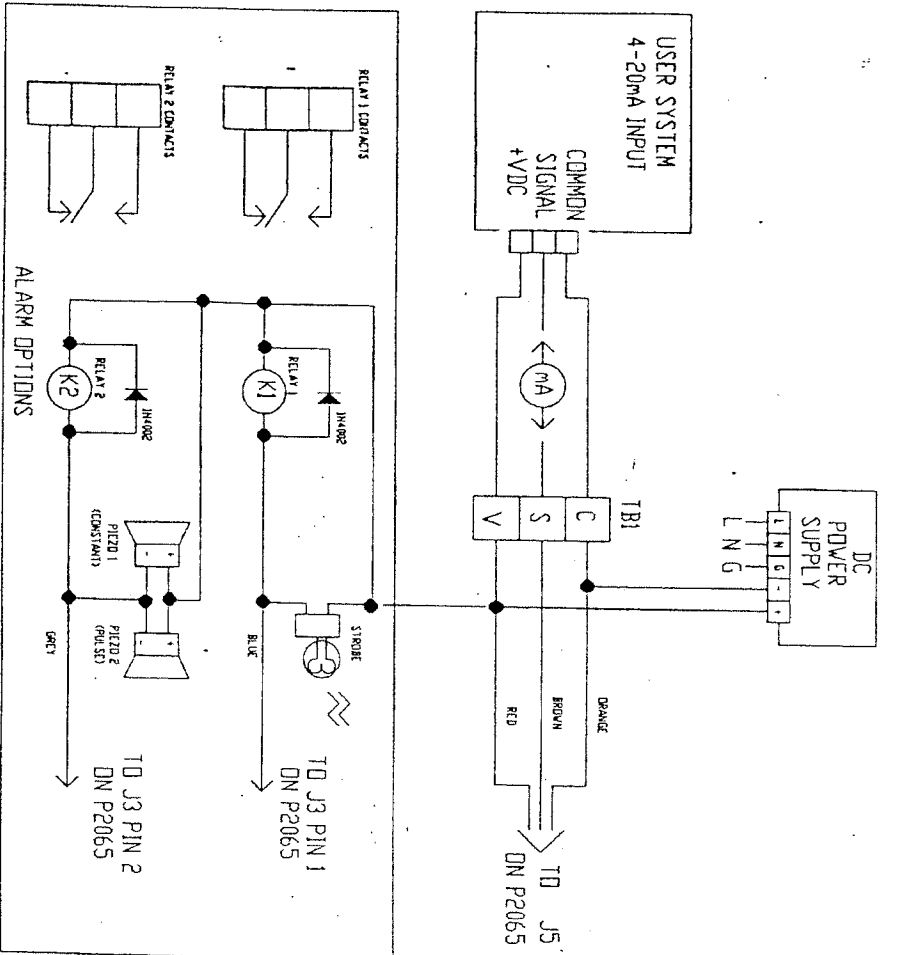
### Control Outputs (Optional)

Strobe (+) ----- TB1 (+V)  
Strobe (-) ----- P2065 J3 (OUT 4) / **First Alarm**  
Piezos (+) ----- TB1 (+V)  
Piezos (-) ----- P2065 J3 (OUT 3) / **Second Alarm**

**NOTE:** The Control Outputs are open-collector transistors limited to 100mA @ 30VDC. In use, the load's positive terminal is connected to the P2065-1's V+ terminal and the load's negative terminal is connected to the J3 connector on the P2065 card (OUT 4 for the First Alarm or OUT 3 for the Second Alarm). When the P2065-1 is in a normal condition the open collector transistors are turned off and the load is inactive. When the programmed alarm level is reached the open collector transistor is turned on providing a path to common, activating the load.

NOTES:

- P2065 JUMPER W4 SHOULD BE INSTALLED WHEN THE POWER SUPPLY USED IS 15VDC OR LESS.
- THE ANALOG OUTPUT IS A 4-20mA CURRENT SOURCE.
- THE OPEN COLLECTOR TRANSISTOR OUTPUTS WILL SINK A MAXIMUM OF 100mA @ 30VDC. DO NOT EXCEED.
- POTENTIOMETERS ON SENSOR ASSEMBLY ARE FOR INITIAL CALIBRATION AND ARE NORMALLY NOT USED FOR FIELD CALIBRATIONS.
- DC POWER SUPPLY SHOULD NOT BE USED TO POWER EQUIPMENT NOT SUPPLIED WITH THE UNIT.
- SENSORS VARY BY TYPE AND MAY NOT MATCH DRAWING.



ALARM OPTIONS

SMART MONITOR CARD

P2065

LO-PWR JUMPER

ANALOG INPUT

COM +V SIG

ANALOG OUTPUT

COM +V SIG

SENSOR INPUT

Y O R B

CONTROL OUTPUTS

W2 D1 D2 D3 D4

VERSION #

KEYPAD ADAPTER

6-C RIBBON CABLE TO KEYPAD (ON DOOR)

J1

J2

J3

J4

J5

J6

TD J4 DN P2065

TD J3 PIN 1 DN P2065

TD J3 PIN 2 DN P2065

TD J5 DN P2065

DRANGE BROWN RED

TBI C S V

DC POWER SUPPLY L N G

USER SYSTEM 4-20mA INPUT COMMON SIGNAL +VDC

RELAY 1 CONTACTS

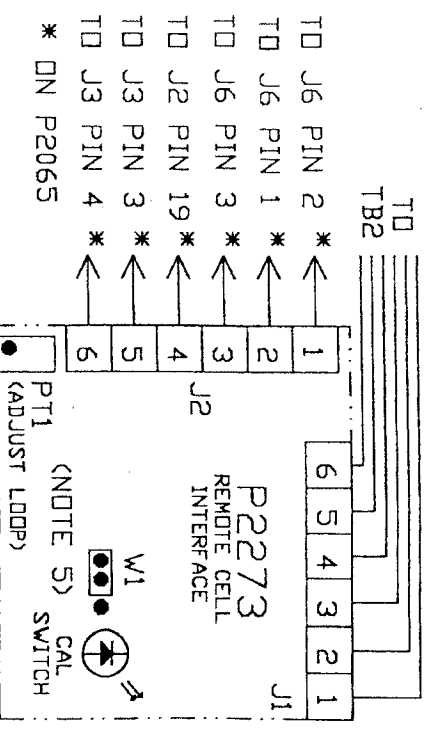
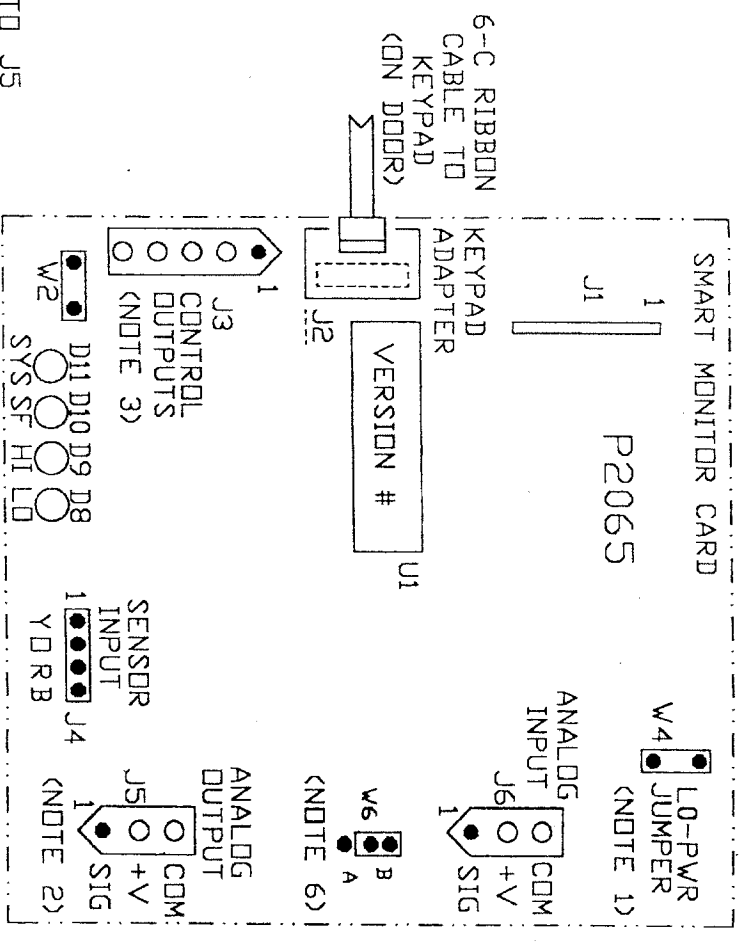
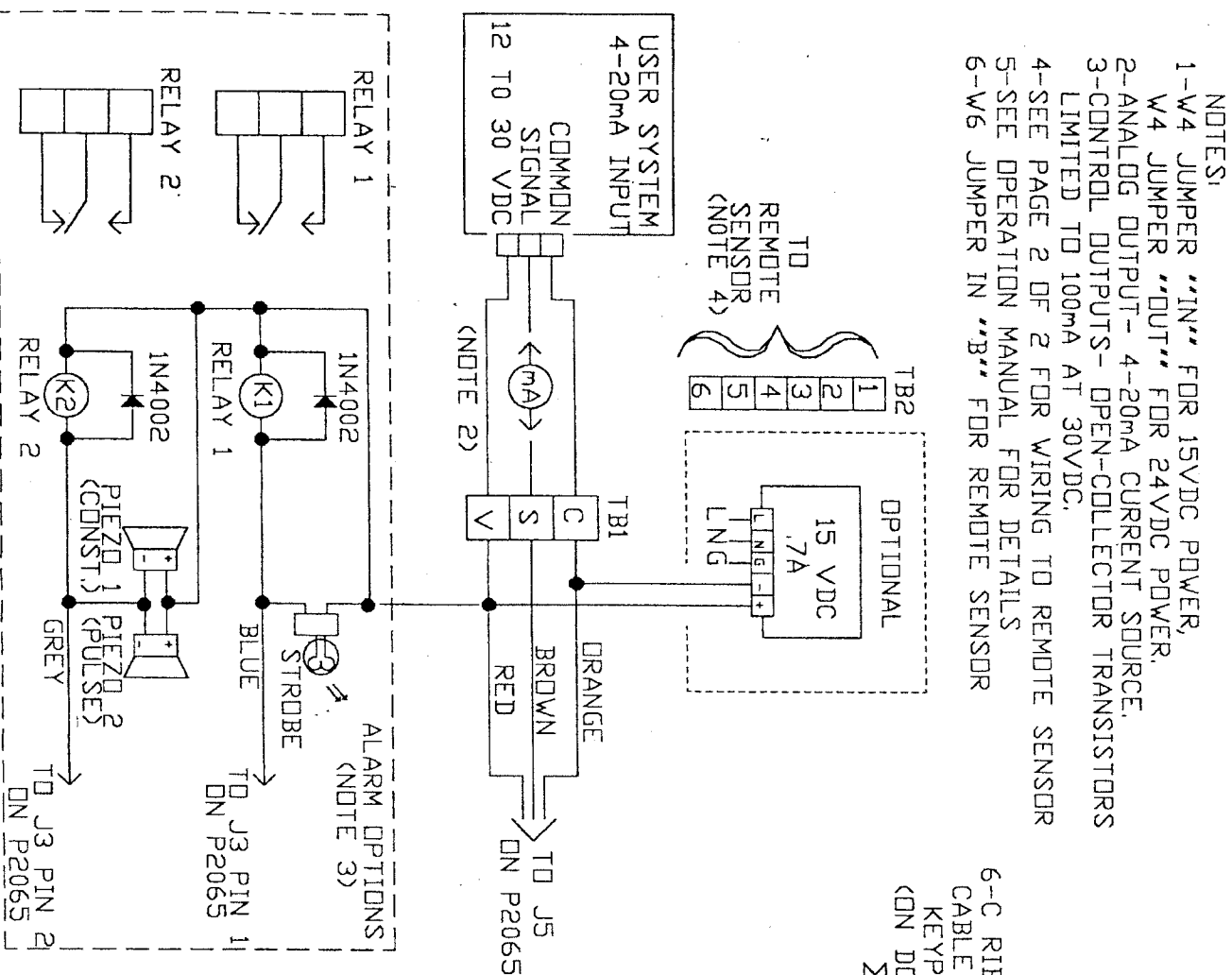
RELAY 2 CONTACTS

PIEZO 1 (CONSTANT) PIEZO 2 (PULSED) GND

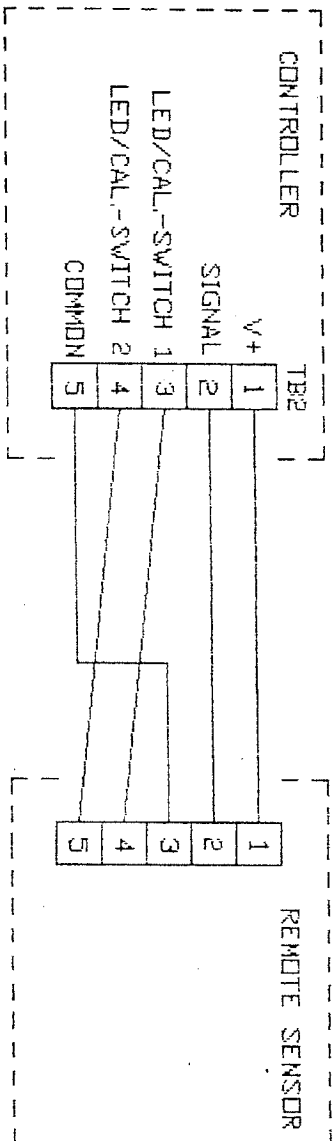
INHORE

RELAY 1 RELAY 2

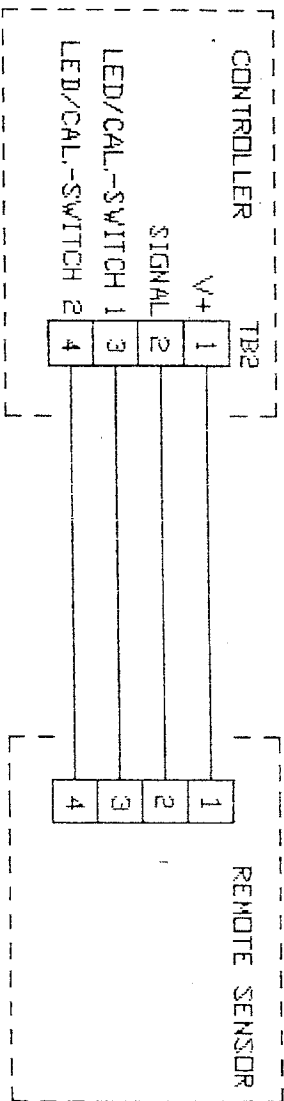
- NOTES:
- 1-W4 JUMPER "IN" FOR 15VDC POWER, W4 JUMPER "OUT" FOR 24VDC POWER.
  - 2-ANALOG OUTPUT- 4-20mA CURRENT SOURCE.
  - 3-CONTROL OUTPUTS- OPEN-COLLECTOR TRANSISTORS LIMITED TO 100mA AT 30VDC.
  - 4-SEE PAGE 2 OF 2 FOR WIRING TO REMOTE SENSOR
  - 5-SEE OPERATION MANUAL FOR DETAILS
  - 6-W6 JUMPER IN "B" FOR REMOTE SENSOR



**CONSPEC CONTROLS**  
 KP-REMOTE FIELD WIRING  
 DRN: FJM  
 DATE: 2/6/95  
 CKD: VCD  
 DWG#: 95007



CARBON DIOXIDE AND COMBUSTIBLE SENSORS  
 \*\*NOTE WIRING CROSSOVER ON 5-WIRE SENSORS\*\*



OXYGEN AND ALL TOXIC-GAS REMOTE SENSORS

# CONSPEC CONTROLS

REMOTE SENSOR FIELD WIRING

DW/N FJM      DATE: 3/2/98

CKD: WCD      DW/G#: 98009