Interscan Corporation

Instruction Manual

RM Series Rackmount Monitor

Table of Contents

Section

1

Introduction

1.1 Component Check

Check the contents list (where applicable) in each shipping container used to ship your system and ensure that all accessories on the list(s) are included. Set all accessories aside until directed to install them later in the manual.

1.2 System Description

The Interscan Rackmount Monitor consists of the Interscan gas sensor, sample draw pneumatics (where applicable), Digital meter/controllers) and various alarm output devices.

In basic operation sample air is drawn through the sensor, via a diaphragm sample pump (when provided) and related pneumatics. The sensor's electrical output is sent via the sensor circuit board to the digital panel meter which processes the sensor outputs and produces a digital readout in PPM (parts per million). The maximum readout will depend on the range ordered and is indicated in section 1.3 on the following page.

When ordered accordingly, the meter/controller also compares the current gas level to preset alarm levels and activates alarm indicators when gas levels exceed these user set levels, in addition to outputting a 4-20 mA analog signal in proportion to the full scale range of the system.

ALL INTERSCAN MONITORS ARE CALIBRATED AT THE FACTORY PRIOR TO SHIPMENT. Unless the **CAL** control is inadvertently changed, no calibration is required until the unit has seen considerable use.

1.3 Instrument Configuration

If your monitor contains special custom features, the operational details of those features are shown below:

GAS – Formaldehyde

FULL SCALE RANGE – 2.00 PPM

OPTIONAL FEATURES INCLUDED

4-20 mA ANALOG OUTPUT – See section 2.3.2

AUTO ZERO – See section 4.4

CUSTOM FEATURES INCLUDED

NONE

Section

2

Installation

2.1 Plumbing The System

2.1.1 REAR PANEL FITTINGS AND CONNECTIONS

Sample air is drawn into and exhausted from the monitor via as series of ¼ inch (6.35 mm) OD "push-in" type bulkhead fittings located on the rear panel of the rackmount monitor . The locations, and purposes of the various fittings are detailed below.

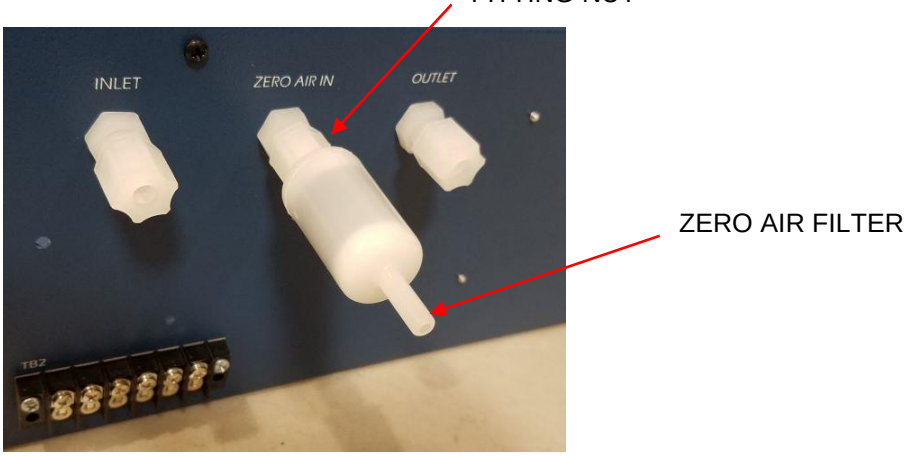
INLET — Top left of rear panel. Gas sample is introduced here.
NOTE: If delivering sample from a pressurized source for units that include a sample pump, a TEE fitting MUST be used before the INLET fitting to bleed off excess pressure and protect the sensor from pressurization. **INLET PRESSURE MUST BE REGULATED TO BELOW 4 PSI!** Contact Interscan to order the proper TEE fitting for pressurized sample applications.

EXHAUST — To the right on the Inlet fitting. The exhaust should be connected to an exhaust vent or manifold. If an exhaust manifold is used, it must have a minimum of 3.5 inch (88.9 mm) ID.

ZERO AIR — **OPTIONAL FEATURE.** Located between the inlet and exhaust fittings. Attach the supplied Zero Air Filter to this fitting according to section 2.1.2 below. See section 4.4 for details on the Auto Zero option.

2.1.2 ZERO AIR FILTER

The Zero Air filter is an in-line charcoal scrubber that connects to the ZERO AIR inlet on the back of the unit. This filter is shipped detached from the unit. To connect this filter, insert either tube end of the filter into the fitting nut of the ZERO AIR inlet fitting on the back of the unit. Tighten the nut fully to hold the filter in place.



2.3 Electrical Connections

2.3.1 AC LINE CORD

The AC line cord is located at the lower right side of the rear panel.

2.3.2 ANALOG OUTPUTS

A millivolt output signal (usually 0-100 mV at full scale) is provided and can be accessed via the barrier strip terminal block TB2 which is located at the bottom left corner of the rear panel. An optional 4-20 mA current loop output is also available and will be located at TB2 as well (if provided). See section 10 at end of manual for output terminations. See section 1.3 for custom output specifications.

2.3.3 ALARM CONTACTS (OPTIONAL)

2 sets of FORM C relay contact outputs are provided corresponding to 2 alarm set points (LO / HI). These contacts terminate at the barrier strip terminal block TB2 located on the rear panel. See section 10 at the end of this manual for details of alarm contact terminations. See section 4.1 for details on programming of the Alarm Set Points.

2.3.3 LOW FLOW CONTACTS (OPTIONAL)

1 set of FORM C relay contact outputs are provided corresponding to LOW FLOW conditions. These contacts terminate at the barrier strip terminal block TB2 located on the rear panel. See section 10 at the end of this manual for details of alarm contact terminations. See section 4.2 for details on the LOW FLOW feature.

Section

3

Quick Start – Basic Functions and Features

This section gives a brief overview of the system's most basic functions and components. A full reading of the manual is recommended for a thorough understanding of all unit functions.

3.1 Front Panel Controls and Indicators

Designation	Function
CAL CONTROL:	10-Turn potentiometer with a turn counting knob located underneath the digital panel meter. Adjusts the meter to correspond to the concentration of the calibration gas used when calibrating the instrument. **This control should ONLY be adjusted when performing unit calibration.**
DIGITAL METER:	Digital display indicator/controller located in the middle of the front panel. Displays gas concentration in parts-per million (ppm) unless a custom resolution is specified. Provides for user adjustability of the alarm set points (optional feature) at the desired ppm level and controls the alarm relays and indicators. An LED indicates which alarm point has been exceeded, 1 (low alarm) or 2 (high alarm). Outputs a 4-20 mA analog signal (optional feature) where 4 mA correspons to **0.0 ppm** and 20 mA to the unit's full scale range **.**
FLOWMETER:	**Optional Feature.** Located at right side of the front panel. Measures and control gas sample through the sensor. Turning the flowmeter control valve clockwise decreases flow-rate while turning it counter-clockwise increases the flow-rate. Proper sampling flow rate for each unit is indicated on a yellow sticker next to the flowmeter.

LOW FLOW INDICATION: **Optional Feature.** L.E.D. indicator located to the left of the flowmeter. Lights when the flowrate drops below a factory set level. This feature may also include relay contacts. See sections 4.2 and 10

POWER ON SWITCH: Toggle switch located in the upper left corner of the front panel. Controls power to the monitor in the up position.

SAMPLE/ZERO SWITCH: OPTIONAL**:** Toggle switch located to the right of the Power On switch. Switches the sample pump ON (SAMPLE) or OFF (ZERO). Disables alarm relays and indicators in the OFF (ZERO) position.

TP1 & TP2 Test points located just to the left of the flowmeter. Used for troubleshooting and for electronic calibration. A GROUND test point is also provided.

ZERO CONTROL: 10-Turn Potentiometer with turn counting knob located underneath the digital panel meter. Used to compensate for sensor background current and adjust meter reading to **0.0 ppm** during the Manual Zero procedure. Also allows for manual simulation of sensor response during ECS calibration.

ZERO FAULT **Optional Feature** L.E.D. indicator located just below the Auto Zero / Manual Zero switch. Lights when the Auto Zero correction limit has been exceeded. See section 4.4

3.2 Other Components

3.2.1 GAS SENSOR

Black cylindrical device located in the right rear corner of the rack chassis (wrap-around cover must be removed to access the sensor). Reacts with EtO when present in the sample stream, producing an electric current that is sent to the Digital meter and displayed as a PPM value.

3.2.2 SAMPLE PUMP (OPTIONAL)

Located to the left of the sensor (wrap-around cover must be removed to access the pump). The diaphragm pump pulls sample air through the sensor and flowmeter and exhausts the air through the EXHAUST fitting on the back of the rackmount chassis.

3.2.3 ZERO AIR FILTER (OPTIONAL)

Units equipped with the AUTO ZERO feature will include an in-line charcoal Zero Air filter that is to be attached to the Zero Air inlet on the back of the monitor. See section 4.4 for more on the AUTO ZERO feature.

3.3 Initial Start-up

Once all installation has been completed, the system is ready for power-up. Set all front panel switches to their down positions. (**If the unit includes AUTO ZERO, make sure the ZERO/MANUAL switch in the MANUAL position**). Turn power on by switching the **POWER ON** switch to the up position. You will likely notice a temporary over-range ("EEE") and/or high positive or negative PPM reading on the panel meter that gradually decreases toward zero. This is normal and is part of the sensor stabilization after prolonged periods without power. The sensors should be allowed to stabilize for 24 hours prior to initial operation.

Any time the system has been powered down or the sensor has been disconnected (off bias) for 24 hours or more, it is recommended that the sensor be allowed to re-stabilize for a minimum of 12 hours upon re-applying power or re-connecting sensor before resuming or beginning sampling. For short off bias durations, re-stabilization may only take a few minutes. The sensor can be considered stabilized when the ppm display does not change for several minutes with the pump off.

3.4 Zeroing The Instrument

All *Interscan* sensors exhibit a slight amount of output even when not exposed to gas or when they are exposed to true "zero" air (a sample free of any sensor reactive gases). This output (called background current) can also fluctuate due to changes in temperature and sensor aging. If not compensated for, the background current would result in positive or negative display readings even though no gas was present. To compensate for this phenomenon, the unit should be

"zeroed" before use for a true "zero" display reading. The ZERO procedure entails drawing sample air through a scrubbing device or filter that eliminates all reactants that the sensor could respond to and adjusting the ZERO control for a true zero reading on the PPM display.

After the initial start-up 24 hour sensor stabilization period, the sensor should be zeroed. Refer to section 4.3 for details on this procedure.

3.5 Sampling

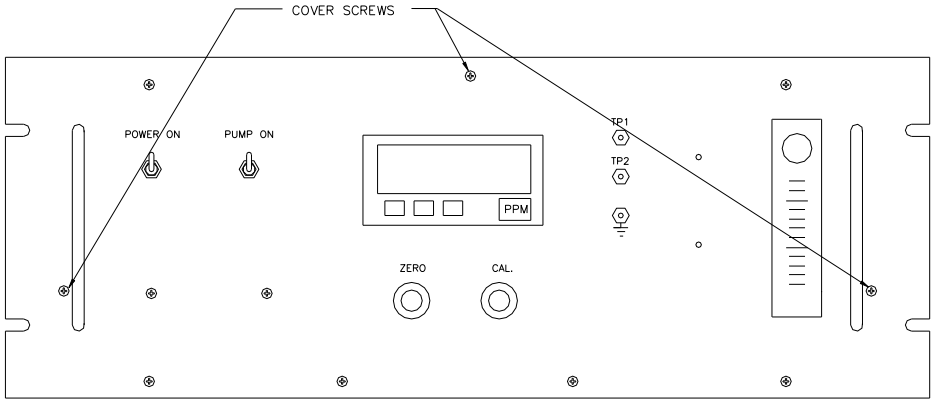
Begin sampling by switching the SAMPLE/ZERO switch to **SAMPLE** and adjusting the flowmeter control valve for a flow rate of **0.50 lpm OR THE FLOWRATE INDICATED ON THE FLOWRATE STICKER NEXT TO THE FLOWMETER.** (For units equipped with **ccm** flowmeters, set the flowrate for the equivalent reading of **500 ccm.**)

NOTE: If sampling from a pressurized source for units that include a sample pump, a TEE fitting must be used before the INLET fitting to bleed off excess pressure and protect the sensor from pressurization. DO NOT APPLY A PRESSURE IN EXCESS OF 4 PSI TO THE SAMPLE INLET AS THIS MAY DAMAGE THE SENSOR AND VOID THE WARRANTY!! Contact Interscan to order the proper TEE fitting for this application. (see pneumatic diagram at the end of this manual.)

If a sample pump is NOT provided, the TEE fitting is not required as long as the pressure source is regulated to below 4 PSI.

3.6 Wrap-around Cover Removal

All rackmount units are provided with a wrap-around cover to protect internal components. This cover must be removed to access the sensor for regular maintenance. The cover is secured to the unit chassis and front panel via the 3 screws along the **top, rear edge** of the cover and 3 screws on the front panel as shown below. Remove these screws and lift cover away from unit to access the sensor. DO NOT REMOVE ANY OTHER SCREWS.


COVER SCREWS
POWER ON
PUMP ON
TP1
TP2
PPM
ZERO
CAL.

Section

4

Advanced System Functions

4.1 Alarm Indicators and Outputs (Optional Feature)

When ordered, level alarm indicators and outputs corresponding to 2 discrete alarm levels will be provided. Alarm features include display indicators at the panel meter face and Form C relay contacts that are available at the back of the monitor (see section 10 for Alarm Contact terminations).

Display features include alarm level indicators (al1 and al2) that will light when each of the 2 alarm levels are exceeded by the gas level. Additionally, the primary PPM display will change color when the alarm levels are exceeded. Above the LOW ALARM level (al1) the display will change from GREEN to AMBER and above the HIGH ALARM level (al2) the display will change from AMBER to RED.

The output relays are integral to the panel meter controller. These relays are configured as 4, Form A contacts. To provide 2 FORM C contacts, the 4 setpoints and associated FORM A contacts are divided into 2 sets of 2 contacts with a single COMMON termination between them. The 2 setpoints are assigned to the relays as follows:

SP1 – LOW ALARM NORMALLY OPEN
SP2 – HIGH ALARM NORMALLY OPEN
SP3 – LOW ALARM NORMALLY CLOSED
SP4 - HIGH ALARM NORMALLY CLOSED

SP1/SP3 should be set to the same value (LO ALARM) and SP2/SP4 should be set to the same value (HI ALARM)

4.1.1 CHECKING ALARM SET-POINTS

Refer to figure 4-1 below for the following sections.

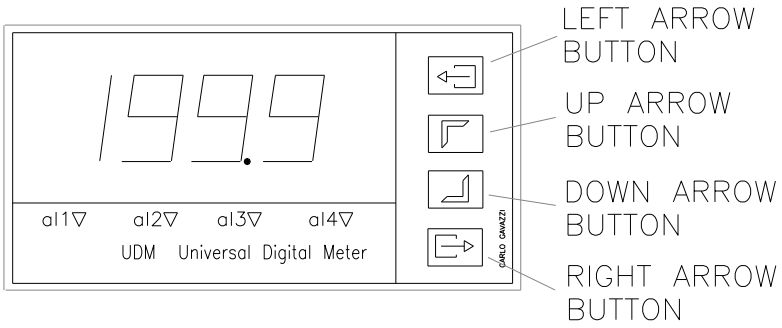


FIGURE 4–1

Momentarily press the **up arrow** button on the panel meter. The display will show "**SP1**". Press the **left arrow** button to display the current set point value for set point 1 (LO ALARM N.O. CONTACT). Wait several seconds for the display to return to "**SP1**". .

Press the **up arrow** button to advance display to "**SP2**". Press the **left arrow** button again to display current set point value for set point 2 (HI ALARM N.O. CONTACT). The display will automatically return to the main display reading after a few seconds.

Press the **up arrow** button to advance display to "**SP3**". Press the **left arrow** button again to display current set point value for set point 2 (LO ALARM N.C. CONTACT). The display will automatically return to the main display reading after a few seconds.

Press the **up arrow** button to advance display to "**SP4**". Press the **left arrow** button again to display current set point value for set point 2 (HI ALARM N.C. CONTACT). The display will automatically return to the main display reading after a few seconds.

4.1.2 CHANGING ALARM SETPOINTS

Alarms are arbitrarily set at the factory at **1/3 (SP1/SP3) and 2/3 (SP2/SP4) of the full scale range**. The alarms can be re-set to any desired level by following the simple procedure below.

Momentarily press the **up arrow** button on the panel meter. The display will show "**SP1**". Press and HOLD the **right arrow** button until the display changes to a numeric value. The left-most digit will be highlighted. Press the **left arrow** button successively to highlight the digit you wish to alter.

Alter the digit by pressing the up **arrow button** to increase the value or the **down arrow** to decrease the value. Repeat this procedure for each digit as required. When satisfied with the value, press the **right arrow** button to lock the value into the memory. Display will return to "SP1".

Press the **up arrow** button to advance to "SP2" and repeat the entire procedure. Repeat for "SP3" and "SP4". When finished, allow the display to automatically return to the main display reading.

IMPORTANT NOTE: SP1 and SP3 collectively control the LO ALARM contacts and should be set for the same value. SP2 and SP4 collectively control the HI ALARM contacts and should also be set for the same value.

4.2 Low Flow Indication (Optional Feature)

The LOW FLOW L.E.D. indicator will light whenever there is a drop in flowrate caused by an inlet line restriction. This could be the result of a clogged inlet filter or a kink in the inlet tubing or other similar sample line restriction. When this indicator is lit, the inlet filter and tubing lines should be checked and maintained as described in section 6.1. If frequent or constant FILTER CLOG indications occur with no associated inlet blockage, it could be an indication of an improperly set FILTER CLOG vacuum switch. Contact the INTERSCAN service dept. if this should occur.

4.3 Zero Procedure

Zeroing of the ppm display is necessary from time to time to compensate for natural zero drift of the sensor output due to temperature fluctuations and sensor aging. The procedures for zeroing the system are described below.

Most monitors can be zeroed by merely adjusting the **ZERO** control for a reading of **0.0 ppm** on the meter display following the 24 hour start-up stabilization period. **For low range units (19.99 ppm full scale or less), and for all Ethylene Oxide, Formaldehyde and Hydrazine models**, the monitor should be zeroed with the pump on as described below. NOTE: The procedure below does NOT apply to CO units which should simply be zeroed by turning the pump off, allowing the senor to stabilize and adjusting the ZERO control for a **0.0 ppm** reading.

Attach the *Interscan* C-12 Zero filter included in the original shipping contents to the inlet fitting using a short length of ¼" OD tubing. Turn on the pump and adjust the flow rate to **0.5 lpm** (**500 ccm** on ccm flowmeters) **OR THE FLOWRATE INDICATED ON THE FLOWRATE STICKER**

NEXT TO THE FLOWMETER. Allow several minutes for the reading to stabilize prior to making **ZERO** adjustments. Once the reading is stabilized, manually adjust the **ZERO** potentiometer knob until the display value reads **0.0 ppm** . Remove the C-12 filter from the inlet filter. **Be sure to remove the C-12 filters before resuming normal sampling as failure to do so will result in no sensor readings when gas is present.**

4.4 Auto Zero (Optional)

4.4.1 AUTO ZERO FUNCTION

The AUTO ZERO feature allows for automatic zeroing of the system display to compensate for excessive sensor zero drift. This is usually incorporated in lower range units. The Auto Zero circuit will zero the ppm display in pre-set user programmed intervals. Setting the **Auto Zero / Manual Zero** switch to **Auto Zero** engages the Auto Zero circuit which will cycle the sensor between normal sampling and auto zeroing at a factory set interval of 2 minutes of zeroing every 4 hours. When in a zero cycle, a solenoid valve diverts the sample flow from the inlet fitting to the Zero air fitting and ambient air is drawn through a charcoal filter which scrubs out sensor reactant gases yielding a true zero sample. The circuit then analyzes the current sensor output and adjusts the display reading to **0.0 ppm (**± 1% of full scale range). After the zero cycle times out the monitor will switch back to normal sampling mode. The Auto Zero cycle will be defeated if the unit is in an alarm condition.

To disable the Auto Zero circuit, set the **Auto Zero / Manual Zero** switch to **Manual Zero**. This will reset the Auto Zero compensation circuit and a sudden change in the display value will likely occur. To compensate, manually zero the monitor according to the procedure described in section 4.3.

NOTE: For CO units that employ the Auto Zero feature, the pump will be automatically turned OFF during the zero cycle. No valve or zero filter is employed with CO units.

4.4.2 ZERO FAULT INDICATION

The Zero Fault indicator will light whenever the Auto Zero compensation limit has been exceeded. If over consecutive zero cycles the sensor output has drifted beyond a factory preset value, the Zero Fault indicator will light indicating that the sensor may need maintenance or replacement.

Section

5

Instrument Calibration

5.1 Introduction

NOTE: If calibrating from a self pressurized source for units that include a sample pump, a TEE fitting must be used before the INLET fitting to bleed off excess pressure and protect the sensor from pressurization. DO NOT APPLY A PRESSURE IN EXCESS OF 4 PSI TO THE SAMPLE INLET AS THIS MAY DAMAGE THE SENSOR AND VOID THE WARRANTY!! Contact Interscan to order the proper TEE fitting for this application.

All *Interscan* instruments are calibrated at the Factory prior to shipment. Unless the CAL. adjustment knob is inadvertently changed, there is no need to calibrate the monitor upon initial startup.

Periodic calibration is required to compensate for natural decrease in the sensor's sensitivity over time. Necessary frequency of calibration is strictly a function of the sampling application and sensor type but is primarily influenced by evaporative water loss in the sensor. The more the sensor tends to lose water, the more frequent calibration may be necessary.

The instrument is calibrated by introducing a known concentration of gas and adjusting the CAL. control for a proper ppm reading on the panel meter. As such, the analysis of the calibration gas must be accurate. The sources of gas standards include commercially available gas mixtures diluted with air or nitrogen in cylinders or permeation devices.

The recommended gas delivery method for calibration is via a sample bag but if a pressurized source must be used, **ensure proper gas cylinder hardware is in place to regulate delivery pressure below 4 PSI.**

Interscan offers “Electronic Calibration Service” (ECS – See section 5.5), which permits the user to calibrate the instrument without the use of gas. Calibration is accomplished by quick and simple adjustments of the ZERO and CAL. controls using a digital voltmeter.

5.2 Calibration Gas Standards

5.2.1 GAS BLENDS IN CYLINDERS

Low concentration gas mixtures (in air or nitrogen) are available with few exceptions, in pressurized cylinders. The major concern in using commercially available mixes of such active gases as EtO, is reliability. The analysis results shown on the label are applicable only at the time the analysis was performed. Concentration stability with time varies widely as a function of the gas mix, its container, and the manufacturer. *Interscan* should be consulted for recommendations on commercially available gas mixtures.

NOTE: When calibrating from a self pressurized source, DO NOT APPLY A PRESSURE IN EXCESS OF 4 PSI TO THE SAMPLE INLET AS THIS MAY DAMAGE THE SENSOR AND VOID THE WARRANTY!!

5.2.2 PERMEATION DEVICES

An alternative calibration method is the use of permeation devices containing the gas liquefied under pressure. Permeation of the gas in nanogram-per-minute rates, permits the generation of a desired concentration in an air or nitrogen carrier.

Varying the temperature, flow rate, and emission rate characteristics gives a fairly wide range of gas concentrations. Many gases in a low ppm range are ideally suited to the permeation device technique. It is important to remember to keep the permeation device flow rate higher than the **0.50 liter/minute** rate required by the *Interscan* monitor.

Consult the permeation device manufacturer for complete operation and procedure information.

5.2.3 CAL GAS PPM CONCENTRATIONS

The choice of PPM concentration for a CAL gas standard regardless of the type of source should be determined by the full scale range of the monitor. The ideal CAL gas should be in a range between **25% and 100% of the full scale range of the monitor.** EX: For a monitor with a full scale range of 500 PPM, the ideal CAL gas concentration should be between 125 PPM and 500 PPM.

NOTE: For units equipped with dilution systems, the CAL GAS concentration should be chosen by dividing the numbers shown above by the DILUTION FACTOR. EX: For a monitor with a full scale range of 500 ppm and a dilution factor of 50, the ideal CAL GAS concentration would be between 125/50 and 500/50 or 2.5PPM and 10PPM.

5.3 Gas Delivery By Sample Bag

Whatever the source of calibration standard, the recommended method of gas collection and delivery is via a proper sample bag, which is then attached to the calibration inlet. The calibration gas is drawn through the sensor by the sample pump.

Contact *Interscan* for recommendations on the type of sample bag to use.

5.4 Gas Delivery By Pressurized Source

The recommended gas delivery method for calibration is via a sample bag but if a pressurized source must be used and your unit includes a sample pump, **a TEE fitting must be used before the INLET fitting to bleed off excess pressure and protect the sensor from pressurization. DO NOT APPLY A PRESSURE IN EXCESS OF 4 PSI TO THE SAMPLE INLET AS THIS MAY DAMAGE THE SENSOR AND VOID THE WARRANTY!! Contact Interscan to order the proper TEE fitting for this application.** (see pneumatic diagram at the end of this manual.)

Always ensure that adequate regulation hardware is in place to regulate the sample delivery pressure to **4 PSI** or lower**.**

5.5 Calibration Procedure Using A Sample Bag

1. Perform the MANUAL ZERO procedure as detailed in section 4.3.

2. Turn on the sample pump and adjust the flow meter control valve to the **THE FLOW RATE INDICATED ON THE YELLOW STICKER NEXT TO THE FLOW METER.**.

3. Fill the sample bag with the calibration standard, and attach it to the inlet fitting. This is best done by attaching a short length, 2 inches (50 mm) of 1/4 inch (6.350 mm) OD flexible tubing to the sample bag nipple, then attaching the tubing to the sample inlet by pushing the tubing firmly into the inlet fitting then pulling back gently to ensure a tight seal.

4. Wait 8-10 minutes for the sensor to fully react to the sample flow then adjust the CAL. potentiometer so that the meter display reads the ppm value of the cal gas being used.

4. Remove the sample bag and allow time for the meter reading to return to zero.

5.6 Calibration Procedure Using A Self Pressurized Source

1. Perform the MANUAL ZERO procedure as detailed in section 4.3.

2. Turn the pump on and adjust the flow meter control valve to the **THE FLOW RATE INDICATED ON THE YELLOW STICKER NEXT TO THE FLOW METER.**

3. Connect the pressure bleed TEE fitting to the INLET fitting and the pressurized gas source via ¼" OD, 1/8" ID tubing to the end of the TEE fitting. Connect the open end of the TEE fitting to an exhaust manifold or an appropriate exhaust area via ¼" OD, 1/8" ID tubing. (see pneumatic diagram at the end of this manual.)

4. Open the pressurized gas source valve to allow flow of gas to the sensor. Confirm that the pressure is regulated to **4 PSI or less.** Re-adjust the flow meter to the recommended flow rate established in step 2 as necessary.

5. Wait 8-10 minutes for the sensor to fully react to the sample flow then adjust the CAL. potentiometer so that the meter display reads the ppm value of the cal gas being used.

6. Disconnect pressurized gas source and allow time for the meter reading to return to zero.

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5.7 Calibration Procedure - Monitors With Dilution Systems

1. Calculate the **CAL PPM ADJUSTMENT VALUE** as the concentration of the CAL gas standard being used MULTIPLIED BY the dilution factor for your dilution system.
   EXAMPLE – Cal gas is 12 PPM & dilution factor is 50.
   CAL PPM ADJUSTMENT VALUE = 12 x 50 = **600 ppm**

2. Disconnect the tubing connecting the Dilution System to the Monitor's Inlet fitting.

3. Perform the MANUAL ZERO procedure as detailed in section 4.3 of the user manual.

4. Turn on the sample pump and adjust the flowmeter control valve to the recommended flow rate of **0.50 lpm (500 ccm), OR THE FLOWRATE INDICATED ON THE FLOWRATE STICKER NEXT TO THE FLOWMETER IF DIFFERENT**.

5. Fill the sample bag with the calibration standard, and attach it to the inlet fitting. This is best done by attaching a short length, 2 inches (50 mm) of 1/4 inch (6.350 mm) OD flexible tubing to the sample bag nipple, then attaching the tubing to the filter inlet or end of 158LD interference scrubber when utilized.

6. After an 8 - 9 minute delay, use the potentiometer adjustment tool supplied with the unit to adjust the CAL. potentiometer so that the meter display reads the **CAL PPM ADJUSTMENT VALUE** calculated in step 1. Clockwise adjustments raise the reading while counter clockwise adjustments lower the reading.

7. Remove the sample bag and allow time for the meter reading to return to zero.

8. Reconnect Dilution System tubing to Monitor inlet fitting.

5.8 Electronic Calibration Service (ECS)

The factory recommended procedure for calibrating all *Interscan Corp*. sensors involves the use of calibration gas or permeation device. Besides being essential for calibration, having a known certified gas standard on hand allows the user to test the instrument at any time to verify that the sensors "really work".

There will be times and circumstances in which calibration using calibration gas or permeation devices is inconvenient and/or impractical. For this reason Interscan Corp. developed the **E**lectronic **C**alibration **S**ervice (ECS).

A certified spare sensor is kept on hand as a replacement, to be installed in the system while the presently used sensor is sent back to the factory for certification. The ECS certification details zero and calibration adjustments that are to be made to the system, to set it up with the specified newly certified sensor.

The ECS program verifies the integrity of the sensor sensitivity only, and does not guarantee the operation of the entire system. Most importantly, the ECS program is not a substitute for basic system maintenance, nor does it check for malfunction of system components.

Section

6

Maintenance

6.1 Inlet Particulate Filter

Inlet filtering is recommended to keep particulate matter from entering the sensor. A Millipore or MFS filter is factory supplied for use with rackmount monitors (Carbon Monoxide units will usually be supplied with a Koby Charcoal filter). When employed, these filters or filter elements need to be inspected and changed on a regular basis with frequency depending on the nature of the environment in which the system operates. Drops in flow rate below the nominal flow rate may indicate a clogged filter and as such, the flow rate should be checked from time to time to ensure that it is maintained at the nominal rate. The filter should be checked and changed if frequent upward adjustment is necessary to keep the flow rate at or above the recommended rate or when the optional FILTER CLOG indicator is lit. Periodic replacement on a field-determined time interval (for your particular installation) is the best approach. If regular maintenance checks reveal heavily packed or clogged filters, more frequent inspection is indicated.

6.1.1 MILLIPORE / MFS TEFLON FILTERS

The Millipore filter is a round white plastic housing that holds a Teflon filter element disc. To check and/or change the Millipore filter element, unscrew the outer or front section of the round filter housing revealing the filter element disc. If the disc is noticeably dirty or clogged, replace it with a new one. It is also a good idea to inspect the inside of the inlet port and clean as necessary. Insert the new filter element with the shiny side facing in toward the rear part of the housing. Carefully screw the outer housing back on to the inner housing making sure the element stay flush against the inner housing surface.

In some cases the MFS filter may be substituted for the Millipore assembly. The MFS housing is blue in color and is a 3 piece assembly instead of 2 pieces in the case of the Millipore. To check and or change the MFS filter element, hold the front section of the housing while unscrewing the rear retaining ring. Remove the ring then pull the element cap away from the front portion of the housing exposing the element. Replace as necessary as described above. Install a new element

by placing the element dull side facing up in the front housing element channel. Place the element cap over the element and secure by screwing on the rear securing ring.

6.1.2 KOBY CHARCOAL FILTERS

Koby charcoal filters should be replaced when noticeable flowrate drop is seen. To check the Koby filter, disconnect if from the inlet and see if there is a significant upward change in the flowrate. If so, the filter is becoming clogged and should be replaced.

6.2 Sensor Maintenance

For optimal performance, the gas sensor in the Interscan monitoring system requires periodic maintenance to address sensor hydration loss due to evaporation. Maintenance is performed by removing and weighing the sensor to determine the amount of weight/hydration loss and then injecting **distilled** or **deionized** water into the sensor to replace the lost water as directed in the following sections. **NOTE: Read each of the following sections completely before performing any maintenance on the sensor.**

6.2.1 MAINTENANCE INTERVAL

The degree of hydration loss can vary depending on operating conditions and sensor type. The factory recommended maintenance interval for most sensors in most applications is ***once every 6 weeks*****.** Sensors should be removed and weighed every 6 weeks as detailed in section 6.2.3 below to determine the amount of weight loss and the amount of water to be added. For most sensors, weight loss should not exceed **50 grams** during maintenance intervals**.** More frequent maintenance may be indicated if this limit is exceeded in a 6 week period.

HYDRAZINE and **FORMALDEHYDE** sensors are more susceptible to rapid hydration loss due to their electrolyte makeup. As such, they require a different maintenance interval and approach. See section 6.2.2 below for details on maintaining **HYDRAZINE** and **FORMALDEHYDE** sensors.

6.2.2 HYDRAZINE AND FORMALDEHYDE SENSORS

The Interscan Hydrazine and Formaldehyde sensors contain an Alkaline based electrolyte and may require more frequent hydration than the Acid based sensors.

For optimum performance, Interscan recommends that Hydrazine and Formaldehyde sensors be weighed once every 2 weeks and hydrated according to the amount of weight loss.

Water should be added to the sensor as directed in section 6.2.3 below. Always add water to within **5 grams of the original sensor weight** (original weight is noted on the label affixed to the side of the senor body). It is extremely important to return the weight of the sensor to within **5 grams** of the original weight. **NEVER ADD WATER OVER THE ORIGINAL WEIGHT.**

6.2.3 SENSOR MAINTENANCE PROCEDURE

1) Turn power to the monitor OFF.

2) Remove the sensor from the monitor.
   a. Carefully disconnect the electrical connections to the sensor (1 blue wire and 1 white/blue stripe wire).
   b. Disconnect the tubing from the sensor ports by unscrewing the elbow fitting nut counter-clockwise and pulling the nut and tubing away from the fitting.
   c. Unscrew the 2 screws holding the sensor base to the slide in bracket and slide the sensor away from the bracket.

3) Weigh the sensor on a gram scale. Be sure to weigh the sensor with both elbow fittings and the red fill plug intact. Subtract the new weight from the sensor's original weight noted on the label affixed to the side of the sensor body. The difference is the weight loss. Weight loss should not be allowed to exceed **50 grams** for most sensors. For **FORMALDEHYDE** and **HYDRAZINE** sensors, weight loss should not be allowed to exceed **25 grams.** If weight *gain* under **5 grams** is observed, no action is required. If weight gain of **5 grams or more** is observed, contact the Interscan Service dept. for further advice.

4) Using the 10ml syringe supplied, restore the sensor to its original weight by injecting an amount of **distilled or de-ionized** water in ml. equal to the weight loss in grams. Ex: 10g weight loss requires 10 ml of water.

5) Always inject the water *SLOWLY*. Observe the fill hole as you inject the water. If you notice water draining from the fill hole, STOP FILLING as this means **the sensor**

can take on no additional water without damage. Weigh the sensor and make note of the weight. Replace the fill plug when finished.

6) **NOTE: DO NOTOVERFILL! Overfilling the sensor can cause electrolyte to leak into the sample tubing during sampling, causing significant damage to the instrument.** It is always better to fill to *slightly under* the original weight than to overfill. **Never remove water from the sensor as this will remove the premixed electrolytes as well as damage the sensor.**

7) Re-install sensor. Assure that all electrical and pneumatic fittings are secure.

8) Turn power to the unit ON. The sensor should be allowed to re-charge with POWER ON and the **PUMP OFF** until the PPM reading appears stable. This should take no more than twice the amount of time the sensor was disconnected from the unit.

Section

7

Troubleshooting

A high percentage of service problems often result from little things you can find and fix yourself. Always consult with the INTERSCAN service department for problems not on this list or if suggested corrective actions fail to fix the problem. ALWAYS turn power off before working inside the unit.

Symptom	Corrective Action or Probable Cause
No power	• Check that power switch is on. • Turn power off and check main fuse (F1) located below the panel meter on the rack chassis. If fuse is blown, replace with AGC-2A and turn power back on. If fuse continues to blow, contact the *Interscan* Service Dept.
Can't achieve proper flowrate.	• Check inlet filter for blockage. • Check the pump's speed control knob on the back side of pump. This should be turned fully clockwise. • Check all tubing for kinks.
Liquid in flowmeter or tubing.	• Sensor has leaked electrolyte. Consult with Interscan service dept. for sensor, and affected component replacement.

Symptom	Corrective Action or Probable Cause
No response to gas	• Check all sensor connectors for firm connections. • Check for solid connection of circuit board connector to circuit board (Sensor circuit board is located on the inside surface of the front panel to the left of the flowmeter). • Check that Cal/Span control is NOT turned all the way down (full counter-clockwise).
Cannot Zero	• Check the Bias voltage with a DVM at TP1 on the front panel. This voltage should be within the range shown in table 7-1 below for the type of sensor being used. If not within the range shown, contact the *Interscan* service dept. • Sensor may be bad. Contact the *Interscan* service dept.

TABLE 7-1 BIAS VOLTAGES

GAS	BIAS VOLTAGE RANGE
CO	665 - 687 mV
EtO	390 - 410 mV
HCl / HCN	480 - 500 mV
MMH / HZ	240 - 260 mV
HCHO	190 - 210 mV
SO_2 / H_2O_2	540 - 560 mV
Cl_2	-790 - -810 mV
ClO_2	-790 - -810 mV
NO_2	-790 - -810 mV
NO / NO_X	340 - 360 mV
H_2S	490 - 510 mV

Section

8

Warranty

Interscan Corporation warrants continuous monitoring systems of its manufacture (sensors, batteries, fuses, lamps, tubing, fittings, filters, and scrubbers excepted) to be free from defects in material and workmanship for a period of one year from date of shipment.

Interscan Corporation warrants sensors of its manufacture to be free from defects in material and workmanship for a period of six months from date of shipment.

Interscan Corporation's sole obligation under this warranty is limited to repairing or replacing, at its option, any item covered under this warranty, when such item is returned intact, prepaid to the factory (or designated service center).

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons, or which have been subject to misuse, negligence, or accident, incorrect wiring by others, installation or use not in accordance with instructions furnished by the manufacturer, or which have had the serial numbers altered, effaced or removed. The sensors are factory sealed and must not be opened or modified in the field for the warranty to remain in effect. This warranty is in lieu of all other warranties, whether expressed or implied.

This warranty does not apply to any of our products, that have had any program and/or software changes incurred, without written authorization from *Interscan Corporation*.

Additionally, warranty on any component shall not exceed the manufacturer's warranty given to *Interscan Corporation*.

Section

9

Customer Service

The INTERSCAN Customer Service Department can be reached at the numbers listed below:

Toll-Free **800-458-6153 x121**
So. Cal. **818-882-2331 x121**
FAX **818-341-0642**
e-mail: service@gasdetection.com

Return Authorization

All units being returned for repair or service require a RETURN AUTHORIZATION NUMBER issued by the INTERSCAN Customer Service Department upon request. This is required to ensure the problem truly needs factory service.

In many cases, problems can be resolved in the field by the user. As such, before contacting Interscan with service questions, consult the TROUBLESHOOTING section of this manual (section 7, page 23) as this may help you to resolve any problems without returning the unit.

Should consulting the TROUBLESHOOTING section of the manual not address your problem, contact the INTERSCAN Customer Service Department as noted below to acquire a RETURN AUTHORIZATION NUMBER. The RMA will expedite prompt return of the repaired unit.

The RMA request form can be found at the following link on line…

http://www.gasdetection.com/contact-interscan/rma-request/

Spare Parts

Contact the Interscan Customer Service Department for inquiries regarding consumable spare parts for your monitor. Have your monitor's serial number at hand when calling.

Section

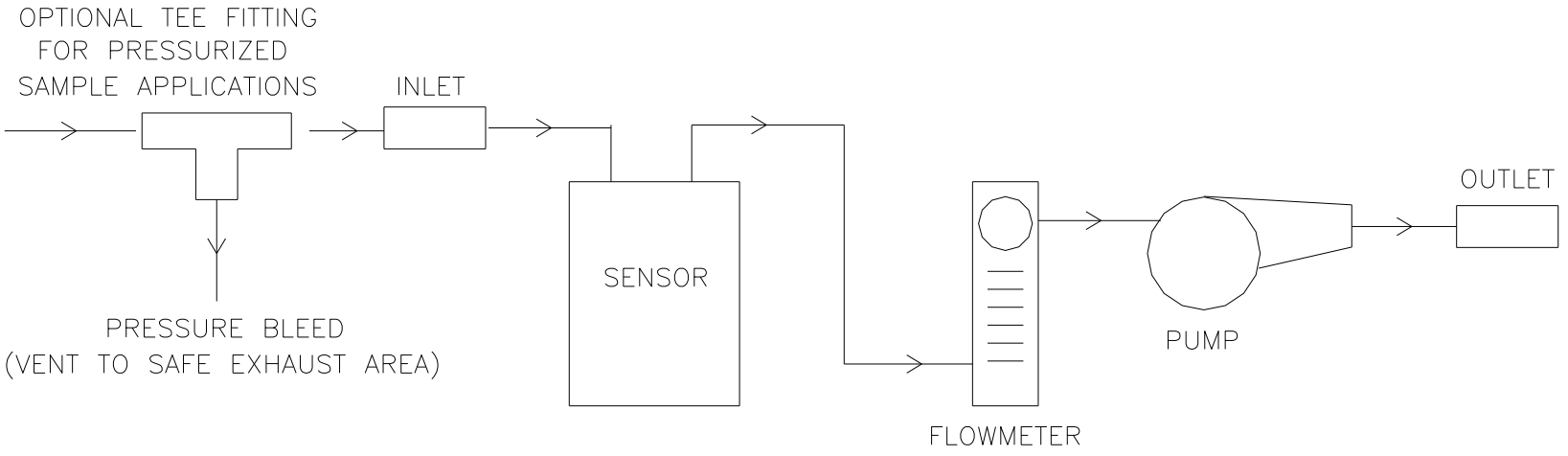
10

User Wiring Connections

ALARM CONTACTS**		
LEVEL ALARM	**ALARM 1 (LO)**	**ALARM 2 (HI)**
COMMON†	TB2-5	TB2-5
NORMALLY OPEN	TB2-6	TB2-8
NORMALLY CLOSED	TB2-7	TB2-9
LOW FLOW ALARM		
COMMON†	TB2-10	
NORMALLY OPEN	TB2-11	
NORMALLY CLOSED	TB2-12	
ANALOG OUTPUT		
0-100 mV +	TB2-1	
0-100 mV -	TB2-2	
4-20 mA OUTPUT**	TB2-3	
4-20 mA RETURN**	TB2-4	

****OPTIONAL FEATURES. MAY NOT BE INLCUDED ON ALL UNITS. SEE SECTION 1.3**

† RELAY OUTPUTS SHARE A SINGLE COMMON CONTACT. AS SUCH, EXTERNAL DEVICES WIRED TO LO AND HIGH ALARM CONTACTS MUST HAVE THE SAME POWER SOURCE.



Interscan Corporation 21700 Nordhoff St. Chatsworth, CA 91311	
DATE: 8-9-07	TITLE: PNEUMATIC DIAGRAM RACKMOUNT MONITORS
ORDER NO.	
DRAWN BY: S. Richards	SCALE
MATL. / TOL.	DRWG. NO.: PD7-2