interscan corporation

Instruction Manual

4000 Series Digital Portable Analyzer

Service Department

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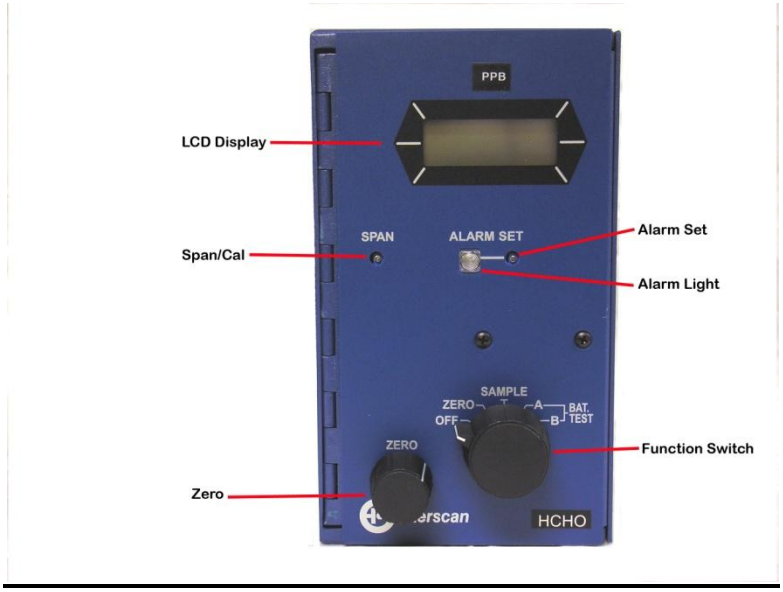
Introduction

Note: *It is* **not** *necessary to calibrate the monitor when received from the* **Interscan** or an **authorized distributor**. *All Interscan monitors are calibrated at the factory prior to shipment.*

The Interscan 4000 Digital series operates on the principle of pulling a sample (**Sample draw**) through a sensor. The Electrochemical sensor is manufactured by Interscan. Electrochemical means that it produces an electrical current proportional to the level of gas passing through. The large size of the Interscan sensors results in larger reactive surface area which yields greater sensitivity.

Equipment Description

1.0 Front Panel



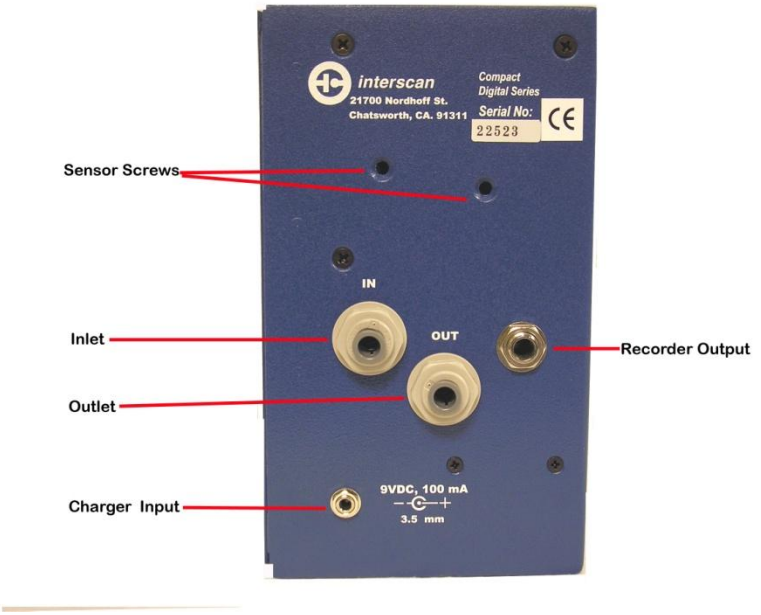
(fig. 1)

Designation	Function
LCD Display:	Indicates gas level when function switch is in ZERO or SAMPLE, and battery level when on BAT. TEST A or B.
ALARM Light:	LED. Flashes ON/OFF when alarm set point is exceeded.
ALARM SET:	25-Turn potentiometer with a screwdriver adjustment. Sets the alarm trip point at the desired gas level. (low alarm set must be greater than 5% of the full scale).
SPAN/CAL:	25-Turn potentiometer with a screwdriver adjustment. Sets display to correspond to the concentration of the calibration gas used for calibrating the instrument or to the level specified on ECS certificate. *Note: The ECS certificate is only provided if you purchased the ECS program.*
FUNCTION SWITCH:	Rotary switch as follows:
OFF:	Analyzer power is OFF.
ZERO:	Analyzer power is ON (pump is OFF).
SAMPLE:	Analyzer power and pump are on. Also in this position (depending on the gas model) the analyzer is zeroed. Sample measurements and calibration are accomplished in the sample mode.
BAT. TEST A:	Indicates state of charge of the Nickel-Cadmium (NiCd) batteries on the LCD Display. These batteries power the pump & alarm. Recharge if the LCD Display level falls to or below 100 (*ignore decimal point).*
BAT. TEST B:	Indicates state of charge of the "C" size alkaline batteries on the LCD Display. These

batteries power the main circuitry and are **NOT** re-chargeable. Replace if the LCD Display level falls to or below 100 (*ignore decimal point).* ***You must allow 24 hours to stabilize prior to use if the batteries are replaced.***

ZERO: 10-Turn Potentiometer. Allows the meter to be adjusted to zero, by compensating for any background signal.

1.1 Rear Panel



(fig. 2)

Designation	**Function**
INLET:	¼" O.D. Quick connect or compression gas fitting.
OUTLET:	¼" O.D. Quick connect or compression gas fitting.

RECORDER OUTPUT: ¼" phone jack for Analog recorder output connection. Typically 0-100mV. Tip – positive, Ring – ground.

CHARGER INPUT: 3.5mm phone jack for 9V DC, 100mA charger input. Tip – positive, Ring – ground.

SENSOR SCREWS: Used to hold Sensor or Sensor base in place.

1.2 Right Side Panel

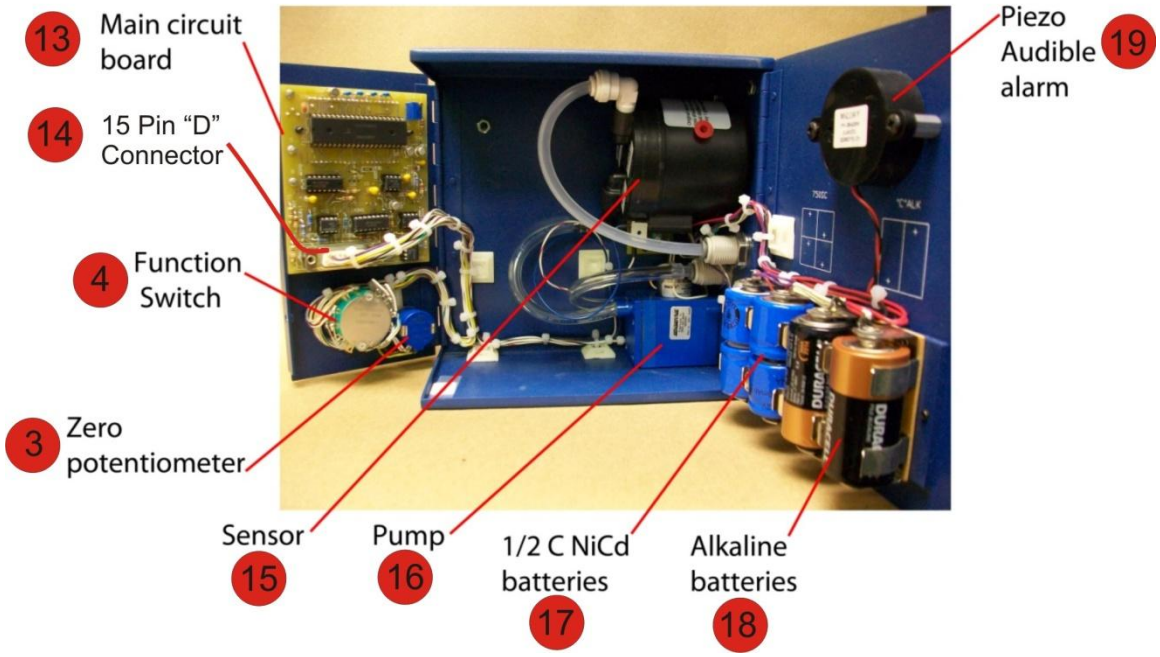


(fig. 3)

AUDIBLE ALARM: **Piezoelectric** Horn, sounds when alarm set point is exceeded.

The above (*fig 3*) indicated two #1 Phillips-head screws located on the right side panel. Removing these screws allows access to the internal components. Do not remove any other screws.

1.3 Internal Components



(fig. 4)

Operating Instructions

For overseas shipment, analyzers are shipped with the 15-Pin D connector DISCONNECTED from the circuit board. This is to preserve the battery life during shipment. To re-connect the wire bundle, simply open the analyzer by removing the 2 screws located on the right side panel. They are located about 1 inch from the top and 1 inch from the bottom, on the door. (*fig. 2 pg. 6*) Re-connect the 15-pin D connector and allow 24 hour stabilization prior to use.

2.0 Setting the Alarm

Normally, the alarm is set at the Factory at 50% of full scale. The alarm can be reset to any desired level by following the procedure below. Minimum alarm level must be greater than 5% of the full scale measuring range.

Set **FUNCTION** switch to **ZERO.** Using the **ZERO** control, advance the LCD display to the desired alarm set point. *Some analyzers require the use of span tool (provided).* Adjust the **ALARM SET** *(fig. 1 pg. 4)* control until the alarm sounds. Adjust the **ZERO** control slightly counterclockwise until the alarm is silent. To confirm setting slowly adjust the **ZERO** control clockwise until the alarm sounds. Re-adjust the **ALARM SET** control if necessary. Adjust the **ZERO** control for a reading of “0” on the display.

2.1 Zeroing the Analyzer

The Analyzer must always be zeroed, prior to use.

Zero adjustments must be made in the **SAMPLE** mode, i.e. with the pump on, in air free of interfering gases. *If necessary, use zero air or a C-12 filter (provided) to zero in the sampling area.* When using C-12 zero filter, connect externally to gas inlet. Allow reading to stabilize, before making final zero adjustment, (stabilization can take approximately 20 minutes). The C-12 filter must be removed after zeroing the analyzer.

2.2 Sampling

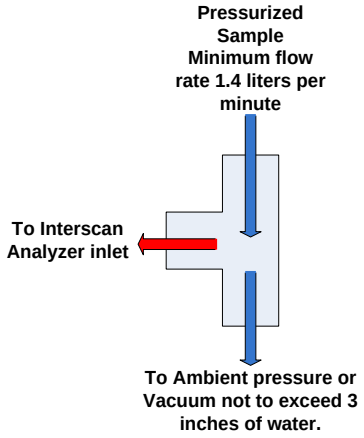
Analyzer must be zeroed prior to sampling (section 2.1).

Set the **FUNCTION** switch to **SAMPLE** to activate the pump. If the **INLET** or **OUTLET** is blocked, the pump may stall. *Note: Running the Analyzer with blocked INLET or OUTLET may lead to the sensor leaking caustic electrolyte leading to analyzer damage.* Power analyzer off, and clear the blockage. To reset the pump, set the **FUNCTION** switch to **ZERO** momentarily and then switch again to **SAMPLE**.

Nominal sample rate in MOST analyzers is approximately 1.0, ± 0.2 liter per minute. *NOTE: For hydrazine analyzers with the measuring range of 0-100ppb the sample flow rate is 2.2 ± 0.2 liters per minute.* The Average sample run time, starting with fully charged "C" NiCd batteries, is 12 hours. If the **BATTERY TEST "A"** indication is down to 100 on the LCD display, the flow rate may have started to decrease. This is usually not a problem unless very precise readings are required.

Sampling from high pressure may only be achieved by using the method indicated in (*fig. 5*).

Note: The sample to the Interscan Analyzer ***must*** *be drawn perpendicular to the Sample flow stream.*



(fig. 5)

Calibration

3.0 Introduction

All analyzers are factory calibrated prior to shipment.

There is no easy answer as to how often a monitor should be calibrated. This is strictly a function of the application (*gas concentration and frequency of exposure to target gas*). The purpose for calibration is to compensate for any possible decrease in sensor sensitivity. The primary cause of sensitivity decrease is excessive loss of water by evaporation. A secondary cause may be by contamination from unknown sources. H_2S sensors show an additional decrease in sensitivity due to internal sulfur formation, the rate of which depends on the gas concentration.

3.1 INTERSCAN'S Electronic Calibration Service

The factory recommended procedure for calibrating all INTERSCAN analyzers, involves the use of certified calibration gas or a permeation device. Besides being essential for calibration, having a known certified gas standard on hand allows the user to test the analyzer at any time to determine that it "really works".

However, there will be times and circumstances in which calibration using calibration gas or permeation devices is inconvenient and costly. For this reason, INTERSCAN has developed our alternative sensor revolving/certification program, Electronic Calibration Service (**ECS**).

A certified spare sensor is kept at the customer's site to be installed into the analyzer, (*after following the 7 steps on the ECS certification*) while the presently used sensor is sent back to the factory for re-certification. The ECS certification, details zero and span/cal adjustments that are to be made on the analyzer, to match or coincide with the specified, newly certified sensor.

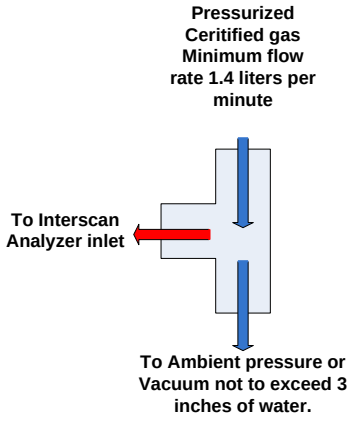
As indicated on the certification sheet, the ECS program verifies sensor sensitivity only. It does not certify the analyzer as a whole. Most importantly, the ECS program is **not** a substitute for basic analyzer maintenance, nor does it check for malfunction of the analyzer components.

3.2 Sample Bag Calibration & Pressurized Cylinder Calibration

Whatever the source of calibration gas, the recommended method is to collect the gas in the proper sample bag, which is then attached to the analyzer INLET. The calibration gas is drawn from the proper sample bag through the sensor. An exception to the use of a sample bag is for those gases, which are reactive with, or chemisorbed by the bag itself (e.g. Chlorine, Hydrazine). Teflon® or Tedlar® bags are suitable for H_2S, SO_2, NO and NO_2. Several bag materials are suitable for CO. Contact the Factory for recommendations.

The sample bag method is the factory-recommended method for calibration. Since an internal pump is used, the same flow rate conditions during the sample and the calibrate modes are assured, eliminating errors due to flow rate differences. For most applications, using a bag is the simplest procedure.

A regulated pressurized certified cylinder fitted with a tee-manifold *(fig. 6)* and unrestricted vent is a good procedure in place of the sample bag, as long as the flow rate of the gas exceeds that of the sample pump.



(fig. 6)

3.3 Calibration Procedure

Analyzer must be zeroed prior to calibration (sec 2.1).

1. For all gases, except Chlorine or other chemisorbable types, fill the 5 liter sample bag with calibration gas, and attach it to the external inlet fitting. This is best done by attaching a short length (2 inch) of 5/16 inch (7.9 mm) O.D. flexible tubing to the sample bag nipple, then attaching the tubing to a 2 inch (51 mm) length of ¼ inch (6.4 mm) O.D. rigid tubing contained within a gas fitting nut securely fastened to the inlet fitting.

2. Set the FUNCTION switch to SAMPLE.

3. Allow 2 to 3 minutes for the reading to stabilize, and by using the SPAN/CAL control, set the display to match the calibration gas concentration being used.

4. Remove the sample bag from the analyzer and allow the display to stabilize.

5. The analyzer is now calibrated and set up for operation.

NOTE: If you require additional information on Calibration procedures, please contact the Service Department at 1-800-458-6153 ext 121 or e-mail service@gasdetection.com

General Maintenance

4.0 Battery Life

Because of current requirements of the circuitry, “C” Size Alkaline battery life is approximately 4 weeks, whether the unit is operating or not. *Note: Batteries vary in capacity by manufacturer and may provide more battery life.* Analyzer malfunction, as a result of low battery, will be evident as either inability to zero the monitor or clipping of the display at a fixed reading below full scale.

Nickel-cadmium battery life is indeterminate. It is somewhat dependent upon how well the charge level is maintained.

4.1 Battery Charging and Replacement

All models of the 4000 Series analyzers use two “C” size alkaline batteries. These are located on the hinged door, right side (*fig. 4 pg. 7*). Polarity is marked on the door over the battery holder.

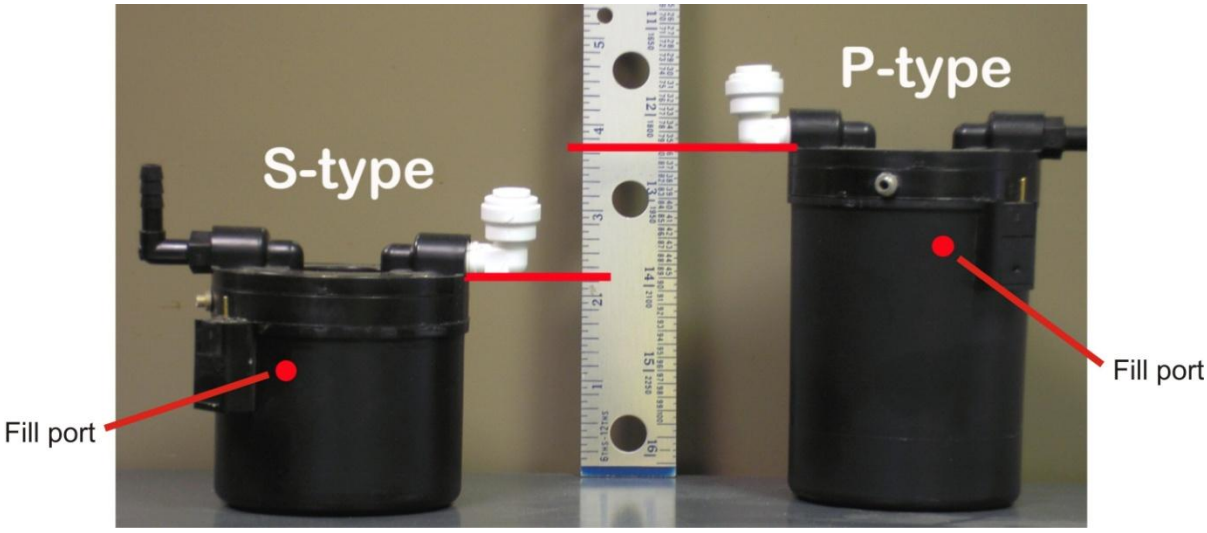
If alkaline batteries are replaced before the Battery Test “B” indicates a low battery condition, a few minutes warm up/stabilization is needed before using the analyzer. If alkaline batteries are low or dead, the analyzer should be allowed to sit for *12 to 24* hours after battery replacement. The **FUNCTION** switch should be set to **OFF** during this time. This is to allow the sensor time to stabilize again.

The rechargeable batteries are ½ “C” size NiCd and are rated at 0.80 ampere hours. They are mounted on the hinged door, left side (*fig. 4 pg. 7*). Polarity is marked on the door, over the battery holder. All models use four ½ cell “C” size NiCd batteries. Condition is shown in the BATTERY TEST “A”, **FUNCTION** switch position. The NiCd battery voltage changes quite rapidly as it approaches the recharge point, which makes accurate display

indication difficult. It is recommended that the batteries be recharged if the reading in BATTERY TEST "A" is at 100 (ignoring the decimal place). Allowing the reading to drop below 100 is not recommended. *Note: NiCd batteries can develop* ***cell memory****. Cell memory is caused by running the analyzer on battery power for a short period of time REPEATEDLY i.e: Running the analyzer for 20 minutes and then recharge. If this occurs repeatedly, the NiCd battery life will only retain a 20 minute charge memory.*

The charger is an external 9V DC, 100mA transformer and is connected to the rear of the unit prior to charging. The tip is positive and the ring ground. The **FUNCTION** switch should be set to **OFF** or **ZERO** when charging. The recommended charge time is 16 hours.

4.2 Water loss in Refillable sensors.



(fig. 7)

All sensors provided with a fill port require that the electrolyte matrix is maintained in a near-saturated condition in order to provide optimum performance. This is achieved by injecting

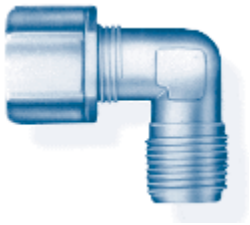
distilled or deionized water into the sensor via the red plug, using the plastic syringe (provided).

Refer to (*fig. 7 pg. 16*). Refillable sensors are identified by the red fill plug in the side of the sensor. The fill plug location may vary from (*fig. 7 pg. 16*). There are two types of refillable sensors. The S-type is a shorter sensor of slightly over 2 1/2 inches (64 mm) in height; the P-type is almost 4 inches (104 mm) in height. "P" and "S" type sensors connect to the analyzer by different connection methods.

For portable survey monitors, the sensor should be removed and weighed every 1 to 2 months, *depending upon usage*. Again it is advisable not to exceed a *maximum weight loss of more than 25 grams.*

Sensor weight is restored be removing the sensor from the analyzer and comparing the current weight of the sensor with its original weight (in grams). Sensor weight is indicated on a label located on the side of the sensor.

There are three types of gas fittings used depending on the age of the original sensor and the gas being measured.



(fig. 8)

Male elbow ¼ O.D. tube compression fitting

This is a compression fitting comprised of the body, nut and two ferrules (*fig. 8*). Disconnect by loosening the nut until the tubing can be pulled away from the body. To re-attach insert the tubing and tighten the nut. Do NOT over tighten the nut as this will damage the nut and fitting



(fig. 9)

Quick connect male elbow

This is a quick connect system comprised of the body, o-ring and ferrule (*fig. 9*). Disconnect by pushing on the ring where the tubing enters the fitting and gently pulling on the tubing. Re-attach by inserting the tubing all the way in and then gently pull backward.



(fig. 10)

Barbed male elbow

The fitting uses a barbed connector system (*fig. 10*). Disconnect by pulling on the tubing. Re-attach by pushing the tubing onto the fitting until firmly seated.

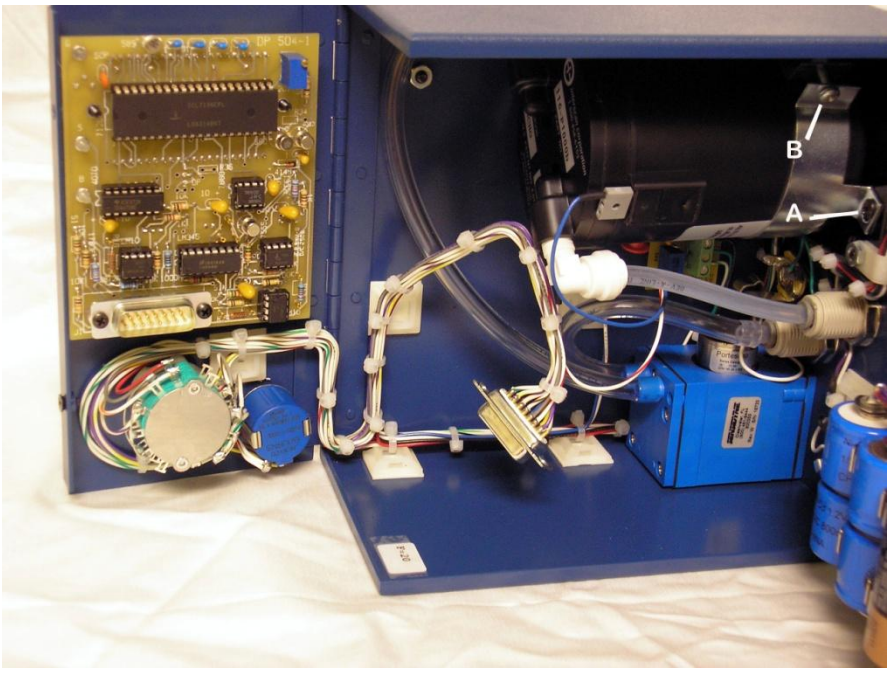


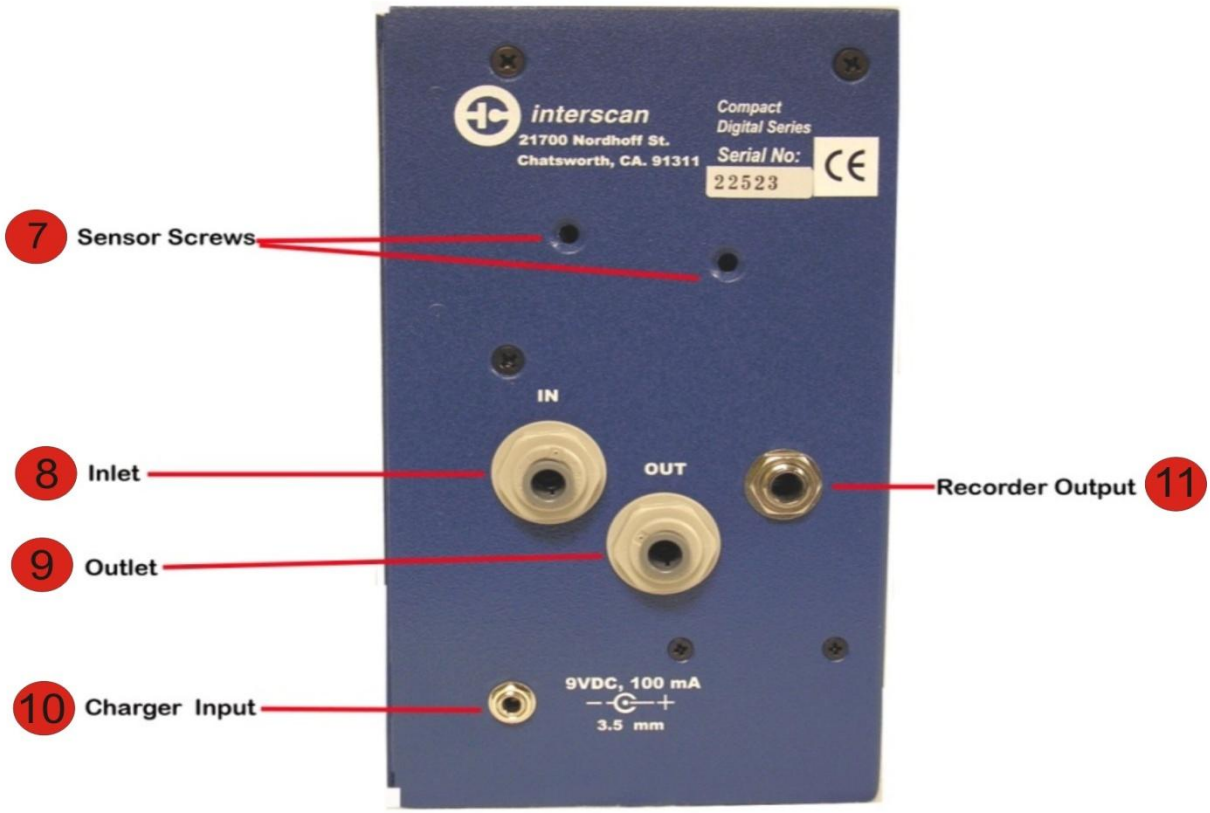
Fig. 11

For P-type sensors refer to (*fig. 11*). Disconnect the 2 electrical connections to the sensor. Disconnect the tubing from each gas fitting. Loosen the screw indicated as “A”. Loosen the clamp screw “B” until the sensor can be removed from clamp.

NOTE: DO NOT REMOVE ANYTHING ELSE!!!!!!

Restore the sensor to within 5 grams original sensor weight by injecting an equivalent cc of distilled or deionized water (10g. weight loss means add 10cc water). DO NOT OVERFILL. If sensor will not take on any more liquid (liquid starts coming out the fill port) do not attempt to add additional distilled water.

Note: Weight loss of excess of 30 grams may prevent the restoration of the weight to within 5 grams of the original weight. DO NOT OVERFILL. After weighing and refilling replace the sensor in the analyzer, tighten screw “B” taking care only to make it tight so as to secure the sensor. Then tighten screw “A”, do not over tighten. Assure that all electrical and pneumatic fittings are secure. *The sensor should be allowed to stabilize for several hours with power off, (up to 24 hours).*



(fig. 12)

For S-type sensors refer to (*fig. 12*). Disconnect the two electrical connections to the sensor. Disconnect the tubing from each gas fitting. Remove the two Sensor Screws.

NOTE: DO NOT REMOVE ANYTHING ELSE!!

Restore the sensor to within 5 grams original sensor weight by injecting an equivalent cc of distilled or deionized water (*10g. weight loss means add 10cc water*). DO NOT OVERFILL. If sensor will not take on any more liquid (liquid starts coming out the fill port) do not attempt to add additional distilled water.

Note: Weight loss of excess of 30 grams may prevent the restoration of the weight to within 5 grams of the original weight. DO NOT OVERFILL. After weighing and refilling replace the sensor in the analyzer, tighten screws on the rear of the analyzer. Assure that all electrical and pneumatic fittings are secure. *The sensor should be allowed to stabilize for several hours with power off.*

4.3 Long Term Storage (one month or more)

Turn **FUNCTION** switch to "OFF" position. Disconnect charger from analyzer. Detach 15 pin "D" connector from circuit board. Remove alkaline batteries and cover analyzer to protect from dust.

4.4 Post Storage Start-up

24 Hours Before Using:

Uncover the analyzer. Install **FRESH** alkaline batteries. Reconnect 15-pin "D" connector from circuit board. Connect the charger to the analyzer to charge NiCd batteries.

After 24 Hours:

Follow instructions in Section 2.0. Analyzer is ready to use or calibrate.

5.0 Troubleshooting

No power.	• Ensure the FUNCTION switch is not in the OFF position. • Are Ni-Cd batteries charged? (See Section 4.1)
Pump won't run.	• Ensure the FUNCTION switch is not in the OFF, or ZERO position. • Are Ni-Cd batteries charged? (See Section 4.1) • Are INLET/OUTLET fittings plugged? Is any tubing kinked?
Can't zero.	• Are alkaline batteries low? (See Section 4.1) • Were alkaline batteries just replaced? (See Section 4.1) • Are alkaline batteries installed correctly? (Proper polarity)
No response to gas	• Ensure the FUNCTION switch is not in the OFF, or ZERO position. (Function switch must be in "Sample" position) • Are Ni-Cd batteries charged? (See Section 4.1) • Are INLET/OUTLET fittings plugged? Is any tubing kinked? • Are alkaline batteries low? (See Section 4.1) • Were alkaline batteries recently replaced? (See Section 4.1) • Are alkaline batteries installed correctly? (Proper polarity) • Is the SPAN/CAL turned all the way down (counter clock wise)? • Is electrical lead(s) connected to sensor? • Is sensor secure in sensor clamp? • Make sure tubing is securely connected to pump and sensor.
Ni-Cads won't charge	• Are the Ni Cad batteries dead? (Remove from unit and check with a voltmeter. Battery polarity is marked behind batteries on panel.

Warranty

6.0 INTERSCAN's Warranty Policy

INTERSCAN CORPORATION warrants portable analyzers 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.

Additionally, in a custom system, warranty on any component shall not exceed the manufacturer's warranty given to INTERSCAN CORPORATION.

Return Authorization

7.0 INTERSCAN's Return Authorization Policy

All returns for repairs require a "RETURN AUTHORIZATION NUMBER" issued by the INTERSCAN Service Department upon request. Below is the link to the RMA form:
http://www.gasdetection.com/contact/index.php

This is done primarily to cause the user to contact the factory directly. The reason for this is that a high percentage of service problems are resolved over the telephone, avoiding the need for returning the analyzer or part.

Should return of the analyzer or part be advised by the Service Department, the "RETURN AUTHORIZATION NUMBER" will expedite prompt return of the repaired unit.

For service information, please contact:

INTERSCAN CORPORATION

Service Department

(800) 458-6153 ext. 121

(818) 882-2331 ext. 121

FAX (818) 341-0642 E-mail: service@gasdetection.com

8.0 Appendix

Appendix A

INTERFERING GAS DATA

No analytical method is completely specific. Gases present in the environment, other than the "target" gas of measurement, may affect analyzer response. Interferences are not necessarily linear, and may also exhibit time dependent characteristics.

The charts that follow detail the ***approximate*** concentration in parts per million of interfering gas required to cause a 1 ppm deflection in the chosen analyzer. In many cases, specificity can be improved. Please note that the response values given are not absolute, and may vary depending on sensor formulation.

The special case of how alcohols affect electrochemical sensors is discussed in this **Knowledge Base article**. (www.gasdetection.com)

For further information on the effects of interfering gases, please contact the **factory**.

The charts follow the format, and grouping of gases, that was originally established in early Interscan print brochures.

Chart 1: CO, Cl_2, ClO_2, H_2, H_2S, NO, NO_2, O_3, SO_2 analyzers
Chart 2: Ethylene oxide (EtO) (C_2H_4O) analyzers
Chart 3: Formaldehyde (HCHO) analyzers
Chart 4: HCl, HCN, hydrazine analyzers
Chart 5: C_2H_4 (ethylene) analyzers

Chart 1: CO, Cl_2, ClO_2, H_2, H_2S, NO, NO_2, O_3, SO_2 analyzers

ANALYZER \ INTERFERING GAS	C_2H_5SH	Cl_2	CO	H_2	HCl	HCN	hydrazine	H_2S	NH_3	NO	N_2O	NO_2	O_3	Saturated HC‡	SO_2	SO_3	Unsat HC‡
CO	>10^3	>10^3 [N]	—	8¤	>10^3	>10^3	>10^3	>10^3	>10^3	>10^3	>10^4	>10^3 [N]	>10^3 [N]	>10^4	>10^3	>10^4	17
Cl_2	3 [N]	—	400 [N]	6000 [N]	4 [N]	1.5 [N]	0.5 [N]	1 [N]	14 [N]	150	>10^4	1	1	>10^4	1 [N]	>10^4	>500
ClO_2	9 [N]	2.8	1200 [N]	>10^4 [N]	12¤ [N]	4.5 [N]	1.5 [N]	3 [N]	42 [N]	450	>10^4	3	3	>10^4	3 [N]	>10^4	>1500
H_2	>10^3	>10^3 [N]	0.1	—	>10^3	>10^3	>10^3	>10^3	>10^3	>10^3	>10^4	>10^3 [N]	>10^3 [N]	>10^4	>10^3	>10^4	3
H_2S (1)	3	11 [N]	40	400	11	10¤	4	—	220	4	>10^4	65 [N]	15 [N]	>10^4	4	>10^4	15
H_2S (2)	1	50 [N]	8000	7000	15	15	6	—	300	15	>10^4	60 [N]	20 [N]	>10^4	6	>10^4	>500
NO	>10^3	>10^3	>10^3	>10^4	>10^3	>10^3	>10^3	>10^3	>10^3	—	>10^4	>10^3	>10^3	>10^4	>10^3	>10^4	>500
NO_2	3 [N]	0.7	350 [N]	6000 [N]	4¤ [N]	2 [N]	0.7 [N]	0.7 [N]	15 [N]	150	>10^4	—	1	>10^4	1 [N]	>10^4	>500
O_3	3 [N]	1	400 [N]	6000 [N]	4 [N]	2 [N]	0.5 [N]	1	15 [N]	150	>10^4	1	—	>10^4	1 [N]	>10^4	>500
SO_2	1	3 [N]	700	5000	2	2	1	0.3	68	6¤	>10^4	24 [N]	2 [N]	>10^4	—	>10^4	>500

(1) Data shown for H_2S models with ranges higher than 0-1999 ppb
(2) Data shown for H_2S models with ranges of 0-1999 ppb and lower

[N] = Negative interference
‡ = Hydrocarbons
¤ = Rejection ratio can be improved electronically

Chart 2: Ethylene oxide (EtO) (C_2H_4O) analyzers

EtO ANALYZER \ INTERFERING GAS	Cl_2	CO	CO_2	ethyl alcohol	Freon	glutaraldehyde	isopropyl alcohol	N_2O	NH_3
	25 [N]	20	>10^5	380	>10^5	5	1.1 ¶	>10^5	300

¶ Isopropyl alcohol represents the most significant interference on the ethylene oxide sensor, but in nearly all cases, potential problems can be overcome. Typical remedial actions include:

a. Point shutdown/automatic restart, which allows the operator to temporarily interrupt monitoring at points that could be affected when isopropyl alcohol is used. Monitoring restarts automatically on a time-adjustable basis.

b. Selection of monitoring points away from those areas that may be unduly affected by isopropyl alcohol.

c. Using alternative germicides, which do not contain isopropyl alcohol.

The EtO sensor may also respond to strong odors of colognes and perfumes, and to certain floor strippers and waxes. Refer to guidelines above covering isopropyl alcohol. Remember that you are attempting to monitor parts per million levels of ethylene oxide in an environment that may contain percent (10,000 ppm = 1 percent) levels of these potentially interfering compounds.

[N] = Negative interference

Chart 3: Formaldehyde (HCHO) analyzers

INTERFERING GAS										
HCHO ANALYZER	CH_3CHO	acetone	Cl_2	CO	ethanol	glutaraldehyde	H_2	H_2S	HCl	SO_2
	17	$>10^3$	7 [N]	5600	127	200	$>10_4$	3 §	35	3 §
	isopropanol	CH_3OH	methyl ethyl ketone	n-butanol	n-propanol	NH_3	NO	NO_2	phenol	propion-aldehyde
	1000	625	$>10^3$	3200	2000	300	500	35 [N]	$>10^3$	160

[N] = Negative interference

§ = Scrubber available

Chart 4: HCl, HCN, hydrazine analyzers

INTERFERING GAS																
ANALYZER		C_2H_5SH	Cl_2	CO	H_2	H_2S	HCl	HCN	hydrazine	N_2O	NH_3	NO	NO_2	SO_2	SO_3	Saturated HC	Unsat HC
	HCl	0.2	17 [N]	1000	$>10_4$	0.1	–	1	5	$>10_4$	21	0.6	15 [N]	0.5	$>10_4$	$>10^4$	>500
	HCN	0.2	20 [N]	1000	$>10_4$	0.1	1	—	6	$>10_4$	21	1	15 [N]	0.5	$>10_4$	$>10^4$	>500
	Hydra–zine	10	5 [N]	1000	$>10_4$	0.1	45	8	–	$>10_4$	1500	1300	30 [N]	3.5	$>10_4$	$>10^4$	>500

[N] = Negative interference

Chart 5: C_2H_4 (ethylene) analyzers

	INTERFERING GAS													
C_2H_4 (ethylene) ANALYZER	acetone	acetylene	Cl_2	CO	CO_2	ethyl alcohol	ethylene glycol	EtO	Freon	glutar-aldehyde	H_2	isopropyl alcohol	N_2O	NH_3
	300	5	15 [N]	8	$>10^5$	150	0.3	0.2	$>10^5$	1	500	0.4	$>10^5$	200

[N] = Negative interference

Appendix B

SCRUBBER INFORMATION

TYPE	FOR ANALYZER	REMOVES
#56	NO	SO_2, NO_2, H_2S, HCl, HCN
#158	CO, EtO, SO_2F_2	SO_2, H_2S, NO, NO_2
C-12	≤ 20 ppm range & all EtO, HCHO, HZ	ALL GAS TYPES *EXCEPT CO*
MS-100	CO	Alcohol & Aldehydes
MS-149	H_2S	Cl_2, SO_2
FB-160	SO_2	H_2S, NO_2
FB-170	NO_2	H_2S, HCl, HCN, SO_2
FB-325	HCHO, HCN	H_2S, HCl, SO_2
FB-149 FB-150	H_2S	HCl, SO_2, NO_2
FB-100	NO_2	H_2S, SO_2
#97	ClO_2	Cl_2