interscan corporation

Instruction Manual

4000 Series Analog Portable Analyzer

Service Department

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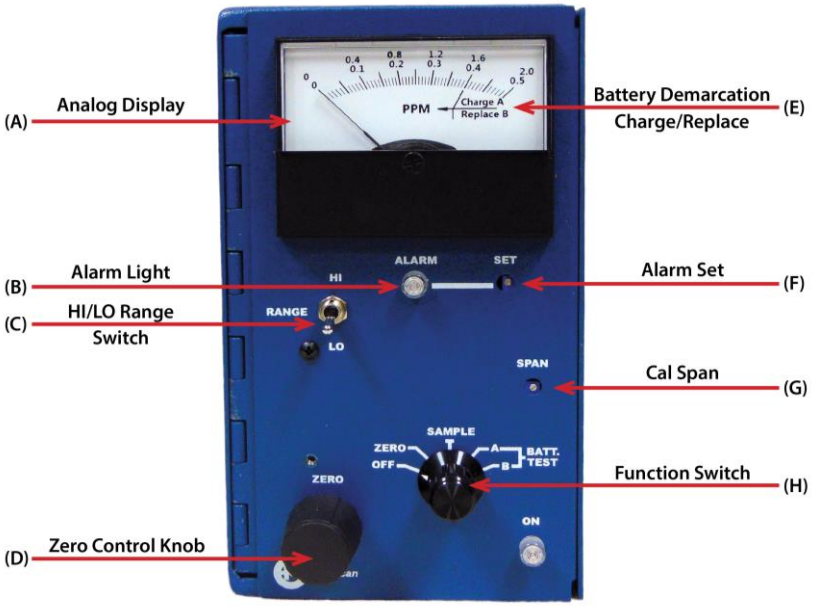
INTRODUCTION

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

The Interscan 4000 Analog 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**
(A) Analog Display:	Indicates gas level when function switch is on ZERO, SAMPLE, and battery level when on BATT. TEST “A” or “B”.
(B) Alarm Light:	LED. Flashes ON/OFF when alarm set point Is exceeded.
(C) HI/LO Range Switch	Toggle switch, allows multiple ranges to be selected. LO= Low Range, HI= High Range
(D) Zero	10-Turn potentiometer. Allows the meter to be adjusted to zero, by compensating for any background signal.

(E) Battery Demarcation — Battery life indicator.

(F) Alarm Set: — 25-Turn potentiometer with a screwdriver adjustment. Sets the alarm trip point at the desired alarm level. (low alarm set must be greater than 5% of the full scale).

(G) Span/Cal: — 25-Turn potentiometer with a screwdriver adjustment. Sets meter to correspond to the concentration of the gas used for calibrating the instrument, or to the level specified on the ECS certificate.

(H) Function Switch: — Rotary switch as follows:

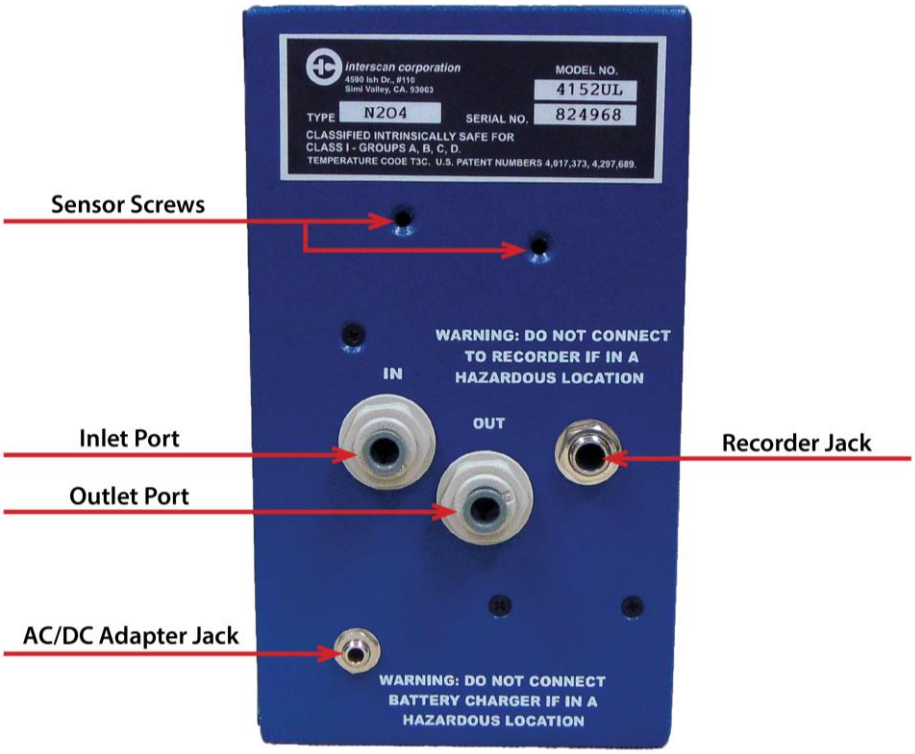
"Off" — Analyzer power is OFF.

"Sample" — Analyzer power and pump are on. In this position the analyzer can be zeroed (see zeroing instructions Sec.1.2, pg.8). Sample measurements and calibration are accomplished in the sample mode.

"Batt. Test 'A' " — Indicates state of charge of the Nickel-Cadmium (NiCd) batteries on the Analog meter. These batteries power the Pump & Alarm. Recharge if the meter falls below the demarcation line.

"Batt. Test 'B' **"** — Indicates state of charge of the “C” size alkaline batteries, on the Analog meter. These batteries power the main circuitry, analog meter, and keep the sensor on bias. The Alkaline batteries are **not** re-chargeable. They need to be replaced if they fall below the demarcation line. If they are below the demarcation line you must allow for an overnight stabilization prior to use. Batteries are to be checked once a month.

1.1 REAR PANEL



(fig.2)

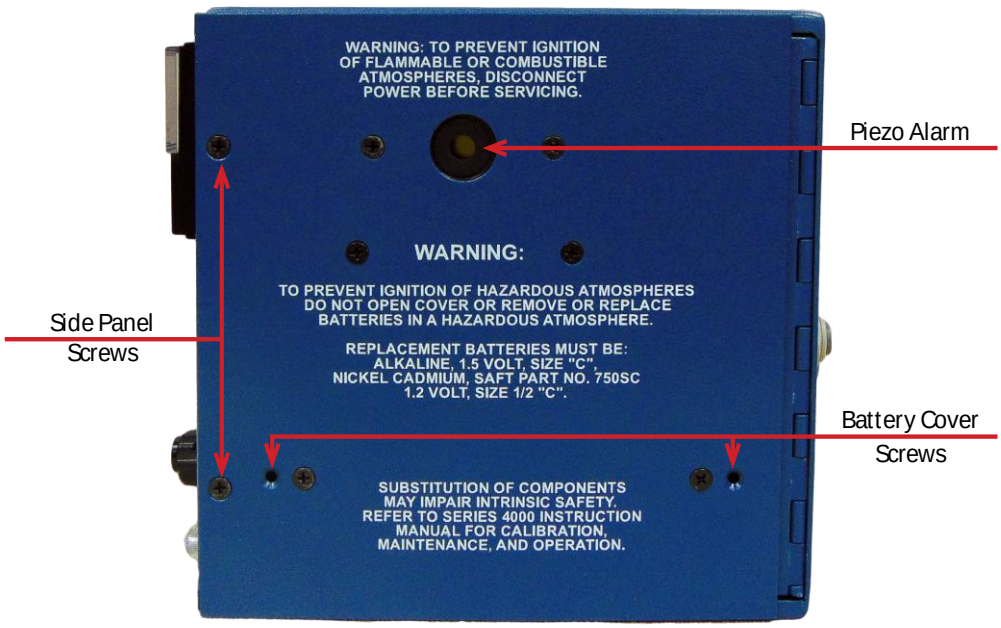
Designation	**Function**
Inlet:	¼" OD compression gas fitting
Outlet:	¼" OD compression gas fitting
Recorder Jack Output	¼" Phone , Analog output (tip-positive, ring- negative)

Warning: Do Not connect to a recorder if in a Hazardous Atmosphere. (Such as Class 1 Div 1, or Class 1 Div 2)

AC/DC Adapter Jack	3.5mm phone jack for 9V DC, 100mA (tip-positive, ring-negative).

Warning: Do Not connect battery charger if in a Hazardous Atmosphere. (Such as Class 1 Div 1, or Class 1 Div 2)

1.2 Right Side Panel

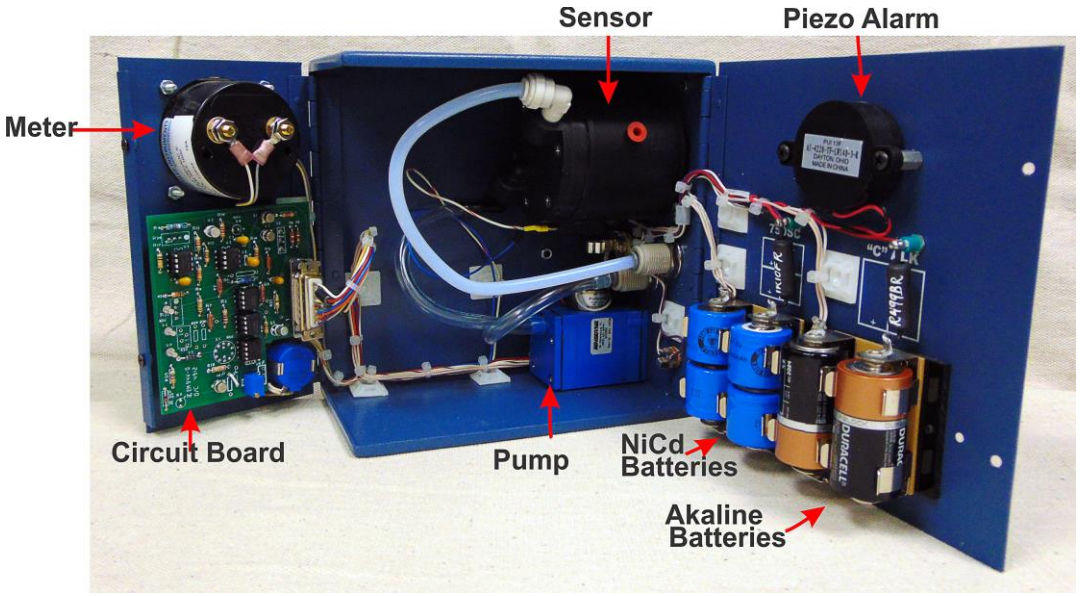


(fig.3)

Audible Alarm: Piezoelectric Horn, sounds when alarm set point is exceeded.

The above (fig.3 pg.7), indicates two Phillips- head screws located on the Right Side Panel. Removing these screws allows access to the internal components. There are also two Phillips-head screws for removing the Battery Cover. Do not remove any other screws.

1.3 Internal Componets



(fig.4)

Operating Instructions

2.0 Setting the Alarm

The alarm can be reset to any desired level by following the procedure below. Minimum alarm levels must be greater than 5% of the full scale measuring range.

Set FUNCTION switch to ZERO. Using the Zero Control Knob, advance the Analog Needle to the desired alarm set point. Using the 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 zero 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 an environment free of interfering gases). U*se zero air*, or a *C-12 zero filter* (if 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 takes approximately 20 minutes). The C-12 zero 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. To reset the pump, set FUNCTION switch to “Zero", or "Off” and back to sample.

Note: *Running the Analyzer with a blocked inlet or outlet may cause the sensor to leak caustic electrolyte from the sensor into the pump, which will damage the pump. Power the analyzer off, and clear the blockage.*

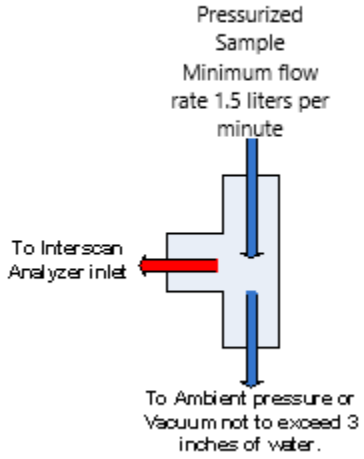
Nominal sample rate for MOST analyzers is approximately 1.0 +/- 0.2 liter per minute. ***Note:*** *For Hydrazine analyzers with the measuring range of 0-100ppb the sample flow rate is 2.2 +/- 0.2 liters per minute.*

The average sample run time, starting with fully charged NiCd batteries, is 12 hours. If the "BATTERY TEST 'A' ” indication is at the “Charge A” line, the flow rate may start to decrease.
The Analyzer will need to be connected to the AC/DC adapter, allow an overnight charge of the NiCd batteries.

2.3 Sampling from a High Pressure Source

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 zeroing and calibration should be performed. This is strictly a function of the application. Sensor zeroing compensates for signal drift and sensor calibration compensates for any possible decrease in sensitivity of the sensor. The primary cause of sensitivity decrease is excessive loss of water in the sensor by evaporation. This is due to time and temperature, or prolonged exposure to a high concentration of gas.

The instrument is best calibrated by introducing a known concentration of gas and adjusting the span control to the proper ppm level. 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.

3.1 Interscan's Sensor Express® - Electronic Calibration Service

Interscan's Sensor Express® program streamlines downtime by sending you pre-calibrated sensors on a regular basis per your needs, without the burden of returning sensors to our factory for re-certification. The sensors are shipped to you either two(2), three(3), or four(4) times per year based upon factory recommendation.

Follow the instruction received with the sensor, allow stabilization, and the instrument is ready for use. The factory recommended procedure for calibrating all Interscan analyzers, involves certified calibration gas or a permeation device system. 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 is fully operational.

As indicated on the certification sheet, the Sensor Express® does not certify the analyzer as a whole. Most importantly, the Sensor Express® program is not a substitute for basic analyzer maintenance, nor does it check for malfunction of the analyzer components.

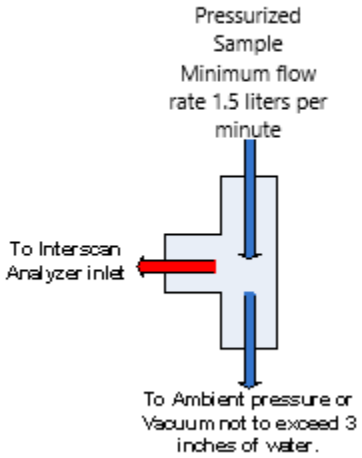
3.2 Sample bag Calibration & Pressurized Cylinder Calibration

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 H2S, SO2, NO and NO2. Several bag materials are suitable for CO. A 5-liter bag is recommended.

Using a sample bag is the factory-recommended method for calibration. Since an internal pump is used, the 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 is at least 140 percent that of the sample pump.



(fig.6)

3.3 Calibration Procedure

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

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 4 inch O.D. Teflon tube to the sample bag, then inserting it into the inlet fitting. Tube dimensions are (101.6mm) of ¼ inch (6.35mm).

Set the FUNCTION switch to SAMPLE.

Allow 2 to 3 minutes for the reading to stabilize. Using the SPAN/CAL control, set the display to match the calibration gas concentration.

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

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

Due to the current requirements of the circuitry, “C” size alkaline battery life should be checked on a monthly basis, whether the unit is operating or not. ***Note****: Batteries vary in capacity by manufacturer.* Analyzer malfunction, as a result of low battery, will be evident when there is an inability to zero the monitor.

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.8). Polarity is marked on the door over the battery holder.

To begin, you will need to remove the battery cover. There are two smaller screws located on the outside of the right panel. Remove the screws and retain. Replace the batteries as needed, then reattach the battery cover by placing the cover over the batteries, inserting the screws, and tightening gently.

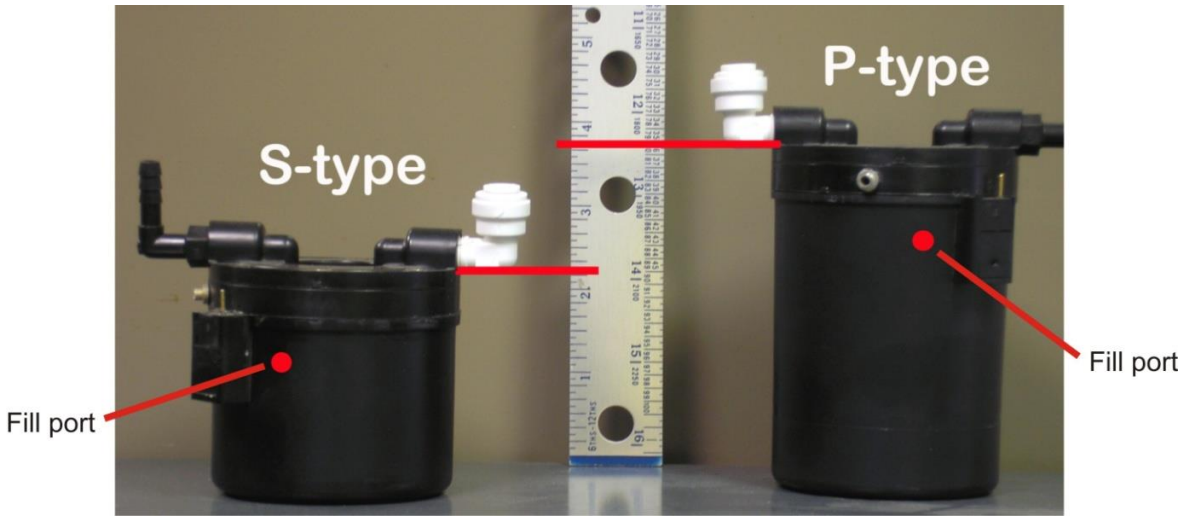
Allow a few minutes for warm-up/stabilization before using the analyzer. Battery condition is shown in “Battery test B” Function switch position. If the batteries are allowed to become very low, or dead, “C” Alkaline batteries will need to be replaced and the analyzer will need an overnight stabilization. The FUNCTION switch should be set to OFF during this time to allow the sensor to stabilize.

The rechargeable batteries are ½ cell “C” NiCd and are rated at 0.80 ampere hours. They are mounted on the hinged door, left side (fig.4 pg.8). Polarity is marked on the door, over the battery holder. All models use four ½ cell “C” size NiCd batteries. Condition is shown in "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 dial indicates that battery test “A” needs to be charged. Allowing the reading to drop below this demarcation line 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 charging the batteries). If this occurs repeatedly, the NiCd battery life will only retain a 20 minute charge memory.*

The charger is an external 9V DC, 500mA transformer and is connected to the rear of the unit prior to charging. The tip is positive and the ring is ground. The FUNCTION switch should be set to OFF when charging. The recommended charge time is 16 hours.

4.2 Water loss in Refillable Sensors



(fig.7)

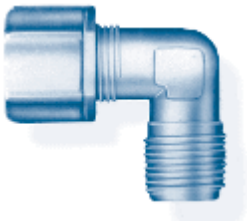
All sensors provided with a fill port require the electrolyte matrix to be maintained in a near-saturated condition in order to provide optimum performance. This is achieved by injecting distilled or deionized water into the sensor via the red plug, using the plastic syringe provided.

Refer to (fig.7). Refillable sensors are identified by the red fill plug on the side of the sensor. The fill plug location may vary from (fig.7). There are two type of refillable sensors. The S-type is a shorter sensor of slightly over 2 ½ inches (64mm) in height; the P-type is almost 4 inches (104mm) in height. “S” and “P” type sensors connect to the analyzer by different connection methods.

The sensor should be removed and weighed every 1 to 2 months, *depending upon usage*. The optimum weight is indicated on the weight label on the side of the sensor.

Sensor weight is restored by 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)

Female elbow ¼ O.D. tube compression fitting

Pictured above 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. Tighten by hand, do NOT over tighten the nut as this will damage the nut and fitting.

(fig.9)

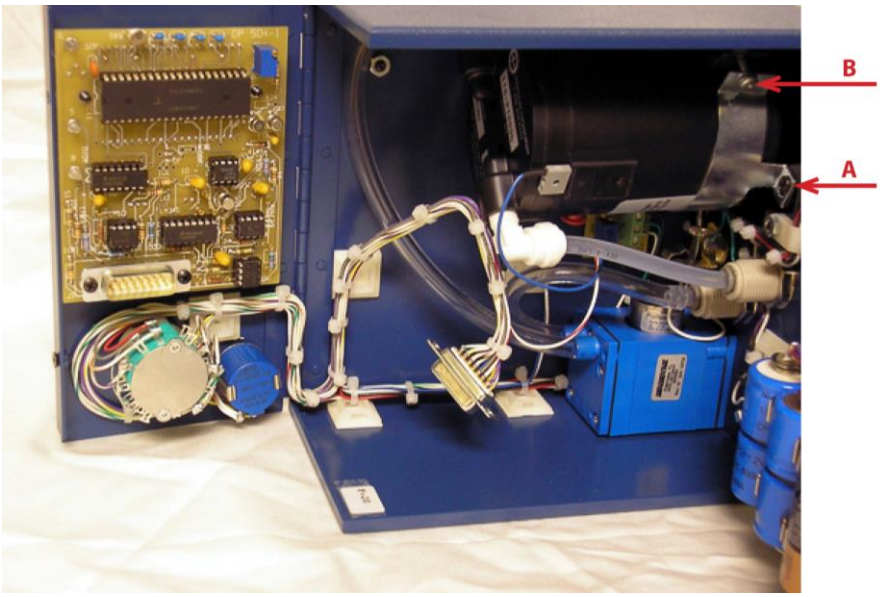
Quick Connect Female elbow

Pictured above is a Quick Connect fitting 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, this will ensure a good connection.

(fig.10)

Barbed male elbow

Pictured above is a Barbed Connector fitting (fig.10). Disconnect by prying using a flat blade screwdriver to loosen the connection, then gently 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 of the 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/deionized water.

***Note**: Excessive weight loss in a sensor may prevent restoration of the original weight within 5 grams of the original weight. DO NOT OVERFILL*.

After weighing and refilling, place 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”, but do not over tighten. Assure that all electrical and pneumatic fittings are secure. *The sensor should be allowed to stabilized for several hours with power off, prior to use.*

(fig.12)

For S-type sensor refer to (fig.12). Disconnect the two electrical connections to the sensor. Disconnect the tubing from each gas fitting and remove the two sensor screws. ***NOTE: DO NOT REMOVE ANYTHING ELSE!!***

Restore sensor to within 5 grams of original weight by injecting an equivalent cc of distilled, or deionized water (10 grams = 10 cc of water). *Do not overfill.*

Note: Weight loss in excess per sensor weight indicated on the label may prevent the restoration of the weight to within 5 grams of the original weight. DO NOT OVERFILL. After weighing and refill, 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, prior to use.

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, and reconnect 15-pin “D” connector to circuit board. Connect the charger to the analyzer to charge NiCd batteries.

After 24 Hours:

Follow instruction 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? (section 4.1)
Pump Will Not Run	Ensure the **FUNCTION** switch **IS NOT** in the **OFF** position Are the Ni-Cd batteries charged? (section 4.1) Are the INLET/OUTLET fittings plugged? Is any tubing kinked?
Cannot Zero	Are alkaline batteries low? (section 4.1) Were alkaline batteries just replaced? (section 4.1) Are alkaline batteries installed correctly? (correct polarity)
No Response to Gas	Ensure the **FUNCTION** switch **IS NOT** in the **OFF** position; function switch needs to be in the sample position. Are NI-Cd batteries charged? (section 4.1) Are INLET/OUTLET fittings plugged? Is any tubing kinked? Are alkaline batteries low? (section 4.1) Are alkaline batteries installed correctly? (correct polarity) Is the SPAN/CAL turned all the way down (counter clockwise) Are electrical leads (s) connected to sensor? Make sure tubing is securely connected to pump and sensor.
Ni-Cd Batteries Won't Charge	Are the Ni-Cd batteries dead? (remove from unit and check each battery with a voltmeter) proper voltage should be 1.22 per cell. Ensure batteries are installed correctly; polarity is on the panel above the batteries. If batteries have been charged in the reverse polarity, they will not work correctly.
Erroneous Readings	Was the sensor allowed to stabilize? Are alkaline batteries low? When conducting the "ECS" process of replacing the sensor, ensure the alkaline batteries are not on the low side, as you may not be able to obtain the mV DC value on the" ECS" certificate.

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 itme 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 MATERIAL AUTHORIZATION NUMBER" issued by the INTERSCAN Service Department upon request. Below is the link to the RMA online form:

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

This is done primarily to encourage the user to contact the factory directly. The reason for this is, a high percentage of service problems are resolved over the telephone or e-mail, possibly avoiding the need to return the analyzer or part.

Should return of the analyzer or part be advised by the Service Department, the "RETURN MATERIAL AUTHORIZATION NUMBER" will prompt the return of the 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 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 following charts detail the ***approximate*** concentration in parts per million (ppm) 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 Interscan's **Interfering Gas Data article**. (www.gasdetection.com/the-tech-center/instrument-sensor-performance/interfering-gas-data)

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	Br_2	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	Unsat HC‡
Br_2	—	3.5 [N]	1.3	450 [N]	6200 [N]	4.5 [N]	2 [N]	0.7 [N]	1.0 [N]	17 [N]	180	$>10^4$	1.3	1.3	$>10^4$	1.3 [N]	>500
CO	$>10^3$ [N]	$>10^3$	$>10^3$ [N]	—	8¤	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^4$	$>10^3$ [N]	$>10^3$ [N]	$>10^4$	$>10^3$	17
Cl_2	0.65	3 [N]	—	400 [N]	6000 [N]	4 [N]	1.5 [N]	0.5 [N]	0.3 [N]	14 [N]	150	$>10^4$	1	1	$>10^4$	1 [N]	>500
ClO_2	2.1	9 [N]	2.8	1200 [N]	$>10^4$ [N]	12¤ [N]	4.5 [N]	1.5 [N]	1.0 [N]	42 [N]	450	$>10^4$	3	3	$>10^4$	3 [N]	>1500
H_2	$>10^3$ [N]	$>10^3$	$>10^3$ [N]	0.1	—	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^4$	$>10^3$ [N]	$>10^3$ [N]	$>10^4$	$>10^3$	3
H_2S (1)	9 [N]	3	11 [N]	40	400	11	10¤	4	—	220	4	$>10^4$	65 [N]	15 [N]	$>10^4$	4	15
H_2S (2)	40 [N]	1	50 [N]	8000	7000	15	15	6	—	300	15	$>10^4$	60 [N]	20 [N]	$>10^4$	6	>500
NO	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^4$	$>10^3$	$>10^3$	$>10^3$	$>10^3$	$>10^3$	—	$>10^4$	$>10^3$	$>10^3$	$>10^4$	$>10^3$	>500
NO_2	0.6	3 [N]	0.7	350 [N]	6000 [N]	4¤ [N]	2 [N]	0.7 [N]	0.2 [N]	15 [N]	150	$>10^4$	—	1	$>10^4$	1 [N]	>500
O_3	0.65	3 [N]	1	400 [N]	6000 [N]	4 [N]	2 [N]	0.5 [N]	0.3	15 [N]	150	$>10^4$	1	—	$>10^4$	1 [N]	>500
SO_2	2.5 [N]	1	3 [N]	700	5000	2	2	1	0.3	68	6¤	$>10^4$	24 [N]	2 [N]	$>10^4$	—	>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

INTERFERING GAS									
EtO ANALYZER	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

ANALYZER		INTERFERING GAS														
		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	4	15 [N]	8	>10^4	150	0.3	0.2	>10^4	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

9.0 Parts List

The parts list is unique to each individual unit, contact factory for your units parts list.