



**Operation  
Manual  
Travelpanel  
50MP  
Portable  
Breathing Air  
Purification and  
Regulation  
System**



**Sperian Instrumentation  
651 South Main Street  
Middletown, CT 06457  
Tel (860) 344-1079 (800) 711-6776  
Fax (860) 344-1068  
P/N 13-298 Version 2.10  
08JULY2008**

**Travel Panel 50MP  
Operations Manual  
Sperian Instrumentation Part Number 13-298  
Version 2.10  
Copyright 2008  
by  
Sperian Instrumentation  
Middletown, Connecticut 06457**

**All rights reserved.**

**No page or part of this operation manual may be reproduced in any form  
without written permission of the copyright owner shown above.**

**Sperian Instrumentation reserves the right to correct typographical errors.**

# Table of Contents

<b>Signal Words .....</b>	<b>3</b>
<b>Introduction 4</b>	
Compressor Selection.....	4
<b>Section 1: How the TravelPanel 50MP works.....</b>	<b>4</b>
1.1 Pre-filter assembly .....	4
1.2 Coalescing filter.....	5
1.3 Activated carbon "adsorber" filter .....	5
1.4 Pressure regulation .....	5
1.5 MultiPro gas detector .....	5
1.6 TravelPanel 50MP Component Locations .....	6
<b>Section 2 TravelPanel 50MP Set-Up and Daily Safety Procedures .....</b>	<b>7</b>
2.1 Initial setup: Alarm connector .....	7
2.2 Daily safety procedures.....	7
2.2.1 MultiPro gas detector checks.....	7
2.2.2 Filter preparation checks .....	7
2.2.2.1 Pre-filter replacement check.....	7
2.2.2.2 Coalescing filter replacement check.....	7
2.2.2.3 Activated carbon "adsorber" filter replacement check .....	8
2.2.3 High intensity alarm test .....	8
2.3 Inlet air attachment.....	8
2.4 Respirator attachment.....	9
<b>Section 3: TravelPanel 50MP Operation .....</b>	<b>9</b>
3.1 Start-up .....	9
3.2 Carbon monoxide and oxygen monitoring .....	10
3.3 Battery usage guidelines.....	10
3.3.1 Battery power monitoring.....	10
3.3.2 NiMH Battery charging .....	10
3.3.3 Replacing alkaline batteries.....	11
3.4 Pressure alarm enable switch .....	11
3.5 Shut-down procedure.....	11
<b>Section 4: Maintenance Procedures .....</b>	<b>12</b>
4.1 Filter Change Procedures .....	12
4.1.1 Pre-filter element replacement.....	12
4.1.2 Coalescing filter replacement .....	12
4.1.3 Activated carbon "adsorber" filter replacement .....	12
4.2 MultiPro gas detector calibration procedure .....	12
4.2.1 Fresh Air/Zero Calibration .....	13
4.2.2 Span Calibration.....	13
4.3 Leak test procedure .....	14
4.4 High intensity audible alarm .....	14
<b>Appendices 15</b>	
Appendix A: Principles of Air Purification for Advanced Users .....	15
Appendix B: Causes and Sources of Contamination.....	18
Appendix C: Sperian Instrumentation Standard Gas Detection Warranty.....	19

## Signal Words

The following signal words, as defined by ANSI Z535.4-1998, are used in the TravelPanel 50MP Reference Manual.

**⚠ DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**⚠ WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**⚠ CAUTION** indicates a potentially hazardous situation, which if not avoided, may result in moderate or minor injury.

**CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

## Introduction

The Travelpanel 50MP is designed for the purification and regulation of compressed respirable breathing air. It removes water, oil, and particulate contaminants as small as 0.01 microns in diameter. An activated carbon filter is used to remove nuisance odors and other organic contaminants. A built-in MultiPro gas detector monitors for carbon monoxide and oxygen (the oxygen sensor is optional). When the monitor detects unsuitable levels of gas, it activates loud audible and visual alarms. Alarms will be sounded if the concentration of CO exceeds 10 PPM, which is the OSHA limit (29 CFR 1910.134) for Grade D respirable breathing air. If the TravelPanel is equipped with the optional oxygen sensor, alarms will be sounded if the oxygen levels either exceed 23.5% or fall below 19.5%.

**⚠WARNING** The MultiPro personal, portable gas detector has been designed for the detection of dangerous atmospheric conditions. An alarm condition indicates the presence of a potentially life-threatening hazard and should be taken very seriously.

The TravelPanel 50MP is designed to provide up to 50 CFM (cubic feet per minute) of purified air. The TravelPanel 50MP may be used to supply respirable breathing air for up to four air-line respirator users at the same time.

**Note: The combined air consumption of all respirators supplied by a single Travelpanel must not exceed a maximum of 50 CFM. Consult the respirator's owner's manual to determine specific CFM requirements.**

A single regulator is used to adjust the outlet pressure for all four quick-connect air-line fittings. The pressure may be set to anywhere between 0 and 125 PSI (pounds per square inch).

**Please see Appendix A for a more detailed discussion of compressor limitations and commonly encountered breathing air contaminants.**

## Compressor Selection

There are a number of suitable compressors on the market that are capable of delivering breathing air to the TravelPanel 50MP. Sperian Instrumentation is unable to recommend any one specific compressor.

## Section 1: How the TravelPanel 50MP works

The TravelPanel 50MP is designed to purify breathing air in three stages. Inlet air is first passed through a pre-filter, then through a coalescing filter, and finally through an activated carbon "adsorber" filter prior to being passed through to the outlet ports. A MultiPro gas detector continuously samples the purified air to insure that the CO and O<sub>2</sub> concentrations stay within the tolerable range for Grade D respirable breathing air.

If the carbon monoxide concentration rises above 10 PPM loud audible and visual alarms are activated, notifying respirator wearers that their compressed air source is contaminated, and no longer meets the minimum requirements for respirable Grade D breathing air.

In instruments equipped with the optional oxygen sensor, alarms will also be sounded if the oxygen levels either exceed 23.5% or fall below 19.5%.

### 1.1 Pre-filter assembly

Inlet air is first directed through a pre-filter assembly. The pre-filter element is designed to intercept most particulate contaminants. Particulate contaminants larger than 5 microns in diameter should be removed during this phase of filtration. The pre-filter assembly also includes an integral auto-draining water trap. Inlet vanes cause the air to spin as it enters the pre-filter "bell." As the air spins water and oil are centrifugally separated from the air-stream. Liquids coalesce on the inner surface of the pre-filter housing and flow to the bottom of the bell. When sufficient fluid has accumulated in the bottom of the housing a "float" causes the water trap valve to open and the accumulated fluids to drain.

**Caution:** The pre-filter and coalescing filter housings should be examined regularly during use. Make sure accumulated liquids are properly drained. In some cases it may be necessary to relieve pressure in the system by disconnecting the Travelpanel from the compressed air source before the auto-drain can function properly.

## 1.2 Coalescing filter

The inlet air is directed next through a coalescing filter. The majority of the water and other liquids present in the inlet air should have been removed as the air passed through the pre-filter. This filter is equipped with a manual drain.

Opening the manual drain stem at the bottom of the coalescing filter housing allows accumulated fluids to be vented.

The coalescing filter is designed to remove 99.9 % of all aerosol particulates (including water and oil droplets as well as dusts and solids) greater than 0.01 microns in diameter.

## 1.3 Activated carbon "adsorber" filter

The activated carbon filter is designed to finish the purification process. The "adsorber" filter removes nuisance odors as well as any other remaining organic contaminants. Any remaining particulates are removed during this phase of filtration.

## 1.4 Pressure regulation

The Travelpanel may be used to provide air for up to four respirator wearers. A single regulator is used to adjust the outlet pressure for all four quick connect air-line fittings. The pressure may be set anywhere between 0 and (the NIOSH maximum) 125 PSI (pounds per square inch).

**Note:** Since a single regulator is used to govern the outlet pressure for all four quick connect air-line fittings, it is not possible to use hose length and respirator combinations which require different pressure settings for different outlets.

## 1.5 MultiPro gas detector

A built-in MultiPro gas detector monitors

carbon monoxide and oxygen levels to ensure that the purified air meets O<sub>2</sub> and CO standards for Grade D breathing air.

**⚠WARNING** The Travelpanel monitors, but does not remove, carbon monoxide from breathing air.

A threaded brass flow restrictor is used to provide a constant flow of purified air (0.5 liters per minute) from the outlet manifold. The (now) low pressure sample is directed down a short length of tube to a gasketed cup attached to the sensor housing. Carbon monoxide and oxygen readings are continuously displayed on the instrument LCD (liquid crystal display).

## 1.6 TravelPanel 50MP Component Locations

- |   |  |
|---|--|
| 1. Inlet housing coupling                     | 15. Outlet hose couplings                    |
| 2. 61-079 Pre-filter assembly with auto-drain | 16. AC Power Inlet                           |
| 3. 61-032 Pre-filter element                  | 17. Pre-filter bowl                          |
| 4. Strobe                                     | 18. 53-030 Automatic pre-filter drain tubing |
| 5. 61-080 Coalescing filter                   | 19. Coalescing filter bowl                   |
| 6. 61-033 Coalescing filter element           | 20. Coalescing filter manual drain           |
| 7. 12-006 Air pressure gauge                  | 21. Calibration inlet                        |
| 8. 61-006 Charcoal filter                     | 22. Pressure alarm enable switch             |
| 9. MultiPro Gas Detector                      | 23. Charcoal filter manual drain             |
| 10. 12-057 Pressure regulator                 | 24. Charcoal filter bowl and element         |
| 11. 12-004 Relief valve (125 PSI)             | 25. Alarm connector port                     |
| 12. Filter change indicator                   | 26. Alarm connector                          |
| 13. 05-414 Brass street elbow                 | 27. Alarm test pushbutton                    |
| 14. 55-017 Four-outlet manifold               | 28. High intensity alarm battery housing.    |

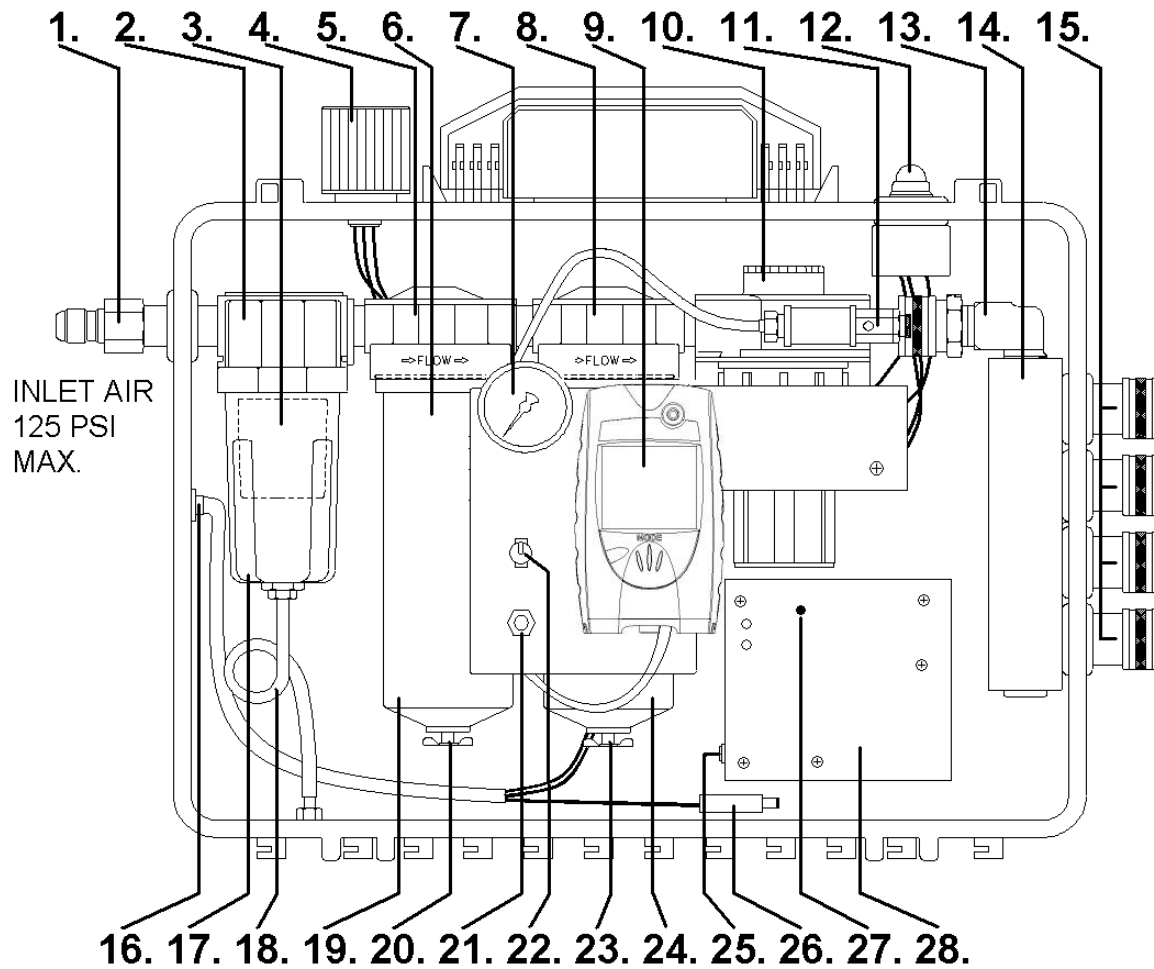
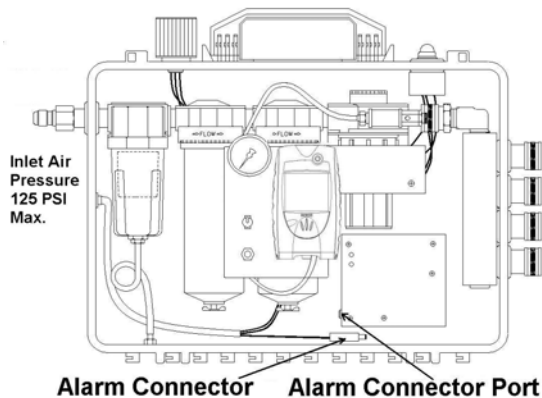


Figure 1.6

## Section 2 TravelPanel 50MP Set-Up and Daily Safety Procedures

### 2.1 Initial setup: Alarm connector

Upon initial receipt of the TravelPanel MP50, first plug the alarm connector into the alarm connector port. The alarm connector is disconnected upon shipment to prevent the alarm from activating in transit. Plug the alarm connector in before proceeding with the daily safety procedures described below.



### 2.2 Daily safety procedures

**⚠️WARNING** The TravelPanel 50MP must be checked for proper function prior to each day's use.

The following sections contain a number of precautionary procedures which should be performed every day to maximize worker safety.

#### 2.2.1 MultiPro gas detector checks

- 1) Turn the unit on and wait a few seconds for the readings to stabilize
- 2) Perform the fresh-air zero procedure (see section 4.2.1.)
- 4) Verify accuracy by exposing the sensor to known concentration "span" gas. (see section 4.2.2.)

#### 2.2.2 Filter preparation checks

Be sure that the manual drains on the coalescing and charcoal filters are closed. Use the following procedures to determine that the filters are clean enough for continued operation.

#### 2.2.2.1 Pre-filter replacement check

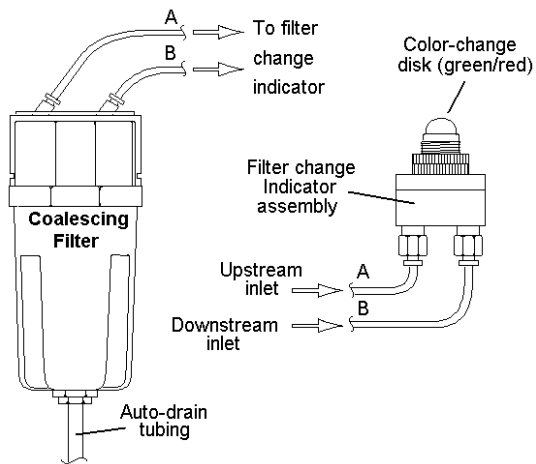
The pre-filter may be visually inspected. In the course of normal operation, Travelpanel filters gradually become discolored. The degree of discoloration depends on the nature and the quantity of the contaminants present in the air being filtered. The most common contaminant is oil from oil-lubricated breathing air compressors. When the pre-filter becomes seriously discolored by oil, (a dark golden color), it is an indication that the pre-filter element is not suitable for operation (regardless of input and output pressure differential). Replace the coalescing filter element whenever such discoloration is noted. (See section 4.1.1 for pre-filter replacement procedures)

#### 2.2.2.2 Coalescing filter replacement check

The best indication that the coalescing filter element must be replaced is the status of the filter change indicator which is located on the top of the case and is visible from outside.

**Note:** The status of the filter change indicator may only be checked while the Travelpanel is in operation and connected to a source of compressed air.

The filter change indicator is designed to measure the pressure before and after the coalescing filter element. When the coalescing filter is clean, compressed air moves through the filter with little resistance. Over time the contaminants which are removed from the air-stream build up on the surface of the filter. This build up makes it harder for air to pass through the filter. The increased resistance produces a pressure drop "downstream" from the pre-filter. When the pressure drop exceeds 15 PSI the indicator disc changes color from green to red, and the coalescing filter element must be replaced.



**Figure 2.2 Filter Change Indicator**

The filter may also be visually inspected. In the course of normal operation, Travelpanel filters gradually become discolored. The degree of discoloration depends on the nature and the quantity of the contaminants present in the air being filtered. The most common contaminant is oil from oil-lubricated breathing air compressors. When the pre-filter becomes seriously discolored by oil, (a dark golden color), it is another indication that the pre-filter element is not suitable for operation (regardless of input and output pressure differential). Replace the coalescing filter element whenever such discoloration is noted. (See section 4.1.2. for coalescing filter replacement procedures)

As a general rule, the coalescing filter should be replaced every third time the pre-filter element is replaced, but coalescing filter may require more frequent replacement. If the pre-filter is unable to catch the bulk of oil contaminating the input air, the coalescing filter will become discolored over time. The more rapidly the coalescing filter begins to look contaminated, the more frequently the filter element needs to be replaced. (See section 4.1.2. for coalescing filter replacement procedures.)

### 2.2.2.3 Activated carbon "adsorber" filter replacement check

As a general rule, the carbon filter should be replaced every third time the pre-filter element is replaced, but the charcoal filter may require more frequent

replacement. Odors present in the Travelpanel output air are an indication that the activated carbon filter is not performing adequately, and that the filter element requires replacement. (See section 4.1.3. for activated carbon filter replacement procedures.)

### 2.2.3 High intensity alarm test

The Travelpanel 50 design includes a high intensity audible alarm with a built in test button. The alarm-test push-button is located on the alarm battery housing. (The push-button is component # 27 on Figure 1.6) Push the button to verify alarm operation.

**⚠CAUTION** The TravelPanel 50MP high intensity alarm is very loud (108 dBA at 12 inches). To avoid risk of hearing damage, cover the alarm bell before depressing the alarm-test push-button.

### 2.3 Inlet air attachment

**⚠WARNING** Maximum allowable inlet pressure is 125 PSI.

**⚠WARNING** If a pressure reducing regulator is being used upstream of the inlet port on the TravelPanel 50MP, be sure to limit the inlet pressure at the regulator to 125 PSI.

**⚠WARNING** Input pressures exceeding the burst pressure of the internal components of the TravelPanel 50MP may lead to property damage, injury or death.

TravelPanel 50MP standard accessories include a quick-disconnect coupler designed to screw into the user's inlet air hose. To connect the Travelpanel to the desired air source, attach the coupler to a suitable respirable breathing air inlet hose, pull back the outer ring on the coupler and slide the coupler onto the inlet air fitting. Make sure that the coupler outer ring snaps back into place after attachment. To disconnect the coupler, pull back the outer ring on the coupler and slide the coupler off the fitting.

**Note:** Be sure that the air source has

enough capacity to supply the required CFM output for the respirators that will be used at the pressure that is required.

## 2.4 Respirator attachment

The TravelPanel 50MP may be used to supply respirable breathing air for up to four air-line respirator users at the same time.

**Note: The combined air consumption of all respirators supplied by a single TravelPanel 50MP must not exceed a maximum of 50 CFM. Consult the respirator owner's manual to determine specific CFM requirements.**

The TravelPanel 50MP design includes four quick connect outlet fittings used for respirator air-line attachment.

Travelpanels may be ordered from the factory equipped with either Hansen or Schraeder type outlet fittings. The fittings selected should be a function of the type of connections required by the respirators and air-line hose that will be used.

## Section 3: TravelPanel 50MP Operation

### 3.1 Start-up

Turn on the MultiPro gas detector by pressing the MODE button on the detector.

**⚠WARNING** The accuracy of the MultiPro gas detector inside the TravelPanel 50MP should be checked periodically with known concentration calibration gas. Failure to check accuracy can lead to inaccurate and potentially dangerous readings.

Connect the TravelPanel 50MP to the inlet air source. Test the high intensity audible alarm by pressing the alarm test button (for location see figure 1.6). Turn the inlet air on and adjust the Travelpanel manifold pressure to the respirator manufacturer's recommended output.

**Note: It is best to attach at least one respirator to the Travelpanel and adjust the regulator while actually flowing air.**

The pressure-regulator adjustment knob is the black plastic ring on the bottom of the pressure regulator (see figure 1.6). Turn clockwise to increase pressure, or counter-clockwise to decrease pressure.

**Note: The manifold pressure may not exceed the NIOSH specified maximum of 125 PSI. Excess air is automatically vented by means of the self-resetting pressure relief valve whenever the pressure exceeds this value. Always keep the regulator pressure set below 125 PSI.**

In the event of a pressure relief valve malfunction, (i.e., if manifold pressure exceeds 125 PSI and the pressure relief valve fails to automatically activate,) then the unit is not safe for operation. Turn manifold pressure all the way down and shut off the inlet air. Bleed off remaining pressure through the manual drain on the bottom of the coalescing filter by pressing on the manual drain stem. When pressure is fully released, disconnect air inlet and outlet hoses. In the event of a relief valve malfunction,

the unit must be sent back to the factory for servicing. Contact Sperian's instrument service department for further instructions.

### 3.2 Carbon monoxide and oxygen monitoring

**⚠WARNING** The Travelpanel monitors, but does not remove, carbon monoxide from breathing air.

The Travelpanel design includes a built-in MultiPro gas detector that continuously monitors the levels of carbon monoxide in the outlet manifold air. The OSHA (29 CFR 1910.134) limit for carbon monoxide in respirable Grade D breathing air is 10 PPM (parts per million). TravelPanel 50MP alarms are activated whenever the concentration exceeds this level. Possible reasons for an alarm include, but are not limited to:

- 1) Compressor malfunction leading to carbon monoxide build up (carbon monoxide can be produced when lubricant oil is burned or "smoked" due to compressor over-heating).
- 2) Inlet air to compressor becomes contaminated (for instance, the compressor begins to suck vehicle exhaust into the system).
- 3) Other contaminant(s) affecting the carbon monoxide sensor. The sensor used in the Travelpanel is designed to respond to a number of potential contaminants besides carbon monoxide. Possibilities include (but are not limited to): organic vapors, hydrogen, sulfur-containing gases, unsaturated hydrocarbons, nitric oxide, and nitrogen dioxide.

If the TravelPanel 50MP is equipped with an oxygen sensor, the oxygen sensor's alarms will be activated if oxygen levels either exceed 23.5% or are reduced below 19.5%.

**If the either the CO or O<sub>2</sub> alarm is activated, stop breathing TravelPanel 50MP-supplied air as quickly as possible, and investigate the source of contamination. Do not resume Travelpanel operation until the**

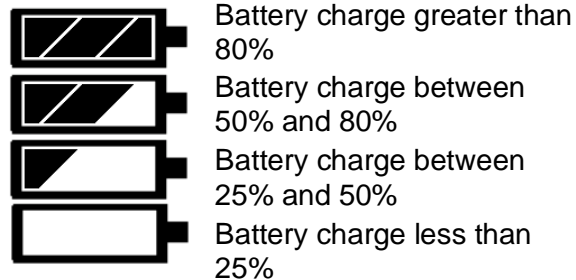
**contamination is eliminated and CO and O<sub>2</sub> levels have both returned to levels that do not cause an alarm to be activated.**

### 3.3 Battery usage guidelines

The TravelPanel 50MP includes either a built-in rechargeable NiMH battery or a pair of alkaline power packs (with 4 AA batteries in each pack) that supply power to the instrument. The TravelPanel 50MP should run approximately 100 hours on either a fully charged NiMH battery or on a new set of high quality alkaline batteries.

#### 3.3.1 Battery power monitoring

Current amount of battery reserve is shown on the MultiPro's display. The battery icon gives an indication of how much power is left in the battery. The illustration below shows the stages of the battery from full to empty (top to bottom).



When the battery icon is empty, it is time to charge the battery.

#### 3.3.2 NiMH Battery charging

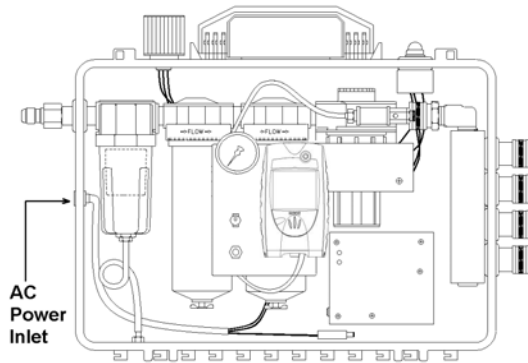
**⚠WARNING** The TravelPanel 50MP must be located in a non-hazardous location during the charging cycle. Charging the TravelPanel 50MP in a hazardous location may impair intrinsic safety.

The NiMH battery in the TravelPanel 50MP should never be charged at temperatures lower than 5 degrees Celsius (40 degrees Fahrenheit) or higher than 30 degrees Celsius (86 degrees Fahrenheit). Charging at temperature extremes can cause permanent damage the battery.

To charge the battery, use the wall cube that came with the TravelPanel to connect the AC power inlet on the left side of the case to a standard 110V

outlet.

If the battery is fully drained, it will take approximately 3 hours to fully charge.

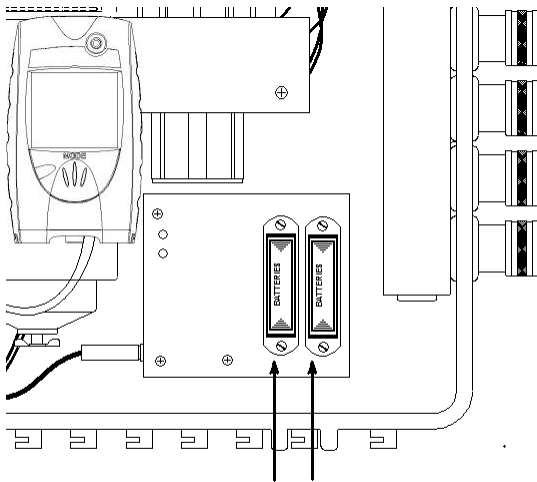


The battery is housed in the battery compartment in the lower right quadrant of the case. When AC power is first applied, the green LED will be lit on the battery compartment. When the green light goes out, charging is complete.

The red LED on the battery compartment is used to show a fault in the battery. Contact Sperian Instrumentation for further details if the red LED is lit.

### 3.3.3 Replacing alkaline batteries

Each of the two alkaline power packs contains 4 AA alkaline batteries.



**Alkaline Battery Packs**

To replace the batteries, press the clasps on the outside of the packs together and pull the battery packs out of the battery compartment. Always replace all 8 AA batteries at the same time.

**⚠WARNING** Use only Duracell MN1500 or Ultra MX1500, Eveready Energizer E91-LR6,

Eveready EN91, Radio Shack 23-874\* size AA 1.5V Alkaline batteries, Eveready CH15\* or Radio Shack 23-149\* size AA NiCad batteries, or Eveready L91\*† AA 1.5V Lithium batteries.



**Press clasps together to remove alkaline packs**

**Note: Always dispose of alkaline batteries in accordance with local ordinances.**

### 3.4 Pressure alarm enable switch

The pressure alarm enable switch is located in the center of the instrument above the calibration gas inlet port (**the pressure alarm switch is component # 22 on Figure 1.6**).

With the switch in the up/on position, the pressure alarm is on and will be sounded when pressure in the outlet manifold falls below 80PSI. Once the alarm is tripped, it will continue to sound until pressure rises to 90PSI or higher.

With the switch in the down/off position, the instrument will not monitor outlet pressure.

### 3.5 Shut-down procedure

When finished with the Travelpanel, shut off inlet air and bleed off excess pressure before disconnecting inlet or outlet hoses. Excess pressure is released by pressing on the manual drain stem on the coalescing filter. Disconnect inlet air and/or respirators if necessary.

To turn off the MultiPro, press and hold the MODE button until the display reads "Release Button" and "Please wait". The instrument has been turned off when the display goes blank.

## Section 4: Maintenance Procedures

Maintenance on the TravelPanel 50MP consists of changing the filters and calibrating the MultiPro gas detector. Calibration kits and replacement filters are available from Sperian Instrumentation. The filter maintenance kit (P/N 54-6015) contains replacement o-rings, three pre-filter elements, one coalescing filter element, and charcoal element. There are a few MultiPro calibration kits available that contain calibration gas, regulator and fittings for the MultiPro.

### 4.1 Filter Change Procedures

#### 4.1.1 Pre-filter element replacement

- 1) Turn filter-housing bowl counter-clockwise approximately 1/4 of a rotation, until unlocked.
- 2) Remove the bowl from the filter-housing body. Replace the o-ring at the top of the bowl, making sure that the o-ring seats evenly.
- 3) Unscrew the white plastic spinner from the filter attachment and slide off the used filter element.
- 4) Replace the used filter with a new pre-filter element and screw the spinner back into place.
- 5) Put the filter-housing bowl back into the body and turn 1/4 of a rotation clockwise until the filter-housing assembly is locked.

#### 4.1.2 Coalescing filter replacement

- 1) Turn filter bowl counter-clockwise approximately 1/4 of a rotation, until unlocked.
- 2) Remove the bowl from the filter body. Replace the o-ring at the top of the bowl, making sure that the o-ring seats evenly.
- 3) Unscrew the particle filter from the filter-housing body and discard. Screw in the replacement filter.
- 4) Put the filter-housing bowl back into

the body and turn 1/4 rotation clockwise until the filter-housing assembly is locked.

#### 4.1.3 Activated carbon "adsorber" filter replacement

- 1) Unscrew and remove the filter-housing bowl by turning counter-clockwise.
- 2) Unscrew and remove the black securing ring from the bottom of the filter element and slide the used filter off of the metal filter securing rod.
- 3) Replace the O-ring around the inside of the filter-housing body, making sure that the O-ring seats evenly.
- 4) Replace the filter element and screw the black securing ring back into place.
- 5) Screw the filter-housing bowl back into place.

### 4.2 MultiPro gas detector calibration procedure

**⚠WARNING** The accuracy of the MultiPro detector inside the TravelPanel 50MP should be checked periodically with known concentration calibration gas. Failure to check accuracy can lead to inaccurate and potentially dangerous readings.

The TravelPanel 50MP design includes a MultiPro gas detector equipped with CO and O<sub>2</sub> sensors. The accuracy of the MultiPro should be verified on a regular basis.

To verify accuracy, first expose the MultiPro to fresh air. If exposure to fresh air yields an oxygen reading of less than 20.7% or greater than 21.1% or a CO reading of anything other than 0, then a Fresh Air/Zero Calibration should be performed as described in section 4.2.1.

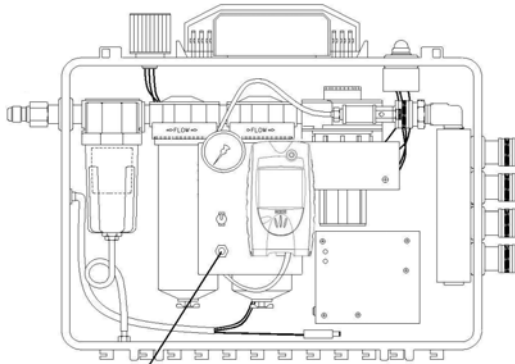
Next expose the MultiPro to a known concentration calibration gas containing carbon monoxide. (as described in section 4.1) shows that LEL or toxic sensor readings are not between 90% and 120% of the value given on the calibration gas cylinder, then the Span Calibration should be performed as described in section 4.2.2.

#### 4.2.1 Fresh Air/Zero Calibration

**⚠WARNING** Fresh air/zero calibrations may only be performed in an atmosphere that is known to contain 20.9% oxygen, 0.0% LEL and 0 PPM toxic gas.

To initiate the fresh air/zero calibration:

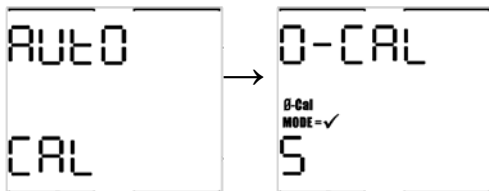
1. In an atmosphere that is known to be fresh (20.9% oxygen, no contaminants), attach the squeeze bulb assembly to the Calibration inlet (see figure 1.6) and squeeze the bulb 6 times to deliver a fresh air sample to the MultiPro.



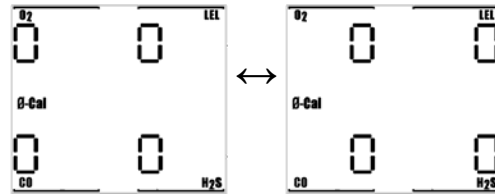
Calibration Inlet

**⚠WARNING** Fresh air/zero calibrations may only be performed in an atmosphere that is known to contain 20.9% oxygen, 0.0% LEL and 0 PPM toxic gas.

2. Press the MODE button three times within two seconds to begin the fresh air/zero calibration sequence. The MultiPro will briefly display AUTO CAL and then begin a 5-second countdown.



3. Press the MODE button before the end of the 5-second countdown to begin the fresh air/zero calibration. The fresh air/zero calibration is initiated when the MultiPro alternates between the following two screens:



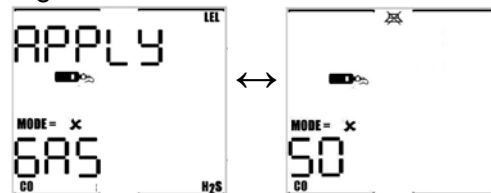
4. The fresh air/zero calibration is complete when the instrument begins another 5-second countdown for the span calibration. If span calibration is not required, allow the countdown to reach 0 without pressing the MODE button.
5. Remove the squeeze bulb assembly from the calibration inlet.

#### 4.2.2 Span Calibration

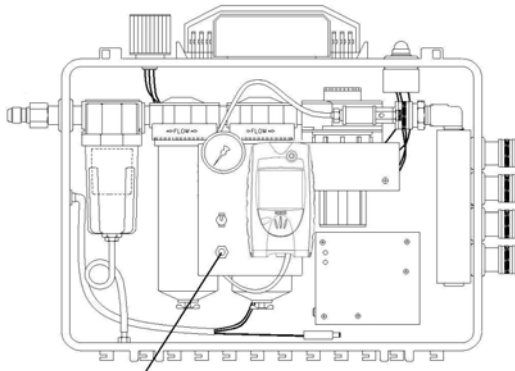
Once the fresh air / zero calibration has been successfully completed, the MultiPro will automatically proceed to the automatic span calibration countdown screen.



1. Press the MODE button before the countdown is complete to initiate the span calibration. The screen will immediately show "APPLY GAS" and then list the sensors for calibration and the expected levels of calibration gas.



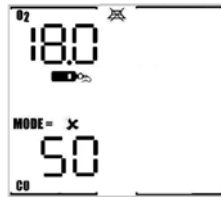
2. Insert the regulator into the calibration gas cylinder and connect the regulator to the calibration inlet with the inlet coupling and short piece of tubing that came with the TravelPanel.



**Calibration Inlet**

3. Apply calibration gas. The readout will change to a numerical display almost immediately and will continue to display the current readings.

The actual calibration of the oxygen sensor to 20.9% occurs during the fresh air calibration, but the oxygen sensor is tested for response to diminished oxygen levels during span calibration. Sperian Instrumentation calibration gas cylinders contain approximately 18.0% oxygen. In order to pass the span calibration, the MultiVision must register an oxygen reading below 19.5% during span calibration.



The calibration is fully automatic from this point on. Upon successful calibration of a sensor, the MultiVision will beep, show the adjusted reading for the calibrated sensor and then move on to the next sensor.

Once the calibration of the CO sensor is successfully completed, the MultiPro will briefly show the maximum adjustment values screen.

The maximum adjustment values for the CO sensor gives an indication of the remaining sensitivity of the sensor. As sensitivity decreases, the maximum possible adjustment will decrease to approach the expected concentration of the calibration gas.

#### 4.3 Leak test procedure

The volume of available inlet air is usually not a limiting factor in situations requiring the use of a TravelPanel 50MP system. Incidental leakage of a minor

amount of air from the system is not normally a cause for concern. On the other hand significant leakage may indicate a loose fitting or damaged component. Leaking or damaged components should be replaced prior to the panel being put back into service. TravelPanel 50MP pneumatics may be tested for leakage by using the following procedure.

- 1) Attach the Travelpanel to a compressed air source and turn the source air on.
- 2) Wait until the pressure has stabilized and turn the source air off.
- 3) Watch the air pressure gauge for sixty seconds. A pressure drop of 5 or more PSI during a one-minute interval indicates there is a significant leak somewhere in the system.
- 4) In the event of a significant leak make sure all filter bowls and fittings are secure and appropriately tight. Make sure that any O-rings or gaskets removed during filter replacement have been replaced with fresh ones.
- 5) Repeat the test. In the event the system continues to leak a commercially available soap solution such as "Snoop" may be used to track down the point of leakage. Contact Sperian Instrumentation's instrument service department for help in replacement of damaged components.

#### 4.4 High intensity audible alarm

The TravelPanel 50MP is equipped with a high intensity audible alarm to warn the user when CO levels or O<sub>2</sub> levels exceed the alarm level limits.. The alarm's sound intensity exceeds 108 dBA (decibels) at 12 inches, ensuring that it will be heard even in noisy environments. The alarm battery may be tested by pressing the black battery-test button.

**⚠WARNING** The high intensity alarm is not classified as intrinsically safe, and may pose a hazard in combustible atmospheric conditions.

# Appendices

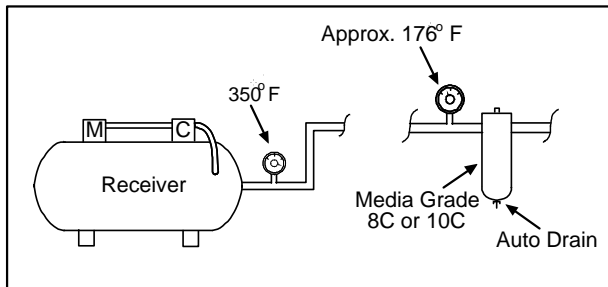
## Appendix A: Principles of Air Purification for Advanced Users

Industrial air supply is typically generated by an oil lubricated compressor. These compressors can be of either the screw or piston type. When such compressors are used to provide breathing air, you must filter the air, regulate its pressure and check for the presence of carbon monoxide. When the air to be purified and regulated comes from a portable compressor, (e.g., as used in sand blasting, asbestos removal, and painting applications) the problems are worse. Generally, portable compressors provide outlet air of a lower quality than larger, permanently installed compressors. The quality of the inlet air to the compressor may also be of concern.

This appendix discusses how to ensure that the air from your compressor is properly purified and pressure regulated to meet OSHA requirements for breathing air.

### 1. What comes out of a typical compressor

Contamination of industrial airline breathing systems is primarily in the form of compressor lubrication mists, vapors, oils, greases, rust, liquid and gaseous water, airline fabrication by-products (slag, flux, metal particles) and industrial contaminants within the atmosphere prior to compression (typically carbon monoxide).



**Figure 1**

All compressors, regardless of age and maintenance record, contaminate the airstream to some degree with lubrication mists and rust particles. Filtration is

required to make the resulting airstream breathable.

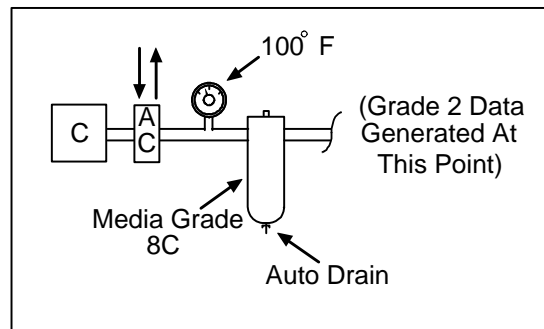
Figure 1 shows a typical small compressor with no aftercooler intended for intermittent general use. A very important thing to note is that the air coming out is very hot (350° F) and extremely humid.

### Contamination Specifications

Water Vapors	42,000 ppm
Dew Point	176° F
Solids	100,000,000/cu. meter
Oil Aerosols	0.5 ppm
Oil Vapors	1.0 ppm
Hydrocarbon Vapors	80 ppm
Specs met	none

When inlet air at room temperature and normal humidity is compressed, the dew point (temperature at which water will condense out of the gaseous state) is raised significantly. This presents problems downstream of the compressor since the water will condense out of the airstream when heat is lost to the surrounding atmosphere.

When working with lubricated air tools, air motors, cylinders, etc., the compressor is normally fitted with an aftercooler, a coarse pre-filter, and an auto draining water trap. This system, which meets Compressed Air and Gas Institute specification CAGI-G7.1 (Grades A and B) is shown in figure 2. For a permanent compressor, this represents the absolute minimum quality of air that should be used with a Travelpanel air purification system.



**Figure 2**



downstream. Then, the dry, cleaner air follows a convoluted path through the filter element, where finer solid particles are filtered out. Finally, the air passes up the center of the element and out the discharge port.

In this way, the pre-coalescing filter removes impurities in two operations: dynamically, by centrifugal separation, which throws out heavier particles and entrained water, and statically, through the filter element itself, which filters out the smaller particles.

The pressurized air is now free of residuals, precipitates, and oil and water aerosols larger than 5 microns.

### **2.1.2. Coalescing filter**

Next, the air is directed through a coalescing filter with a manual drain. If the inlet air to the TravelPanel 50MP is properly cooled, it shouldn't be necessary to use the manual drain. The coalescing filter is intended to remove 99.9% of all oil and water aerosols larger than 0.01 microns. The coalescing filter is made up of a corrosion-resistant zinc die cast body, a transparent polycarbonate sump bowl (capacity 3.4 ounces) with a manual drain valve and borosilicate sub-micronic glass fiber/epoxy bonded element.

The high-efficiency coalescing filter operates on a somewhat different principle than the particulate interceptor filter. The principles include direct interception, inertial impaction, and diffusion.

As the pre-filtered air enters the cylindrical element at the center, the contaminating particles larger than the filter element openings are stopped by direct interception. Solid particles remain in the filter element while aerosols agglomerate into larger drops. Aerosols in the turbulent airstream impact the glass fibers and accumulated droplets are removed from the flow.

Diffusion (molecular Brownian movement) causes the smaller particles to collide or coalesce with the glass fibers and accumulated liquid droplets on the fibers. Collected liquid migrates to

the crossing points of the fibers, where larger drops form or coalesce. Pressure differential through the element then forces these drops to the downstream surface of the element where they gravitate downward to the sump.

As a result, the coalescing elements can capture particles smaller than the nominal size of the flow passages through the element at a lower delta pressure than would be expected with an element of equal filtration capability that uses the direct interception process of entrapment.

### **2.1.3. Activated charcoal filter (Adsorber)**

Following the pre-coalescer and coalescer filter is the final stage of filtration, the adsorption process. The adsorber "polishes" the airstream, removing trace amounts of hydrocarbons as well as odors. The adsorber filter is comprised of a zinc die-cast body, a spun aluminum bowl, a manual drain valve, and an activated charcoal adsorber element. Air enters the center of the filter element, passes through the activated charcoal, and exits at the discharge port. The chemical action of the activated charcoal serves to cleanse the breathing air of trace hydrocarbons and organic odors.

## **2.2. Pressure regulation**

After the inlet air has been filtered, it is necessary to regulate its pressure to NIOSH requirements. An adjustable regulator with a pressure gauge ensures that the outlet manifold is within the acceptable limits for the respirator being used.

## **2.3. Carbon monoxide monitoring**

Even with such extensive filtration, it is impossible to remove existing carbon monoxide from the breathing air. Carbon monoxide can be produced by breakdown of the compressor lubricants, or it can be present in the inlet air. The TravelPanel 50MP contains a built in CO monitor with an alarm set at 10 parts per million.

## **Summary**

The Travelpanel series of air purification panels are designed to meet or exceed OSHA industrial breathing air specifications for respirable Grade D breathing air contained in 29 CFR 1910.134.

There are two additional requirements, namely:

1) Compressor inlet air must contain between 19.5 and 23.5 % oxygen.

2) Compressor inlet air must contain less than 1000 PPM carbon dioxide.

Since fresh air contains 20.9% oxygen and only trace amounts of carbon dioxide are produced by compressors, these requirements are very easy to meet.

## Appendix B: Causes and Sources of Contamination

### (1) Contamination from intake air

Carbon monoxide	Carbon dioxide	Gaseous hydrocarbons	Condensed hydrocarbons	Water
Motor exhaust	Recirculated air from central air conditioning and/or heating in highly populated areas (shopping malls, industrial plants, etc.)	Fumes from nearby dry cleaning shops, beauty salons, chemical plants, industrial manufacturing plants, motor exhaust	Dust, pollen, motor exhaust	Humidity

### (2) Contamination from within compressor

Carbon monoxide	Carbon dioxide	Gaseous hydrocarbons	Condensed hydrocarbons	Water
<p><b>a)</b> Combustion product of hydrocarbon fuels and lubricants--can be caused by overheated oils</p> <p><b>b)</b> Oxidation of charcoal filters due to over-heating</p> <p><b>c)</b> CO which has accumulated on a filter can be released when a drop in operating pressure occurs</p>	<p><b>a)</b> Certain CO filters convert CO into CO<sub>2</sub>, causing an increase in levels (usually not enough to cause alarm)</p> <p><b>b)</b> CO<sub>2</sub> which has accumulated on a filter can be released when a drop in operating pressure occurs.</p>	Overheating compressor lubricants can cause the generation of lubricant vapors which can slip by piston rings	<p><b>a)</b> Oil mist can be generated from compressor lubricants escaping through faulty piston rings.</p> <p><b>b)</b> Inorganic particulates can be caused by carbon from an activated charcoal filter or rust from steel piping</p>	Moisture can be picked up by the output air when water separators are not properly maintained

## Appendix C: Sperian Instrumentation Standard Gas Detection Warranty

### General

Sperian Protection Instrumentation, LLC (hereafter Sperian) warrants gas detectors, sensors and accessories manufactured and sold by Sperian, to be free from defects in materials and workmanship for the periods listed in the tables below.

Damages to any Sperian products that result from abuse, alteration, power fluctuations including surges and lightning strikes, incorrect voltage settings, incorrect batteries, or repair procedures not made in accordance with the Instrument's Reference Manual are not covered by the Sperian warranty.

The obligation of Sperian under this warranty is limited to the repair or replacement of components deemed by the Sperian Instrument Service Department to have been defective under the scope of this standard warranty. To receive consideration for warranty repair or replacement procedures, products must be returned with transportation and shipping charges prepaid to Sperian at its manufacturing location in Middletown, Connecticut, or to a Sperian Authorized Warranty Service Center. It is necessary to obtain a return authorization number from Sperian prior to shipment.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. SPERIAN WILL NOT BE LIABLE FOR LOSS OR DAMAGE OF ANY KIND CONNECTED TO THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.

### Instrument & Accessory Warranty Periods

Product(s)	Warranty Period
Biosystems PHD6, PhD <sup>5</sup> , PhD Lite, PhD Plus, PhD Ultra, Cannonball3, MultiVision, Toxi, Toxi/Oxy Plus, Toxi/Oxy Ultra, ToxiVision, Ex Chek	As long as the instrument is in service
ToxiPro <sup>®</sup> , MultiPro	2 years from date of purchase
ToxiLtd <sup>®</sup>	2 years after activation or 2 years after the "Must Be Activated By" date, whichever comes first
Toxi3Ltd <sup>®</sup>	3 years after activation or 3 years after the "Must Be Activated By" date, whichever comes first
Mighty-Tox 2 Prorated credit is given towards repair or purchase of a new unit of the same type.	0 – 6 months of use 100% credit 6 – 12 months of use 75% credit 12 – 18 months of use 50% credit 18 – 24 months of use 25% credit
IQ Systems, Series 3000, Airpanel, Travelpanel, ZoneGuard, Gas✓Chek1 and Gas✓Chek4	One year from the date of purchase
Battery packs and chargers, sampling pumps and other components, which by their design are consumed or depleted during normal operation, or which may require periodic replacement	One year from the date of purchase

### Sensor Warranty Periods

Instrument(s)	Sensor Type(s)	Warranty Period
Biosystems PHD6, PhD Plus, PhD Ultra, PhD <sup>5</sup> , PhD Lite, Cannonball3, MultiVision, MultiPro, ToxiVision, ToxiPro <sup>®</sup> , Ex Chek	O <sub>2</sub> , LEL**, CO, CO+, H <sub>2</sub> S & Duo-Tox	2 Years
	All Other Sensors	1 Year
Toxi, Toxi/Oxy Plus, Toxi/Oxy Ultra	CO, CO+, H <sub>2</sub> S	2 Years
	All Other Sensors	1 Year
All Others	All Sensors	1 Year

\*\* Damage to combustible gas sensors by acute or chronic exposure to known sensor poisons such as volatile lead (aviation gasoline additive), hydride gases such as phosphine, and volatile silicone gases emitted from silicone caulks/sealants, silicone rubber molded products, laboratory glassware greases, spray lubricants, heat transfer fluids, waxes & polishing compounds (neat or spray aerosols), mold release agents for plastics injection molding operations, waterproofing formulations, vinyl & leather preservatives, and hand lotions which may contain ingredients listed as cyclomethicone, dimethicone and polymethicone (at the discretion of Sperian's Instrument Service department) void Sperian Instrumentation's Standard Warranty as it applies to the replacement of combustible gas sensors.