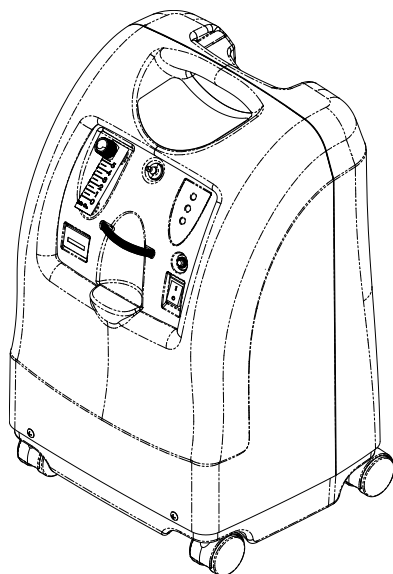




Invacare[®] Perfecto2[™] Oxygen Concentrator

IRC5PO2AW, IRC5PO2VAW

en **HomeFill[®] Oxygen System Compatible**
Service Manual

DEALER: Keep this manual.
The procedures in this manual **MUST** be performed by a qualified technician.



Yes, you can.

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I General

I.1 Symbols

Signal words are used in this manual and apply to hazards or unsafe practices which could result in personal injury or property damage. See the information below for definitions of the signal words.



DANGER!

– Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING!

– Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION!

– Caution indicates a potentially hazardous situation which, if not avoided, may result in property damage or minor injury or both.



Refer to the following table for the meaning of symbols marked on the equipment and/or packaging:

 Gives useful tips, recommendations and information for efficient, trouble-free use.

Symbols in Documentation



General Warning Sign

 The background color inside the triangle is yellow on product labels.



Read manual

 The color of the symbol background is blue on product labels.



No Smoking

 The color of the circle with diagonal bar is red on product labels.



No Open Flame

 The color of the circle with diagonal bar is red on product labels.



Class II, Double Insulated

Protected against solid foreign objects of 12.5 mm diameter and greater.

Protected against vertically falling water drops.

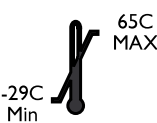
IP21



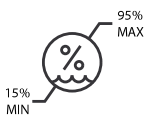
Indoor Use ONLY



Keep Dry



Transport and Storage Temperature



Transport and Storage Humidity



Alternating Current



Type BF equipment



Recycle



DO NOT dispose of in household waste



Electrical Hazard



Manufacturer



EC Representative



This product complies with Directive 93/42/EEC concerning medical devices.

The launch date of this product is stated in the CE declaration of conformity.

For more details about CE marks, refer to 10.1 Specifications, page 54.

Symbols on Product



Unit running



Unit not running

O₂ Indicators

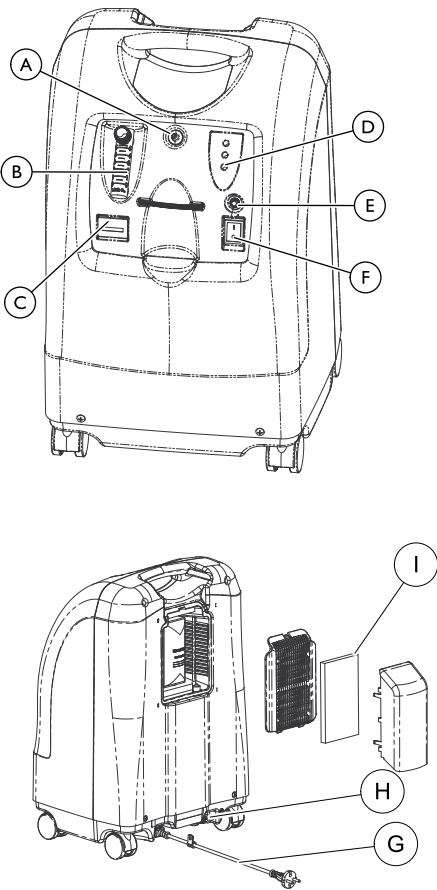
Symbol	O ₂ Purity	Indicator Lights (LED)
O ₂	SYSTEM OKAY O ₂ over 85%	GREEN Indicator Light
	O ₂ between 73% to 85%	YELLOW Indicator Light A. YELLOW Solid B. YELLOW Flashing Sensor Failure Call a qualified technician
	SYSTEM FAILURE O ₂ Below 73%	RED Indicator Light Continuous Audible Alarm Sieve - GARD™ Compressor Shutdown

I.2 Limited Warranty—Europe and Australia

Terms and conditions of the warranty are part of the general terms and conditions particular to the individual countries in which this product is sold.

Contact information for your local Invacare office is located inside the back cover of this manual.

I.3 Component Identification

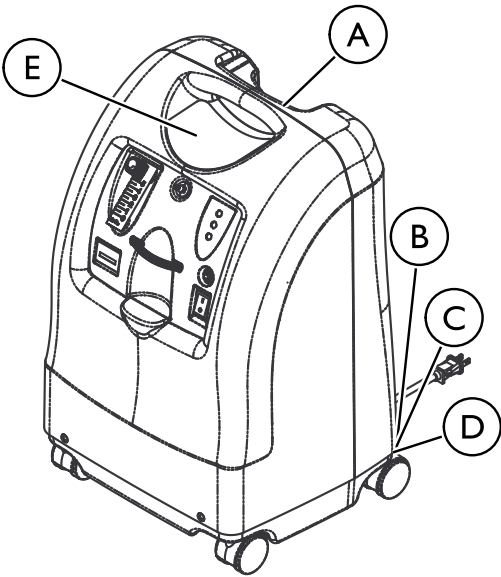


This outlet fitting is to be used only for filling oxygen cylinders with the HomeFill home oxygen compressor. The outlet fitting does not affect concentrator performance. Refer to the HomeFill owner's manual, part number 1145804, (Northern, 1145805, Southern or 1145806, Scandinavian for connection and operating instructions. When not in use, the plug provided with the concentrator should be inserted into the outlet fitting. For more information about the HomeFill, contact your Invacare dealer.

A	Oxygen Outlet
B	Flowmeter
C	Elapsed Time Meter
D	Oxygen Purity Indicator Lights/Fault and Power Indicator Lights
E	Circuit Breaker
F	Power Switch
G	Power Cord
H	Outlet Fitting
I	Cabinet Filter
Not shown	PreciseRX™ Pediatric Humidifier/Flowmeter Accessory — IRCPF16AW
Not shown	HomeFill home oxygen compressor — IOH200AW

2 Safety

2.1 Label Locations



Ⓐ	Serial number label is located on the resonator intake assembly.
Ⓑ	Specification Label is located on the back of the concentrator at the base.
Ⓒ	EU Representative label is located on the base.
Ⓓ	Phthalate label is located on the base.
Ⓔ	Perfecto₂™ SEE USER MANUAL OR CONTACT YOUR HOME EQUIPMENT PROVIDER FOR SAFE OPERATING INSTRUCTIONS, ALARMS, AUDIBLE ALERTS AND USE OF ACCESSORIES. ⚠ DANGER RISK OF FIRE - NO SMOKING, OPEN FLAME OR IGNITION SOURCES Keep ALL sources of ignition out of the room in which this product is located and away from areas where oxygen is being delivered. Textiles, oil and other combustibles are easily ignited and burn with great intensity in oxygen enriched air. ⚠ DANGER RISK OF ELECTRIC SHOCK DO NOT remove cover. Refer servicing to qualified service personnel. HomeFill® Compatible
	Perfecto₂™ V SEE USER MANUAL OR CONTACT YOUR HOME EQUIPMENT PROVIDER FOR SAFE OPERATING INSTRUCTIONS, ALARMS, AUDIBLE ALERTS AND USE OF ACCESSORIES. ⚠ DANGER RISK OF FIRE - NO SMOKING, OPEN FLAME OR IGNITION SOURCES Keep ALL sources of ignition out of the room in which this product is located and away from areas where oxygen is being delivered. Textiles, oil and other combustibles are easily ignited and burn with great intensity in oxygen enriched air. ⚠ DANGER RISK OF ELECTRIC SHOCK DO NOT remove cover. Refer servicing to qualified service personnel. HomeFill® Compatible

2.2 General Guidelines



DANGER!
Risk Of Death, Injury, Or Damage

Improper use of the product may cause death, injury or damage. This section contains important information for the safe operation and use of this product.

- DO NOT use this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as user manuals, service manuals or instruction sheets supplied with this product or optional equipment.
- If you are unable to understand the warnings, cautions or instructions, contact a healthcare professional, dealer or technical personnel before attempting to use this equipment.
- Check ALL external components and carton for damage. In case of damage, or if the product is not working correctly, contact a technician or Invacare for repair.
- THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.



DANGER!
Risk Of Death, Injury, Or Damage From Fire

Textiles, oil or petroleum substances, grease, greasy substances and other combustibles are easily ignited and burn with great intensity in oxygen enriched air and when in contact with oxygen under pressure. To avoid fire, death, injury or damage:

- DO NOT SMOKE while using this device.
- DO NOT use near OPEN FLAME or IGNITION SOURCES.
- DO NOT use any lubricants on concentrator unless recommended by Invacare.
- NO SMOKING signs should be prominently displayed.
- Avoid creation of any spark near oxygen equipment. This includes sparks from static electricity created by any type of friction.
- Keep all matches, lighted cigarettes, electronic cigarettes or other sources of ignition out of the room in which this concentrator is located and away from where oxygen is being delivered.
- Keep the oxygen tubing, cord, and concentrator out from under such items as blankets, bed coverings, chair cushions, clothing, and away from heated or hot surfaces including space heaters, stoves, and similar electrical appliances.



DANGER!
Risk of Death, Injury, from Electric Shock

To reduce the risk of burns, electrocution, death or injury to persons:

- DO NOT disassemble. Refer servicing to qualified service personnel. There are no user serviceable parts.
- Avoid using while bathing. If continuous usage is required by the physician's prescription, the concentrator must be located in another room at least 7ft (2.1m) from the bath.
- DO NOT come in contact with the concentrator while wet.
- DO NOT place or store concentrator where it can drop into water or other liquid.
- DO NOT reach for concentrator that has fallen into water. Unplug IMMEDIATELY.
- DO NOT use frayed or damaged AC power cords.

**DANGER!****Risk of Death, Injury, from Electric Shock**

To reduce the risk of burns, electrocution, death or injury to persons:

- DO NOT disassemble. Refer servicing to qualified service personnel. There are no user serviceable parts.
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- DO NOT come in contact with the concentrator while wet.
- DO NOT place or store concentrator where it can drop into water or other liquid.
- DO NOT reach for concentrator that has fallen into water. Unplug IMMEDIATELY.
- DO NOT use frayed or damaged AC power cords.

**WARNING!****Risk Of Injury Or Damage**

- Invacare products are specifically designed and manufactured for use in conjunction with Invacare accessories. Accessories designed by other manufacturers have not been tested by Invacare and are not recommended for use with Invacare products.
- There are many different types of humidifiers, oxygen tubing, cannulas and masks that can be used with this device. You should contact your local home care supplier for recommendations on which of these devices will be best for you. They should also give you advice on the proper usage, maintenance, and cleaning.

**DANGER!****Risk of Injury or Death**

To avoid choking or ingestion of chemicals from airway contamination:

- DO NOT use the concentrator in the presence of pollutants, smoke, fumes, flammable anesthetics, cleaning agents, or chemical vapors.

**WARNING!****Risk of Injury or Death**

To prevent injury or death from product misuse:

- Closely supervise when this concentrator is used by or near children or impaired individuals.
- Monitor patients using this device who are unable to hear or see alarms or communicate discomfort.

**WARNING!****Risk of Injury or Death**

To avoid choking and/or strangulation from tubing entanglement:

- Keep children and pets away from nasal cannula and tubing.
- Close supervision is necessary when the nasal cannula is used by or near children and/or impaired persons.

**WARNING!****Risk of Injury or Death**

To reduce the risk of injury or death from illness:

- Replace the nasal cannula on a regular basis. Check with your equipment supplier or physician to determine how often the cannula should be replaced.
- DO NOT share cannulas between patients.

**WARNING!****Risk of Injury**

A change in altitude may affect total oxygen available to you. To prevent oxygen deprivation:

- Consult your physician before traveling to higher or lower altitudes to determine if your flow settings should be changed.

**WARNING!****Risk of Injury or Damage**

To prevent injury or damage from cord misuse:

- DO NOT move or relocate concentrator by pulling on the cord.
- DO NOT use extension cords with AC power cords provided.
- Properly store and position electrical cords and/or tubing to prevent a tripping hazard.

**WARNING!****Risk of Injury or Damage**

To prevent injury or damage from misuse:

- NEVER leave concentrator unattended when plugged in.
- Make sure concentrator is off when not in use.

**WARNING!****Risk of Injury or Damage**

Invacare oxygen concentrators are specifically designed to minimize routine preventive maintenance. To prevent injury or damage:

- Only professionals of the healthcare field or persons fully conversant with this process such as factory trained personnel should perform preventive maintenance or performance adjustments on the oxygen concentrator, except for tasks described in this manual.
- Users should contact your dealer or Invacare for service.

**CAUTION!****Risk of Damage**

To prevent damage from liquid ingress:

- If the concentrator is not working properly, if it has been dropped or damaged, or dropped into water, call equipment supplier/qualified technician for examination and repair.
- NEVER drop or insert any object or liquid into any opening.
- For indoor use ONLY.

**WARNING!****Perfecto₂ Parts Compatibility**

- The Platinum concentrator and the Perfecto₂ concentrator share many similar components. However, there are some components that are NOT cross compatible and they are specific to each model.
- Parts that can be used for Perfecto₂ repairs are listed in the Perfecto₂ parts catalog, form number 93_038. Please reference this catalog before replacing any parts. Use of incorrect parts could result in injury or property damage.



WARNING!

Risk of Injury

It is very important to select the prescribed level of oxygen flow. To void injury from oxygen deprivation:

- DO NOT increase or decrease the flow unless a change has been prescribed by your physician or therapist.
- ALWAYS confirm prescribed dose before administering to patient and monitor on a frequent basis.



CAUTION!

Risk of damage

Shorter periods of operation may reduce maximum product life. For optimum performance:

- The concentrator should be on and running for a minimum of 30 minutes at a time.

2.3 Radio Frequency Interference



WARNING!

Risk of Injury or Damage

To reduce the risk of injury or product damage from interference with wireless equipment:

- Keep concentrator at least 9.8 ft (3.0 m) away from wireless communication equipment such as wireless home network devices, mobile phones, cordless phones and base stations, walkie-talkies, etc.

This equipment has been tested and found to comply with EMC limits specified by IEC/EN 60601-1-2. These limits are designed to provide a reasonable protection against electromagnetic interference in a typical medical installation.

Other devices may experience interference from even the low levels of electromagnetic emissions permitted by the above standards. To determine if the emissions from the concentrator are causing the interference, turn the concentrator Off. If the interference with the other device(s) stops, then the concentrator is causing the interference. In such rare cases, interference may be reduced or corrected by one of the following measures:

- Reposition, relocate, or increase the separation between the equipment.
- Connect the equipment into an outlet on a circuit different from that to which the other device(s) is connected.

3 Installation

3.1 Verification of Battery Free Power Loss Alarm

Check the concentrator for proper operating conditions.

1. If the unit has been in below-freezing temperatures, allow it to warm up to room temperature before operating.
2. The concentrator may need to be turned on for four to five seconds to charge the Battery Free Power Loss Alarm. Connect power cord to outlet and turn the concentrator on. Turn flow control knob counterclockwise and flow will begin IMMEDIATELY. Set flow rate to five L/min. Let the unit run for 30 minutes, then turn unit off.
3. Unplug the power cord and press On/Off (I/O) switch to the On (I) position. An intermittent audible alarm will sound. This confirms proper operation of the Battery Free Power Loss Alarm. Turn On/Off switch Off (O).
4. Connect power cord to outlet and turn on concentrator. Unit will beep on start-up.
5. Check the oxygen concentration per specifications after 30-40 minutes running time.

3.2 Sequence of Operation

Turning On (I) the power switch applies 230 VAC to the compressor motor, hour meter, transformer, cooling fan and the printed circuit (P. C.) board.

Room air enters the compressor via the cabinet filter and the compressor inlet filter. The air is compressed by the Wob-L pistons in the compressor to a pressure of 144.79 kPa (21 p.s.i.).

As increased pressure creates increased temperature, a heat exchanger is used to lower the temperature before the air enters the 4-way valve. It is then channeled to a sieve bed containing the adsorption material. Restriction downstream of the sieve bed causes pressure to build up inside the sieve bed which is necessary for the adsorption process. A small amount of relatively pure oxygen enters the top of the second bed through a restrictive leak in the pressure equalization (P. E.) valve with the balance entering a storage tank. The nitrogen removed is exhausted back from the bed through the 4-way valve into room air. A muffler is located at the exhaust end of the valve to muffle the sound of the exhaust as it exits the concentrator.

The oxygen not being used to exhaust is channeled into the storage tank. The pressurized oxygen is regulated down to 5 p.s.i. (34.4 kPa), enters an accurate flow-measuring device, flows through the outlet HEPA filter and check valve, then out to the patient.

The electrical activation of the 4-way Valve is accomplished every 8 to 15 seconds by the pressure sensor and P. C. Board electronics when the pressure reaches a set point of 144.79 kPa (21 p.s.i.) output flows 4 L/min and above or 16 p.s.i. (110.32 kPa) output flows 3 L/min and below. The time between cycles is dependent on altitude, flow rate and internal environmental factors.

A P. E. valve opens just prior to the shift of the 4-way valve. This allows highly concentrated oxygen to enter the just exhausted bed from the top. This additional pressure allows the bed to start its cycle at a higher pressure. The P. E. valve will close just after the shift of the 4-way valve.

If main power is lost, the Battery Free Power Loss Alarm will sound a short "BEEP", with a long pause after. All units are equipped with a diagnostic alarm system that signals if the pneumatic pressure or electrical systems malfunction. The troubleshooting guide in this manual explains the alarm system signals and reasons, in detail. Refer to Troubleshooting.

3.3 SensO₂ Oxygen Sensor Technology - Ceramic Zirconia Sensor

3.3.1 Technical Description

The oxygen being produced by the concentrator flows out of the product tank and into the flowmeter. A small flow of oxygen produced by the unit is sent through a precision orifice to the oxygen sensor mounted on the printed circuit board.

As the oxygen enters the sensor, it passes through a screen and contacts the sensing disk.

Electric current flowing through a metal film resistor heats the disk in excess of 300° C.

Oxygen molecules contact the electrode of the disk and pick-up extra electrons to become oxygen ions. These oxygen ions are attracted to the electrode on the bottom of the zirconia sensing disk. Because of the crystal structure of the zirconia, only oxygen ions can pass through. When the oxygen ions reach the bottom electrode, the extra electrons are released from the oxygen ions and oxygen molecules return to the air. The number of electrons is directly related to the oxygen concentration. The electrons travel to the P.C. board where they are counted and the oxygen concentration reading is calculated.

A microprocessor on the P.C. board contains software that interprets the signal being received from the sensor. It compares the signal to clinically acceptable limits. Signals outside of the clinically acceptable limits generate responses in the form of lights, audible indicators, and/or system shut-down.

3.3.2 Operating Sequence

Once the power switch has been turned On (I), the SensO₂ circuit will wait five minutes for the concentrator to begin producing clinically acceptable oxygen and the oxygen sensor to stabilize. The GREEN light will illuminate (indicating normal system operation) while the oxygen sensor is warming up.

After five minutes, if the oxygen purity exceeds 85% ± 2%, the GREEN light will continue to illuminate.

If the oxygen level is not above 85% ± 2% after the first five minutes, the system will continue to monitor the O₂ and wait for a maximum of 30 minutes from start-up to reach 85% ± 2% before activating an alarm. Environmental factors such as low voltage, high altitude, or age of the machine will affect the time required to reach 85% ± 2%.

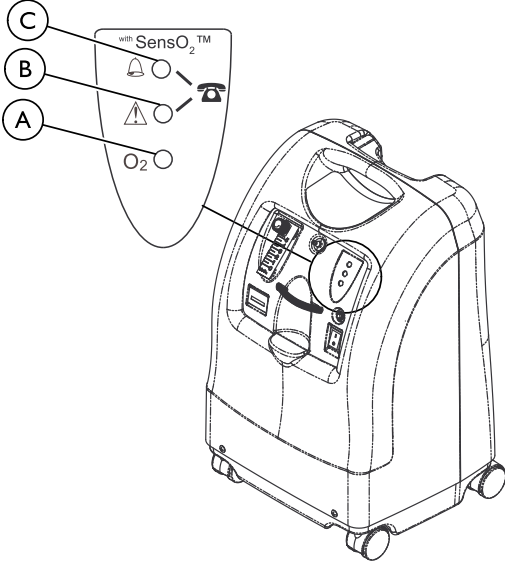
If the oxygen level is not above 85% ± 2% within the first 30 minutes, the oxygen concentration alarm sequence will activate and the unit will shut down.

When oxygen concentration is above 85% ± 2%, the sensor measures oxygen purity every 10 minutes. If a reading falls below 85% ± 2%, a YELLOW light will illuminate. If the oxygen purity falls below 73% ± 3% the RED light/Alarm/Shut-Down mode will activate.

3.4 SensO₂ Alarm Indicators



DANGER!
Risk of Death, Injury or Damage
To prevent electrical shock
– ALWAYS disconnect concentrator from electrical outlet before servicing.



	YELLOW light ⑥	Call supplier IMMEDIATELY. You may continue to use the concentrator unless instructed otherwise by your supplier. Be certain that backup oxygen is nearby.
O ₂	GREEN light ①	(O ₂) - Normal Operation.
	RED light ③	Total unit shutdown. Switch IMMEDIATELY to backup oxygen supply. Call supplier IMMEDIATELY.
	GREEN light ① with YELLOW light ⑥ flashing	Call supplier IMMEDIATELY. Oxygen sensor malfunctioning; you may continue to use the concentrator. Indicators - If your unit does not feature the O ₂ Sensor.

Operation

The concentrator is equipped with an oxygen purity indicator. This feature monitors the purity level of the oxygen generated by the concentrator. If purity falls below alarm thresholds, indicator lights on the control panel will illuminate.

 Concentrator may be used during the initial start warm-up time (approximately 30 minutes) while waiting for the O₂ purity to reach maximum.

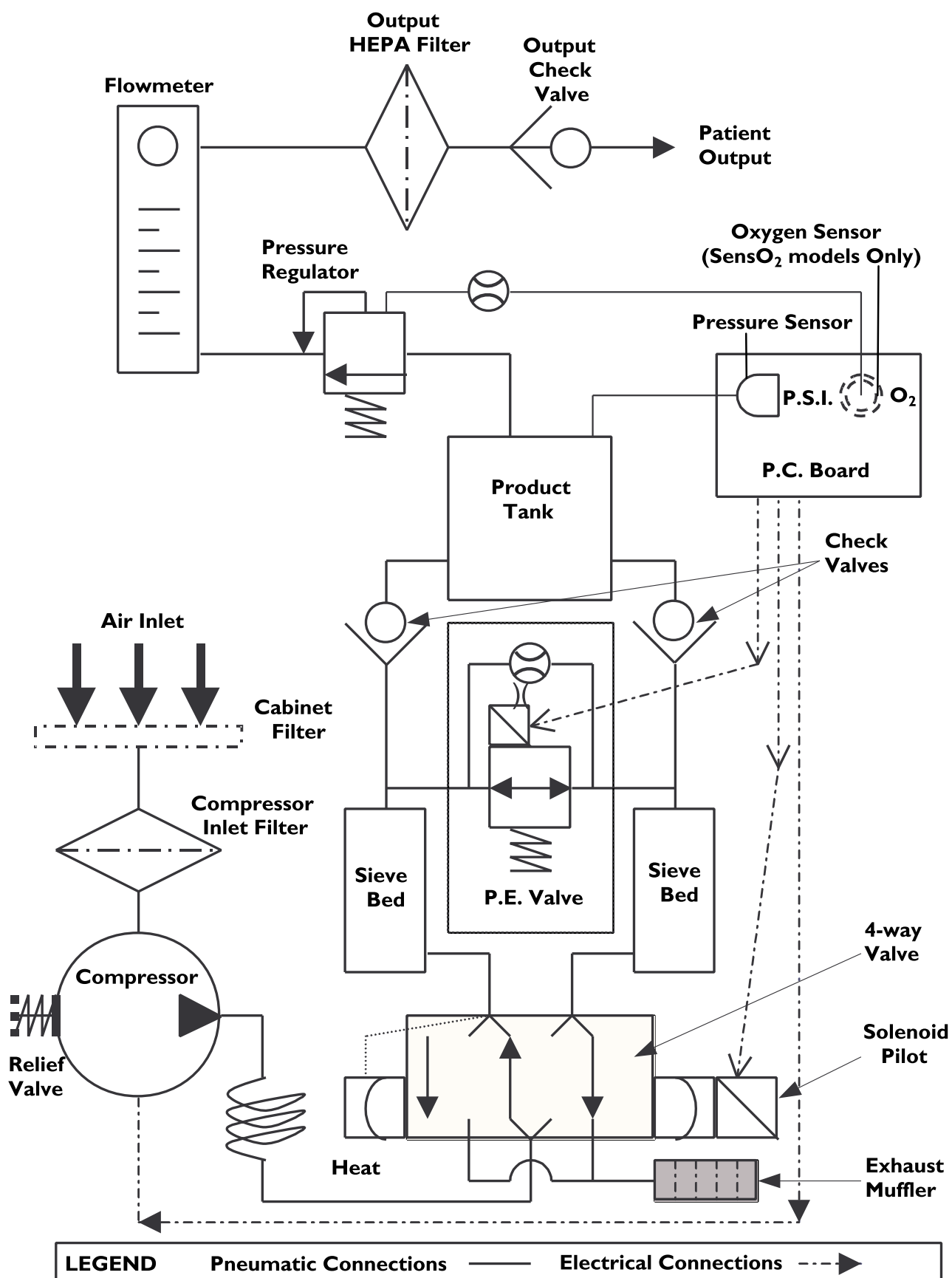
When the unit is turned on, the GREEN light will come on (SYSTEM OK/O₂ greater than 85%). After five minutes, the oxygen sensor will be operating normally and will control the indicator lights depending on oxygen concentration values. The explanation of the indicator light functions are as follows:

Indicator Lights

 Indicator lights are visible only when lit.

4 Pneumatic Diagram

4.1 Pneumatic Diagram



5 Maintenance

5.1 Cleaning the Cabinet Filter


DANGER!

– To prevent electrical shock, ALWAYS disconnect concentrator from electrical outlet before servicing.



At a minimum, preventive maintenance MUST be performed according to the maintenance record guidelines. In places with high dust or soot levels, maintenance may need to be performed more often.

Refer to recycling information following local governing ordinances and recycling plans regarding disposal of the concentrator or components.

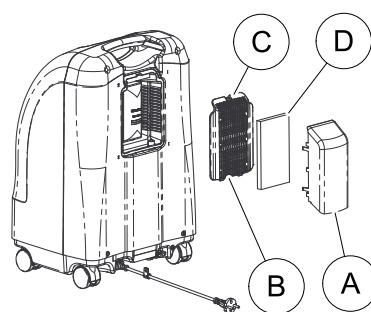
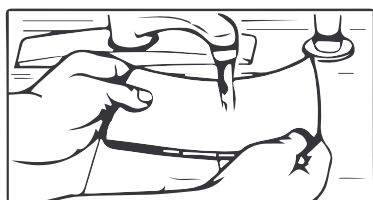

CAUTION!
Risk of Damage

To avoid damage to the internal components of the unit:

– DO NOT operate the concentrator without the filter installed or with a dirty filter.



There is one cabinet filter located on the back of the cabinet.



1. Remove the air scoop (A) from back of unit.
2. Remove the filter access panel (B) by pressing down on center tab (C) and pulling panel out.
3. Remove cabinet filter (D) from filter access panel and clean as needed.



Environmental conditions that may require more frequent inspection and cleaning of the filters include but are not limited to: high dust, air pollutants, etc.

4. Clean the cabinet filter with a vacuum cleaner or wash with a mild liquid dish detergent and water, rinse thoroughly.
5. Thoroughly dry the filter and inspect from fraying, crumbling, tears and holes. Replace filter if any damage is found.
6. Reinstall cabinet filter onto filter access panel
7. Reinstall filter access panel into unit.
8. Reinstall air scoop onto back of unit.

5.2 Checking the Outlet HEPA Filter

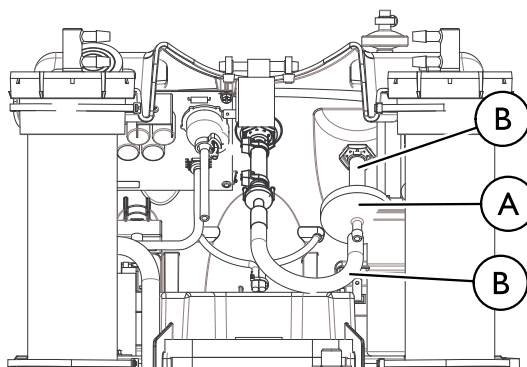


The outlet HEPA filter can be checked during preventive maintenance or between patients by performing the following procedure.

1. Turn the concentrator On (I) and adjust the flowmeter to the maximum flow rate of the unit.
2. Observe the flowmeter's flow indicator while connecting a 15.2 m (50 ft) cannula tube to the outlet barb of the concentrator (not shown).
3. If the flow indicator fluctuates, the outlet HEPA filter may need replacement. Refer to 9.1 Troubleshooting, page 48

5.3 Replacing the Outlet HEPA Filter

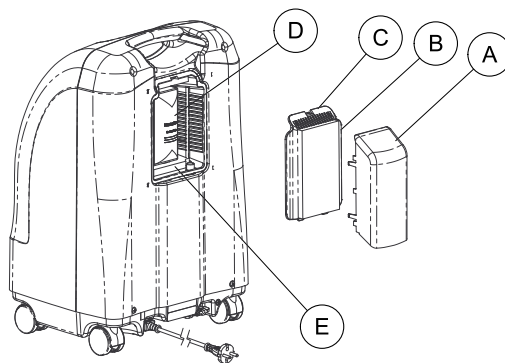
 Perform this procedure during preventive maintenance or between patients depending on the outlet HEPA filter check results.



1. Turn power Off (O) and unplug the unit.
2. Remove the cabinet. Refer to 6.I Removing Cabinet, page 17.
3. For easier access to the outlet HEPA filter , remove the compressor inlet HEPA filter by grasping the compressor inlet filter, pull outward and up until filter is dislodged from rubber base.
4. With a flat head screwdriver, remove the tubing  from both sides of the existing outlet HEPA filter by prying the tubing away from the outlet HEPA filter.
5. Discard existing outlet HEPA filter.
6. Connect tubing to both sides of the new outlet HEPA filter as shown below.
7. Run unit and inspect for leaks. Refer to 8.I Leak Test, page 41.
8. If no leaks detected, turn power Off (O) and unplug the unit.
9. Reinstall the cabinet. Refer to 6.I Removing Cabinet, page 17 and reverse all steps.

5.4 Replacing the Compressor Inlet HEPA Filter

 Perform this procedure during preventive maintenance or between patients depending upon the environment the concentrator is used in.

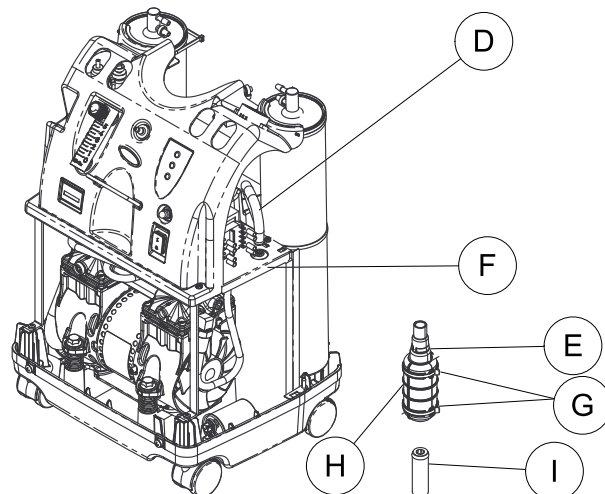
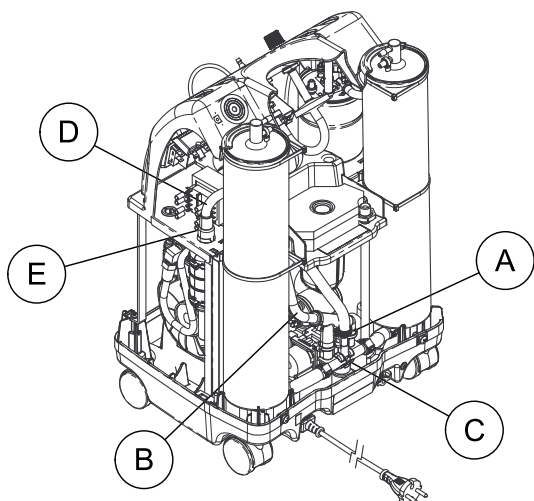


1. Turn power Off (O) and unplug the unit.
2. Remove the air scoop .
3. Remove the filter access panel  by pressing down on center tab  and pulling panel out.
4. Grasp the compressor inlet HEPA filter , pull outward and up until filter is dislodged from rubber base .
5. Discard the existing compressor inlet HEPA filter.
6. Install new compressor inlet filter by inserting the filter into the rubber base.
7. Push the filter down until the rubber base touches the edge of the filter.
8. Reinstall the filter access panel.
9. Reinstall the air scoop.

5.5 Replacing the Muffler Assembly

 Perform this procedure during preventive maintenance or between patients depending upon the environment the concentrator is used in.

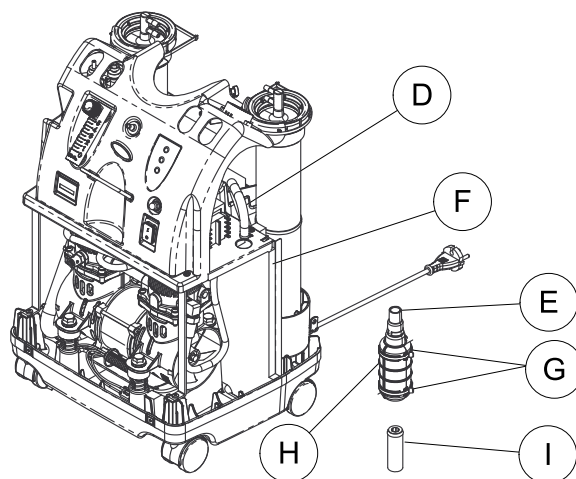
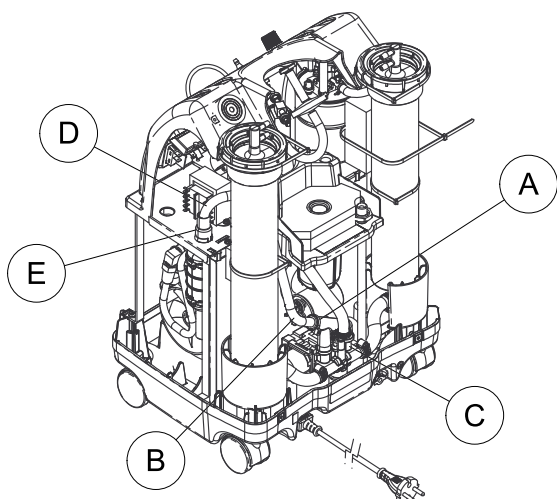
IRC5PO2AW



 Filter, capacitor, and PE valve not shown.

 PE valve not shown.

IRC5PO2VAW

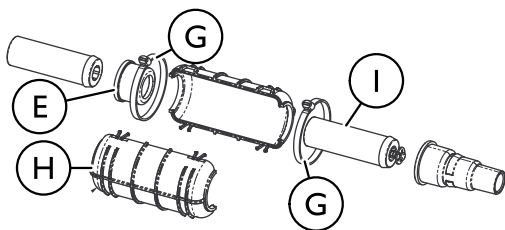


 Filter, capacitor, and PE valve not shown.

 PE valve not shown.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Cut tie wrap **A** that secures the bottom of the manifold exhaust tube **B** to the "F" tube **C**.
4. Remove the bottom of the manifold exhaust tube from the "F" tube.
5. Disconnect and remove the top of the manifold exhaust tube **D** from the grommet **E**.
6. Push the muffler assembly down through the opening in the sound box **F**.
7. Cut the two tie wraps **G** around the muffler assembly.
8. Separate the muffler assembly.

9. Inspect the components to ensure they are clear.



10. Do one of the following:

- Replace exhaust canister (H) and throttling muffler (I) if plugged or restricted.
- Install only new throttling muffler if exhaust canister is in good condition.

11. Install new/existing muffler assembly by reversing 3-8.

12. Run unit and inspect for leaks. Refer to 8.1 Leak Test, page 41.

13. If no leaks detected, turn power Off (O) and unplug the unit.

14. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

5.6 Cleaning the Heat Exchanger



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

- ALWAYS disconnect concentrator from electrical outlet before servicing.

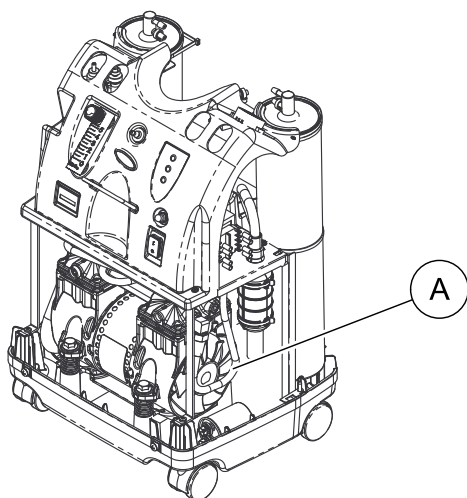


CAUTION!

Risk of Damage

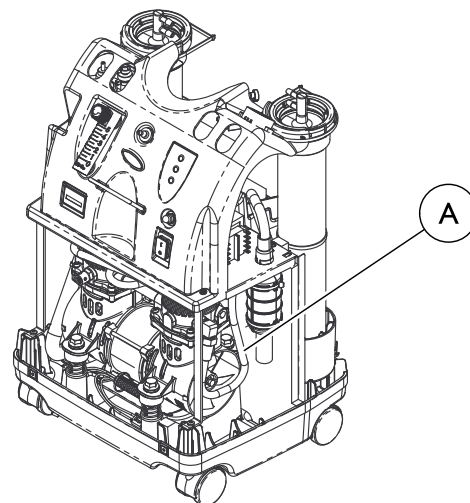
- Use care not to deform heat exchanger (A) when installing, removing or cleaning.

IRC5PO2AW



PE valve is not shown.

IRC5PO2VAW



PE valve is not shown.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove excess dirt from the heat exchanger (A) using compressed air or vacuum.
4. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

5.7 Preventive Maintenance Checklist

Model No:

Serial No:

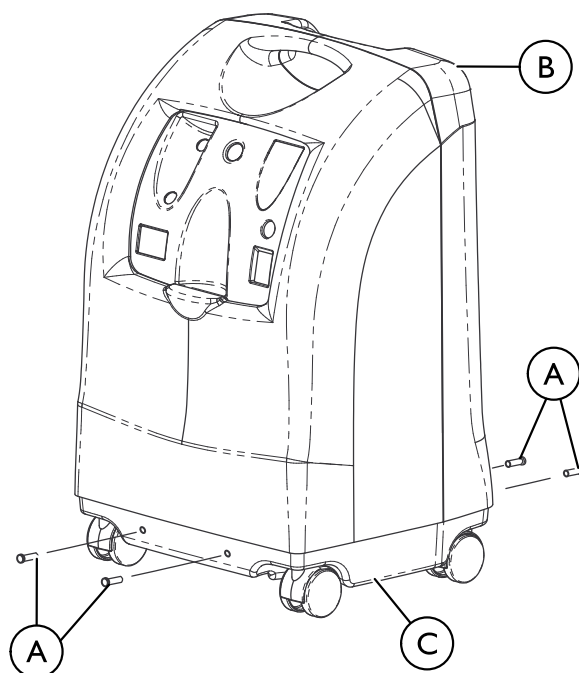
ON EACH INSPECTION							
Record Date of Service							
Record Elapsed Hours on Hour Meter							
Clean Cabinet Filter(s)							
Check Prescribed L/min. Flow Rate							
DURING PREVENTIVE MAINTENANCE SCHEDULE, OR BETWEEN PATIENTS							
UNITS WITH SensO₂ — EVERY 26,280 HOURS							
Check Oxygen Concentration*							
Clean/Replace Cabinet Filter							
Check/Replace Outlet HEPA Filter*							
Check/Replace Compressor Inlet Filter*							
Check Power Loss Alarm							

 26,820 hours are equivalent to usage 24 hours per day, 7 days per week for 3 years.

*To be conducted by provider or qualified service technician. Refer to 8.6 Oxygen Sensor, page 44.

6 Service

6.1 Removing Cabinet

**DANGER!****Risk of Death, Injury, or Damage**

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.

1. Turn power Off (O) and unplug the unit.
2. Remove the four mounting screws (A) that secure cabinet assembly (B) to the base assembly (C).
3. Lift the cabinet straight up.



When required, vacuum inside of the cabinet and exposed foam insulation.

4. To re-install cabinet, reverse STEPS 2-3.

6.2 Replacing Compressor Assembly

6.2.1 Replacing Compressor Assembly Before September 2015


DANGER!
Risk of Death, Injury, or Damage

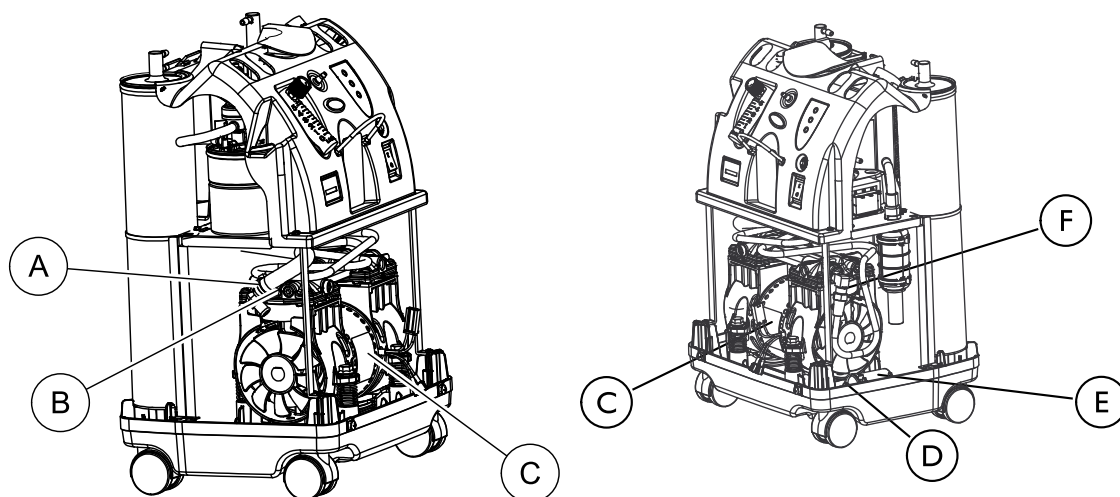
To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



Refer to recycling information following local governing ordinances and recycling plans regarding disposal of the concentrator or components.

IRC5PO2AW

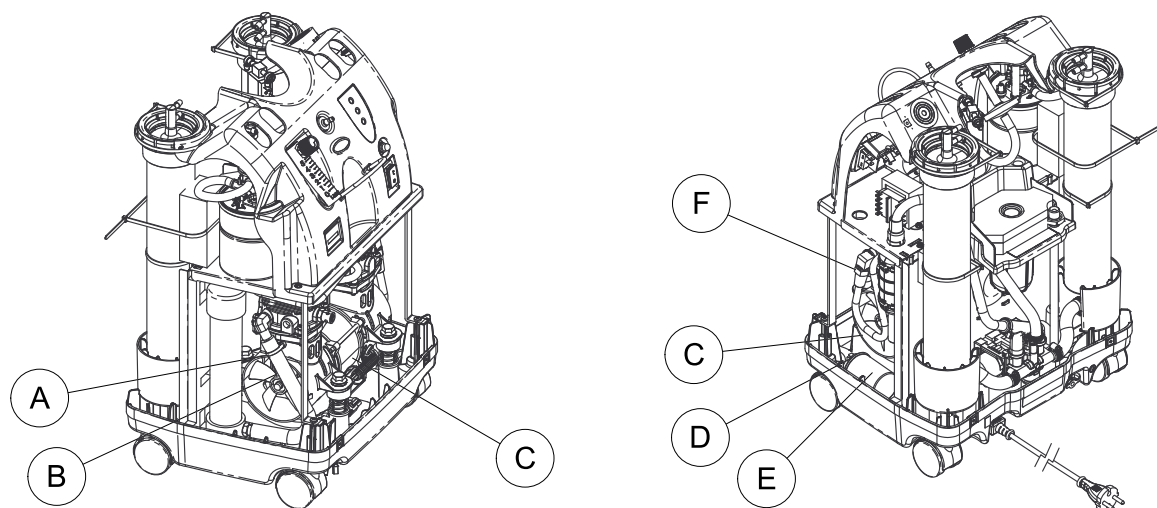


PE valve not shown.



PE valve not shown.

IRC5PO2VAW



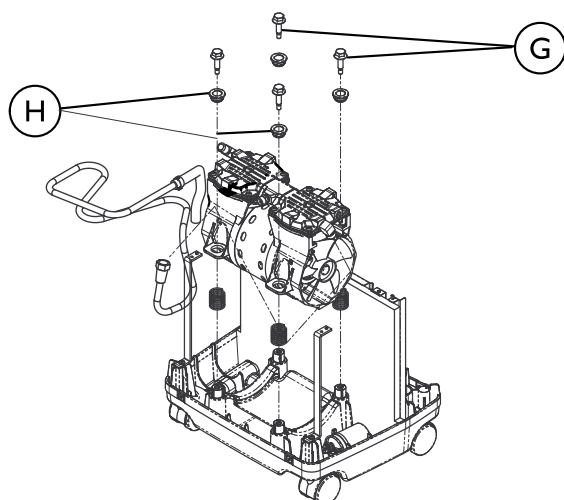
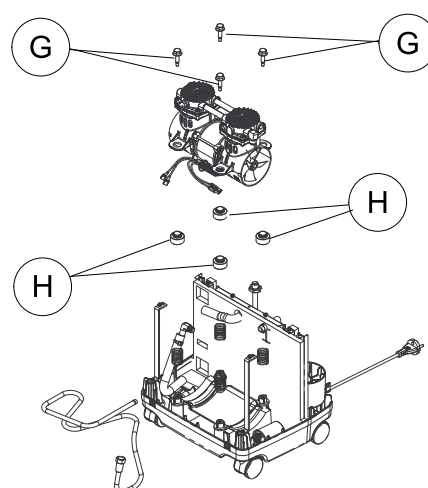
PE valve not shown.



Filter and PE valve not shown.

1. Turn power Off (O) and unplug the unit.
2. Remove the cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Cut the tie wrap (A) that secures the intake hose (B) to the compressor assembly (C).
4. Disconnect intake hose from compressor assembly.
5. Remove compressor wires from wire clamps or tie-wraps (not shown).
6. Disconnect compressor connector from the main harness connector (not shown).
7. Disconnect capacitor wires (D) from the top of the capacitor (E).

8. Disconnect brass nut ⑥ from compressor.

IRC5PO2AW**IRC5PO2VAW**

9. Remove the four mounting screws ⑥ and grommets ⑦ that secure the compressor to the base assembly. Leave springs on post in the base.
10. Tilt compressor assembly forward and lift out.
11. Reverse STEPS 3-10 to install new compressor assembly. Torque screws to 30 ± 5 in-lbs when assembling the four mounting screws in STEP 9.
12. Run unit and inspect for leaks. Refer to 8.I Leak Test, page 41.
13. If no leaks detected, turn power Off (O) and unplug the unit.
14. Reinstall the cabinet. Refer to 6.I Removing Cabinet, page 17 and reverse all steps.

6.2.2 Replacing Compressor Assembly After September 2015



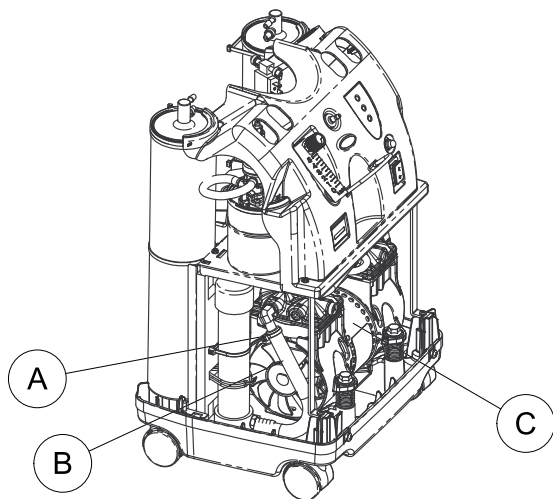
DANGER!

Risk of Death, Injury, or Damage

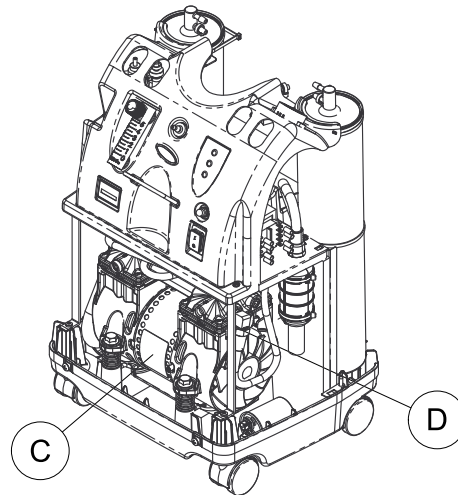
To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.

IRC5PO2AW

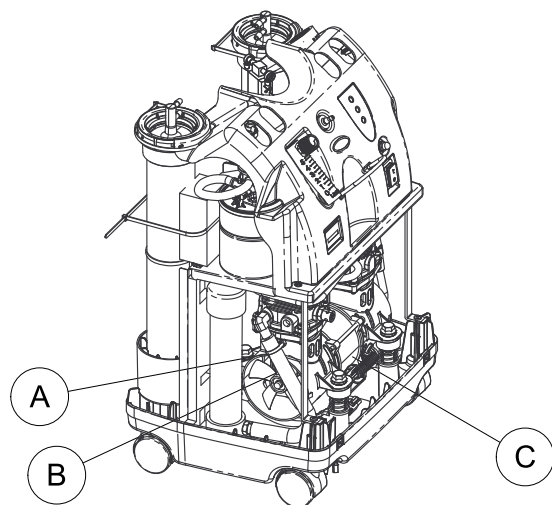


PE valve not shown.

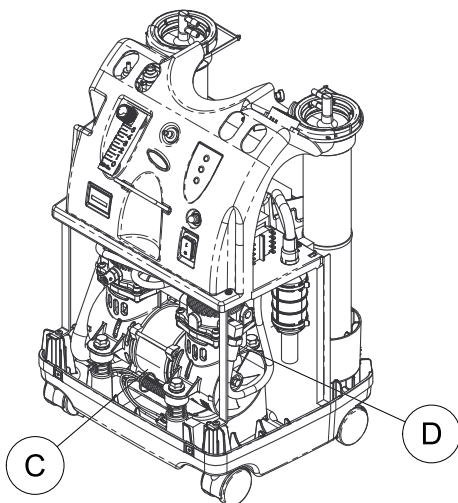


PE valve not shown.

IRC5PO2VAW



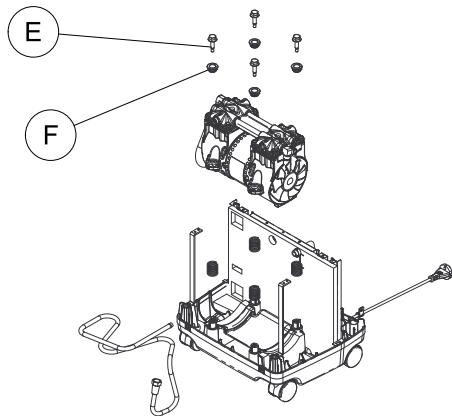
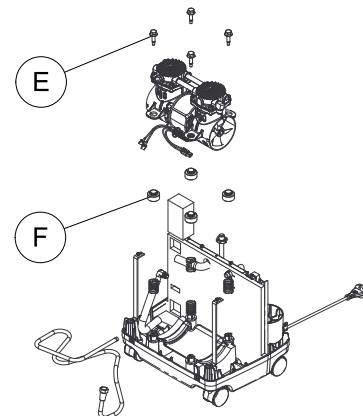
PE valve not shown.



PE valve not shown.

1. Turn power Off (O) and unplug the unit.
2. Remove the cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Cut the tie wrap (A) that secures the intake hose (B) to the compressor assembly (C).
4. Disconnect intake hose from compressor assembly.
5. Cut tie-wraps that secure compressor wires to gusset.
6. Disconnect the compressor wires (not shown) from the jumper wires (not shown).

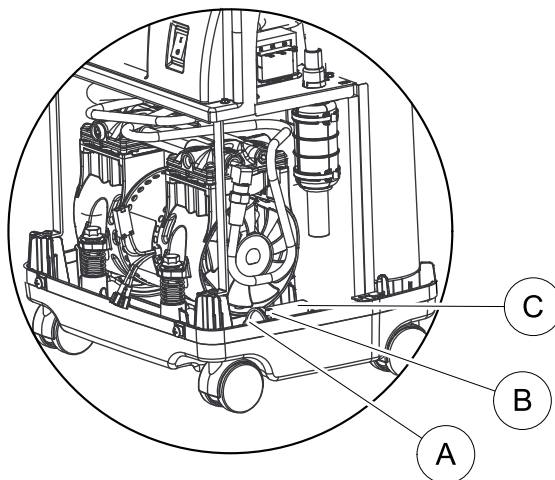
7. Disconnect brass nut ⑤ from compressor.

IRC5PO2AW**IRC5PO2VAW**

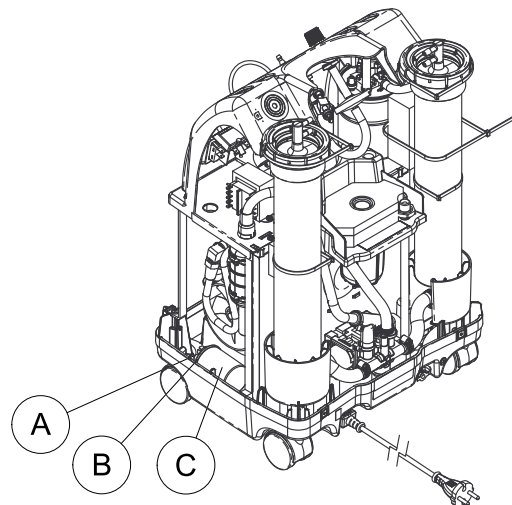
8. Remove the four mounting screws ⑤ and grommets ⑥ that secure the compressor to the base assembly. Leave springs on posts in the base.
9. Tilt compressor assembly forward and lift out.
10. Reverse steps 3-8 to install new compressor assembly. Torque screws to 30 +/- 5 in-lbs when assembling the four mounting screws in STEP 8.
11. Run unit and inspect for leaks. Refer to 8.1 Leak Test, page 41.
12. If no leaks detected, turn power Off (O) and unplug the unit.
13. Reinstall the cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.3 Replacing Capacitor

6.3.1 Replacing Capacitor Before September 2015

AW MODEL

 PE valve not shown.

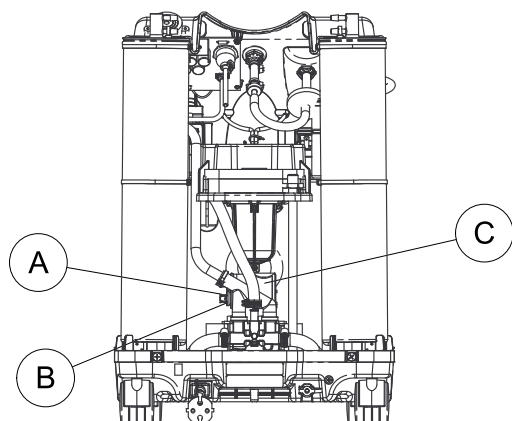
VAW MODEL

 Filter and PE valve not shown.

1. Turn power Off (O) and unplug the unit.
2. Remove the cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Using needlenose pliers, disconnect the spade connectors from the capacitor terminals ①.
4. Cut the tie wrap ② that secures the capacitor ③ to the base of the concentrator.
5. Remove the capacitor from the concentrator base.
6. Install new capacitor by reversing STEPS 3-5.
7. Run unit and inspect for leaks. Refer to 8.1 Leak Test, page 41.
8. If no leaks detected, turn power Off (O) and unplug the unit.
9. Reinstall the cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

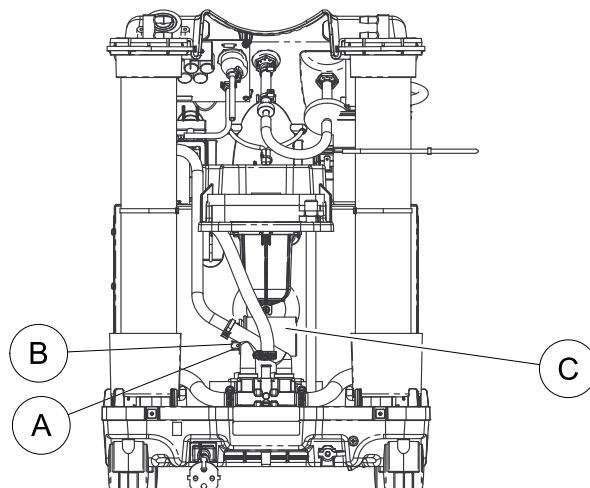
6.3.2 Replacing Capacitor After September 2015

IRC5PO2AW



Filter and PE valve not shown.

IRC5PO2VAW



Filter and PE valve not shown.

1. Turn power Off (O) and unplug the unit.
2. Remove the cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Using needlenose pliers, disconnect the spade connectors (A) from the capacitor terminals (B) .
4. Cut the tie wraps (not shown) that secures the capacitor (C) to the vertical sound box and remove the capacitor.
5. Attach non-skid pad (1072004) to capacitor.
6. Install the new capacitor by reversing STEPS 3 and 4.
7. Run unit and inspect for leaks. Refer to 8.1 Leak Test, page 41.
8. If no leaks detected, turn power Off (O) and unplug the unit.
9. Re-install the cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.4 Replacing P. E. Valve

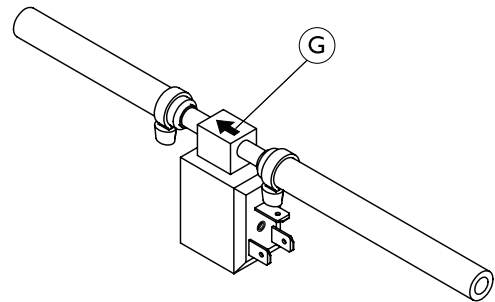
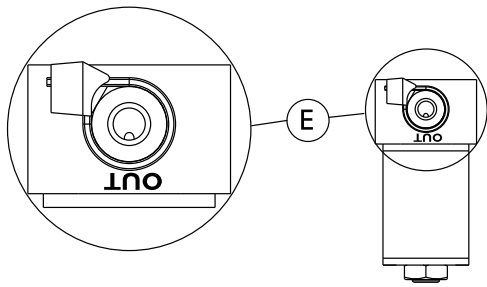
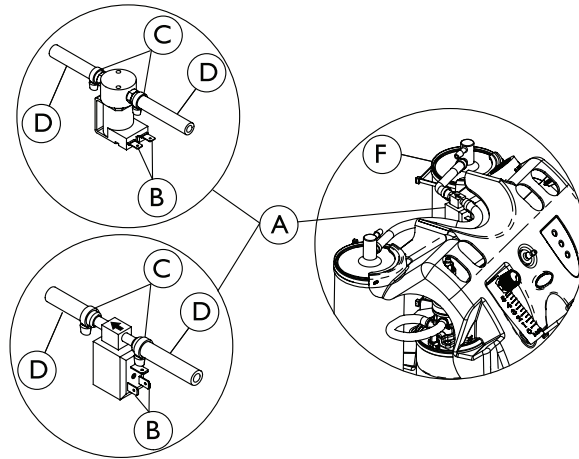


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



i Depending on the date of manufacture, the unit will be equipped with one of the two PE valve assemblies **A** shown above, circular shape (top) or rectangular shape (bottom).

Only the AW model is shown. The PE valve for the VAW model replaces in the same manner.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove the compressor inlet HEPA filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.
4. Remove spade connectors (not shown) from P. E. valve terminals **B**.
5. Remove tie-wraps **C** from P. E. valve tubing **D**.
6. Remove P. E. valve assembly from tubing.



CAUTION!

– If P. E. valve is not to be installed IMMEDIATELY, plug the sieve bed fittings to prevent sieve bed contamination.



To ensure proper orientation on the circular shape PE valve, the “OUT” port barb **E** should face to the left side sieve bed **F** when viewing from behind the unit.

To ensure proper orientation on the rectangular shape PE valve, the FLOW arrow **G** should face to the left side sieve bed **F** when viewing from behind the unit.

7. Install new P. E. Valve and P. E. valve assembly IMMEDIATELY, by reversing STEPS 4-6.



CAUTION!

– Ensure the restrictor is on the product tank side of the IRC5PO2VAW concentrator.

8. Reinstall the compressor inlet HEPA filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.



Autotuning of the concentrator is necessary. Refer to 7.1 Autotuning, page 40.

9. Run unit and inspect for leaks. Refer to 8.1 Leak Test, page 41.
10. If no leaks detected, turn power Off (O) and unplug the unit.
11. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.5 Replacing Sieve Beds



Refer to recycling information following local governing ordinances and recycling plans regarding disposal of the concentrator or components.

6.5.1 Replacing Sieve Beds (IRC5PO2AW)



DANGER!

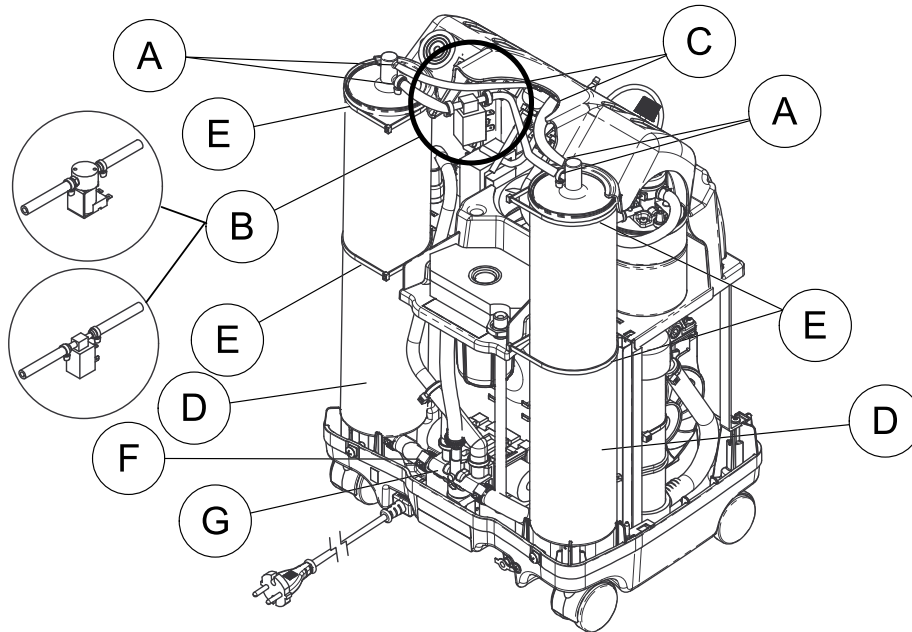
Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



Filter not shown.



ALWAYS replace sieve beds in pairs to ensure that both beds are in optimum condition.

There are two configurations of the PE valve assembly, a circular shape PE valve assembly (Item B) and a rectangular shape PE valve assembly (Item B). Only the circular shape PE valve assembly is shown in the unit.

Depending on date of manufacture, the circular shape PE valve assembly will either be located in the middle of the two sieve beds or shifted closer to the left sieve bed as shown.

The rectangular shape of the PE valve assembly will always be located closer to the left sieve bed.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove compressor inlet HEPA filter. Refer to 5.3 Replacing the Outlet HEPA Filter, page 13.
4. Remove tie wraps (A) and disconnect P. E valve assembly (B) and check valve assembly (C) from top of sieve beds (D).
5. Remove the four large tie-wraps (E) (two on each sieve bed).
6. Tilt sieve beds back and lift up. Rest sieve beds on rear of base.
7. Using a hose clamp tool, remove the clamp (F) and reinforced tubing (G) from bottom of both sieve beds and remove sieve beds.



CAUTION!

– DO NOT remove plastic caps from new sieve bed fittings until ready to install new beds. Severe sieve contamination can occur if uncapped beds are exposed to air.

8. Remove plastic caps from the top and bottom fittings of the new sieve beds.
9. Install new sieve beds reversing STEPS 3-8.



After replacing sieve beds, autotuning is necessary. Refer to 7.1 Autotuning, page 40.

10. Run unit and check for leaks. Refer to 8.1 Leak Test, page 41.
11. If no leaks detected, turn power Off (O) and unplug the unit.
12. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.5.2 Replacing Sieve Beds (IRC5PO2VAW)

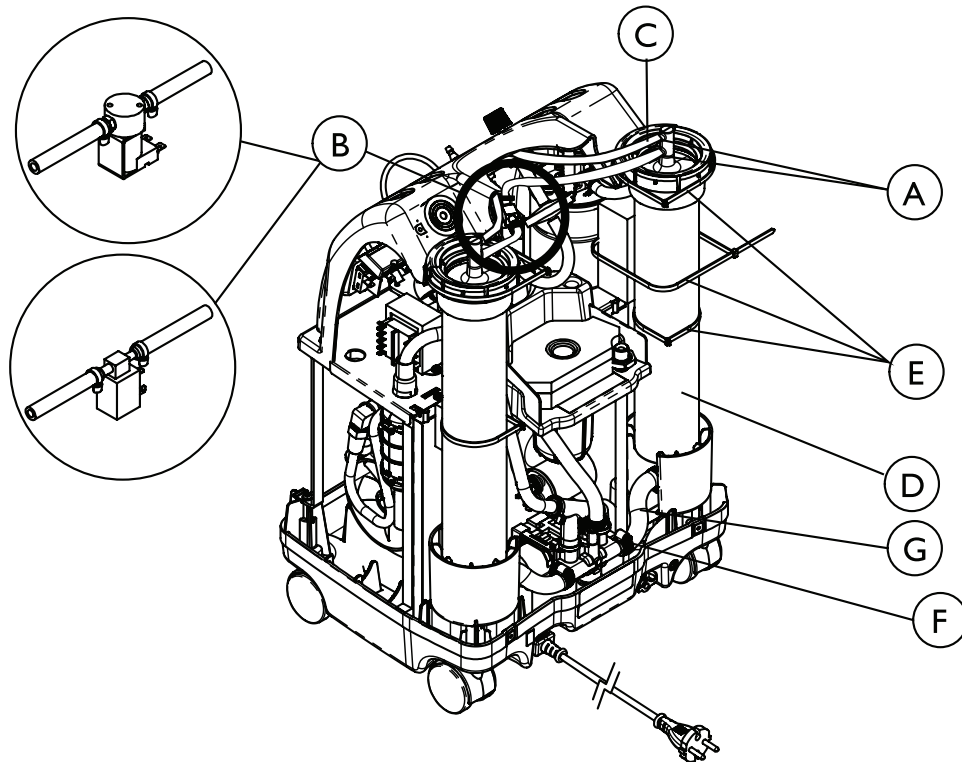


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



ALWAYS replace sieve beds in pairs to ensure that both beds are in optimum condition.

There are two configurations of the PE valve assembly, a circular shape PE valve assembly (Item B) and a rectangular shape PE valve assembly (Item B). Only the circular shape PE valve assembly is shown in the unit.

Depending on date of manufacture, the circular shape PE valve assembly will either be located in the middle of the two sieve beds or shifted closer to the left sieve bed as shown.

The rectangular shape of the PE valve assembly will always be located closer to the left sieve bed.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove compressor inlet HEPA filter. Refer to 5.3 Replacing the Outlet HEPA Filter, page 13.
4. Remove tie wraps (A) and disconnect PE valve assembly (B) and check valve assembly (C) from top of sieve beds (D).
5. Remove the five large tie wraps (E).
6. Remove sieve bed top adaptors, tilt sieve beds back and lift up. Rest sieve beds on sieve bed bottom adaptors.
7. Using a hose clamp tool, remove the clamp (F) and reinforced tubing (G) from bottom of both sieve beds and remove sieve beds.
8. Remove plastic caps from the top and bottom fittings of the new sieve beds.
9. Install new sieve beds reversing STEPS 3- 8.
10. Run unit and inspect for leaks. Refer to 8.1 Leak Test, page 41.
11. If no leaks detected, turn power Off (O) and unplug the unit.
12. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.6 Replacing Check Valves



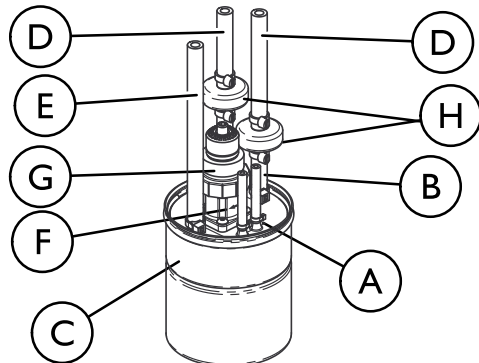
DANGER!

Risk of Death, Injury, or Damage

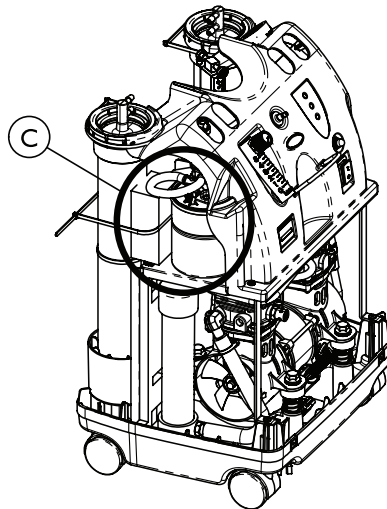
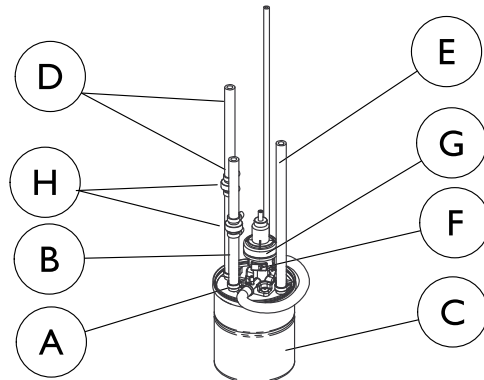
To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.

Product Tank with Regulator Manufactured Before 7/1/12



Product Tank with Regulator Manufactured After 7/1/12



Only the VAW model is shown for clarity. The product tank replaces in the same manner for the AW model.

PE Valve is not shown.

Replace both check valves when performing this procedure. The check valves are one way directional and can be checked by passing air through them. Air should flow in one direction only.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. It may be necessary to remove the compressor HEPA inlet filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.
4. Remove tie-wrap (A) securing the lower 1/4-inch tubing (B) to the product tank (C).
5. Remove the tie-wrap (not shown) securing the upper 1/4-inch tubing (D) to the barb on the sieve bed (not shown).



WARNING!

Risk of Injury or Damage

Low system pressures and eventual bed contamination will result if check valves are not properly installed.

- The check valves are one-way directional and MUST be installed correctly.
- The check valves must be installed with the black end of the valve facing the product tank.



CAUTION!

Risk of Damage

The regulator outlet tubing (E) is identified by the flow arrow (F) on the side of the regulator (G) which points to it.

- DO NOT put a check valve on the regulator outlet tubing.

6. Position the check valve assembly (H) so the black side of the valve is facing the underside of the check valve to ensure proper orientation.
7. Use two tie-wraps (not shown) to secure the 1/4-inch tubing to the product tank and to the barb on the sieve bed where previously removed.



Ensure check valves are not crossed. Left barb product tank check valve goes to left barb on sieve bed. Right barb product tank check valve to right barb on sieve bed.

8. Reinstall compressor inlet HEPA filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.
9. Run units and check for leaks. Refer to 8.1 Leak Test, page 41.
10. If no leaks detected, turn power Off (O) and unplug the unit.
11. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.7 Replacing Regulator



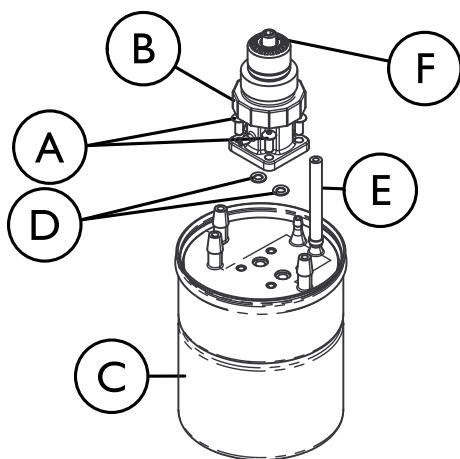
DANGER!

Risk of Death, Injury, or Damage

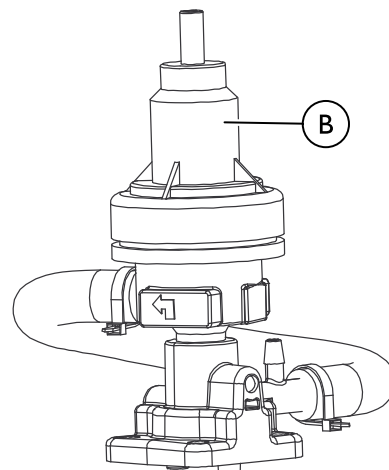
To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.

Product Tank with Regulator Manufactured Before 7/1/12



Product Tank with Regulator Manufactured After 7/1/12



1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove the 1/8-inch tubing that is connected to the regulator assembly.
4. Remove the four mounting screws (A) that secure regulator (B) to product tank cap (C).
5. Remove regulator from product tank lid ensuring that the O-rings (D) are removed.
6. Clean mounting surface of product tank cap.
7. Install the two O-rings for the NEW regulator onto the ports (underside) of the NEW regulator before installation.



WARNING!

Risk of Injury or Damage

Note flow arrow on regulator. This MUST face toward the regulator outlet tubing (E) or flow will be interrupted causing system shutdown.

– Ensure proper installation of regulator.

8. Install new regulator onto product tank cap.
9. Use the four mounting screws to secure the new regulator onto the product tank cap.
10. Torque the mounting screws to 0.56 N*M (5 ± 1 in-lbs).
11. Reinstall 1/8-inch tubing that is connected to the regulator assembly.
12. Adjust regulator pressure if necessary. Refer to 6.8 Adjusting Regulator, page 27.
13. Run units and check for leaks. Refer to 8.1 Leak Test, page 41.
14. If no leaks detected, turn power Off (O) and unplug the unit.
15. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.8 Adjusting Regulator



For this procedure, refer to images in 6.7 Replacing Regulator, page 27.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug unit in and turn power switch On (I).
4. Adjust the flow meter to approximately 5 L/min as specified by the flow meter.
5. Install pressure gauge onto oxygen outlet.



Use a 0 - 207 kPa (30 psi). pressure gauge.

Check O₂ pressure at oxygen outlet. It should read a steady 34.5 kPa ± 3.45 kPa (5 psi ± 0.5 psi) If pressure is not in specification, proceed to STEP 3. If pressure falls within specification, no adjustment is needed.

6. Using the access hole located on the control panel, locate the pressure adjustment screw (F) in center of pressure regulator top (B).

7. Perform one of the following:
 - a. Regulators before 07/01/12 (Sensored) or 09/01/12 (Non-Sensored) - Insert a 5/32- inch Allen wrench into the pressure adjustment screw.
 - b. Regulators after 06/30/12 (Sensored) or 08/31/12 (Non-Sensored) - Insert a 3/32 (2.5 mm) Allen wrench into the pressure adjustment screw.
8. While reading pressure gauge, do one of the following:
 - Turn pressure adjustment screw clockwise to increase output pressure; or
 - Turn pressure adjustment screw counterclockwise to decrease output pressure.
9. Adjust until pressure reads a steady 34.5 kPa $\pm$ 3.45 kPa (5 psi $\pm$ 0.5 psi).
10. Allow the concentrator to run for ten minutes.
11. Retest the pressure by performing STEPS 6-9, to ensure proper operation.
12. Once required pressure is achieved, reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.
13. Refer to 9.1 Troubleshooting, page 48 if you are unable to adjust or maintain 34.5 kPa $\pm$ 3.45 kPa (5 psi $\pm$ 0.5 psi).

6.9 Replacing Heat Exchanger Assembly

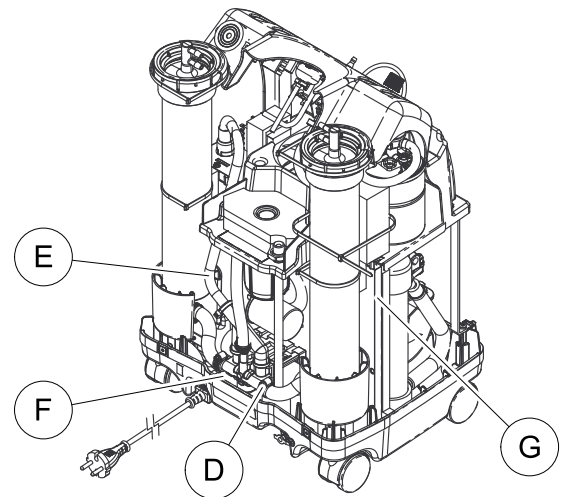
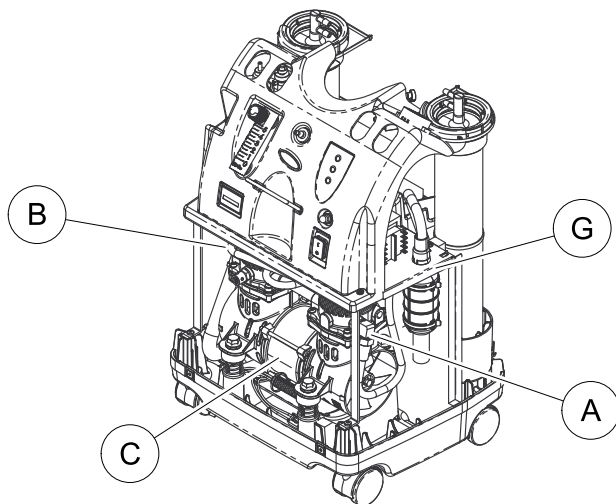


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



Only VAW model is shown. AW model is replaced in the same manner.

PE valve not shown in both views. Filter not shown in rear view..

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.

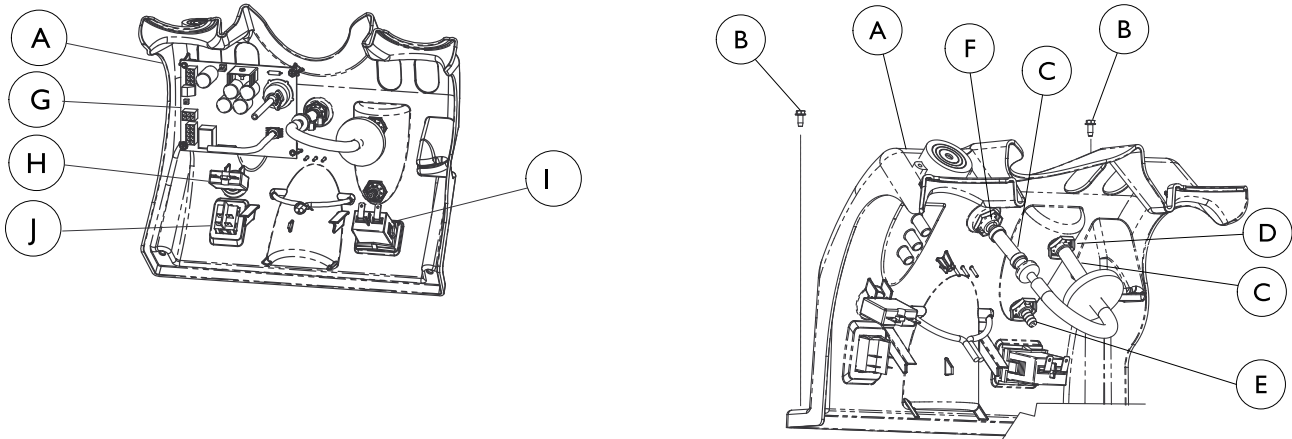


CAUTION!

– Use care not to deform heat exchanger when installing, removing or cleaning.

3. Disconnect brass nut (A) that secures the heat exchanger assembly (B) to the compressor (C).
4. On the backside of the Perfecto₂, loosen the clamp (D) that secures the tube (E) to the manifold assembly (F) and remove the tube from the manifold assembly.
5. Remove heat exchanger assembly by pulling tube through sound box (G).
6. Reverse STEPS 3-5 to install new heat exchanger.
7. Run unit and check for leaks. Refer to 8.1 Leak Test, page 41.
8. If no leaks detected, turn power Off (O) and unplug the unit.
9. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.10 Removing and/or Replacing Control Panel



ITEM	DESCRIPTION
A	Control Panel
B	Mounting Screws
C	1/4-inch Mounting Screws
D	Top Barbed Fitting For the Flowmeter
E	Bottom Barbed Fitting For the Flowmeter
F	Patient Outlet Barbed Fitting
G	P.C. Board
H	Circuit Breaker
I	Hour Meter
J	On/Off (I/O) Switch

6.10.1 Removing Control Panel



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Cut the two tie wraps (not shown) that secure the control panel A to the sieve beds (not shown).
4. Cut the two tie wraps that secure the P. E. valve assembly to the control panel (not shown).
5. Remove the two mounting screws B that secure the control panel to the sound box.
6. Remove the 1/4-inch I. D. tubing C from the top barbed fitting D of the flowmeter (not shown).
7. Remove the 1/4-inch I. D. tubing C (not shown) from the bottom barbed fitting E of the flowmeter (not shown).
8. Cut tie wrap and remove 1/4-inch I. D. tubing C from the patient outlet barbed fitting F behind the control panel.
9. Disconnect the wire harness from P.C. board G.



Before performing STEP 9, label all wires to ensure correct reinstallation.

10. Remove spade connectors from circuit breaker H, hour meter I and On/Off (I/O) switch J. (Jumper wire harness from On/Off (I/O) switch to circuit breaker does not have to be removed).
11. Remove the control panel assembly.

6.10.2 Replacing the Control Panel



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.

1. Remove the control panel. Refer to 6.10.1 Removing Control Panel, page 29.
2. Remove the P.C. Board. Refer to 6.12 Replacing P. C. Board, page 32.
3. Remove the transformer. Refer to 6.13 Replacing the Transformer, page 33.
4. Remove the On/Off switch. Refer to 6.14 Replacing On/Off Switch, page 34.
5. Remove the flow meter. Refer to 6.15 Replacing Flowmeter, page 35.
6. Remove the hour meter. Refer to 6.16 Replacing Hour Meter, page 36.
7. Remove horn and palnuts that hold the barbed outlet fitting.
8. Cut tie wrap on the bungee cord and remove the bungee cord from the control panel.
9. Discard the existing control panel.
10. Install new control panel by reversing STEPS 1-8.
11. Run unit and inspect for leaks. Refer to 8.1 Leak Test, page 41.
12. If no leaks detected, turn power Off (O) and unplug the unit.
13. Re-install the cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.11 Replacing Cooling Fan

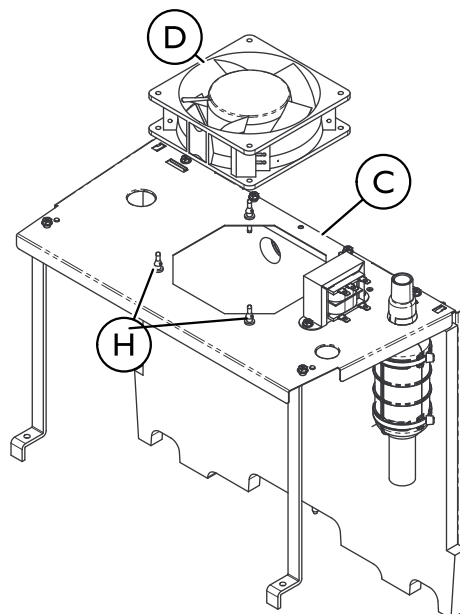
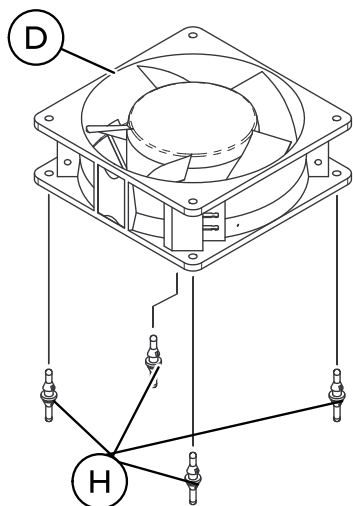
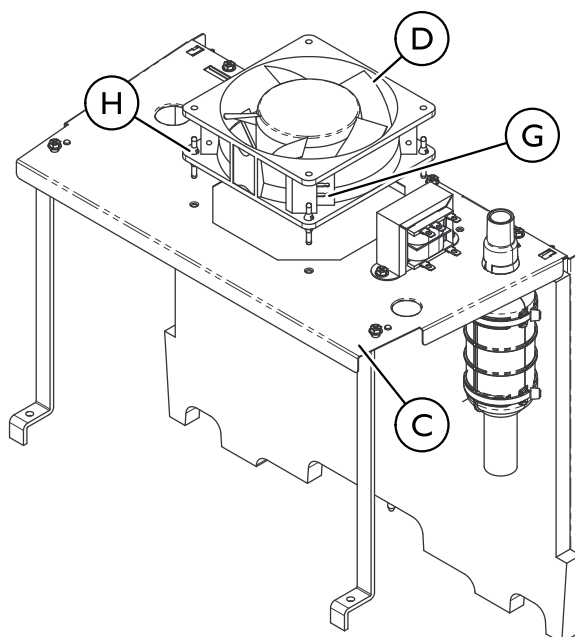
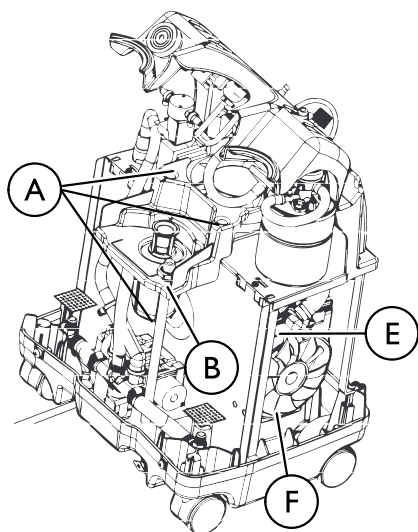


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove control panel. Refer to 6.10 Removing and/or Replacing Control Panel, page 29.
4. Remove compressor inlet HEPA filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.
5. Remove the three mounting screws (A) that secure the intake resonator (B) to the soundbox (C).



Two mounting screws are installed in the top. The other mounting screw is located on the backside of the intake resonator near the bottom.

6. Move the intake resonator back slightly for access to the cooling fan (D). Disconnect the intake hose (E) on the compressor assembly (F), if necessary.
7. Disconnect spade connectors from fan terminals (G) on side of cooling fan. Note orientation for proper reinstallation.



The cooling fan is fastened to the soundbox with four rubber grommets (H) on each corner.

8. Lift cooling fan up and dislodge the rubber grommets (H) from the soundbox.
9. Remove the rubber grommets from the existing cooling fan.

10. Note the orientation of the installed rubber grommets. There are two recessed areas on the rubber grommet. The larger recessed area of the grommet is installed in the fan. The smaller recessed area is installed in the sound box.
11. Inspect rubber grommets for damage. If damage is found, do not use and replace with new rubber grommets.
12. Install rubber grommets into new cooling fan with larger recessed area installed in the fan.



CAUTION!

Risk of Damage

- Fan **MUST** be oriented properly so air from the fan blows **DOWN** onto the compressor (see air flow arrow on back of fan and make sure the arrow is pointing down).

13. Connect spade connectors to fan terminals on side of cooling fan.
14. Orient cooling fan onto soundbox.
15. Pull rubber grommets down into the sound box until rubber grommet is seated.
16. Move intake resonator back into position.
17. Secure the intake resonator to the soundbox with the three mounting screws.



Two screws install in the top and one screw installs on the back near the bottom of the intake resonator.

18. If necessary, reconnect the intake hose on the compressor assembly.
19. Reinstall control panel. Refer to 6.10 Removing and/or Replacing Control Panel, page 29.
20. Reinstall compressor inlet HEPA filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13 and reverse all STEPS.
21. Run unit in and check for leaks. Refer to 8.1 Leak Test, page 41.
22. If no leaks detected, turn power Off (O) and unplug the unit.
23. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.12 Replacing P. C. Board



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

- **ALWAYS** disconnect concentrator from electrical outlet before servicing.

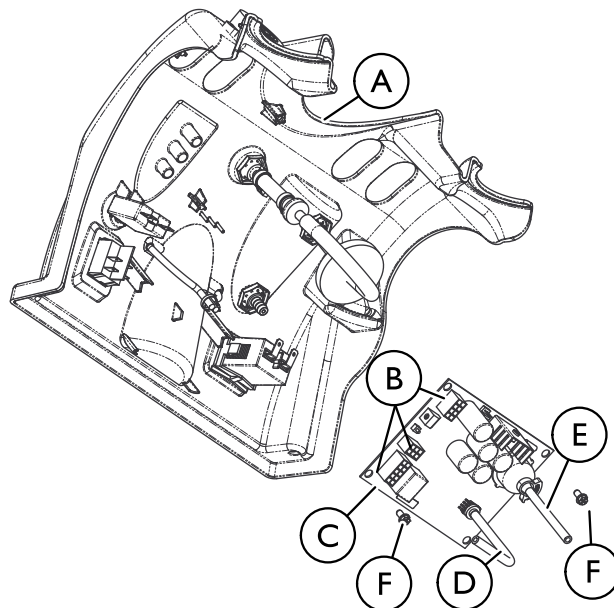


CAUTION!

Risk of Damage

Follow these pre-cautions to prevent damage to the P. C. boards:

- Before handling any P. C. boards, you need to be properly grounded to prevent static damage to the components of the board. A Static Cuff **MUST** be worn and properly grounded using an alligator clip. Electrical conduit or a water pipe is normally sufficient when a known good ground is not available. Care should be taken to ensure that the alligator clip contacts with bare metal surface.
- When removing quick disconnects terminals, **DO NOT** pull on wire itself as damage to the connection may occur. Hold down the P. C. board with one hand and use an upward force with a slight rocking motion to remove the terminals.
- Before installing any P. C. boards, ensure that all insulators are in place.



1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove control panel (A). Refer to 6.10 Removing and/or Replacing Control Panel, page 29.
4. Remove the two mounting screws (F) from the P. C. board.
5. Position new P. C. board on the control panel..

6. Secure new P. C. board in place with existing mounting screws.
7. Reinstall control panel. Refer to 6.10.1 Removing Control Panel, page 29 and reverse ALL steps.
8. Run concentrator to ensure unit operates to specifications.
9. After replacing P. C. board, autotuning may be necessary. Refer to 7.1 Autotuning, page 40.
10. Check for leaks at pressure sensor tubing on product tank cap. Refer to 8.1 Leak Test, page 41.
11. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.13 Replacing the Transformer

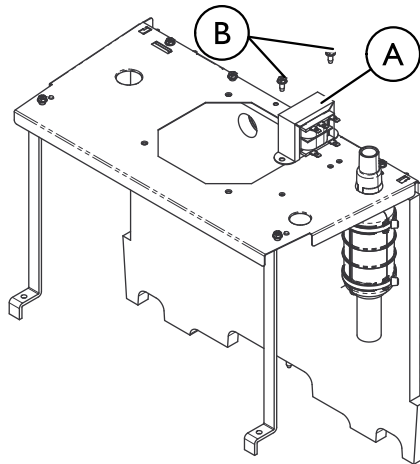


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove control panel. Refer to 6.10.1 Removing Control Panel, page 29.
4. Locate the transformer (A) located on the sound box.
5. Label all wires before disconnecting for proper re-connections.
6. Remove the two mounting screws (B) that secure the transformer to the soundbox.
7. Note orientation of transformer on soundbox before removing for proper reinstallation.
8. Remove the existing transformer and discard.
9. Install new transformer in orientation noted in STEP 7.
10. Connect all wires as noted from STEP 4.
11. Reinstall control panel. Refer to 6.10.1 Removing Control Panel, page 29 and reverse ALL steps.
12. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.14 Replacing On/Off Switch

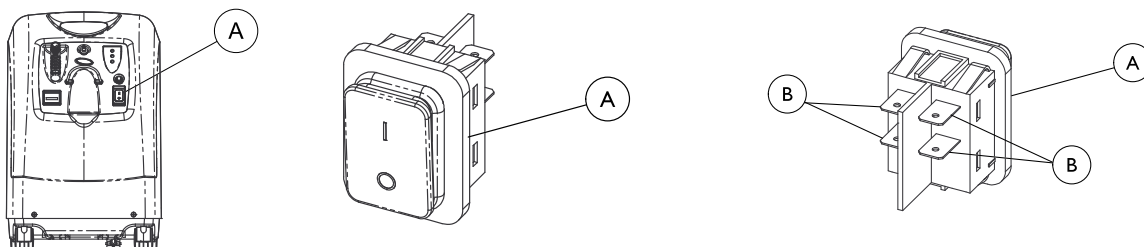


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove control panel. Refer to 6.10.1 Removing Control Panel, page 29.
4. Remove and label the four spade connectors ⑥ from back of existing On/Off (I/O) switch ⑤.
5. Compress retaining grips on back of existing On/Off (I/O) switch and push switch out through front of control panel.



Ensure proper orientation of the On/Off (I/O) switch and wiring connections before installation.



CAUTION!

Risk of Damage

Possible damage to the concentrator may result if not properly installed.

– DO NOT install the On/Off (I/O) switch upside down. Universal Off (O) symbol should be at bottom and Universal On (I) symbol should be at the top.

6. Discard existing On/Off (I/O) switch.
7. Reverse STEP 4 and 5 to secure new On/Off (I/O) switch.
8. Reinstall control panel. Refer to 6.10.1 Removing Control Panel, page 29 and reverse ALL steps.
9. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.15 Replacing Flowmeter

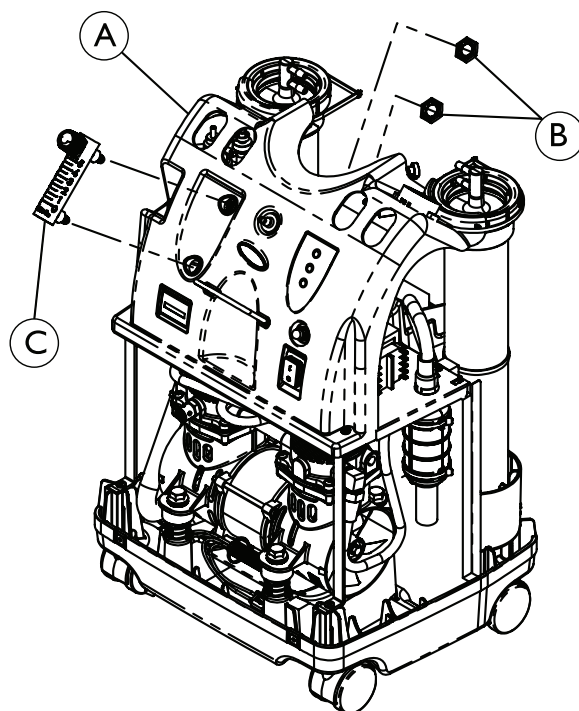


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



PE valve not shown.

Only VAW model is shown. Flowmeter for the AW model replaces in the same manner.

1. Turn power Off (O) and unplug the unit..
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Note the location of the tubing for accurate replacement after new flowmeter is installed.
4. Remove control panel A. Refer to 6.10.2 Replacing the Control Panel, page 30.
5. Remove palnuts B that secure flowmeter C to the control panel.
6. Remove flowmeter from front of control panel and discard.
7. Install new flowmeter reversing STEPS 5-6.
8. Reinstall control panel. Refer to 6.10.2 Replacing the Control Panel, page 30.
9. Run unit and check for leaks where ¼-inch tubing engages flowmeter barbed fittings D. Refer to 8.1 Leak Test, page 41 and reverse ALL steps.
10. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.16 Replacing Hour Meter

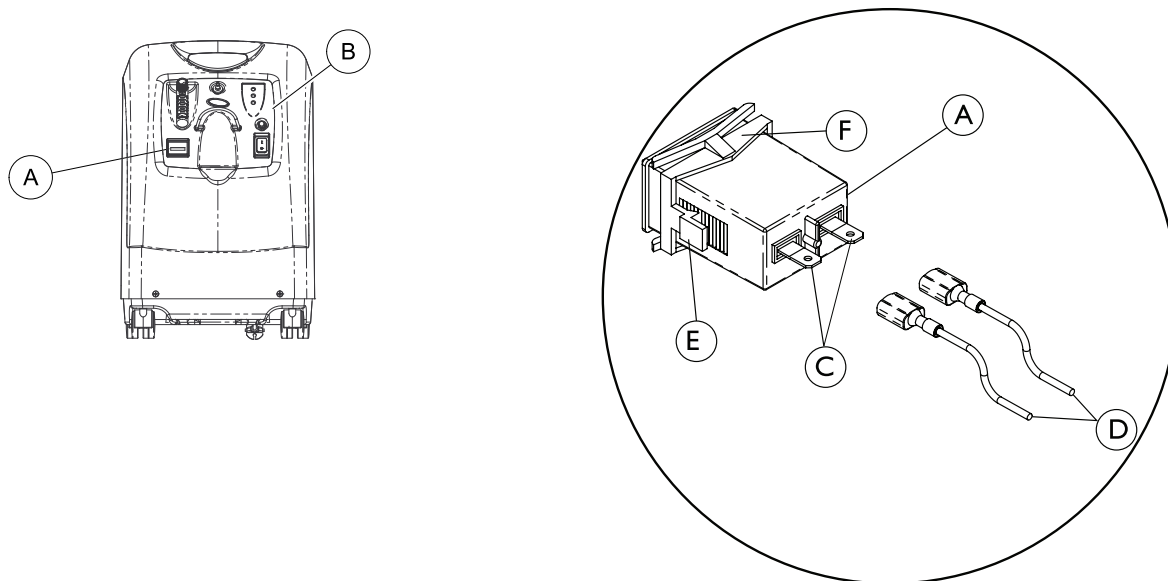


DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



 Only the AW model is shown. The hour meter for the VAW replaces in the same manner.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove control panel (B). Refer to 6.10.2 Replacing the Control Panel, page 30.
4. Remove and label the two hour meter connectors (C) and wires (D) connected to back of hour meter (A).
5. Squeeze retaining clips (E) on hour meter housing (F) that secure hour meter to control panel.
6. Remove hour meter by pushing meter through front of control panel and discard.
7. Install new hour meter reversing STEPS 4-6.
8. Reinstall control panel. Refer to 6.10.2 Replacing the Control Panel, page 30 and reverse ALL steps.
9. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

6.17 Replacing 4-Way Valve and/or Manifold Assembly



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

- ALWAYS disconnect concentrator from electrical outlet before servicing.

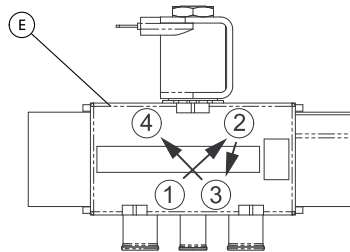


CAUTION!

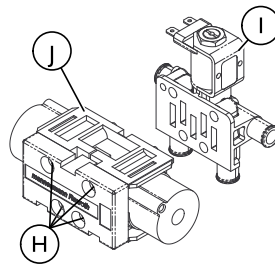
Risk of Damage

This is a maintenance free valve. Opening the valve will void any and all warranties applicable to the valve.

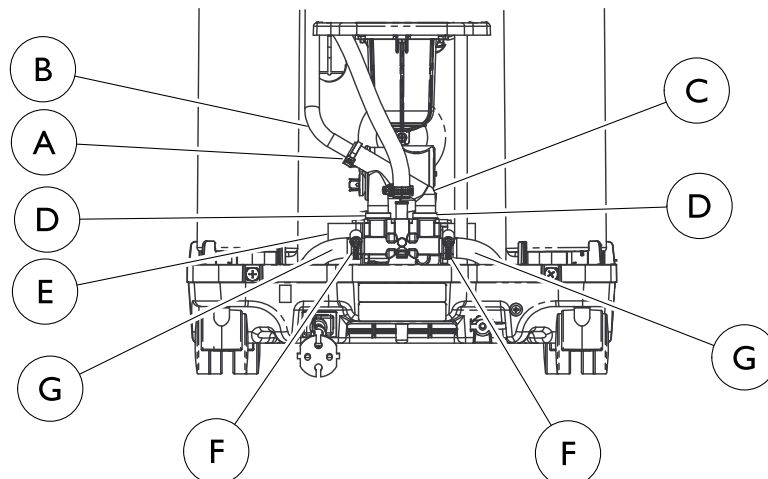
- Do not open or alter valve.



 The numbers above indicate the MOUNTING SCREW TORQUE SEQUENCE: pre-torque to 10 + 2 in-lbs., then torque to 22 + 2 in-lbs.



The CEME pilot valve will replace in the same manner.



Only the AW model is shown. The 4 way valve and/or manifold assembly will replace in the same manner.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Cut the one tie wrap **A** that secures the manifold exhaust tube **B** to the "F" tube **C**.
4. Remove the manifold exhaust tube from the "F" tube.
5. Cut the two tie wraps **D** that secure the "F" tube to the 4 way valve/manifold assembly **E**.

6. Remove the “F” tube from the 4 way valve/manifold assembly.
7. Using a hose clamp tool, remove the clamps ⑥ that secure the tubes ③ to the 4-way valve/manifold assembly.
8. Remove the tubes from both sides of the 4 way valve/manifold assembly.
9. Note the orientation of the 4-way valve/manifold assembly before removing for correct re-installation.
10. Lift 4-way valve/manifold assembly up and out of the base of the concentrator.
11. Disconnect spade connectors located on the side of the 4 -way valve assembly (Not shown).
12. Remove the four mounting screws ④ that secure the 4-way valve/manifold assembly together.
13. Replace the necessary 4-way valve ①, manifold ① or both.
14. Loosely install mounting screws through 4-way valve .

 Ensure the manifold gasket is in place on 4-way valve before installing.



CAUTION!

Risk of Damage

To avoid damage to the 4-way valve
– Adhere to Torque sequence and specification.

15. Align the 4-way valve with the manifold assembly.
16. Tighten mounting screws in the sequence described above.
17. Pre-torque the mounting screws to 10 ± 2 in-lbs using the torque sequence.
18. The mounting screws can now be torqued to 22 ± 2 in-lbs in the same sequence.
19. Connect spade connectors located on the side of the 4 -way valve assembly.
20. Position the 4-way valve/manifold assembly in the base of the concentrator on the foam block in the orientation noted in STEP 9.
21. Slide the tubes onto each side of the manifold/valve assembly.
22. Using a hose clamp tool, secure the tubes to the 4-way valve/manifold assembly with the clamps.
23. Install the “F” tube into the 4-way valve/manifold assembly.
24. Secure the “F” tube to the 4 way valve/manifold assembly with two tie wraps.
25. Install the manifold exhaust tube into the “F” tube.
26. Secure the manifold exhaust tube to the “F” tube with a tie wrap.
27. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

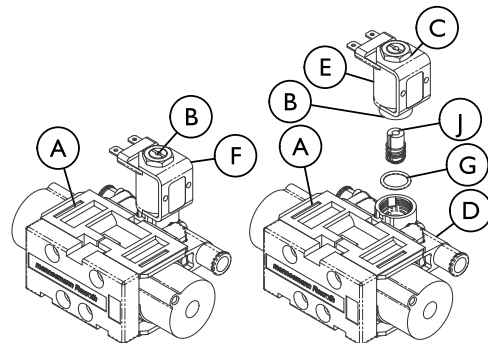
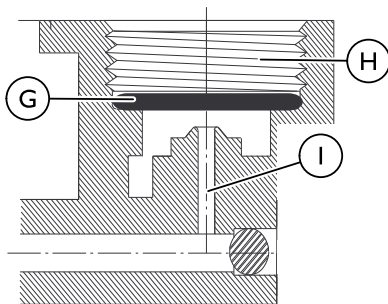
6.18 Replacing Pilot Assembly



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock
– ,ALWAYS disconnect concentrator from electrical outlet before servicing.



CEME pilot assembly replaces in the same manner.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Remove the 4-way valve/manifold assembly. Refer to 6.17 Replacing 4-Way Valve and/or Manifold Assembly, page 37.
4. Locate pilot valve ① on 4-way valve/manifold assembly.
5. Hold pilot valve stem ② with the flat blade screwdriver and turn the 9/16-inch locknut ③ counterclockwise one complete turn.
6. Unscrew the pilot valve stem assembly from the manifold ④ while leaving the coil ⑤ with yoke ⑥ and locknut intact on stem.
7. Remove pilot valve assembly ① and discard.



WARNING!

Risk of Injury or Damage

Damage to the plastic manifold and/or plastic manifold airflow passage ① may occur. Damage to airflow may result in improper oxygen delivery and harm to the user. To avoid:
– DO NOT use sharp tools to remove O-ring ③ from plastic manifold opening ④.

8. Remove O-ring ③ from manifold opening.

9. Discard O-ring.
10. Install new O-ring into the opening in the plastic manifold housing.



CAUTION!
Risk of Damage

To avoid damage to the rubber O-ring and/or plastic manifold:

- DO NOT overtighten pilot valve stem when installing it into plastic manifold.

11. Align new pilot valve assembly with four way valve assembly.
12. Loosen the locknut.
13. Use a flat blade screwdriver, and tighten pilot valve stem clockwise until snug. Torque to 25 inch-lbs. $\pm$ 5 inch-lbs.
14. Position pilot valve assembly at an approximate 90° angle to the right as viewed from the front of valve.
15. Tighten locknut clockwise with the 9/16-inch wrench until snug to secure the stem and coil. DO NOT overtighten. Torque to 20 in-lbs $\pm$ 3 in-lbs.



CAUTION!
Risk of Damage

To avoid damage to the plastic manifold:

- DO NOT overtighten locknut when installing it onto pilot valve stem.

16. Reinstall the 4-way valve/manifold assembly. Refer to 6.17 Replacing 4-Way Valve and/or Manifold Assembly, page 37.
17. Plug power cord in and turn concentrator On (I) to ensure proper operation.
18. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

7 Autotuning

7.1 Autotuning



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

- ALWAYS disconnect concentrator from electrical outlet before servicing.
- Turn unit Off (O) and unplug before adjusting timing switch.
- Use extreme care when making adjustments to the timing switch.
- DO NOT allow screwdriver or your hands to contact the P. C. Board when unit is plugged in and/or On (I).

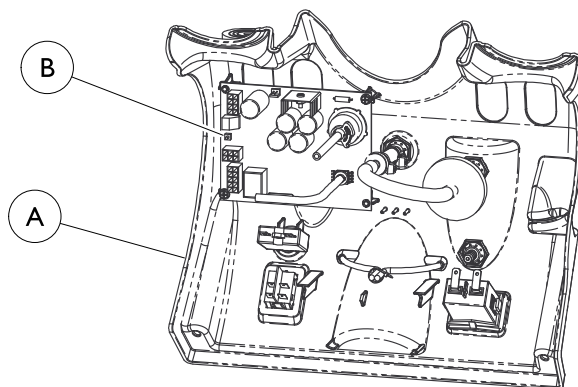


WARNING!

Risk of Injury or Damage

To avoid erasing the factory settings and misusing the concentrator

- DO NOT push the autotune button while powering up.



1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug the unit in and turn the power On (I).
4. Locate the P. C. board A.
5. Set the output flow to 5.0 L/min +0.5 L/min -0.0 L/min.
6. Wait for the main valve shift to indicate one of the following:
 - If the P. C. board is new, the front panel RED indicator light will slowly blink, indicating autotune has initiated.
 - If the P. C. board is used and has performed autotuning before, press and release the small push button B on the P. C. board. The front panel RED indicator light will slowly blink, indicating the unit is autotuning and automatically adjusting the P.E. valve timing.
7. The GREEN (onboard) diagnostic light will flash the current value of the P. E. valve timing number.
8. Place the cover back on the unit but DO NOT install the cover screws. Let the unit run until autotuning is completed.
9. When autotuning is complete, the RED front panel indicator light will change from a slow blinking to a flashing of the final P. E. valve timing number.
10. Turn the unit Off (O) and then back On (I). The timing value is stored in memory for future use.



If the unit is turned off before an autotune cycle is completed, the P. E. valve timing will not be stored or updated. If the board is new, autotuning **MUST** be successfully completed before the unit can be placed into service.
11. After a successful autotune, run the unit for 30 minutes and verify that the oxygen concentration output of the unit is within specification.
12. If the oxygen output concentration is not within specification, rerun the autotune again.
13. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

8 Testing

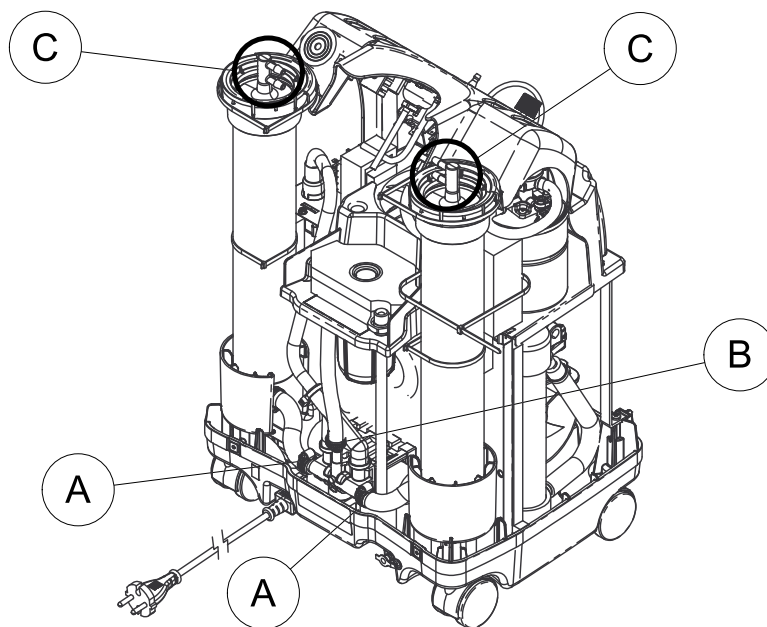
8.1 Leak Test


DANGER!

Risk of Death, Injury or Damage

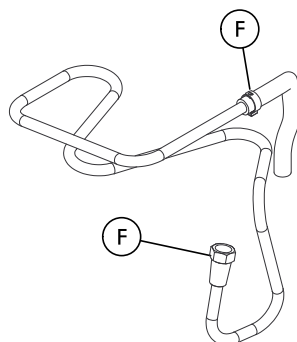
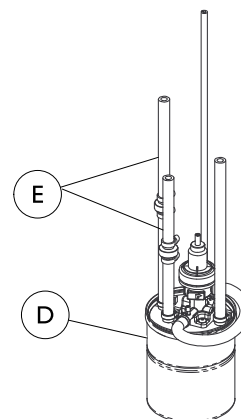
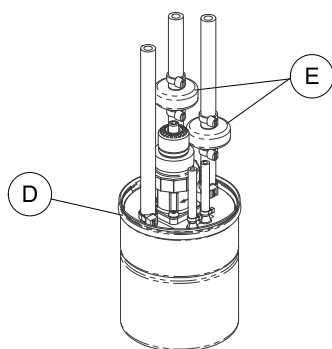
To prevent electrical shock

– ALWAYS disconnect concentrator from electrical outlet before servicing.



Product Tank with Regulator Manufactured Before 7/1/2012

Product Tank with Regulator Manufactured After 7/1/2012



Only the VAW model is shown. Leak test for the AW model is performed in the same manner.

Filer, capacitor, and PE valve not shown.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug in unit.
4. Turn the concentrator On (I).
5. Let concentrator run for 30 minutes.



WARNING!

Risk of Injury or Damage

To avoid injury or damage from misuse

- Apply small amount of leak test solution to fittings only. Avoid all other components.
- Carefully leak test for pressure leaks around sieve bed hoses at 4-way valve.
- DO NOT leak test 4-way valve body.
- DO NOT allow leak test solution to enter into 4-way valve and system.

6. With "leak-test" solution or equivalent soapy water, leak test the following:
 - a. The two sieve bed hose connection at the 4-way valve/manifold assembly (A).
 - b. Leak test the hose fitting on center port of 4-way valve/manifold assembly (B).
 - c. Hose connections to top and bottom fittings of sieve beds (C).
 - d. P. E. valve hose connections

 PE valve location varies depending on date of manufacture.

 - e. Hose fittings at product tank cap (D) and check valves (E)(F).
 - f. Both fittings on heat exchanger assembly (F).
7. If no leaks are found, proceed to STEP 11. If leaks are found, proceed to STEP 8.
8. Turn power Off (O) and unplug the unit.
9. Replace any tubing that appears cracked, worn, etc.
10. Repeat STEPS 3-7.
11. Re-install cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

8.2 Power Loss Alarm



DANGER!

Risk of Death, Injury, or Damage

To prevent electrical shock

- ALWAYS disconnect concentrator from electrical outlet before servicing.
- Check alarms periodically for proper function.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug in unit.
4. Turn the concentrator On (I).
5. With the unit running, remove the line cord from power source.



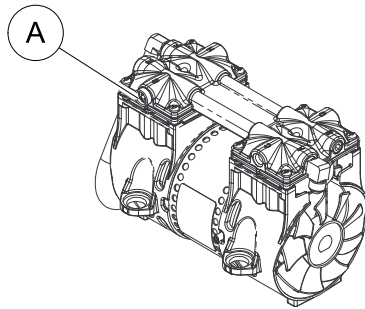
The power loss alarm mode should sound the audible alarm IMMEDIATELY or within 30 seconds.



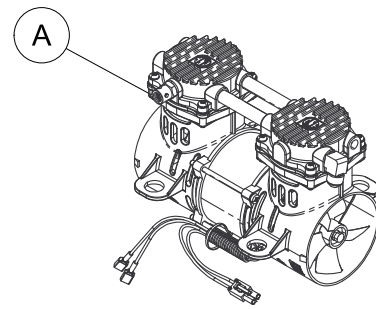
With the unit unplugged and inoperable for a short period of time, the battery free circuit will be drained. If power failure alarm does not sound with unit unplugged and power switch On (I), the battery free circuit is drained. It will recharge when unit is plugged in and switched On (I).

8.3 Low Pressure Test

AW Compressor



VAW Compressor



If any alarm fails to perform to specification, contact Invacare Technical Service.

1. There are two separate failure modes for Low Pressure:
 - Low product tank pressure. (Pressure in tank drops below a preset value, typically 7 psi).
 - Failure to reach the set point pressure within a prescribed time limit, or Timeout Failure.

Low Product Tank Pressure Test

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug in unit.
4. Turn the concentrator On (I).
5. With unit running, set flow at maximum rating.
6. When the main valve switches, pull the stem on the compressor relief valve (A) out as far as it will go and hold it.
7. The low pressure alarm should activate within 30 seconds. The front red panel light will illuminate with a continuous audible alarm.

Set Point Pressure Test

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug in unit.
4. Turn the concentrator On (I).
5. With unit running, set flow at maximum rating.
6. Remove the pressure sensor tubing (tie-wrap) from the top of the product tank (not shown).
7. The low pressure alarm should activate within 30 seconds and release stem once the sound is heard. Refer to Senso₂ Alarm Threshold Table in 8.6 Oxygen Sensor, page 44 for shutdown mode.
8. Replace tubing and tie wrap.

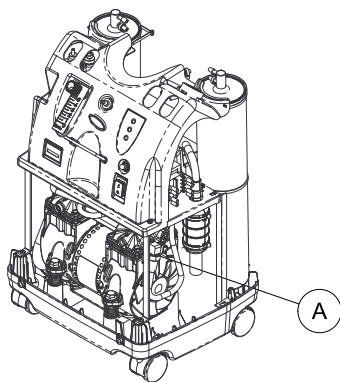
8.4 Time-Out Test



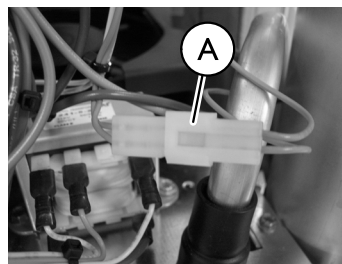
For this procedure, refer to the images in 8.3 Low Pressure Test, page 43

1. Turn power Off (O) and unplug the unit
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Disconnect the compressor connector from the main wiring harness.
4. Plug unit in and turn power On (I).
5. The Time-Out Failure alarm should activate within 40 seconds. The front red panel light will illuminate with a continuous audible alarm.
6. Reconnect the compressor connector to the main wiring harness.

8.5 High Pressure Test



DETAIL "A"



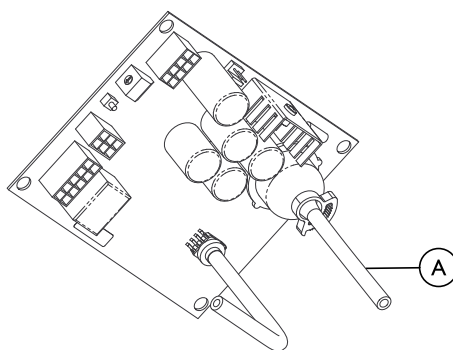
i Only the AW model is shown. The high pressure test is performed in the same manner for the VAW model. Capacitor and the PE valve are not shown.

i If any alarm fails to perform to specification, contact Invacare Technical Service.

- High Pressure - Occurs when pressure in product tank rises beyond a preset value, typically $158.58 \text{ kPa} \pm 6.89 \text{ kPa}$ ($23 \text{ psi} \pm 1 \text{ psi.}$).
- Main Valve Coil - Alarm sequence occurs when the main valve coil, connection or P.C. board circuitry has failed.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug in unit.
4. Turn the concentrator On (I).
5. With the unit running and flow set at approximately 5 L/min., disconnect in-line connector A shown above.
6. The main valve coil alarm should activate within 40 seconds. The front red panel light will illuminate with a continuous audible alarm.
7. Reconnect in-line connector.

8.6 Oxygen Sensor



i Alarm sequence occurs when concentration levels fall below a preset value, typically $73\% \pm 3\%$ or $85\% \pm 2\%$.

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug in unit.
4. Turn unit On (I). Set output flow at approximately 5 L/min.
5. Monitor the O₂ level.
6. With the O₂ level greater than 85% after five minutes, the GREEN panel indicator light will remain illuminated.
7. Slowly adjust flow beyond maximum rated flow until you can achieve a concentration level greater than 75% but less than 84%. Within 30 minutes the YELLOW panel indicator light will illuminate and the unit will continue to run.

8. Clamp off the 1/8-inch oxygen sensor tubing ① between the oxygen sensor and the product tank regulator.



WARNING!

Risk of Injury or Damage

To avoid damage to the tubing and injury from an oxygen sensor failure:

- Do not cut oxygen sensor tubing when clamping the oxygen sensor tubing.

9. Within 30 minutes, and the front red panel light will illuminate with a continuous audible alarm. The compressor will shut down with the alarm.

LABEL SYMBOL	STATUS	INDICATOR LIGHTS
O ₂	SYSTEM OKAY O ₂ over 85%	GREEN Indicator Light
	O ₂ Between 73% to 85%	YELLOW Indicator light 1. YELLOW Solid 2. YELLOW Flashing Sensor Failure Call a qualified technician.
	SYSTEM FAILURE O ₂ Below 73%	RED Indicator light Continuous Audible Alarm Sieve-GARD™ Compressor Shutdown Call a qualified technician

8.7 P. E. Valve Coil Test



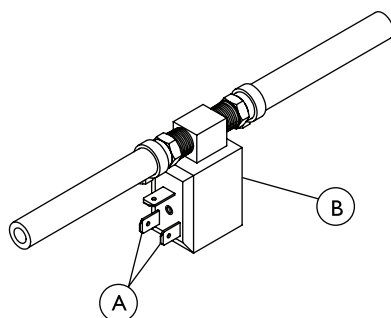
P. E. Valve Coil - Alarm sequence occurs when the P. E. Valve Coil, connection or P. C. Board Circuitry has failed.



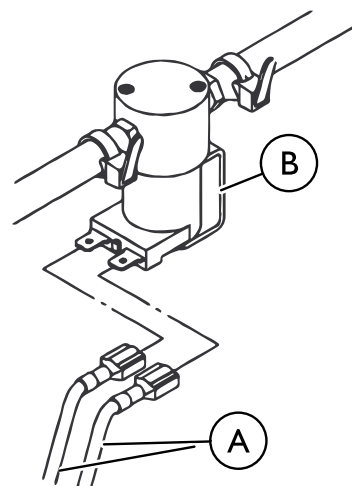
If any alarm fails to perform to specification, contact Invacare Technical Service.

If problems arise during test, contact Invacare Technical Service for further assistance.

RECTANGULAR PE VALVE



CIRCULAR PE VALVE



The wires ① are not shown in the view for the rectangular PE valve, only the location of the wire connection .

1. Turn power Off (O) and unplug the unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Plug in unit.
4. Turn the concentrator On (I).
5. With the unit running and flow set at approximately 5 L/min., remove one wire ① from the P. E. valve coil ②. The P. E. valve coil alarm should activate within 10 seconds.
6. Reinstall cabinet. Refer to 6.1 Removing Cabinet, page 17 and reverse all steps.

Use the chart in 5.7 Preventive Maintenance Checklist, page 16 to record date and number of hours when preventive maintenance was performed on the concentrator or any repairs made.

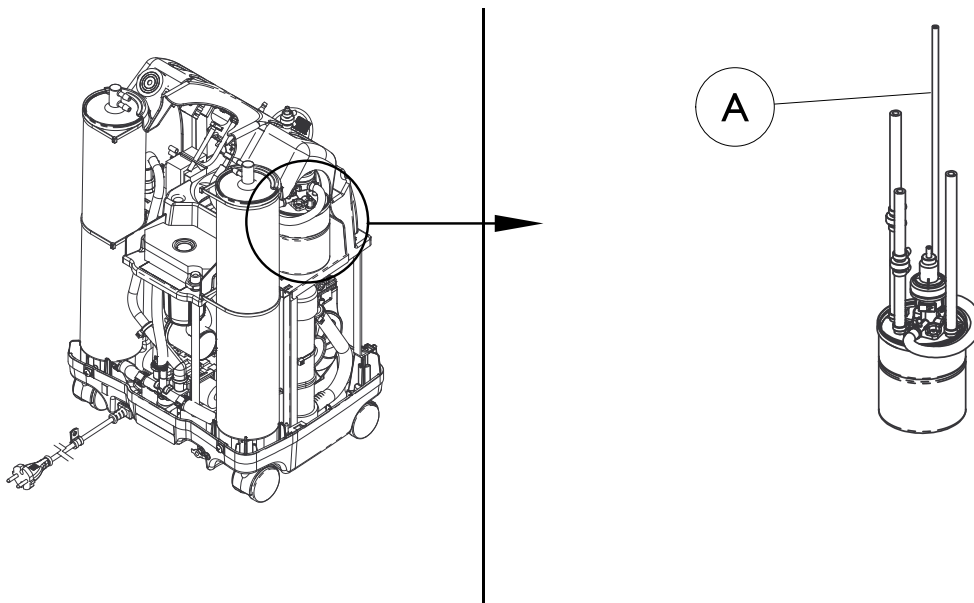
8.8 Checking Sieve Bed Pressure IRC5PO2AW



DANGER!

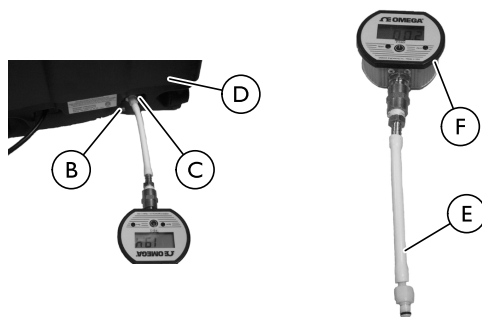
– To prevent electrical shock, ALWAYS disconnect concentrator from electrical outlet before servicing.

Disassembly



1. Turn power Off (●) and unplug unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.

Pressure Testing



1. Connect pressure gauge to the ¼ x 2-inch silicone tubing (A) with connector (p/n 1131392).
2. Remove plug (B) in HomeFill port (C) in back of concentrator (D).
3. Connect ¼ x 2-inch silicone tubing with connector (E) to HomeFill port.
4. Check each connection to make sure it is tight.
5. Turn the concentrator On (I).



Adjust the concentrator to MAXIMUM rated liter flow to 5 L/min.

Wait approximately five minutes to allow system pressures to achieve proper equilibrium before testing.

6. The pressure in the concentrator should rise within 20 seconds to 144.79 kPa $\pm$ 2.07kPa (21 psi $\pm$ 0.3 psi) and shift the 4-way valve to the opposite sieve bed.
7. After the 4-way valve shift, the pressure in the concentrator will drop to 82.74 $\pm$ 13.79(12 psi $\pm$ 2 psi) before rising within 20 seconds to 144.79 kPa $\pm$ 2.07kPa (21 psi $\pm$ 0.3 psi) and shift the 4-way valve to the opposite sieve bed.
8. If pressure reading on pressure gauge (F) is 144.79 kPa $\pm$ 2.07kPa (21 psi $\pm$ 0.3 psi) when both valve shifts are made, proceed to STEP 10.
9. If pressure in the concentrator does not fall into the specifications listed above, refer to 8.1 Leak Test, page 41.
10. Turn the concentrator Off (●).
11. Disconnect pressure gauge from the HomeFill port and reinstall plug.

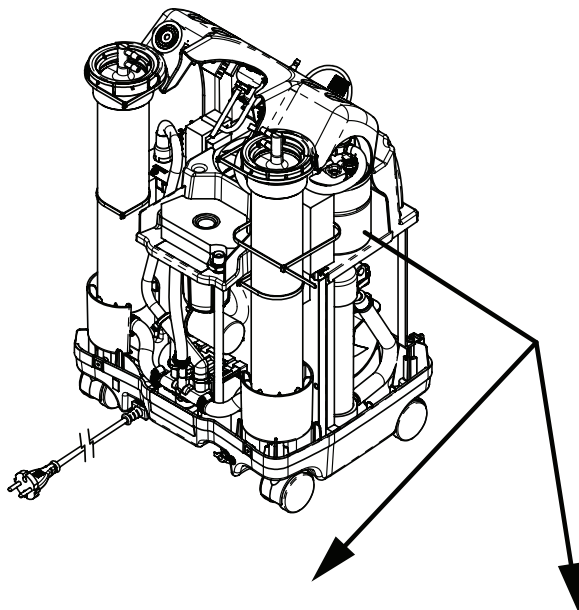
8.9 Checking Sieve Bed Pressure (Model IRC5PO2VAW Only)



DANGER!

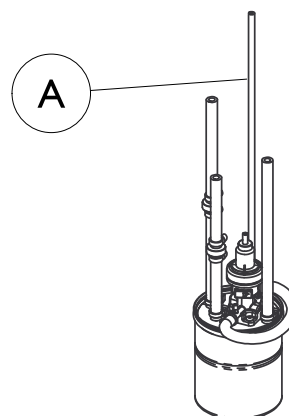
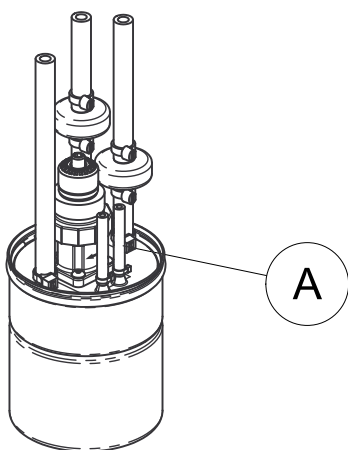
– To prevent electrical shock, ALWAYS disconnect concentrator from electrical outlet before servicing.

Disassembly



Product Tank with Regulator Manufactured Before 7/1/2012

Product Tank with Regulator Manufactured After 7/1/2012



1. Turn power Off (●) and unplug unit.
2. Remove cabinet. Refer to 6.1 Removing Cabinet, page 17.
3. Turn unit so the back faces you.
4. Remove tie wrap and disengage pressure sensor tubing Ⓐ from product tank.

Installation

1. Insert the 1/8" "T" fitting into the ends of the tubing.
2. Secure tie wraps to each end of the tubing 1/8" "T" fitting connection.
3. Attach the 1/8" x 2-inch tubing to the new 1/8" "T" fitting and secure with tie wrap.
4. Insert plug into the open end of the 1/8" x 2-inch tubing.
5. Secure with tie wrap.

9 Troubleshooting

9.1 Troubleshooting

		OXYGEN CONCENTRATOR Refer to Service Manual DIAGNOSTIC ALARM SYSTEM	
...ADJUSTMENTS BY UNAUTHORIZED PERSONNEL VOIDS WARRANTY...			
ALARM	LED FLASHES		PROBABLE CAUSE
	RED	GREEN	
BEEP AT START UP	0	0	NO PROBLEM, SYSTEM OK
SHORT BEEP WITH LONG PAUSE	0	0	MAIN POWER LOSS
CONTINUOUS	1	1	LOW PRESSURE; MAJOR LEAK
CONTINUOUS	1	2	HIGH PRESSURE; NO SWITCHING
CONTINUOUS	1	3	TIME OUT FAILURE; COMPRESSOR
CONTINUOUS	1	5	PILOT VALVE CIRCUIT
CONTINUOUS	2	1	73% SHUTDOWN; LOW O2
CONTINUOUS	2	3	PE VALVE COIL
CONTINUOUS	2	4	EEPROM FAILURE
CONTINUOUS	3	1	OXYGEN SENSOR FAILURE
NOTE: CYCLE POWER ON AND OFF FIVE (5) TIMES TO CLEAR INTERNAL FAULT CODE.			
PERFORMANCE SPECIFICATION			
Flow: 0.5 to 5.0 L/min. Oxygen Concentration: 95.6% to 87%		Flow: 2.0 to 10.0 L/min. Oxygen Concentration: 94% to 87%	
1137267 REV B			

Symptom	Probable Cause	Solution
Normal Operation: Internal Status Indicators: RED: Off GREEN: Off Unit plugged in, power switch On (I). Single beep on start up.	No Problems.	System Okay.
Power loss: Internal Status Indicators: RED: Off GREEN: Off Unit unplugged, power switch On (I), alarm off	No Problems.	Battery Free Circuit drained. Plug in cord and turn power switch On (I) to recharge.
Power loss: Internal Status Indicators: RED: Off GREEN: Off Unit plugged in, power switch to On (I), alarm off, battery Free circuit drained.	No power at outlet.	Check electrical outlet with a voltmeter set on VAC scale. If outlet isn't working, check protective device in home's electrical panel or consult an electrician. Also ensure that unit is properly plugged in. DO NOT use extension cords. Move to another outlet or circuit.
	Power cord: 1. Frayed. 2. Broken or damaged spade. 3. Spade connector from power cord loose or disconnected (inside back of unit).	1. Reattach cord. 2. Replace power cord connectors on plug. 3. Reattach connector.
	Circuit breaker tripped.	Reset breaker. NOTE: Breaker may trip to safeguard concentrator during a power surge. If breaker trips IMMEDIATELY, there is a probable short in the unit. Check for pinched or charred wires. If the breaker does not trip, run unit for approximately two hours. The circuit breaker should be less than 10 ohms. If breaker trips again, there is an internal problem.

Symptom	Probable Cause	Solution
	On/Off (I/O) switch. 1. Disconnected wire. 2. Faulty switch.	Check all electrical connections to the ON/OFF (I/O) switch for any disconnected wires. If the concentrator does not come on at all and wiring is intact, label and remove wires one at a time. Remove and replace with new one. Transfer wires from old switch to new switch one at a time to the matching contact.
	P. C. board. 1. P. C. board damaged. 2. Loose or damaged connector.	1. Replace P. C. Board. Refer to 6.12 Replacing P. C. Board, page 32. 2. Repair or replace connector.
Internal Power Loss Senso ₂ : Internal Status Indicators: RED: Off GREEN: Off Alarm may or may not be on.	P.C. board faulty.	Replace P. C. board. Unit requires retiming after P. C. board replacement. Refer to 6.12 Replacing P. C. Board, page 32.
Control panel Indicators: RED: Off YELLOW: Off GREEN: Off Fan operates, Compressor not operating.	Transformer assembly. 1. Faulty. 2. Connector loose or disconnected. 3. Faulty wiring.	1. Replace. Refer to 6.13 Replacing the Transformer, page 33. 2. Reattach connector. 3. Replace transformer assembly. Refer to 6.13 Replacing the Transformer, page 33.
High Pressure: Internal Status Indicators: RED: One Flash GREEN: Two Flashes Unit plugged in, power switch On (I), continuous alarm. Compressor shut down.	P. C. board: 1. Malfunction 2. Disconnected wire. 3. Shifting valve at pressures greater than 25 psi for concentrator.	1. Set flow to max L/min. for concentrator. Check voltage across pilot valve on volt DC scale. If meter reads 0 volts when unit is turned On (I), replace P. C. board. Refer to 6.12 Replacing P. C. Board, page 32. 2. Check spade connectors on pilot valve and connectors on P. C. board. 3. Replace P. C. board. Unit requires retiming after P. C. board replacement. Refer to 6.12 Replacing P. C. Board, page 32.
	4-way Valve: 1. Pilot Valve not shifting. 2. Coil resistance 3. 4-way Valve/Manifold assembly is stuck.	1. Check the resistance on the pilot valve. Replace the valve if shorted or open. Refer to 6.18 Replacing Pilot Assembly, page 38. 2. Replace 4-way valve. Refer to 6.17 Replacing 4-Way Valve and/or Manifold Assembly, page 37. 3. Coil should read 80 ohm $\pm$ 20.
LOW PRESSURE: Internal Status Indicators: RED: One Flash GREEN: One Flash Or RED: One Flash GREEN: Three Flashes Control Panel Indicators: RED: On YELLOW: Off GREEN: Off	Heat exchanger: 1. Leak at tubing or body chamber. 2. Inspect tubing and heat exchanger.	1. Replace or retighten tubing. 2. Replace heat exchanger.
	Compressor: 1. Leaks at fittings or tubing. 2. Leaking or defective relief valve. 3. Insufficient voltage at outlet. 4. Worn cup seals or gaskets.	1. Replace or repair. 2. Repair lead or replace. 3. DO NOT use extension cords. Use another outlet. 4. Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18.
	Compressor inlet filter dirty or plugged.	Replace compressor inlet filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.

Symptom	Probable Cause	Solution
Unit plugged in, power switch On (I), continuous audible alarm. Compressor shut down (Failure to cycle due to low pressure).	Regulator cracked or leaking.	Replace regulator. Refer to 6.7 Replacing Regulator, page 27.
	P. E. valve leaking.	Replace P. E. Valve. Check voltage at P. E. valve connector on 24 volt D.C. scale. The P. E. Valve activates or energizes approximately one seconds prior to the activation of the 4 way valve with approximately 24 volts. If voltage is in excess of 24 volts consistently, replace the P. C. board. Refer to 6.12 Replacing P. C. Board, page 32. If the P. C. board voltage acts normally, replace the P. E. valve. Refer to 6.4 Replacing P. E. Valve, page 22.  Check for leaks starting at the compressor output through all the pneumatic connections. Major leaks will cause system pressures to remain below adequate shift (exhaust) pressures and will cause compressor shutdown.
Defective Parts: Internal Status Indicators: RED: One Flash GREEN: Five Flashes Or RED: Two flashes GREEN: Three Flashes Control Panel Indicators: RED: On YELLOW: Off GREEN: Off Unit plugged in, power switch On (I), continuous audible alarm. Compressor shut down.	Defective main valve coil.	1. Replace main valve. 2. Replace main valve coil.
	Connector loose.	Reattach connector.
	Defective P. E. valve coil. (Resistance 80 ohms $\pm$ 10.)	Replace P. E. coil if shorted or open on resistance check. Refer to 6.4 Replacing P. E. Valve, page 22.
	Defective P. E. valve.	Replace P. E. valve. Refer to 6.4 Replacing P. E. Valve, page 22.
	Connector loose.	Reattach connector.
	Defective P. C. board.	Replace P. C. board. Refer to 6.12 Replacing P. C. Board, page 32.
Unit not operating: Alarm: On or Off Internal Status Indicators: RED: Two Flashes GREEN: Four Flashes Or RED: Two Flashes GREEN: Five Flashes	P. C. board Failure.	Replace P. C. board. Refer to 6.12 Replacing P. C. Board, page 32.

Symptom	Probable Cause	Solution
Low Concentration:  Check for O₂ purity using a calibrated Oxygen Analyzer at Test Point I (oxygen outlet) of the concentrator.	- Cabinet filters dirty. - Compressor inlet filter dirty.	- Clean or replace. Refer to 5.1 Cleaning the Cabinet Filter, page 12 and 5.3 Replacing the Outlet HEPA Filter, page 13. - Replace inlet filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.
Internal Status Indicators: RED: Two Flashes GREEN: One Flash 73% Shutdown Control Panel Indicators: RED: On YELLOW: Off GREEN: Off For SensO₂ units, the RED indicator will signal extremely low purity and will be accompanied by a continuous audible alarm and a system shutdown. Repairs are required.	Compressor: - Defective. - Faulty capacitor. - Bad motor windings. - Worn seals. - Bad bearings. - Leak at fittings or tubing. - Leaky or defective relief valve. - Insufficient voltage (outlet).	- Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18. - Replace capacitor. Refer to 6.3 Replacing Capacitor, page 21. - Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18. - Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18. - Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18. - Replace fittings or tubing. - Replace relief valve. - DO NOT use extension cords.
	Heat exchanger: - Leak at tubing or body chamber. - Inspect tubing and heat exchanger.	- Replace or retighten. - Replace or retighten. Replace heat exchanger. Refer to 6.9 Replacing Heat Exchanger Assembly, page 28.
	Regulator cracked or leaking.	Replace Regulator. Refer to 6.7 Replacing Regulator, page 27
	Leaky check valves.	Set the concentrator to 2 L/min. If the concentration falls below 87% oxygen, replace the check valves. Refer to 6.6 Replacing Check Valves, page 26.
	Exhaust muffler dirty or plugged.	Replace. Refer to 5.5 Replacing the Muffler Assembly, page 14.
	Fan: - Not operating. Unit overheating. - Faulty fan.	- Leads to fan disconnected. Reconnect. - Replace. Refer to 6.11 Replacing Cooling Fan, page 31.
	Sieve beds defective.	Replace. Refer to 8.8 Checking Sieve Bed Pressure IRC5PO2AW, page 46 or 8.9 Checking Sieve Bed Pressure (Model IRC5PO2VAW Only), page 47.
	Tubing kinked or blocked.	Repair or replace.
	P. C. board: Shifts at wrong pressures.	Check pressure at product tank. Pressure should rise to 144.79 kPa (21 psi) at shift point. If not, replace P. C. Board. Refer to 6.12 Replacing P. C. Board, page 32.
	Flowmeter: - Flowmeter opened beyond maximum flow rate. - Cracked or broken fitting. - Input tubing leaking or loose.	- Return flow to maximum setting. - Replace fitting. - Repair or replace. Refer to 6.15 Replacing Flowmeter, page 35.
	P. E. valve: - Bad coil. - Restrictor blockage.	- Replace P. E. valve. Refer to 6.4 Replacing P. E. Valve, page 22. - Replace P. E. valve. Refer to 6.4 Replacing P. E. Valve, page 22.
	Inspect P. C. board restrictor tubing for kinks or tears.	Replace P. C. board. Refer to 6.12 Replacing P. C. Board, page 32.

Symptom	Probable Cause	Solution
Fluctuating Flow:	Regulator/Flowmeter: 1. Incorrectly set regulator. 2. Flowmeter malfunction.	1. Check pressure at oxygen outlet. Adjust regulator. Refer to 6.8 Adjusting Regulator, page 27 2. If flow is still unstable, check for leaks starting at the compressor outlet fitting through all pneumatic connections. If no leaks are found and flow is still fluctuating, replace the regulator. If pressure at test point is within spec (5 psi $\pm$ 0.5 max. [34.4 kPa $\pm$ 6.89]), replace flowmeter. Refer to 6.15 Replacing Flowmeter, page 35.
	Outlet HEPA filter: 1. Dirty or plugged	1. If low flow conditions persist, replace outlet HEPA filter. Refer to 5.3 Replacing the Outlet HEPA Filter, page 13.
Unit Excessively Loud:	Pneumatic exhaust: 1. Muffler cracked, damaged or missing. 2. Muffler tubing disconnected or damaged.	1. Replace. Refer to 5.5 Replacing the Muffler Assembly, page 14. 2. Reconnect or replace tubing.
	Compressor inlet filter missing and/or orange sticker removed.	1. Replace compressor inlet filter. Refer to 5.4 Replacing the Compressor Inlet HEPA Filter, page 13.
	Incorrect style of inlet filter (aftermarket).	1. Replace with factory OEM sound reduced style inlet HEPA filter.
	Compressor removed.	1. Replace Compressor. Refer to 6.2 Replacing Compressor Assembly, page 18.
Unit Overheats:	Base exhaust vent plugged or restricted.	Place unit at least 30,5 cm (12 inches) from any wall. DO NOT place unit on pile or shag carpeting that may restrict air flow.
	Cabinet filters dirty or blocked.	Clean or replace. Refer to 5.1 Cleaning the Cabinet Filter, page 12.
	Fan: 1. Leads to fan disconnected. 2. Defective fan. 3. Fan installed upside down.	1. Reconnect leads. 2. Replace fan. 3. Install fan with air flow arrow pointing down.
	Heat exchanger: 1. Dirty or plugged. 2. Damaged.	1. Clean heat exchanger. 2. Replace heat exchanger. Refer to 6.9 Replacing Heat Exchanger Assembly, page 28.
	Compressor: 1. Defective. 2. Faulty capacitor. 3. Bad motor windings. 4. Worn seals. 5. Bad bearings.	1. Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18. 2. Replace capacitor. Refer to 6.3 Replacing Capacitor, page 21. 3. Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18 4. Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18 5. Replace compressor. Refer to 6.2 Replacing Compressor Assembly, page 18
	Line voltage excessive (surge).	Have line voltage inspected by certified electrician. A voltage regulator may be required and is obtainable from your local electric company.

Symptom	Probable Cause	Solution
Oxygen Purity: Internal Status Indicators: Control Panel Indicators: RED: Off YELLOW: On GREEN: On After 30 minutes of run time, unit operates normally, oxygen purity within normal range. GREEN or YELLOW panel indicator should illuminate.	P. C. board defective.	Replace P. C. board. Refer to 6.12 Replacing P. C. Board, page 32. Refer to 7.1 Autotuning, page 40.
Unit Not Operating, Internal Status Indicators: RED: Off GREEN: Off Control Panel Indicators: RED: Off YELLOW: Off GREEN: Off Power Switch ON. Continuous audible alarm.	Transformer assembly: 1. Assembly connector disconnected. 2. Faulty transformer assembly.	1. Reattach connector. 2. Replace transformer assembly. Refer to 6.13 Replacing the Transformer, page 33.
Unit Operating, Internal Status Indicators: RED: Three Flashes GREEN: One Flash Control Panel Indicators: RED: Off YELLOW: Flashing GREEN: On	Internal repairs required.	Replace SensO ₂ circuit board. Refer to 6.12 Replacing P. C. Board, page 32.
Potential Obstruction Alert does not activate on flows less than 0.5 L/min.	System leak.	Repair leak in product tank, regulator, tubing, fittings, or flow meter.
	Defective check valves.	Replace check valves. Refer to 6.6 Replacing Check Valves, page 26.

10 Technical data

10.1 Specifications

Electrical Requirements:	230 VAC $\pm$ 10% (253 VAC/207 VAC), 50 Hz
Rated Current Input:	1.5 A
Sound Level:	40 dBA max
Altitude:	Up to 6,000 ft (1828 meters) above sea level without degradation of concentration levels. Not recommended for use above 6,000 ft (1828 meters). Atmospheric pressure range: 101.33kPa - 81.22kPa
*Oxygen Output Concentration Levels:	87% to 95.6% for flows ranging at 0.5 to 5 L/min 93% $\pm$ 3% at 2 L/min
Maximum Outlet Pressure:	34.5 kPa $\pm$ 3.45 kPa (5 psi $\pm$ 0.5 psi)
Low Flow Alarm:	0.5 to 5 L/min For flowrates less than 1 L/min, we recommend the use of the Invacare Pediatric Flowmeter IRCPF16AW Accessory.
Potential Obstruction Alert:	0.5 to 5 L/min The concentrator detects a condition that may indicate a potential obstruction of the output oxygen. Rapid audible beeping alert (this alert is deactivated when accessories are connected). May be associated with flow setting of 0.5 L/min or less.
Power Consumption:	Perfecto ₂ AW - 300 W at 5 L/min, 280 W at 3L/min Perfecto ₂ VAW - 320 W at 5 L/min
Pressure Relief Mechanism Operational at:	241 kPa $\pm$ 24.1 kPa (35 psi $\pm$ 3.5 psi)
Change in maximum recommended flow when back pressure of 7kPa applied):	0.7 L/min
Filters:	Cabinet, Outlet HEPA and Compressor Inlet
Safety System:	Current overload or line surge shutdown High temperature compressor shutdown High Pressure Alarm w/compressor shutdown Low Pressure Alarm w/compressor shutdown Battery Free Power Loss Alarm SensO ₂ Oxygen System Possible Obstruction Alert
Width:	38.1 cm $\pm$ 1 cm (15 in $\pm$ 3/8 in)
Height:	58.4 cm $\pm$ 1 cm (23 in $\pm$ 3/8 in)
Depth:	30.5 cm $\pm$ 1 cm (12 in $\pm$ 3/8 in)
Weight:	Perfecto ₂ AW - 20.5 kg $\pm$ 1 kg (45 lbs $\pm$ 2 lbs) Perfecto ₂ VAW - 18.1 kg $\pm$ 1 kg (40 lbs $\pm$ 2 lbs)
Shipping Weight:	Perfecto ₂ AW - 22.7 kg $\pm$ 1 kg (50 lbs $\pm$ 2 lbs) Perfecto ₂ VAW - 20.4 kg $\pm$ 1 kg (45 lbs $\pm$ 2 lbs)
Operating Ambient Temperature:	10°C - 35°C (50°F - 95°F) at 60% maximum relative humidity
Cabinet:	Impact Resistant flame-retardant plastic cabinet that conforms to UL 94-V0.
No APAPG	Not suitable for use in the presence of a flammable anaesthetic mixture

Standard and Regulatory Listings	IEC/EN60601-1, A1, A2 IEC/EN60601-1-2 IEC/EN61000-3-2 IEC/EN61000-3-3, ISO8359 MDD 93/42/EEC, Annex I and IX
CE marked model:	IRC5PO2AW/IRC5PO2VAW
Electrical:	No extension cords.
Placement:	No closer than 30,5 cm (12 in) from any wall, draperies, or furniture to assure sufficient air flow Avoid deep pile carpets and heaters, radiators or hot air registers Floor location only No confined spaces (Example: No closets)
Tubing:	2 m (7 ft) cannula with a maximum 15 m (50 ft) of Crush-Proof Tubing (DO NOT pinch)
Time of Operation:	Up to 24 hours per day.
Recommended Storage and Shipping Temperature:	-29°C to 65°C (-20°F to 150°F), at 15-95% relative humidity.
Environment:	Smoke and soot-free No confined spaces (Example: No closets)
Minimum Operating Time:	30 Minutes



Stated concentration levels achieved after initial warm-up period (approximately 30 minutes).

10.2 O₂ Indicators

Label Symbol	O ₂ Purity	Indicator Lights (LED)
O ₂	SYSTEM OKAY O ₂ over 85%	GREEN Indicator Light
	O ₂ Between 73% to 85%	YELLOW Indicator light 1. YELLOW Solid 2. YELLOW Flashing Sensor Failure Call a qualified technician. Have a back-up supply of oxygen ready.
	SYSTEM FAILURE O ₂ Below 73%	RED Indicator Light Continuous Audible Alarm Sieve-GARD™ Compressor Shutdown.

II Customer Service

II.1 Customer Service and Warranty Information

Customer Service and Warranty Information

Terms and conditions of the warranty are part of the general terms and conditions particular to the individual countries in which this product is sold.

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