AirSep® Corporation
Centrox
PSA Oxygen Concentrator

Instruction Manual
Before you attempt to install, operate, or repair the oxygen concentrator, read and thoroughly understand this instruction manual. Improper operation can result in severe bodily injury, damage to the system, or poor performance.

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### Ownership Data

Take a moment to note important information below about your AirSep CENTROX PSA Oxygen Concentrator. Keep this instruction manual, along with your invoice, to serve as a permanent record of your purchase.

#### PSA Oxygen Concentrator

<table>
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#### AirSep Representative

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1.0 Introduction

1.1 General

This instruction manual provides a description of the AirSep CENTROX Pressure Swing Adsorption (PSA) Oxygen Concentrator as well as instructions for its installation, operation, and maintenance. Pertinent drawings and component information are also included.

To ensure safe operation and proper system maintenance, AirSep Corporation recommends that you keep this instruction manual readily available for reference.

1.2 Warnings, Cautions, and Notes

As you read the instruction manual, pay special attention to the Warning, Caution, and Note messages. They identify safety guidelines or other important information as follows:

- **WARNING**
  - Provides information that can prevent severe bodily injury or death.

- **CAUTION**
  - Provides information that can prevent minor bodily injury or property damage.

- **NOTE**
  - Provides information important enough to emphasize or repeat.

1.3 References to Controls and Indicators with Labels

This operating manual uses uppercase characters (e.g., ON/OFF switch) to refer to controls and indicators. Refer to section 4 for a description of all the controls and indicators of the oxygen concentrator.
2.0 Safety

2.1 General

Oxygen, the most abundant of the elements, makes up about 50 percent of the earth's crust. In its free state, it forms about one-fifth of our air by volume. Although oxygen is classified as a non-flammable gas, it supports combustion. As an active element, it combines directly or indirectly with all elements except the rare gases. It is an invisible gas that is colorless, odorless, and tasteless.

To ensure your safety, thoroughly read and familiarize yourself with this Safety section. AirSep Corporation strongly recommends that you review this section periodically.

2.2 Potential Hazards

Before you attempt to install, operate, or repair the CENTROX Oxygen Concentrator, read and thoroughly understand this instruction manual. Improper operation can result in severe bodily injury, damage to the system, or poor performance.

It is recommended to have an alternate source of oxygen supply if a power failure or equipment malfunction occurs.

Take extreme care to keep all the oxygen piping and vessel clean. To avoid a fire or an explosion, oxygen clean all surfaces that can come in contact with oxygen. Check all oxygen fittings/joints for leaks with an oxygen-compatible leak-detecting solution.
Oxygen vigorously accelerates the burning of combustible materials. In an oxygen-enriched atmosphere, many materials that do not burn in normal air require only a slight spark or moderate heat to set them aflame.

To avoid a fire or an explosion, keep gasoline, kerosene, oil, grease, cotton fibers, paint, and any other combustible material away from any part of the CENTROX Oxygen Concentrator or optional auxiliary oxygen receiver.

Do not smoke or use an open flame near the oxygen concentrator or optional auxiliary oxygen receiver.

Post "NO SMOKING OR OPEN FLAMES" signs in the area where the oxygen concentrator and optional auxiliary oxygen receiver are located. AirSep STRONGLY recommends that only individuals trained and experienced in the safe handling of oxygen operate this system.

The interior of the CENTROX Oxygen Concentrator contains electrical parts that can produce an electrical hazard if not handled properly. To prevent electrical shock, read and thoroughly understand the Troubleshooting section of this instruction manual before you service the system.

Connect the oxygen concentrator power cord to a properly grounded wall outlet on a circuit that cannot be accidentally turned off. Do not use extension cords.

To prevent fire or electrical shock, locate the oxygen concentrator and the auxiliary oxygen receiver (if supplied) indoors away from rain or any other type of moisture.
2.3 Safety Publications

This section is not a complete summary of required safety procedures. Review the following publications for additional information on the safe handling of oxygen:

- "Installation of Bulk Oxygen Systems at Consumer Sites;" NFPA No. 50; National Fire Protection Association; 1 Batterymarch Park; P. O. Box 9101; Quincy, Massachusetts 02269-9101 USA.

- "Oxygen;" Pamphlet G-4; Compressed Gas Association; 1725 Jefferson Davis Highway; Arlington, Virginia 22202-4102 USA.

- "Cleaning Equipment For Oxygen Service," Pamphlet G-4.1; Compressed Gas Association; 1725 Jefferson Davis Highway; Arlington, Virginia 22202-4102 USA.
3.0 System Description

3.1 Introduction

Air Contains 21% oxygen, 78% nitrogen, 0.9% argon, and 0.1% other gases. AirSep Oxygen Concentrator separates this small percentage of the oxygen from the compressed air through a unique Pressure Swing Adsorption (PSA) process.

The CENTROX unit consists of two enclosures. The smaller enclosure contains two compressors that supply air for the process. Each compressor has a dedicated switch and circuit breaker. The cord from the enclosure plugs into the PSA enclosure. This cord must not be plugged into any other power supply outlet. Circuitry inside the PSA enclosure controls the power supplied to the compressors. The power cord from the PSA enclosure plugs into the wall. Figure 3.1 shows the two enclosures of the CENTROX oxygen concentrator.

![Figure 3.1: CENTROX Oxygen Concentrator](image)

The compressor enclosure (See Figure 3.1) supplies pressurized air to the PSA enclosure (See Figure 3.1). Inside the PSA enclosure, the pressurized air enters the feed & waste manifold (See Figure 4.4). A series of valves in the feed & waste manifold controls the flow of air into each of the adsorber beds (See Figure 4.4). Valves also connect the beds to two mufflers (See Figure 4.4) that allow waste gas to be vented from the beds. The oxygen concentrator uses in its adsorber vessels an inert ceramic material called molecular sieve to separate compressed air into the oxygen and the other gases. The unique properties of molecular sieve allow it to attract, or adsorb, nitrogen physically from air under pressure.
This allows oxygen to exit the adsorbers as a product gas. Oxygen from top of the beds then flows to the check valve assembly and then to the product manifold (See Figure 4.4). The check valve assembly supplies product oxygen to the flow controller. The product manifold controls the flow of oxygen from one bed to another during various stages of the oxygen generating process. The product oxygen then flows through the product valve to the customer’s application. An oxygen analyzer continuously monitors the purity of oxygen and provides an alarm in case of low purity.

The entire oxygen generating process is completely regenerative, which makes it both reliable and virtually maintenance-free. The molecular sieve does not normally require replacement.

This instruction manual serves as the guidelines for CENTROX oxygen concentrator. Refer to the illustrations, located in the Appendix A of this instruction manual, for the detailed flow diagram and electrical schematic of the oxygen concentrator referenced in this instruction manual.
4.0 Controls, Parts, and Connections

4.1 Introduction

The section describes the various parts, controls, indicators and connections required for the CENTROX oxygen concentrator.

4.2 Oxygen Concentrator Controls and Indicators

4.2.1 Compressor Enclosure

Figure 4.1 shows the compressor enclosure along with all the controls and indicators.

![Figure 4.1: Compressor Enclosure](image)

**ON/OFF (Power) Switch**

The individual ON/OFF switches (green color) on the compressor enclosure starts and stops the operation of the oxygen compressors. When you supply power to the system, the green indicator light of the switches turns on. It remains lit whether the switch is in the ON or OFF position (See Figure 4.1).

**Circuit Breaker Reset Buttons**

The individual circuit breaker reset buttons on the compressor enclosure are used to reset the compressors after an electrical overload shutdown (See Figure 4.1).
Air Intake Filters

Located on the left side panel, the air intake filter removes any foreign particles from the air that enters the compressor enclosure (See Figure 4.1).

Fuses/Circuit Breakers, if required, must be replaced with the same type and amp rating as the original.

4.2.2 PSA Enclosure

Figure 4.2 shows the controls and indicators of the PSA enclosure.

ON/OFF (Power) Switch

The ON/OFF switch starts and stops the operation of the oxygen concentrator. When you supply power to the system, the switch’s green indicator light turns on. It remains lit whether the switch is in the ON or OFF position (See Figure 4.2).

AUTO/MANUAL Switch

The AUTO/MANUAL switch includes an yellow indicator light. In the AUTO position, the concentrator cycles on and off to meet oxygen demand. In the MANUAL position, the concentrator cycles continuously. The concentrator produces oxygen only while the yellow light is lit (See Figure 4.2).

Hour Meter

The hour meter indicates the total number of hours the concentrator has cycled (See Figure 4.2).
Low Purity Light
The unit is equipped with an oxygen sensor. If the purity supplied to the tank is below 85% (±3%), the red light on the PSA enclosure will be on (See Figure 4.2).

Low Purity Alarm
If the purity is below 85% (±3%) for more than 30 minutes, an audible alarm will sound (See Figure 4.2).

NOTE
The low oxygen purity alarm will sound for 4 seconds when the unit is turned on.

FEED AIR PRESSURE Gauge
The FEED AIR PRESSURE gauge indicates the pressure of the feed air before it enters the PSA enclosure (See Figure 4.2).

PRODUCT PRESSURE Gauge
The PRODUCT PRESSURE gauge indicates the pressure of oxygen coming out of the adsorber beds (See Figure 4.2).
4.3 Oxygen Concentrator Parts

Figure 4.3 and Figure 4.4 shows the internal components of the CENTOX oxygen concentrator

4.3.1 Compressor Enclosure

**Compressors**
The compressors compress the air entering the enclosure before it is supplied to the PSA enclosure (See Figure 4.3).

**Cabinet Fans**
The cabinet fans provide internal cooling for the air compressor. Fans also help in better circulation of the air inside the compressor enclosure (See Figure 4.3).

**Compressor Intake Filter**
This filter provides additional filtration for the air as it enters the air compressor. This filter is attached to the gray PVC pipe. The complete assembly of the PVC pipe and the filter is called resonator (See Figure 4.3).

**Heat Exchanger**
The heat exchanger coils cool the compressed air leaving the compressor enclosure (See Figure 4.3).

**Check Valve Assembly**
Check Valve assembly prohibits the back flow of compressed air.
4.3.2 PSA Enclosure

Adsorber Beds
The adsorbers contain the molecular sieve that adsorbs (attracts) nitrogen from compressed air and allows oxygen to pass through as product gas (See Figure 4.4).

Main Circuit Board
Main circuit board provides signal to all the valves based on the status of the oxygen generator.

Feed Air Dump Valve
The solenoid-operated valve is used to dump the compressed feed air for 3-5 sec at the initial start-up and 1 sec at the start of standby mode. This removes any pressure that builds up inside the compressor to ensure easy start-up.

Check Valve
Check Valve assembly prohibits the back flow of compressed air.
Feed Valves
The automatic feed air valves control the flow of the feed air as the air enters the adsorbers (See Figure 4.4).

Waste Valves
The automatic waste valves control the flow of waste gas as it exits the adsorbers (See Figure 4.4).

Exhaust Mufflers
The mufflers muffle the noise produced by the waste gas that vents through the beds (See Figure 4.4).

Product Manifold
Product manifold facilitates the oxygen flow across adsorber beds (from top of the adsorber beds) and to the product delivery line.

Equalization Valves
The equalization valves on the product manifold controls the flow of oxygen from one bed to another during various steps of the oxygen generation process (See Figure 4.4).

Check Valves Assembly
The check valve assembly supplies the product oxygen to the flow controller. See Figure 4.4.

Product Pressure Gauge
Product pressure gauge mounted on the check valve assembly (See Figure 4.4) displays the pressure of the product oxygen.

Flow Controller
The flow controller regulates the flow of oxygen (See Figure 4.4).

Product Valve
The valve prevents the supply of oxygen when the unit is in standby mode (Refer to section 6 for the description of different types of mode). See Figure 4.4 for the location of the product valve.

Coalescing Filter
The coalescing filter serves as bacteria filter and removes any bacteria present in the oxygen supply (See Figure 4.4).

Oxygen Monitor Board
The oxygen sensor monitors the purity supplied from the PSA enclosure. If the oxygen purity decreases below the set point, low purity light on the PSA enclosure will be on. If the problem persists for more than 30 minutes, a low purity alarm will sound.
**Oxygen Sample Regulator**

A regulator before the oxygen monitor board regulates the pressure to 4-5 psig to the oxygen monitor board. Refer to the section 7 for the regulator adjustment.

**Pressure Switch**

When the oxygen concentrator operates in Auto mode, the pressure switch monitors the oxygen pressure at the outlet of the oxygen concentrator. When the pressure at the oxygen concentrator outlet increases to the pressure switch upper setpoint, the pressure switch circuit closes and the oxygen concentrator starts a timed shutdown that stops the unit at the end of the shutdown sequence (After 10 additional cycles). When the pressure at the oxygen concentrator outlet decreases to the lower setpoint of the switch, the pressure switch opens to activate the oxygen concentrator and the oxygen production begins. When the oxygen concentrator operates in Manual mode, the pressure switch circuit remains open and the oxygen concentrator cycles continuously. Refer to the appendix A of the manual for lower and upper setpoint settings of the pressure switch.
4.4 Auxiliary Kits Information (Optional)

The items discussed in this section are supplied as ordered. Listed below are the different starter kits available as per the oxygen concentrator ordered.

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Table 4.1: Optional Starter Kits for the Concentrator Purchased

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<td>Primary/Secondary Ball Valve Assembly, Oxygen-clean, (Secondary Hose)</td>
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<tr>
<td>KI470-1</td>
<td>Regulator-Flowmeter Assembly, Oxygen-clean (Main Oxygen Outlet Hose)</td>
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<tr>
<td>TA150-1</td>
<td>60 Gallon Tank Assembly, O₂ Cleaned</td>
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Table 4.2: Description of the Parts included in the Starter Kits

Please contact AirSep Corporation Sales representative for ordering the starter kits. Below is a brief description of item included in the starter kits.

Primary Oxygen Ball Valve

The primary oxygen ball valve controls the flow of oxygen from the oxygen concentrator to your oxygen distribution system. See Figure 5.1.

Secondary Oxygen Ball Valve

The secondary oxygen ball valve controls the flow of a backup source of oxygen to your oxygen distribution system. This ball valve should always be closed unless a backup source is connected to it. See Figure 5.1.

Regulator-Flowmeter Assembly

This assembly consists of a pressure regulator and a flowmeter. The pressure regulator attaches to the outlet port of the oxygen receiver to regulate the pressure of the oxygen. The flowmeter is used to regulate
the flow of the oxygen at the outlet of the oxygen receiver. Refer to figure 5.1 for the installation location of this assembly.

**Oxygen Isolation Ball Valve Assembly**

The oxygen isolation ball valve stops the flow of oxygen to the oxygen receiver during troubleshooting. The oxygen relief valve in the assembly prevents excess pressure from building in the oxygen receiver if a system malfunction occurs. This assembly is shipped mounted on the oxygen receiver. See Figure 4.5.

**Main Oxygen Hose**

An oxygen-clean hose is provided that connects the outlet of the supply valve assembly (Refer to section 4.5) on the oxygen concentrator to the oxygen isolation ball valve assembly on the oxygen receiver.

**Secondary Oxygen Hose**

Secondary hose is provided to connect the outlet of the regulator-flowmeter assembly to the inlet of the primary oxygen ball valve. Refer to Figure 5.1.

**Oxygen Receiver**

The oxygen receiver stores oxygen produced by the oxygen concentrator. It also provides stable flow and purity for short-term surges of oxygen that exceed the rated capacity of the oxygen concentrator.

![Oxygen Receiver Diagram](image-url)
4.5 Connections

Supply Valve Assembly
This assembly is shipped loose and must be connected to the PSA enclosure oxygen outlet. The supply valve assembly limits the amount of flow to the oxygen receiver during purge. Refer to Figure 5.1 and 6.1.

Power Cord
This power cord and its grounded electrical plug supply power to the CENTROX when connected to a grounded electrical outlet.
5.0 Installation

5.1 Unpacking

AirSep Corporation ships CENTROX Oxygen Concentrators on a wooden skid covered with corrugated cardboard. This container includes an accessory kit with an instruction manual and all the items necessary to properly install the oxygen concentrator. The oxygen receiver (if supplied) is shipped separately. Contact your AirSep Corporation’s Sales representative for ordering the auxiliary kits supplied with the CENTROX oxygen concentrator.

AirSep recommends that you follow these unpacking guidelines carefully to protect yourself against loss from any damage caused during shipment.

1. Inspect the exterior for damage. If you observe any damage, note it on the freight bill or the express receipt before you sign it.

   Failure to note exterior damage on the freight bill or the express receipt at the time of delivery can result in the carrier’s refusal of a damage claim.

   Remove the corrugated cardboard very carefully. You may need to return the oxygen concentrator if it was damaged during shipment.

2. Carefully cut and remove any banding straps from the container. Then remove the corrugated cardboard.

3. Remove the oxygen concentrator from the wooden skid.

4. Thoroughly inspect the oxygen concentrator interior and exterior for damage caused during shipment. Pay special attention to the cabinet switches, gauges, brackets, etc.

5. Remove the accessory kit and inspect the contents for damage.

6. Although the CENTROX is carefully inspected, tested, and packed, it can be damaged during shipment due to improper handling. If you find any concealed damage (loss or damage not found until the
concentrator is unpacked), immediately call the delivery carrier and file a concealed-damage claim. Keep ALL container material and interior packing for the carrier's inspection.

**NOTE**

YOU MUST MAKE A CONCEALED-DAMAGE CLAIM WITHIN 24 HOURS OF DELIVERY. Only the consignee can file this claim.

**NOTE**

Follow these unpacking guidelines carefully to protect yourself against loss from any damage caused during shipment.
5.2 Pre-Installation Guidelines

Before you install the CENTROX oxygen concentrator, and the oxygen receiver, if supplied, refer to the Specifications section in the Appendix of this instruction manual to determine the applicable space, and the power requirements for your particular model.

A backup source of oxygen must be available if a power failure or system malfunction occurs.

Make sure the area that surrounds the oxygen concentrator is well ventilated, and provide sufficient space around the unit [at least three feet] to allow for cool air flow as well as to allow safe operation and maintenance.

Locate the oxygen concentrator in an area where the ambient air temperature remains between 4°C (40°F) and 40°C (104°F) to prevent damage not covered under the AirSep Corporation Product Warranty.

Connect the oxygen concentrator power cord only to a properly grounded electrical outlet on a circuit that cannot be accidentally turned off. Do not use extension cords.

Provide proper voltage to the oxygen concentrator to prevent damage not covered under the AirSep Product Warranty.

Do not plug in the power cord until you complete the installation of the oxygen concentrator.
5.3 Installation Instructions

To assure proper installation and safe operation of your CENTROX PSA Oxygen Concentrator, AirSep Corporation recommends that you review this entire section before you attempt to install the unit.

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**WARNING**

Do not turn off power to any component unless you are sure the medical facility does not require any oxygen, or there is a sufficient alternative/backup source of oxygen.

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**WARNING**

Before you attempt to install, operate, or repair the oxygen concentrator, read and thoroughly understand this instruction manual. Improper operation can result in severe bodily injury, damage to the system, or poor performance.

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Refer to the Figure 5.1 as you follow the installation instructions:

1. Place the oxygen concentrator near the inlet of your oxygen distribution system.

2. Mount both the enclosures securely to a wall, ensuring that there is a minimum of two feet between the two enclosures and minimum of three feet between the compressor enclosure and a wall. The compressor enclosure can be on either side of the PSA enclosure.

3. Open the compressor enclosure and remove the tie wrap from each compressor. The tie wrap holds the compressor to a bracket support for shipping purpose.

4. Attach the red air hose from the compressor enclosure to the fitting on the left hand side of the PSA enclosure (See Figure 4.5 and 5.1).

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**NOTE**

The supply valve assembly at the outlet of the oxygen concentrator has a small hole drilled in it and allows a controlled amount of flow during purging process (See Section 6) of the 60 gallon tank (If supplied).

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5. Mount the supply valve assembly (shipped loose) at the outlet of the PSA enclosure. Refer to Figure 5.1 and 6.1.

6. Attach the main oxygen hose from the supply valve to the inlet of the oxygen isolation ball valve assembly at the oxygen tank (See Figure 4.5 and 5.1).
7. Attach the regulator-flowmeter assembly at the outlet of the oxygen receiver.

8. Connect the inlet of the primary oxygen ball valve to the outlet of the regulator-flowmeter assembly (See Figure 5.1) with the secondary oxygen hose.

9. Attach a regulator set at 48 psig (not supplied by AirSep Corporation) to the outlet of the backup cylinder.

10. Connect the inlet of the secondary oxygen ball valve to the outlet of the above regulator using oxygen-clean hose.

11. Attach the center fitting of the primary/secondary ball valve assembly ‘T’ to your distribution system. The flowrate setting of the flowmeter should not exceed the value specified in the Appendix A of the manual.

12. Plug the electrical cord coming out of the compressor enclosure to the PSA enclosure as shown in the Figure 5.1.

13. Plug the cord from the PSA enclosure into the power supply outlet.

14. Make sure that the secondary ball valve is closed.
6.0 Operation

6.1 Initial Start-Up

![WARNING]

Before you attempt to install, operate, or repair the CENTROX Oxygen Concentrator, read and thoroughly understand this instruction manual. Improper operation can result in severe bodily injury, damage to the system, or poor performance.

Oxygen vigorously accelerates the burning of combustible materials. In an oxygen-enriched atmosphere, many materials that do not burn in normal air require only a slight spark or moderate heat to set them aflame.

To avoid a fire or an explosion, keep gasoline, kerosene, oil, grease, cotton fibers, paint, and any other combustible material away from any part of the oxygen concentrator.

Do not smoke or use any open flame near the oxygen concentrator or oxygen receiver.

Post "NO SMOKING OR OPEN FLAMES" signs in the area where the components are located. AirSep STRONGLY recommends that only individuals trained and experienced in the safe handling of oxygen operate this system.

![NOTE]

Before the CENTROX can supply oxygen within purity specifications, you must purge all air from the oxygen receiver(s).

Provide proper voltage to the oxygen concentrator to prevent damage not covered under the AirSep Product Warranty.
When you turn the oxygen concentrator on for the first time, it can take 20-30 minutes for the oxygen purity to reach the specification.

1. Observe that the ON/OFF switch on the PSA enclosure is in the off position.

2. Insert the compressor enclosure electrical plug to the electrical inlet at the bottom of the PSA enclosure. Refer to Figure 5.1.

3. Connect the PSA enclosure power cord to a properly grounded electrical outlet that cannot be accidentally turned off. Do not use extension cords.

4. If a power light is off, first check the electrical connection and then the oxygen concentrator circuitry. If this condition still exists, refer to the Troubleshooting section.

5. Set the AUTO/MANUAL switch on the PSA enclosure to the MANUAL position.

6. Ensure that oxygen isolation ball valve is open (See Figure 5.1).

7. If the unit is equipped with an oxygen monitor, the oxygen monitor light on the control panel remains on until the oxygen purity reaches 85% ±3%. The oxygen monitor alarms intermittently after 30 minutes if the CENTROX does not reach proper oxygen purity. During start-up, this alarm is silenced for 30 minutes.

8. Air exhausts for 3-5 seconds from the feed air dump valve (See Figure A.1). This is normal. It removes any pressure that builds up inside the compressor to ensure easy start-up.

6. Close the primary and the secondary oxygen ball valves (See Figure 5.1).

7. Remove the hose that connects the center fitting of the primary/secondary ball valve assembly to your distribution system. This will allow the air in the tank to be vented to the atmosphere.

8. Put the supply valve in the closed position (See Figure 6.1).
9. Set both the ON/OFF switches on the compressor enclosure in the 'ON' position.
10. Set the PSA enclosure’s ON/OFF switch to the ON position. At this stage, all the green ON/OFF switches should be ON.
11. Open the primary oxygen ball valve.
12. Fully open the regulator and flowmeter (See Figure 5.1). Oxygen should start coming out of the outlet once the regulator and flowmeter are open.
13. Allow the unit to run to purge air out of the tank and to achieve the minimum purity level of the oxygen as specified in the appendix A of the operating manual. This step may take 20-30 minutes.
14. Make sure that the minimum purity level of the oxygen as specified in the appendix A of the operating manual has been reached (the low purity light and the alarm goes off).
15. Fully close the primary oxygen ball valve (See Figure 5.1).
16. Set the AUTO/MANUAL switch on the PSA enclosure to the AUTO position.
17. Allow the oxygen receiver to attain a pressure of 55-65 psig. Make sure oxygen concentrator enters the standby mode and the yellow AUTO/MANUAL light shuts off.
18. Fully open the supply valve on the PSA enclosure.
19. Make sure that the regulator at the outlet of the oxygen tank is set at 50 psig (Open the primary oxygen ball valve slightly to adjust the regulator).
20. Close the primary oxygen ball valve and reattach the hose to the distribution system.
21. Open the primary oxygen ball valve.
22. Allow 15 LPM (max.) to flow through the flowmeter.
23. Make sure that the regulator at the outlet of the backup oxygen supply is set at 48 psig.
25. Check all fittings and connections for leaks.
6.2 Operation

AUTO Mode

With the AUTO/MANUAL switch on the PSA enclosure’s panel in the AUTO position, the oxygen concentrator cycles on and off automatically based on oxygen demand. When the PRODUCT PRESSURE gauge increases to the approximate pressure switch maximum pressure specified in this instruction manual, oxygen production stops after ten cycles and enters the Standby mode. At this stage, the yellow indicator light on the AUTO/MANUAL switch shuts off. When the pressure of the oxygen coming out of the adsorber beds decreases to approximately the pressure switch minimum pressure specified in this instruction manual, the oxygen concentrator resumes oxygen production and the yellow indicator light on the AUTO/MANUAL switch illuminates. The AUTO mode enables the most energy-efficient operation of the oxygen concentrator. Use the AUTO mode during normal operation and to shut down the oxygen concentrator.

MANUAL Mode

With the AUTO/MANUAL switch on the oxygen concentrator control panel in the MANUAL position, the oxygen concentrator cycles continuously, regardless of the pressure fluctuations. Use the MANUAL mode during initial start-up or start-up after an extended shutdown of the oxygen concentrator and, depending on the oxygen flow, pressure, and purity requirements of your application, as directed by your AirSep Corporation representative.
6.3 **Shutdown**

**WARNING**
Do not turn off power to the oxygen concentrator unless you are sure that the facility does not require any oxygen, or there is a sufficient alternative/backup source of oxygen.

1. Close the primary oxygen ball valve.
2. Observe that the AUTO/MANUAL switch is in the AUTO position, and wait until the yellow light shuts off and the CENTROX concentrator enters the standby mode.
3. Set the ON/OFF switch on the PSA enclosure to the OFF position.
4. Set the ON/OFF switches on the compressor enclosure to the OFF position.
5. Close the oxygen isolation ball valve (See Figure 5.1).

**CAUTION**
Failure to wait until the yellow light on the AUTO/MANUAL switch automatically shuts off will result in initial lower purity oxygen during subsequent startup.

6.4 **Normal Start-Up**

1. Make sure the AUTO/MANUAL switch is in the AUTO position and the ON/OFF switch's green power light is on.
2. Ensure that the oxygen isolation ball valve is open (See Figure 5.1).
3. Set the ON/OFF switch on the compressor enclosure to the ON position.
4. Set the ON/OFF switch on the PSA enclosure to the ON position.
5. Open the primary oxygen ball valve.

6.5 **Start-Up after an Extended Shutdown**

When the CENTROX oxygen concentrator is turned on after an extended shutdown, the oxygen receiver may be full of air or low purity oxygen. Before the CENTROX can supply oxygen within purity specifications, you must purge all air from the oxygen receiver. To do this, follow all steps described in Section 6.1.
Using the oxygen generator at flows higher than 15% above those specified in Appendix A of this manual, will result in the likely contamination of the molecular sieve beds. This damage is not covered under the standard warranty.
7.0 Maintenance/Service

To ensure the long life of your CENTROX Oxygen Concentrator, maintain the unit as described in the following sections. Follow the procedures described in this section of the instruction manual for daily, semi-annual, and annual maintenance.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>Remove and wash air intake filters.</td>
</tr>
<tr>
<td>Semi-Annual</td>
<td>Clean Compressor intake filters.</td>
</tr>
<tr>
<td>Annually</td>
<td>Replace coalescing filter element. The filter element should be changed if found very dirty even if one year time period has not elapsed.</td>
</tr>
<tr>
<td></td>
<td>Check performance of all the solenoid valves. Replace or rebuild as necessary.</td>
</tr>
<tr>
<td>12000 hours</td>
<td>Rebuild the feed air compressor.</td>
</tr>
</tbody>
</table>

*Table 7-1 Maintenance Chart*

Foreign particles in the feed air affect the operation of the oxygen concentrator. The filters supplied in the concentrator are factory-selected based on the unit's air requirements and average air conditions.

The interior of the CENTROX Oxygen Concentrator contains electrical parts that can produce an electrical hazard if not handled properly. To prevent electrical shock, use extreme care when you service the system.

AirSep selects concentrator filters based on their ability to perform in severe conditions. Use of other than Original Equipment Manufacturer filters/elements can cause damage not covered under the AirSep Product Warranty.

Failure to maintain the air intake and compressor intake filters can allow foreign particles in the air to enter the oxygen concentrator and cause damage not covered under the AirSep Product Warranty.
7.1 Weekly Maintenance

Once every seven days. (Remove the air intake filters (See Figure 4.1) from the left side of the compressor enclosure and wash it with soap and water.)

7.2 Semi-Annual Maintenance

7.2.1 Cleaning the Compressor Intake Filters

Once every six months or as often as necessary, use the following procedure to clean the compressor intake filters.

1. Close the primary oxygen ball valve.
2. Observe that the AUTO/MANUAL switch is in the AUTO position, and wait until the yellow light shuts off.
3. Set the ON/OFF switch to the OFF position on both the enclosures.
4. Unplug the unit from main power supply.
5. Open the compressor enclosure.
6. Pull up on the black cap on the compressor intake filter housing to remove it. This is attached to the gray PVC pipe (See Figure 4.3: Resonator).
7. Remove and wash the foam insert with soap and water.
8. Replace the foam insert.
9. Replace the black cap.
10. Close the compressor enclosure.
11. Follow all steps in Section 6.1 – Initial Start-up.

7.2.2 Adjusting the Oxygen Sample Regulator

Ensure that the backup supply of oxygen is present with the secondary oxygen ball valve open, if oxygen is needed while adjusting the oxygen monitor regulator.

1. Close the primary oxygen ball valve.
2. Observe that the AUTO/MANUAL switch is in the AUTO position, and wait until the yellow light shuts off.
3. Set the ON/OFF switch on the PSA enclosure to the OFF position.

4. Open the PSA enclosure.

5. Pull outward on the oxygen monitor regulator knob and turn it fully counterclockwise.

6. Disconnect the tubing at the oxygen sample regulator. See Figure 4.4 for location of oxygen sample regulator.

   ! IMPORTANT
   Remove any tie-wraps from the tubing before you disconnect it.

7. Connect the tubing from regulator pressure test kit# KI488-1 to oxygen sample regulator.

8. Set the AUTO/MANUAL switch to MANUAL position

9. Set the ON/OFF switch to ON position.

   ! WARNING
   The interior of the Centrox Oxygen Concentrator contains electrical parts that can produce an electrical hazard if not handled properly. To prevent electrical shock, use extreme care when you service the system.

10. Adjust the knob on the oxygen sample regulator until the gauge registers 4-5 psig.

11. Lock the oxygen sample regulator knob by pressing it. Confirm the setting after locking the regulator.

   ! CAUTION
   Do not set the oxygen sample regulator above 5 psig as it may create an overdraining condition and result in low purity oxygen alarm.

12. Set the ON/OFF switch to the OFF position.

13. Remove the oxygen regulator pressure kit tubing from the oxygen sample regulator.

14. Reconnect the tubing from oxygen monitor board to the oxygen sample regulator.

15. Secure the tubing with new tie-wraps.

16. Close the PSA enclosure.

17. Follow all steps in Section 6.1 (Initial Start-up).
7.3 Annual Maintenance

The expected life of the coalescing filter element is approximately 12 months. Failure to replace the filter element on schedule results in a void AirSep Product Warranty.

AirSep selects concentrator filters based on their ability to perform in severe conditions. Use of other than Original Equipment Manufacturer filters/elements can cause damage not covered under the AirSep Product Warranty.

Failure to maintain the air intake and compressor intake filters can allow foreign particles in the air to enter the concentrator and cause damage not covered under the AirSep Product Warranty.

7.3.1 Coalescing Filter Element Replacement

The coalescing filter is located inside the PSA enclosure (See Figure 4.4). It removes any foreign particles present in the oxygen supply.

Order the element to be replaced through the AirSep Industrial Service Department. Specify Part Number FI018-1, cleaned for oxygen service. Contact AirSep Monday through Friday, from 8:00 a.m. to 4:00 p.m. Eastern Standard Time/USA or Canada, at 1-800-320-0303 or (716) 691-0202 outside of the USA/Canada.

1. Wash your hands thoroughly, and make sure they are oil-free before you begin this procedure.

Oxygen can cause spontaneous combustion, and as such, is a fire hazard. Make sure that no flammable materials are located in the oxygen concentrator area designated "Oxygen in Use — No Smoking."

2. Close the primary oxygen ball valve. See Figure 5.1 for location of this valve.
3. Observe that the AUTO/MANUAL switch is in the AUTO position, and wait until the yellow light shuts off.

4. Set the ON/OFF switch of the PSA enclosure to the OFF position.

5. Close the oxygen isolation ball valve. See Figure 5.1 for location of this valve.

6. Unplug the PSA enclosure power cord from the electrical outlet.

7. Open the PSA enclosure.

8. Push up on the pin or unscrew the plastic nut (whichever applicable) on the bottom of the filter bowl.

   Pressure releases when you push up on the pin or unscrew the plastic nut (whichever applicable) on the filter bowl.

9. When the PRODUCT PRESSURE gauge registers 0 psig, the unit is depressurized.

10. When the unit is depressurized, replace the filter element.

11. To gain access to the element, you must remove the filter bowl. Unscrew the bowl counterclockwise to remove it. Use one hand to steady the filter head while removing the bowl with the other to ensure you do not loosen the fittings and hoses connected to the sides of the filter.

12. Unscrew the filter element, and remove the O-ring. Replace the element and the O-ring with new one, taking care to ensure that ring remains oil- and grease-free. Reconnect the bowl to the filter body. Use one hand to steady the filter head while making sure the filter bowl is completely screwed on with the other.

13. Follow all the steps in Section 6.1 (Initial Start-up)

14. Leak test the coalescing filter assembly.

### 7.4 Pressure Switch Adjustment Procedure

In the Centrox units, typically the normally open contact of the pressure switch is used for the wiring purposes. Please refer to the Figure 7.1 for the following adjustment procedure:

1. If the oxygen concentrator is in the line of the final application when adjustment (signal setting) is made to the pressure switch, be sure
that the switch can be test operated without effecting the other equipment.

2. Remove switch cover, if any.

3. Turn adjusting nut at top of the switch clockwise until setting indicator is fully up. Turn deadband adjusting knob on front of the switch clockwise as far as possible. Refer to Figure 7.1.

```
NOTE

Adjusting nut and knob will turn easily until they hit a stop. Do not over torque. Over torque may cause damage.
```

![Figure 7.1: Pressure Switch](image)

4. Follow the steps in the chart below to make signal settings.

<table>
<thead>
<tr>
<th>Adjustment Procedure</th>
<th>Normally Open</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical Connection to Switch</strong></td>
<td><strong>Position of Test Lamp</strong></td>
</tr>
<tr>
<td>1. Starting with zero signal, connect the test lamp to common.</td>
<td>Off (Open Circuit)</td>
</tr>
<tr>
<td>2. Apply desired actuation pressure. Then back off</td>
<td>On (Closed)</td>
</tr>
</tbody>
</table>
(counter-clockwise) top adjusting nut until switch actuates (set point increasing).

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally Open Terminal</td>
<td>Off (Open Circuit)</td>
</tr>
</tbody>
</table>

3. Lower pressure to desired reactuation signal. Then turn deadband adjusting knob counterclockwise until switch reactuates (set point decreasing).

5. Cycle pressure between two desired signals and make minor adjustments to adjusting nut and knob as required to achieve exact set points.

**NOTE**

If the adjustment of the switch has been made when the oxygen concentrator is not in the line of final application, the switch should be retested when installed in the final line of application. Follow adjustment instruction. Be sure switch can be test operated without affecting the other equipment.
8.0 Troubleshooting

The AirSep CENTROX Oxygen Concentrator runs pressurized during normal operation. **You must depressurize the unit BEFORE you attempt any REPAIRS.**

Use the following procedure to depressurize the oxygen concentrator safely.

1. Shut down the oxygen concentrator as described in Section 6.3.
2. To depressurize the concentrator, follow the steps in the Coalescing Filter Element Replacement procedure in Section 7.3.1.

3. The PRODUCT PRESSURE gauge should now register 0. If it does not, stop and contact your nearest AirSep Service Representative or the AirSep Industrial Service Department for further instructions.

Contact the AirSep Industrial Service Department by phone Monday through Friday between 8:00 a.m. and 4:00 p.m. Eastern Standard Time/USA or Canada at **1-800-320-0303** or **(716) 691-0202** outside of the USA/Canada.

Send fax inquiries anytime to **(716) 691-1255**.

Address written inquiries to:

AirSep Corporation  
401 Creekside Drive  
Buffalo, NY 14228-2085 USA  
Attention: Commercial Products Service Department

Send e-mail inquiries to **cpdservice@airsep.com**

Visit **www.airsep.com** to learn about our complete range of standard Oxygen Generators.

4. Proceed to determine and repair the problem.
5. When you complete the repair, start up the oxygen concentrator as described in Section 6.1 – Initial Start-up.
8.1 Troubleshooting Chart

The chart on the following pages is a guide for troubleshooting the AirSep CENTROX Oxygen Concentrator.

The interior of the oxygen concentrator contains electrical parts that can produce an electrical hazard if not handled properly. To prevent electrical shock, use extreme care when you service the system.

The Printed Circuit Boards (PCBs) contain components that are sensitive to electrostatic discharge (ESD) and can be damaged if not handled properly. As when handling any ESD-sensitive PCB, observe standard ESD safety procedures. These procedures include the following:

- Handle the PCB only by the edges.
- Work on a grounded ESD mat.
- Wear a grounded wrist strap.
- Store PCBs only in anti-static bag.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen compressor(s) do not start. No green power light.</td>
<td>PSA enclosure not plugged to the power supply.</td>
<td>Plug in the PSA enclosure.</td>
</tr>
<tr>
<td></td>
<td>Compressor enclosure not plugged in to the PSA enclosure.</td>
<td>Plug in compressor enclosure to the PSA enclosure.</td>
</tr>
<tr>
<td></td>
<td>Tripped Circuit breaker(s).</td>
<td>Reset circuit breaker(s).</td>
</tr>
<tr>
<td></td>
<td>ON/OFF switches on the compressor enclosure are in OFF position.</td>
<td>Put the ON/OFF switches on the compressor enclosure in ON Position.</td>
</tr>
<tr>
<td></td>
<td>ON/OFF switch on the PSA enclosure in OFF position.</td>
<td>Put the ON/OFF switch on the PSA enclosure in ON Position.</td>
</tr>
<tr>
<td></td>
<td>Defective ON/OFF switch.</td>
<td>Replace ON/OFF switch.</td>
</tr>
<tr>
<td></td>
<td>Blown 3A or 15A fuse in PSA enclosure.</td>
<td>Replace the appropriate fuse.</td>
</tr>
<tr>
<td></td>
<td>Faulty electrical connections.</td>
<td>Check electrical connections.</td>
</tr>
<tr>
<td></td>
<td>Defective circuit board.</td>
<td>Replace circuit board. (Refer to Section 8.1.3).</td>
</tr>
<tr>
<td>Oxygen concentrator does not cycle. No green power light on the PSA</td>
<td>Unit not plugged in to the power supply.</td>
<td>Plug in unit to the electrical outlet.</td>
</tr>
<tr>
<td>enclosure.</td>
<td>No power supply to the wall outlet.</td>
<td>Replace fuse or reset breaker.</td>
</tr>
<tr>
<td></td>
<td>Blown 15A fuse.</td>
<td>Replace fuse.</td>
</tr>
<tr>
<td>Oxygen concentrator does not cycle, but green power light is ON on the</td>
<td>ON/OFF switch is off.</td>
<td>Set ON/OFF switch to ON position.</td>
</tr>
<tr>
<td>PSA enclosure. AUTO/MANUAL switch is set to MANUAL position, and yellow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>light is off.</td>
<td>Defective ON/OFF switch.</td>
<td>Replace ON/OFF switch.</td>
</tr>
<tr>
<td></td>
<td>Blown 3A fuse.</td>
<td>Replace fuse.</td>
</tr>
<tr>
<td></td>
<td>Defective AUTO/MANUAL switch.</td>
<td>Replace AUTO/MANUAL switch.</td>
</tr>
<tr>
<td></td>
<td>Defective power wire to circuit board.</td>
<td>Repair or replace wire.</td>
</tr>
<tr>
<td></td>
<td>Low voltage condition.</td>
<td>Call electric company.</td>
</tr>
<tr>
<td></td>
<td>Defective transformer.</td>
<td>Replace transformer.</td>
</tr>
<tr>
<td></td>
<td>Defective circuit board.</td>
<td>Replace circuit board.</td>
</tr>
<tr>
<td>Problem</td>
<td>Probable Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Oxygen concentrator does not cycle. Green power light is ON on the PSA</td>
<td>ON/OFF switch is set to OFF position.</td>
<td>Set ON/OFF switch to ON position.</td>
</tr>
<tr>
<td>enclosure; AUTO/MANUAL switch is set to AUTO position. Yellow light</td>
<td>Defective ON/OFF switch.</td>
<td>Replace ON/OFF switch.</td>
</tr>
<tr>
<td>is off. Product Pressure gauge registers less than 50 psig (205 kPa).</td>
<td>Defective wire to circuit board.</td>
<td>Repair or replace wire.</td>
</tr>
<tr>
<td></td>
<td>Pressure switch improperly adjusted</td>
<td>Adjust pressure switch correctly. (Refer to Section 8.1.1.)</td>
</tr>
<tr>
<td></td>
<td>Defective pressure switch.</td>
<td>Replace pressure switch.</td>
</tr>
<tr>
<td></td>
<td>Defective circuit board.</td>
<td>Replace circuit board.</td>
</tr>
<tr>
<td>Oxygen concentrator turns on. Green power light on the PSA enclosure</td>
<td>Defective ON/OFF switch on the PSA</td>
<td>Replace ON/OFF switch on the PSA enclosure.</td>
</tr>
<tr>
<td>is not ON.</td>
<td>enclosure.</td>
<td></td>
</tr>
<tr>
<td>Oxygen concentrator cycles, but yellow light does not turn ON. AUTO/</td>
<td>Defective wire.</td>
<td>Repair or replace wire.</td>
</tr>
<tr>
<td>MANUAL switch is set to AUTO position.</td>
<td>Defective AUTO/MANUAL switch.</td>
<td>Replace AUTO/MANUAL switch.</td>
</tr>
<tr>
<td></td>
<td>Defective circuit board.</td>
<td>Repair or replace circuit board.</td>
</tr>
<tr>
<td>Problem</td>
<td>Probable Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Oxygen concentrator cycles continuously. AUTO/MANUAL switch is set to AUTO position. Yellow light is ON. Oxygen Receiver Pressure gauge registers less than 50 psig (345 kPa). Oxygen purity is acceptable.</td>
<td>Compressor does not build up adequate pressure.</td>
<td>Replace compressor.</td>
</tr>
<tr>
<td>Compressor intake filter plugged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed air dump valve leaks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressor relief valve leaks</td>
<td>Replace relief valve</td>
<td></td>
</tr>
<tr>
<td>Air leak in system.</td>
<td>Check oxygen concentrator. Repair as necessary.</td>
<td></td>
</tr>
<tr>
<td>Oxygen usage is greater than capacity of oxygen concentrator.</td>
<td>Check oxygen usage. If usage exceeds system capacity (32 SCF/hr [15 lpm]), reduce usage.</td>
<td></td>
</tr>
<tr>
<td>Oxygen leak in system.</td>
<td>Check oxygen concentrator and oxygen distribution system for leaks. Repair as necessary.</td>
<td></td>
</tr>
<tr>
<td>Problem</td>
<td>Probable Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Oxygen concentrator cycles continuously. AUTO/MANUAL switch is set to AUTO position. Yellow light is on. Oxygen Receiver Pressure gauge registers 63 psig (435 kPa) or higher.</td>
<td>Pressure switch improperly adjusted.</td>
<td>Readjust pressure switch. (Refer to Section 8.1.1).</td>
</tr>
<tr>
<td></td>
<td>Defective wire to AUTO/MANUAL switch.</td>
<td>Repair or replace wire to AUTO/MANUAL switch.</td>
</tr>
<tr>
<td></td>
<td>Defective AUTO/MANUAL switch.</td>
<td>Replace AUTO/MANUAL switch.</td>
</tr>
<tr>
<td></td>
<td>Defective wire to pressure switch.</td>
<td>Repair or replace wire to pressure switch.</td>
</tr>
<tr>
<td></td>
<td>Defective pressure switch</td>
<td>Replace pressure switch.</td>
</tr>
<tr>
<td></td>
<td>Defective circuit board.</td>
<td>Replace circuit board. (Refer to Section 8.1.3).</td>
</tr>
<tr>
<td></td>
<td>Extended shutdown (oxygen receiver pressure registers 0).</td>
<td>Refer to Start-Up procedure given in section 6.1.</td>
</tr>
<tr>
<td></td>
<td>Momentary power loss.</td>
<td>Purge system. (Refer to Start-Up procedure.)</td>
</tr>
<tr>
<td></td>
<td>Leaky feed air check valve.</td>
<td>Replace feed check valve.</td>
</tr>
<tr>
<td></td>
<td>Oxygen leak in system.</td>
<td>Check oxygen concentrator and oxygen distribution system for leaks. Repair as necessary.</td>
</tr>
</tbody>
</table>

**Problem**

- Oxygen concentrator cycles continuously.
- AUTO/MANUAL switch is set to AUTO position. Yellow light is on. Oxygen Receiver Pressure gauge registers 63 psig (435 kPa) or higher.
- Low purity oxygen (21-82%) temporarily after start-up. Alarm sounds. Oxygen monitor light illuminates.

**Probable Cause**

- Pressure switch improperly adjusted.
- Defective wire to AUTO/MANUAL switch.
- Defective AUTO/MANUAL switch.
- Defective wire to pressure switch.
- Defective pressure switch.
- Defective circuit board.
- Incorrect initial start-up.
- Extended shutdown (oxygen receiver pressure registers 0).
- Momentary power loss.
- Leaky feed air check valve.
- Oxygen leak in system.

**Solution**

- Readjust pressure switch. (Refer to Section 8.1.1).
- Repair or replace wire to AUTO/MANUAL switch.
- Replace AUTO/MANUAL switch.
- Repair or replace wire to pressure switch.
- Replace pressure switch.
- Replace circuit board. (Refer to Section 8.1.3).
- Refer to Start-Up procedure given section 6.1.
- Refer to Start-Up procedure given in section 6.1.
- Purge system. (Refer to Start-Up procedure.)
- Replace feed check valve.
- Check oxygen concentrator and oxygen distribution system for leaks. Repair as necessary.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low purity oxygen (21-82%) continuously after start-up. Alarm sounds. Oxygen monitor light illuminates.</td>
<td>Oxygen System overdrawn.</td>
<td>Check the oxygen usage. The oxygen system must not be used beyond the rated capacity.</td>
</tr>
<tr>
<td>Oxygen receiver pressure registers less than 50 psig (345 kPa).</td>
<td>Defective solenoid valve.</td>
<td>Identify and rebuild valve.</td>
</tr>
<tr>
<td></td>
<td>Defective wire to circuit board.</td>
<td>Repair or replace wire.</td>
</tr>
<tr>
<td></td>
<td>Oxygen leak in system.</td>
<td>Check oxygen concentrator for leaks. Repair as necessary.</td>
</tr>
<tr>
<td></td>
<td>Leaky check valves in check valve assembly.</td>
<td>Clean or replace check valves.</td>
</tr>
<tr>
<td></td>
<td>Plugged waste muffler.</td>
<td>Replace muffler.</td>
</tr>
<tr>
<td></td>
<td>System does not cycle properly.</td>
<td>Check all wires and connections. Repair as needed. If problem continues, replace circuit board.</td>
</tr>
<tr>
<td></td>
<td>Defective circuit board.</td>
<td>Replace circuit board. (Refer to Section 8.1.3).</td>
</tr>
<tr>
<td></td>
<td>Compressor pressure not adequate.</td>
<td>Replace compressor.</td>
</tr>
<tr>
<td></td>
<td>Molecular sieve contaminated.</td>
<td>Replace molecular sieve. Contact AirSep Industrial Service Department for assistance.</td>
</tr>
<tr>
<td>Solenoid valve chatters loudly.</td>
<td>Low voltage condition.</td>
<td>Check power supply.</td>
</tr>
<tr>
<td></td>
<td>Dirty valve.</td>
<td>Clean or rebuild valve.</td>
</tr>
<tr>
<td></td>
<td>Worn valve core.</td>
<td>Rebuild valve.</td>
</tr>
<tr>
<td></td>
<td>Bad Coil.</td>
<td>Replace Coil.</td>
</tr>
<tr>
<td></td>
<td>Low voltage to valve from circuit board.</td>
<td>Replace circuit board. (Refer to Section 8.1.3).</td>
</tr>
<tr>
<td>Problem</td>
<td>Probable Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td>Concentrator runs with intermittent alarm. Oxygen flow 32 SCF/hr (15 lpm). Purity is within specifications.</td>
<td>Oxygen sample regulator not set correctly.</td>
<td>Reset the regulator. Refer to section 7.2.2.</td>
</tr>
<tr>
<td></td>
<td>Faulty electrical connection.</td>
<td>Check electrical connection.</td>
</tr>
<tr>
<td></td>
<td>Defective oxygen monitor board.</td>
<td>Replace monitor board.</td>
</tr>
<tr>
<td>Concentrator runs with oxygen monitor light illuminated for more than 30 minutes. Audible alarm does not sound. Low purity oxygen (21-82%).</td>
<td>Faulty electrical connections.</td>
<td>Check all wires and connections. (Refer to the wiring diagrams in Appendix A.) If problem continues, replace alarm board.</td>
</tr>
<tr>
<td></td>
<td>Defective alarm buzzer.</td>
<td>Replace alarm buzzer.</td>
</tr>
<tr>
<td>Concentrator runs with audible alarm for more than 15 minutes. Oxygen monitor light is not illuminated. Low purity oxygen (21-82%).</td>
<td>Faulty electrical connections.</td>
<td>Check all wires and connections. (Refer to the wiring diagrams in Appendix A.) If problem continues, replace alarm board.</td>
</tr>
<tr>
<td></td>
<td>Defective oxygen monitor light.</td>
<td>Replace oxygen monitor light.</td>
</tr>
</tbody>
</table>
8.1.1 Pressure Switch Troubleshooting

The pressure switch is located at the bottom of the PSA enclosure (Figure 4.4).

If the pressure switch does not work properly, review the following probable causes:

<table>
<thead>
<tr>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect electrical connections.</td>
<td>Check leads to switch. Make sure they are properly connected.</td>
</tr>
<tr>
<td>Faulty control circuit.</td>
<td>Check electrical power supply to switch. Check for open-circuited or grounded wires and loose connections at terminal block or switch.</td>
</tr>
<tr>
<td>Incorrect adjustment.</td>
<td>Check high and low adjustments for proper setting. (See Appendix D — Component Literature.)</td>
</tr>
</tbody>
</table>

If you cannot correct the operation of the pressure switch, replace the entire switch.

8.1.2 Solenoid Valve Troubleshooting

If a solenoid valve does not energize, review the following probable causes:

<table>
<thead>
<tr>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defective wire to valve.</td>
<td>Repair or replace wire.</td>
</tr>
<tr>
<td>Defective coil.</td>
<td>Replace coil.</td>
</tr>
<tr>
<td>Defective valve.</td>
<td>Rebuild or replace valve.</td>
</tr>
<tr>
<td>Defective circuit board.</td>
<td>Replace circuit board.</td>
</tr>
</tbody>
</table>

If a solenoid valve stays constantly energized then the circuit board is defective. Replace the circuit board.

To determine if a solenoid valve, main circuit board, or wire is defective, review the following:

**Solenoid Valves**

Set a voltmeter to DC, and carefully connect the leads to the two terminal spades on the coil of the solenoid valve. The voltmeter should register 100 VDC ±10% when energized, and 0 when de-energized.
Feed Air Dump Valve

This valve is normally closed. A problem with the valve exists only if air constantly escapes from the outlet.

**NOTE**

Whenever you start up the CENTROX, it is normal for air to escape from the feed air dump valve for 3-5 seconds.

**NOTE**

If all of the solenoid valves receive the proper voltage but a solenoid valve still malfunctions, proceed to rebuild the valve.

If any valve, with the exception of the feed air dump valve, does not energize during normal operation:

1. Check the wires from the circuit board to the valves for defects.
2. If the problem still exists, check the solenoid valve coils. Replace coil, if found defective.
3. If the problem still exists, replace the circuit board.

### 8.1.3 Main Circuit Board Removal

1. Set the unit's ON/OFF switch of the PSA enclosure to the OFF position, and unplug the power cord.
2. Open the PSA enclosure.
3. Disconnect the connectors from the circuit board. If the unit has oxygen monitor installed, the main circuit board is the lower one (Figure 4.4).
4. Push in on the board support tabs with a slotted screwdriver while you pull each corner.
5. Remove the circuit board.
The Printed Circuit Boards (PCBs) contain components that are sensitive to electrostatic discharge (ESD) and can be damaged if not handled properly. As when handling any ESD-sensitive PCB, observe standard ESD safety procedures. These procedures include the following:

- Handle the PCB only by the edges.
- Work on a grounded ESD mat.
- Wear a grounded wrist strap.
- Store PCBs only in anti-static bag.

8.1.4 Main Circuit Board Installation

Handle the new circuit board only by the edges to prevent an electrostatic short.

1. Push the circuit board on to the four support tabs.
2. Firmly plug the connectors into the new circuit board so that the connectors’ locking tabs lock against the circuit board.
3. Close the PSA enclosure.

8.1.5 Compressor Removal

To remove the compressor for exchange, follow the steps below:

1. Set the ON/OFF switch on both the enclosures to the OFF position, and unplug the power cord.
2. Close the oxygen isolation ball valve.
3. Open the compressor enclosure.
4. Remove the suction tube and the other end of the stainless steel hose that comes out from the compressor outlet.
5. Disconnect the two power cords from the terminal block and the two capacitor wires.
6. Also disconnect the ground wire from the compressor.
7. Remove the four bolts that connect the compressor plate to the base of the unit.

8. Slide out the compressor.

---

Take note of the assembly of the spring mounts. These components will need to be reinstalled when the new compressor is assembled.

---

9. Carefully place the compressor upside down, and remove the four bolts that connect the compressor to the mounting plate.

10. Carefully remove all the fittings from the compressor.

### 8.1.6 Compressor Installation

To install a new compressor, follow the steps below:

1. Place the new compressor upside down.

2. Align the holes of the spring mount plates with the holes on the compressor.

3. Place the springs on the spring mount plates.

4. Place the compressor mounting bracket onto the springs.

5. Thread the four bolts into the compressor ensuring that all spring mount assembly parts are present.

6. Turn the compressor right side up. Make sure that the springs are centered on the black plastic bushings.

7. Thread the brass fittings and pressure relief valve into the compressor.

8. Follow the compressor removal procedure in reverse order.

9. Reconnect both side panels on the unit.
## A Appendix

### Technical Data

#### Specifications

Data in this section refer to the CENTROX oxygen concentrators. This data may vary as per the customer's requirements.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Oxygen output:</td>
<td>32 SCF/hr at 0–50 psig*</td>
</tr>
<tr>
<td></td>
<td>15 slpm at 0-345 kPa**</td>
</tr>
<tr>
<td>Oxygen purity:</td>
<td>USP 93%</td>
</tr>
<tr>
<td>Oxygen dew point:</td>
<td>-73°C (-100°F)</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>27 x 21 x 13 in. (H x W x D) (Compressor Encl.)</td>
</tr>
<tr>
<td></td>
<td>38 x 27 x 15 in. (H x W x D) (PSA Enclosure)</td>
</tr>
<tr>
<td>Approximate weight:</td>
<td>100 lbs (Compressor Enclosure)</td>
</tr>
<tr>
<td></td>
<td>160 lbs (PSA Enclosure)</td>
</tr>
<tr>
<td>Power requirements:</td>
<td>120 VAC ± 10%, 60 Hz, Single Phase</td>
</tr>
<tr>
<td></td>
<td>240 VAC ± 10%, 50 Hz, Single Phase</td>
</tr>
<tr>
<td>Pressure Switch Setting:</td>
<td>For 120 VAC, 60 Hz power supply</td>
</tr>
<tr>
<td></td>
<td>Minimum: 58 psig</td>
</tr>
<tr>
<td></td>
<td>Maximum: 63 psig</td>
</tr>
<tr>
<td></td>
<td>For 240 VAC, 50 Hz power supply</td>
</tr>
<tr>
<td></td>
<td>Minimum: 52 psig</td>
</tr>
<tr>
<td></td>
<td>Maximum: 58 psig</td>
</tr>
</tbody>
</table>

(Pressure switch setting may vary slightly based on the customer’s requirements.)

---

*SCF (Standard Cubic Foot) gas measured at 1 atmosphere and 70°F.
**SLPM (Standard Litre Per Minute) gas measured at 1 atmosphere and 70°F.
Drawings and Schematics
Figure A.1: Flow Schematic
Figure A.2: Wiring Schematic (120 V, 60 Hz) – PSA Enclosure
Figure A.3: Wiring Schematic (240 V, 50 Hz) – PSA Enclosure
Figure A.4: Wiring Schematic (120 V, 60 Hz) – Compressor Enclosure
Figure A.5: Wiring Schematic (240 V, 50 Hz) – Compressor Enclosure
Product Warranty

AirSep Corporation ("AirSep") warrants to the party purchasing from AirSep (the "original purchaser") the PSA Oxygen Concentrator to be free from defect in parts and workmanship for one year from the date of start-up, not to exceed eighteen (18) months from the date of shipment to the original purchaser, under normal use, maintenance and operation*. TO THE EXTENT PERMITTED UNDER APPLICABLE LAW, ALL WARRANTIES WITH RESPECT TO SUCH UNIT SHALL ONLY EXTEND TO AND BE FOR THE BENEFIT OF THE ORIGINAL PURCHASER AND SHALL NOT BE ASSIGNABLE TO, EXTEND TO OR BE FOR THE BENEFIT OF ANY OTHER PARTY. AirSep’s obligations under this warranty are limited, at AirSep’s option, to the repair, replacement or refunding the purchase price of any such unit of equipment (or part thereof) found by AirSep to be defective in parts or workmanship; provided, however, that AirSep shall have no obligation hereunder with respect to a defective part unless it receives written notice of such defect prior to the expiration of the applicable warranty period as referenced above.

Each unit of equipment for which a warranty claim is asserted shall, at the request of AirSep, be returned on a prepaid basis with proof of purchase date to the AirSep factory specified by AirSep at the expense of the original purchaser. Replacement parts shall be warranted as stated above for the unexpired portion of the original warranty. This warranty does not extend to any unit or part subjected to misuse (at AirSep’s sole determination), accident, improper maintenance or application, or which has been repaired or altered outside of the AirSep factory without the express prior written authorization of AirSep.

Notwithstanding anything to the contrary contained herein, during the applicable warranty period, as specified above, AirSep will pay the cost of return freight charges to the original purchaser, provided an authorized AirSep representative approved return of the unit or parts, for any equipment found by AirSep to be defective. For warranty repairs performed during the first 90 days from the date of invoice, AirSep will pay freight both ways. After the applicable parts warranty period has expired, the original purchaser is responsible for freight both ways.

* Please refer to the appropriate product documentation for applicable installation and operating requirements.
Limits of Liability

THE FOREGOING WARRANTY IS THE ONLY WARRANTY MADE BY AIRSEP WITH RESPECT TO THE EQUIPMENT (OR ANY PART THEREOF) AND IS IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IN FACT OR IN LAW, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. IT IS EXPRESSLY UNDERSTOOD THAT THE SOLE AND EXCLUSIVE REMEDY FOR ANY DEFECT IN PARTS OR WORKMANSHIP IS LIMITED TO ENFORCEMENT OF AIRSEP’S OBLIGATIONS AS SET FORTH ABOVE, AND AIRSEP SHALL NOT BE LIABLE TO ORIGINAL PURCHASER OR ANY OTHER PARTY FOR LOSS OF USE OF THE EQUIPMENT, LOST PROFITS OR FOR ANY OTHER SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (EVEN IF AIRSEP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES).

Returning the Oxygen Concentrator or a Component for Service

If the oxygen Concentrator or a defective part requires service, contact your distributor. If instructed by your distributor to contact AirSep Corporation, follow the procedure below to return the oxygen Concentrator or a component for service or credit.

1) Obtain a Return Goods Authorization (RGA) number from the AirSep Commercial Products Service Department. (Refer to Chapter 8, Troubleshooting for information about contacting AirSep Corporation.) Before you call for service assistance, have the following information readily available:
   - Oxygen Concentrator Model
   - Serial Number
   - Hours of Use
   - Invoice Date

AirSep Corporation issues no credit for any warranted item until you present the model number, serial number, and invoice date of the oxygen Concentrator, and defective part is returned to AirSep Corporation.

2) Write the RGA number clearly on the outside of the shipping container.
AirSep Corporation accepts no item(s) for service or credit unless prior written authorization was issued by AirSep Corporation.

3) Return item(s) in their original packaging material. Pack merchandise for a safe return. AirSep Corporation assumes no responsibility for damage that occurs in transit. Any damage to the oxygen Concentrator or a component because of failure to follow this procedure is the sole responsibility of the customer.

Return item(s) on a freight prepaid basis only.
Use the following lists to order parts for the oxygen concentrator. To order, please contact your distributor. If instructed by your distributor to contact AirSep Corporation, contact the AirSep Commercial Products Service Department as described in Chapter 8, Troubleshooting. If the list does not contain the part you require, please provide a precise description of the part when you call.
## Model Centrox 120 VAC Spare Parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
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<td>Filter, Element</td>
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<td>FI153-1</td>
</tr>
<tr>
<td>Foam, Filter, 1 7/8&quot; dia</td>
<td>1</td>
<td>FO039-1</td>
</tr>
<tr>
<td>Foam, Filter, 4&quot;X4&quot;</td>
<td>1</td>
<td>FO015-1</td>
</tr>
<tr>
<td>Compressor, 115V/60</td>
<td>1</td>
<td>CO185-1</td>
</tr>
<tr>
<td>Compressor Rebuild Kit</td>
<td>2</td>
<td>CO220-1</td>
</tr>
<tr>
<td>Valve, Rebuild Kit, 316372</td>
<td>6</td>
<td>VA034-1</td>
</tr>
<tr>
<td>Valve, Rebuild Kit, 316375</td>
<td>3</td>
<td>VA048-1</td>
</tr>
<tr>
<td>Valve, Solenoid, 1/8&quot; 100VDC</td>
<td>1</td>
<td>VA495-1</td>
</tr>
<tr>
<td><strong>Emergency Kit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check Valve, 1/4&quot;</td>
<td>1</td>
<td>VA044-1</td>
</tr>
<tr>
<td>Solenoid Valve, 3/8&quot;</td>
<td>1</td>
<td>VA011-1</td>
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<tr>
<td>Circuit Board, 110V</td>
<td>1</td>
<td>CB057-1</td>
</tr>
<tr>
<td>Circuit Board, O2 Monitor</td>
<td>1</td>
<td>CB005-5</td>
</tr>
<tr>
<td>Circuit Breaker 10 amp</td>
<td>1</td>
<td>CR021-1</td>
</tr>
<tr>
<td>Fan, 115V/50/60</td>
<td>1</td>
<td>FN001-3</td>
</tr>
<tr>
<td>Fuse, 15 amp</td>
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<td>Fuse, 3 amp</td>
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<td>FU004-1</td>
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<tr>
<td>Gauge, 0-100 psi</td>
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<tr>
<td>Heat Exchanger</td>
<td>1</td>
<td>HX010-2</td>
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<tr>
<td>Muffler</td>
<td>1</td>
<td>MU009-1</td>
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<tr>
<td>Pressure Switch</td>
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<td>SW003-3</td>
</tr>
<tr>
<td>Regulator, 1/8&quot;</td>
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<td>RG022-1</td>
</tr>
<tr>
<td>Relay, 45 amp</td>
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<td>RL013-2</td>
</tr>
<tr>
<td>Sieve Bed Assy.</td>
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<td>BE126-1</td>
</tr>
<tr>
<td>Spring, Compressor Mount</td>
<td>4</td>
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</tr>
<tr>
<td>Transformer, 115/10 VAC tap 60HZ</td>
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<td>TR001-1</td>
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<tr>
<td>Transformer, 115/230VAC</td>
<td>1</td>
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<tr>
<td>Flow Meter, 15 SLPM, 50 PSIG VERTICAL</td>
<td>1</td>
<td>FM025-2</td>
</tr>
<tr>
<td>Filter, Coalescing w/ Metal Bowl</td>
<td>1</td>
<td>FI137-1</td>
</tr>
<tr>
<td><strong>Supplemental Equipment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen Analyzer, MAXTEC, MAX O2 Plus</td>
<td>1</td>
<td>AN005-1</td>
</tr>
<tr>
<td>Oxygen Analyzer, MAXTEC, HANDHELD</td>
<td>1</td>
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</tr>
<tr>
<td>Regulator Pressure Test Kit</td>
<td>1</td>
<td>KI488-1</td>
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### Model Centrox 240 VAC Spare Parts

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<td>Foam,Filter,4&quot;X4&quot;</td>
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<tr>
<td>Compressor,240V/50</td>
<td>1</td>
<td>CO185-2</td>
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<td>Compressor Rebuild Kit</td>
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<tr>
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<td>3</td>
<td>VA048-1</td>
</tr>
<tr>
<td>Valve, Solenoid,1/8&quot; 100VDC</td>
<td>1</td>
<td>VA495-1</td>
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</table>

**Emergency Kit**

<table>
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<tr>
<th>Item</th>
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</thead>
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<td>Circuit Breaker 6 amp</td>
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<td>HX010-2</td>
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<td>Muffler</td>
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<tr>
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<td>Relay, 45 amp</td>
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<tr>
<td>Spring, Compressor Mount</td>
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<td>Filter, Coalescing w/ Metal Bowl</td>
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**Supplemental Equipment**

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<th>Part #</th>
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<td>AN005-1</td>
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<tr>
<td>Oxygen Analyzer, MAXTEC, HANDHELD</td>
<td>1</td>
<td>AN021-1</td>
</tr>
<tr>
<td>Regulator Pressure Test Kit</td>
<td>1</td>
<td>KI488-1</td>
</tr>
</tbody>
</table>
D Appendix Component Literature

Filters
- Wilkerson Corporation
  M03-02-M00
  1/4" FPT
  Mini, Compact, Standard, & Hi-Flow Oil Removal Filters
  Installation and Maintenance Sheet

Regulators
- Norgren
  General Purpose Regulators
  Installation Sheet
- Siemens Energy & Automation
  Moore Constant Differential Type Flow Controllers
  Installation, Operation and Maintenance Sheet

Pressure Switch
- ASCO Switch Co.
  PG-Series
  Tri-point pressure switches
  Installation and Maintenance Instructions

Valves
- ASCO Valves
  Open-Frame Solenoids
  Series U8016 and US8016
  Installation and Maintenance Instructions
- ASCO Valves
  M6 Open-Frame Solenoids
  Drawing No. 214639-107
  Installation and Maintenance Instructions
- ASCO Valves
  Form No. V6950R5
  Installation and Maintenance Instructions
With Metal Bowl

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<th>bar</th>
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<tbody>
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<td>1700</td>
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Operating Temperature Maximum: 80°C (176°F)

With Automatic Drain

<table>
<thead>
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<th>kPa</th>
<th>PSIG</th>
<th>bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>10</td>
<td>0.68</td>
</tr>
</tbody>
</table>

Installation

1. The equipment to which the filter is attached should be internally cleaned to remove all traces of accumulated oil and dirt. Also, new pipe or hoses should be installed between the filter and equipment being protected.
2. Blow all upstream pipe work clear of accumulated dirt and liquids.
3. Select a filter location as close as possible to the equipment being protected and downstream of any pressure regulator.
4. A 5 micron pre-filter is recommended to protect the high efficiency filter and to prolong the element life.
5. Install filter so that air lines are in the direction of arrow on cover.
6. Install filter vertically with the bowl drain mechanism at the bottom. Free moisture will thus drain into the sump "quiet zone" at the bottom of the bowl (automatic drain models are recommended as standard equipment).

Operation

Manual drain filters must be drained regularly before the separated moisture and oil reaches the bottom of the filter element. Automatic drain models will collect and dump the liquids automatically.

Pressure differential gauges should be used to determine when the maximum recommended pressure differential of 10 PSI (0.7 KG/CM²) has been reached.

DO NOT EXCEED THE RATED RECOMMENDED FLOWS. THE MINIMUM FLOW IS TEN PERCENT OF THE NOMINAL RATING.

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from The Company, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application, including consequences of any failure and review the information concerning the product or systems in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuming that all performance, safety and operating requirements of the application are met.

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Maintenance

To replace the element in the filter, first shut off the air supply and relieve pressure within the filter bowl. Unscrew the bowl and unscrew the filter element. This element cannot be cleaned and should be replaced when a pressure differential of 19 PSI (0.13 bar) is reached. To insert a new filter element, hold the element by the bottom cap, position the new O-ring over the top threaded cap end, turn the element gently into the body's threaded section and make sure it is screwed tightly into place.

CAUTION: Touching or handling the element section may cause contamination, spotting or migration of oil.

Automatic drain valves should be checked to ensure they are operating correctly.

Troubleshooting

(If oil aerosol appears downstream from the filter):

1. Examine downstream air lines to determine if they were cleaned out before installation of the filter. Residual oil will contaminate an installation from new pipe work if it is not initially cleaned.

2. Determine if the sealing gasket or O-ring is in place, and that it is not cut or otherwise damaged. (When checking the element, do not touch the element's body. Always handle the element by the bottom end cap.) When reinstalling the element, turn it gently to make sure that it is screwed tightly in place.

3. Check the rate of air being used. The air flow should not exceed the rated capacity of the element, nor be less than 10% of its rated flow. When operating at 150°F (65°C), the temperature should not exceed 65°F (18°C). Higher temperatures are used, oil vapor may condense if the air cools downstream of the filter.

4. Check for acid fumes or other harmful gases being drawn into the compressor intake. The element may be affected by certain chemicals.

5. Determine the type of oil used in the compressor. Some synthetic or high flash point oils are detrimental — contact factory for advice.
GENERAL INFORMATION

The Moore Constant Differential Type Flow Controller is used in conjunction with an external needle valve to provide constant volume flow rates for either liquids or gases over a continuously adjustable flow range.

When used on gases, upstream pressure must be constant to provide a constant mass flow rate (i.e., standard volume units per time unit, e.g., SCFM). Constant upstream pressure is not needed for constant volume flow rates (i.e., volume units per time unit; e.g., CFM).

With liquids, both mass and volumetric flow rates are held constant, regardless of up or downstream pressures.

MODEL DESIGNATION

Constant Differential Flow Controller

Body Construction

B - Brass (with Neoprene Diaphragm)
S - Stainless Steel (with Kynar Diaphragm)

Used with Constant Upstream Pressure

Very Low Flow Rates

SPECIFICATIONS

Supply Pressure:
Minimum: At least 5 psi greater than the maximum downstream pressure of the needle valve-controller combination.

Maximum: 

<table>
<thead>
<tr>
<th>MODEL</th>
<th>CLOSED</th>
<th>OPEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>63BU</td>
<td>60 psi</td>
<td>260 psi</td>
</tr>
<tr>
<td>63BUL</td>
<td>60 psi</td>
<td>260 psi</td>
</tr>
<tr>
<td>63SU</td>
<td>100 psi</td>
<td>500 psi</td>
</tr>
<tr>
<td>63SUL</td>
<td>100 psi</td>
<td>500 psi</td>
</tr>
</tbody>
</table>

Ambient Temperature Limits:
Models 63BU & BUL -40°F to +180°F
Models 63SU & SUL -40°F to +250°F

PRINCIPLE OF OPERATION

If the pressure drop across a restriction is held constant, the flow through the restriction is constant.

The needle valve (a variable restriction) can be set to an opening which will produce the desired flow rate.

The pressure drop (ΔP) across the needle valve is held constant by the flow controller as follows:

1. The input pressure (P1) is applied to the needle valve and to the top of the controller's diaphragm, and forces the diaphragm and attached plunger down.

2. The Differential Spring and downstream pressure (P2) force the diaphragm and plunger up. The Differential Spring produces an upward force equal to that produced by a constant pressure (K).

3. The Controller is balanced when the force due to P1 equals the forces due to P2 and K (i.e., P1 = P2 + K). Since the pressure drop (ΔP) across the needle valve equals P1 - P2, and since P1 - P2 equals K, then the pressure drop (ΔP) must equal K; therefore flow is constant.

INSTALLATION

Mounting dimensions and the location and size of connections are shown on the installation drawings. The controller may be mounted in any desired position. The needle valve and feedback connections should be installed as close to the controller as possible to minimize pressure drop between those points. The supply to the controller should be filtered to remove any solids.

Caution

When installing the constant upstream flow controller, be sure the external needle valve is open. (See Installation Diagram). Failure to do this could result in applying a differential pressure across the diaphragm of the flow controller in excess of its rated limit, thus causing the diaphragm to rupture.
### CAPACITY
The formulas for the calculation of maximum and minimum flow rates can be found in Table 1.

The minimum controllable flow will depend on the leakage past the valve plunger in the controller. It is, therefore, a function of the cleanliness of the valve and the pressure drop across it as well as any inherent leakage. In general, for a standard flow controller, the minimum controllable flow will be approximately 1/100 of the maximum flow.

### Table 1: Flow Capacity Formulas

<table>
<thead>
<tr>
<th></th>
<th>Higher Range Models 6350 and 6350-L</th>
<th>Low Flow Models 6300-L and 6300-L-L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GAS FLOW-CAPACITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum at less than</td>
<td>SCCM = ( 400 \times P_d \times 330 \sqrt{T} \times G )</td>
<td>SCCM = ( 400 \times P_d \times 330 \sqrt{T} \times G )</td>
</tr>
<tr>
<td>critical flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum at critical flow</td>
<td>SCCM = ( 300 \times P_u \times 330 \sqrt{T} \times G )</td>
<td>SCCM = ( 300 \times P_u \times 330 \sqrt{T} \times G )</td>
</tr>
<tr>
<td>Minimum controllable flow</td>
<td>Approximately 1/200 of maximum</td>
<td>SCCM = ( 8 \times P (P_u - P_d) \times G \times T )</td>
</tr>
<tr>
<td><strong>LIQUID FLOW-CAPACITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>CCM = ( 473 \times P \times G )</td>
<td>CCM = ( 473 \times P \times G )</td>
</tr>
<tr>
<td>Minimum</td>
<td>Approximately 1/200 of maximum</td>
<td>CCM = ( 66 \times P \times G \times T )</td>
</tr>
<tr>
<td>NEEDLE VALVE SIZING (With 3 psi drop across valve)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For any liquid</td>
<td>( K_n = \frac{CCM}{650} )</td>
<td></td>
</tr>
<tr>
<td>For any gas</td>
<td>( K_n = \frac{SCCM}{650} )</td>
<td></td>
</tr>
</tbody>
</table>

*Critical flow exists when the ratio of upstream pressure (Pu) to downstream pressure (Pd) is equal to or less than approximately 0.53.

\( P_d \left( \frac{1}{P_u} \right) \leq 0.53 \)

The actual ratio value for air is 0.528, it should be noted that it varies slightly for other gases.

SCCM = Cubic centimeters per minute of gas at standard conditions (70°F, 14.7 psia). Note: 1 SCC = 20.317 SCC.

\( \Delta P \) = psi pressure drop across the controller valve = total drop minus 3 psi.

\( P_u \) = psia pressure at inlet of controller (allow 3 psi for drop across the needle valve, if it is installed upstream).

\( P_d \) = psia pressure at outlet of controller (allow 3 psi for drop across the needle valve, if it is installed downstream).

\( G \) = Specific gravity of the gas referred to air, or specific gravity of the liquid referred to water at 4°C.

\( T \) = Absolute temperature of the gas = degrees F + 460.

\( R_v \) = Ratio of viscosities of gas referred to air, or ratio of viscosities of liquid at operating temperature to water at 4°C.

\( K_n \) = Flow constant of needle valve.

Rangeability and minimum controllable flow of each size depend upon the needle valve used, the specific gravity of the fluid, the operating pressures, and other factors.

The formulas for calculation of maximum flows for both the low-flow and higher-range models. Because minimum flows occur in a laminar pattern with the low-flow models, a separate formula is furnished. Rangeability is considerably higher on gases than on liquids.

### Flow-Rate Examples

<table>
<thead>
<tr>
<th>Conditions:</th>
<th>Max. Flow</th>
<th>Min. Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 psig (287 psia) at inlet of controller</td>
<td>56,000 scf/min</td>
<td>7.5 cc/min</td>
</tr>
<tr>
<td>10 psi drop across controller (not including 3 psi needle valve drop)</td>
<td>1,500 cc/min</td>
<td>149 cc/min</td>
</tr>
<tr>
<td>70°F process temperature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Higher-range units (Series 63)**

| On air | 56,000 scf/min | 280 scf/min |
| On water | 1,500 cc/min | 7.5 cc/min |

**Low-range units (Series 63L)**

| On air | 6,600 scf/min | 7 cc/min |
| On water | 149 cc/min | 0.6 cc/min |
**OPERATION**

With the supply turned on, adjust the needle valve to obtain the desired flow rate. The valve may be adjusted for any flow within the capacity of the unit.

**MAINTENANCE**

The only maintenance normally required will be to keep the valve plunger and external needle valve clean. Any change in the rate of flow for a given needle valve setting will probably be caused by partial clogging of the needle valve. Failure to obtain minimum flows will probably be caused by solids on the controller valve plunger. It will be necessary to disassemble the 63-U model controller in order to remove the plunger valve. Use the Parts List for the controller as an assembling aid.

---

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DIAL</th>
<th>INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>63U</td>
<td>2 1/8</td>
<td>3 1/4</td>
</tr>
<tr>
<td>63UUL</td>
<td>2 1/8</td>
<td>3 1/4</td>
</tr>
<tr>
<td>63U</td>
<td>2 3/8</td>
<td>3 1/2</td>
</tr>
<tr>
<td>63UUL</td>
<td>2 3/8</td>
<td>3 1/2</td>
</tr>
</tbody>
</table>

Installation Dwg. Model 63U Constant Flow Controller
PARTS LIST

Siemens Energy & Automation

MODE Constant Differential Type Flow Controller

FOR SMALL FLOWS — MODEL 838U-L

Drawing No. 10740PL

MODEL 838U-L

D/M 10746685

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2930-1</td>
<td>&quot;O&quot; Ring</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>10746-10</td>
<td>Bottom Forging</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>10911-24</td>
<td>Valve Seat</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1518-5</td>
<td>Differential Spring</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>2881-9</td>
<td>Top Forging</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>10746-2</td>
<td>Diaphragm and Valve Assembly</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>1/4&quot; Lockwasher</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>Screw</td>
<td>1/4-20 x 3/4&quot; Lg. Fill. Hd.</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Screw</td>
<td>1/4-20 x 5/8&quot; Lg. Fill. Hd.</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>1145-19</td>
<td>Mounting Bracket</td>
<td>1</td>
</tr>
</tbody>
</table>

* Recommended On-Hand Spare Parts Always Specify Range, Serial No. or Other Nameplate Information When Ordering Spare Parts
### PARTS LIST

#### Siemens Energy & Automation

**MOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLER**

**FOR SMALL FLOWS — MODEL 63SU-L**

**Drawing No. 12046PL**

**MODEL 63SU-L**

**B/M 12046S11**

---

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>12041-23</td>
<td>Protecting Ring</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>2936-120</td>
<td>&quot;O&quot; Ring</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>12046-16</td>
<td>Bottom Forging</td>
<td>1</td>
</tr>
<tr>
<td>* 5</td>
<td>12046-8</td>
<td>Valve Seat</td>
<td>1</td>
</tr>
<tr>
<td>* 6</td>
<td>3131-22</td>
<td>Differential Spring</td>
<td>1</td>
</tr>
<tr>
<td>* 7</td>
<td>12045-6</td>
<td>Diaphragm and Valve Assembly</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>12041-42</td>
<td>Top Housing Assembly</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>1/4&quot; Lockwasher</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>Screw</td>
<td>1/4-20 x 1-1/4&quot; Lg, Soc, Hd.</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Screw</td>
<td>1/4-20 x 1&quot; Lg, Soc, Hd.</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>1145-19</td>
<td>Mounting Bracket</td>
<td>1</td>
</tr>
</tbody>
</table>

* Recommended On-Hand Spare Parts. Always Specify Range, Serial No. or Other Nameplate Information When Ordering Spare Parts.
# PARTS LIST

**Siemens**  
**Energy & Automation**

**MOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLER**  
**[CONSTANT UPSTREAM PRESSURE]**

- **MODEL 63SU**  
- **B/M 12041510**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12041-23</td>
<td>Diaphragm Protecting Ring</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3131-22</td>
<td>Differential Spring</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>12041-41</td>
<td>Bottom Forging</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>12041-33</td>
<td>Valve and Diaphragm Assy.</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>12041-42</td>
<td>Top Housing Assy.</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Lockwasher 1/4&quot;, Steel, W.N.P.</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Screw 1/4-20 x 1/4 Lg. Socket Hd., Steel, W.N.P.</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Screw 1/4-20 x 1 Lg. Socket Hd., Steel, W.N.P.</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>1145-19</td>
<td>Mounting Bracket</td>
<td>1</td>
</tr>
</tbody>
</table>

* *Recommended On-Hand Spare Parts. Always Specify Range, Serial No., or Other Nameplate Information When Ordering Spare Parts.*
PARTS LIST

Siemens
Energy & Automation

MOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLER
(CONSTANT UPSTREAM PRESSURE)

Drawing No. 2062PL

MODEL 630U
B/M 206239

Item No. | Part No. | Description               | Req'd |
--------|---------|---------------------------|------|
  1      | 1518-5  | Differential Spring       | 1
  3      | 2062-1B | Bonnet Forging            | 1
  4      | 2082-8  | Valve and Diaphragm Assy. | 1   
  5      | 2881-9  | Trap Forging              | 1
  6      |         | Lockwasher 1/4" N-Aslip, Steel, M.N.P. | 6
  7      |         | Screw 1/4-20 x 3 3/4 Lg. Fl. Hd. | 1
  8      |         | Screw 1/4-20 x 5 1/2 Lg. Fl. Hd. | 3   
  9      | 1145-19 | Mounting Bracket          | 1

* Recommended On-Hand Spare Parts. Always Specify Part No. and Other Nameplate Information When Ordering Spare Parts.
Installation & Maintenance Instructions

DESCRIPTION

The PG-Series Limited Adjustable Deadband Switch Units are used with transducer units to make TriPoint Pressure Switches or Temperature Switches. These switch units are made of aluminum alloy and designed for rugged use. The switch units may be provided as open-frame type construction or with a general purpose or watertight enclosure. All wiring terminals, adjustment, and visual scales are accessible from the front of the switch.

The switch may be supplied as a complete unit, with the switch assembly unit and transducer unit completely assembled. The components may be separate units to be assembled upon installation. The switch has an adjustable set point (set point increasing) and an adjustable deadband which controls (within limits) the reset point (set point decreasing). The switch unit can be mated with a wide selection of pressure or temperature transducers to cover a broad range of pressures, fluids, or temperatures. The switch will control electrical circuits in response to changes in pressure or temperature signals.

IMPORTANT: These instructions cover the installation and use of this switch unit on pressure and temperature transducers. Select the paragraphs that apply to your particular installation and application. The word signal is used in place of pressure, or temperature changes.

INSTALLATION

Check the nameplate for the correct catalog number, pressure ranges, temperature ranges, media, and proof pressure or rated over-range temperature. Never apply incompatible fluids or exceed the pressure or temperature rating of the switch. Installation and inspection to be performed by qualified personnel.

Nameplates are located on switch (or switch cover) and on the bottom of the transducer. Check to be sure the third digit in each number is the same. If not, the unit should not be used (Refer to Figure 6).

IMPORTANT: All internal adjustments have been made at the factory. Any adjustment, alteration or repair to the internal parts of the switch other than stated herein voids all warranties. Signal setting adjustments required are made by an adjusting nut on top of the switch (for set point) and a front knob adjustment (for deadband).

Temperature Limitations

Switch ambient temperature limits are -4°F (-20°C) to 122°F (50°C). To determine fluid temperature limitations, see Form No. P7090 for pressure transducer catalog numbers and construction materials, then refer to chart below.

<table>
<thead>
<tr>
<th>Transducer Construction Materials</th>
<th>Fluid Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>brass die cast components</td>
<td>-6°F (-25°C) to 160°F (71°C)</td>
</tr>
<tr>
<td>316 stainless steel</td>
<td>-4°F (-20°C) to 180°F (82°C)</td>
</tr>
<tr>
<td>All FEP</td>
<td>-50°F (-45°C) to 180°F (82°C)</td>
</tr>
<tr>
<td>All FEP, FEP, FEP, EPR, &amp; EPR</td>
<td>Maximum 160°F (71°C)</td>
</tr>
<tr>
<td>All FEP, FEP, &amp; EPR, &amp; EPR, &amp; EPR</td>
<td>Maximum 160°F (71°C)</td>
</tr>
</tbody>
</table>

For steam service, the fluid temperature with a spigot (spigot tube or condensate loop) installed directly into the transducer will be below 250°F (121°C).

Assembly Of Switch And Transducer Units (Refer to Figure 6)

IMPORTANT: The switch unit and transducer unit may be purchased as a complete assembly or as separate units. If separate units are purchased, refer to Form No. P7090 for a complete listing of switch unit and transducer unit combinations. Form No. P7090 is provided to ensure that the proper switch unit is assembled to the proper transducer unit.

Pay careful attention to exploded view provided in Figure 6 for assembly of switch unit and transducer unit. Proceed in the following manner:

CAUTION: The third digit in the catalog number on both the switch unit and the transducer unit must be identical. If not, do not assemble to each other. If the same, proceed.

1. Remove bolts (4) from base of switch unit. On general purpose or watertight constructions, remove switch cover.
2. Remove instruction label and pressure or temperature switch range scale from the transducer unit.
3. Place transducer unit on base of switch unit and assemble. Start bolts (4) approximately two turns by hand to avoid the possibility of cross threading. After initial engagement, torque bolts (4) in a clockwise manner to 80 ± 10 in-lbs (9 ± 1.1 Nm).
4. Remove backing paper from range scale and install on front of the switch body over the opening for the adjusting indicator point.

Positioning

Switch may be mounted in any position.

Mounting

Refer to Figures 1, 2, and 3 for mounting.
Figure 3. Optional Mounting Bracket

Piping/Tubing (Pressure Transducer)

Adequate support of piping and proper mounting of switch should be made to avoid excessive shock or vibration. To minimize the effect of vibration on a switch, mount perpendicular to vibration. Connect piping or tubing to switch at base of transducer. It is recommended that flexible tubing be used whenever possible. Apply pipe compound sparingly to male pipe threads only. If applied to female threads, the compound may enter the transducer and cause operational difficulty. Avoid pipe strain on switch by properly supporting and aligning piping. When tightening pipe, do not use switch as a lever. Use wrenching flats provided at base of transducer for tightening. Locate wrenches on transducer body or piping as close as possible to connection point.

IMPORTANT: For steam service, install a condensate trap (pinned or steam siphon tube) directly into the pressure transducer.

CAUTION: To avoid damage to the transducer body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. IF TEFILON tape, paste or similar lubricant is used, use extra care due to reduced friction.

IMPORTANT: To eliminate the effect of undesirable pressure fluctuations in the system, install a surge suppressor.

Wiring

Wiring must comply with local codes and the National Electrical Code. Use No 14 AWG copper conductor for 60°C maximum. The switch housing has a wire clamp and ground in screw. Switch is marked N/O for Normally Open, N/C for Normally Closed, and C for Common. The general purpose switch enclosure is provided with a 7/8" diameter hole to accommodate 1/2" electrical bulb or connector. The watertight switch enclosure has a 1/2" conduit hub. It is recommended that a flexible conduit connection be used. If rigid conduit is used, do not use it as a means of supporting (mounting).

IMPORTANT: Electrical load must be within range stated on nameplate. Failure to stay within the electrical range of the switch rating may result in damage to or premature failure of the electrical switch.

CAUTION: Do not exert excessive screwdriver force on snap switch when making terminal connections. When connections are made, be sure there is no stress on the wire leads. Either condition may cause malfunction of switch.

*DaPonte's Registered Trademark

![Diagram](image)

<table>
<thead>
<tr>
<th>ELECTRICAL RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switch</strong></td>
</tr>
<tr>
<td>Standard Switch</td>
</tr>
<tr>
<td>Rating</td>
</tr>
</tbody>
</table>

Figure 4. Schematic

INSTALLATION OF TEMPERATURE TRANSDUCERS

Direct Probe

The direct probe (local) temperature transducer is provided with a 1/8" NPT connection. When installing, do not use switch unit as a lever for tightening. Use wrenching flats provided at base of transducer for tightening.

Capillary and Bulb

The capillary and bulb (remote) temperature transducers are provided with a length of capillary and a 1/8" diameter sensing bulb. CAUTION: Do not bend capillary at sharp angles. For proper operation, be sure sensing bulb is completely immersed in fluid and not in contact with heating element or anything that would directly affect the temperature of the fluid being sensed.

Thermal Well (optional feature)

A thermal well may be used for capillary and bulb (remote) or direct probe (local) temperature transducers. The thermal well affords protection for the sensing bulb and allows removal of the sensing bulb while maintaining a pressure tight vessel. When installing sensing bulb in thermal well, be sure that it is fully inserted. Where a thermal well already exists, new nuts may be obtained to adapt the capillary and bulb to the existing thermal well. The existing thermal well must be for a 1/8" diameter sensing bulb.

Union Connector (Optional Feature)

A union connector will allow direct mounting of the sensing bulb in the fluid being controlled. Install union into piping connection before tightening union onto bulb. For maximum performance, the bulb should be inserted in the union connection so that the end of the sensing bulb is even with the end of the union connector nut. Do not apply excessive torque when tightening union connector nut.

Adjustment (Signal Setting) of Limited Adjustable Deadband Switch

When facing switch with the switch in the upright position, the adjusting nut on the top adjusts the signal setting (set point increasing). The knob in the front center of the switch adjusts the deadband (set point decreasing) refer to Figure 6. To make adjustments, a 1/4" wrench or screwdriver is required. A pressure or temperaturegage (within suitable range) is also required. If electrical connection (to line of final application) of the switch is not desirable, a battery-powered test lamp orriminator may be used. Pressure or temperature range scales may be used for initial signal settings. These will be accurate within 5%. Adjust switch until indicator is in the middle of the solid red line below the desired range. For exact signal settings, proceed as follows:

Page 2 of 4

ASCO Valves

Automatic Switch Co.

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CENTROX Instruction Manual

Form No. P7089R1

50-40 Hanover Road, Fairlawn Park, New Jersey 07020
AirSep® Corporation

CENTROX Instruction Manual D-17

Adjustment (Signal Setting) of Normally Closed or Normally Open Limited Adjustable Deadband Switch
(Refer to Figures 5)

1. If the limited adjustable deadband switch is in the line of final application when adjustment (signal setting) is made, be sure switch can be tested operated without affecting other equipment.
2. On general purpose and lightweight constructions, remove switch cover.
3. Turn adjusting nut at top of switch clockwise until setting indicator is fully up. Turn deadband adjusting knob on front of switch clockwise as far as possible.

CAUTION: Adjusting nut and knob will turn easily until they hit a stop. Do not over torque. Over torque may cause damage.

4. Follow the steps in the chart below to make signal settings.

<table>
<thead>
<tr>
<th>Adjustment Procedures</th>
<th>Normally Closed</th>
<th>Normally Open</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Switch Terminal</td>
<td>Test Lamp On-Off</td>
</tr>
<tr>
<td>1. Starting with max.</td>
<td>NC</td>
<td>On (Closed Circuit)</td>
</tr>
<tr>
<td>2. Apply desired signal</td>
<td>NC</td>
<td>OFF (Open Circuit)</td>
</tr>
<tr>
<td>3. (Low signal to desired maximum signal)</td>
<td>NC</td>
<td>On (Closed Circuit)</td>
</tr>
</tbody>
</table>

5. Cycle between two desired signals and make minor adjustments to adjusting nut and knob as required to achieve exact set points.
6. After settings have been made, make permanent electrical connections.

Testing of Installation

If the adjustment of the switch has been made outside of the line of final application, the switch should be retested when installed in the line of final application. Follow adjustment instructions. Be sure switch can be test operated without affecting other equipment.

MAINTENANCE

WARNING: To prevent the possibility of personal injury or property damage, turn off electrical power and depressurize switch unit before inspection or removal.

IMPORTANT: Switch is not field repairable. The switch must be returned to the factory (Automatic Switch Company, Flomax Park, New Jersey) or serviced only by an authorized factory representative. Address all service inquiries to Automatic Switch Company; 50-60 Hanover Road, Flomax Park, New Jersey 07932, Valve Service Department. The only adjustments which may be performed on the switch are the adjustment of the set point and deadband and replacement of the transducer unit. Replacement of transducer should be done only if external leakage is evident.

Preventive Maintenance

- While in service, operate the switch (cycle between desired signals) at least once a month to ensure proper operation. If necessary, electrical wiring and pipe connections should be made so that switch can be test operated without affecting other equipment.
- Periodic inspection of the switch, external surfaces only, should be carried out. Switch should be kept clean and free from paint, foreign matter, corrosion, icing, and freezing conditions.
- Keep the medium entering the transducer as free as possible from dirt and foreign material.

Causes of Improper Operation

Switch will not actuate or actuates and reactuates undesirably.

- Incorrect Electrical Connection: Check leads to switch. Be sure they are properly connected. Switch is marked NO for Normally Open, NC for Normally Closed and C for Common.
- Faulty Control Circuit: Check electrical power supply to switch. Check for loose or blown fuses, open -circuited or grounded wires, loose connections at terminal block or switch. See name-plate for electrical ratings and range.
- Incorrect Adjustment: Check adjustment of set point and deadband for proper setting. Refer to adjustment instructions.
- External Leakage: Check to see that bolts (4) holding transducer to pressure switch are properly torqued to 80 ± 10 in-lbs (9.0 ± 1.1 Nm). If bolts are tight and leakage is still evident, replace transducer. Refer to paragraph on Assembly of Switch Unit and Transducer Unit.
- Excessive Vibration or Surges Causing Switch to Actuate and Reactuate: Check for fluctuations in system and ingest pressure surge suppressor. Check switch mounting and be sure there is no excessive vibration.
- Incorrect Pressure: Check pressure in system with suitable pressure gage. Pressure must be within range specified on name-plate.
- Incorrect Temperature: Check temperature in system with suitable thermometer. Temperature must be within range specified on nameplate. Check location of capillary and bulb for incorrect mounting. Refer to paragraph on Installation of Temperature Transducers.

If the operation of the switch cannot be corrected by the above means, the entire switch unit should be replaced or an authorized factory representative consulted.

FOR SERVICE, REPLACEMENT, OR NEW TRANSDUCER
Consult Factory, or Authorized Factory Representative or Distributors

ORDERING INFORMATION

For Limited Adjustable Deadband Switch or New Transducer When Ordering, Specify Catalog Numbers, Fluid, Pressure Range, Temperature Range, Serial Numbers, and Proof Pressure or Rated Overrange Temperature.

NAMEPLATES ARE LOCATED ON SWITCH COVER AND BOTTOM OF TRANSDUCER.
**CAUTION**

Adjusting nut will turn easily until it hits a stop.
**DO NOT OVERTORQUE**

Enlarged isometric view showing adjusting nut and knob for signal setting.

Front view looking directly at limited adjustable deadband switch.

Figure 5. Adjustment (Signal Setting) of Limited Adjustable Deadband Switch.

**IMPORTANT**

The third digit in Catalog No. on the switch unit and transducer unit must be identical. See example below.

Limited adjustable deadband switch unit example
Catalog No. PG[1]6A

Transducer unit (pressure type) example
Catalog No. HEPDA11

Grounding screw and wire clamp

Scale provided with transducer

Torque bolts(4) in a crisscross manner to 80 ±10 in-lbs [9.0 ± 1.1Nm]

Figure 6. Open—Frame Switch Unit and Transducer Unit to be assembled.
This sheet lists switch and transducer unit combinations. Table 1 helps to ensure the proper switch unit is assembled to the pressure transducer unit, thus providing the complete limited adjustable deadband pressure switch.

In Table 1 locate the switch unit catalog number being used. Then go to the right in the same line as the switch unit catalog number and find the transducer unit catalog number which may be used with this particular switch unit. IMPORTANT: The third digit in both the switch unit and transducer unit catalog numbers must be identical. For example, a Switch Unit Catalog No. PG20A can be used with Transducer Unit Catalog No. RE20A11. The mating produces a complete limited adjustable deadband pressure switch, Catalog No. PG20A/RE20A11. Note that the third digits in both catalog numbers are identical. If the third digits are not identical, it is an incorrect match and the units should not be assembled.

NOTE: Switch units listed to the left may be used with any transducer units listed to right provided they are on the same horizontal line.

| TABLE I |
| SWITCH UNITS | RANGE | PRESSURE TRANSDUCER UNITS |
| General Purpose Enclosure | Epoxy Painted Steel Raintight Enclosure | 316 Stainless Steel Watertight Enclosure | Open-Frame | Adjustable Operating Range (P.S.I.G.) | Rated Overrange Pressure (P.S.I.G.) | Adjustable Deadband (P.S.I.G.) | Aluminum and Bronze “N” | Nylon with Threaded Brass Insert and Bronze “N” | Brass and Bronze “N” | 303 Stainless Steel and Viton* | All 316 Stainless Steel |
| Catalog Number | Catalog Number | Catalog Number | Catalog Number | | | | | |
| PG30A | PG30A | PG30A | PG30A | 0 - 9 | 60 | 0.7 - 1.3 | RD30A11 | RD30A11 | R30A11 | RD30A11 |
| PG30A | PG30A | PG30A | PG30A | 2 - 18 | 100 | 1.8 - 3.1 | RD30A11 | RD30A11 | R30A11 | RD30A11 |
| PG30A | PG30A | PG30A | PG30A | 4 - 36 | 150 | 2.0 - 4.0 | RD30A11 | RD30A11 | R30A11 | RD30A11 |
| PG30A | PG30A | PG30A | PG30A | 8 - 60 | 150 | 2.1 - 4.6 | RD30A11 | RD30A11 | R30A11 | RD30A11 |
| PG30A | PG30A | PG30A | PG30A | 10 - 100 | 150 | 4.0 - 8.0 | RF10A11 | RF10A11 | R10A11 | RF10A11 |
| PG30A | PG30A | PG30A | PG30A | 60 - 600 | 500 | 23 - 75 | RL20A21 | RL20A21 | L20A21 | RL20A21 |
| PG30A | PG30A | PG30A | PG30A | 150 - 1500 | 500 | 100 - 250 | RL15A21 | RL15A21 | L15A21 | RL15A21 |
| PG30A | PG30A | PG30A | PG30A | 300 - 3000 | 500 | 350 - 1000 | RL40A21 | RL40A21 | L40A21 | RL40A21 |
| PG30A | PG30A | PG30A | PG30A | 400 - 4000 | 500 | 450 - 2000 | RL50A21 | RL50A21 | L50A21 | RL50A21 |

IMPORTANT: All units listed above are suitable for air and hydraulic oil service. For water service, all units are suitable except aluminum.

NOTES:
1. Rated overrange pressure on RF10A71 is 150 psig and for RG10A71 is 300 psig.
2. Those transducers are acceptable for steam service if used with gasket (arid metal loop) between steam line and transducer.
3. Enclosures ending in "R" have 316 stainless steel bodies, not 303 stainless steel.
4. 316 stainless steel transducer deadbands are approximately 30% greater than values shown.
5. To make switch enclosures Type 4 watertight, a watertight conduit hub must be installed in the 7/8" diameter hole. Use conduit hub part No. P001 or equivalent.

Form No. P7090

Automatic Switch Co. 50-60 Hanover Road, Plaistow, New Jersey 03032

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Installation & Maintenance Instructions

ASCO® TRIPONT® Temperature Switches

LIMITED ADJUSTABLE DEADBAND COMPACT LINE TEMPERATURE SWITCHES
OPEN-FRAME. GENERAL PURPOSE, RAINTIGHT OR WATERTIGHT SWITCH ENCLOSURES

DESCRIPTION

This sheet lists switch unit and transducer unit combinations. Table II helps to assure that the proper switch unit is assembled to the proper transducer unit, thus providing a complete limited adjustable deadband temperature switch.

In Table II locate the switch unit catalog number being used. Then go to the right on the same line as the switch unit catalog number and find the transducer unit catalog number which may be used with this particular switch unit. IMPORTANT: The third digit in both the switch unit and transducer unit catalog numbers must be identical. For example, a Switch Unit Catalog No. PG10A can be used with Transducer Unit Catalog No. KA014A. The matching produces a complete limited adjustable deadband temperature switch, Catalog No. PG10A/KA014A. Note that the third digits in both catalog numbers are identical. If the third digits are not identical, it is an incorrect unit and the units should not be assembled.

NOTE: Switch units listed to the left may be used with any transducer units listed to right provided they are on the same horizontal line.

<table>
<thead>
<tr>
<th>TABLE II</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWITCH UNITS</td>
</tr>
<tr>
<td>General Purpose</td>
</tr>
<tr>
<td>No.</td>
</tr>
<tr>
<td>PG10A</td>
</tr>
</tbody>
</table>

NOTE:
- Rated overrange temperatures are limited as follows:
  - For copper capillary units: 550°F (288°C).
  - For direct mount units: 280°F (137°C).
- To make switch enclosure Type 4 watertight, a watertight conduit hub must be installed in the 7/8" diameter hole. Use conduit hub part No.43901 or equivalent.
## UL LISTINGS

This sheet is a listing of switch unit and transducer unit combinations that are Listed and/or Component Recognized by Underwriters Laboratories, Inc. The table below is provided to ensure that the proper switch unit (section) is assembled to the proper transducer unit (section), thus providing a complete, UL Listed and/or Recognized Component pressure switch. Only completely assembled combinations are UL Listed and/or Recognized Component. See table below for UL complementary product category listing and guide card numbers.

## INSTALLATION INSTRUCTIONS

To determine the proper switch and transducer combinations, first locate the switch unit catalog number in the table below. Then, going to the right on the same line (as the switch unit catalog number) find the transducer unit catalog number which may be used with this particular switch unit. IMPORTANT: The third digit in both the switch unit and transducer unit catalog number must be identical. For example, a switch unit Catalog No.PA31A can be used with transducer unit Catalog No.RV34A11. The mating produces a complete pressure switch Catalog No.PA31A-RV34A11.

### SWITCH UNITS

See Note [a]

| Series: PA, PB, PC & PG Followed by Numbers Below | Pressure Transducer Units

<table>
<thead>
<tr>
<th>Applicable Options</th>
<th>Air</th>
<th>Water Pressure</th>
<th>Honeywell/Nema Connection</th>
<th>Air</th>
<th>Water Pressure</th>
<th>Honeywell/Nema Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-Frame (No Cover)</td>
<td>Air</td>
<td>Honeywell/Nema Connection</td>
<td>Air</td>
<td>Honeywell/Nema Connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40A 41A 46A 48A 46A</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>20A 21A 24A 26A 26A</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>30A 31A 34A 36A 36A</td>
<td>-</td>
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</tr>
<tr>
<td>20A 21A 24A 26A 26A</td>
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<tr>
<td>10A 11A 14A 16A 16A</td>
<td>-</td>
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<td>10A 11A 14A 16A 16A</td>
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<td>20A 21A 24A 26A 26A</td>
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<td>10A 11A 14A 16A 16A</td>
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</tr>
</tbody>
</table>

### NOTES:

- All transducers used with general purpose and watertight switch units are UL Listed as Industrial Control Equipment Enclosed, Motor Controllers Pressure Operated, Guide NKPZ2. Transducers which end in 11, 21, 32 or 42 and used with General Purpose and Watertight Switch Units are also UL Listed as Switches for Heating and Cooling Appliances, Guide MFHX.
- All transducers used with open-frame (no enclosure) switch units are considered UL Recognized Components as Industrial Control Equipment, Motor Controllers Pressure Operated, Guide NKPZ2. Transducers which end in 11, 21, 32, or 42 used with open-frame (no enclosure) switch units are also considered UL Recognized Components as Switches for Heating and Cooling Appliances, Guide MFHX.
- Dupont's registered trademark.

### Automatic Switch Co.

50-00 Hawarden Road, Flushing Park, New Jersey 07932
**UNDERWRITERS LABORATORIES, INC. LISTED AND/OR RECOGNIZED COMPONENTS**

**ASCO® TRIPOINT® Compact Line Temperature Switches**

**UL LISTINGS**
This sheet is a listing of switch unit and transducer unit combinations that are Listed and/or Component Recognized by Underwriters Laboratories, Inc. The table below is provided to ensure that the proper switch unit (section) is assembled to the proper transducer unit (section), thus providing a complete, UL Listed and/or Recognized Component temperature switch. Only completely assembled combinations are UL Listed and/or Recognized Component. See table below for UL complementary product category listing and guide card numbers.

**INSTALLATION INSTRUCTIONS**
To determine the proper switch and transducer combination, first locate the switch unit catalog number in the table below. Then going to the right on the same line (as the switch unit catalog number) find the transducer unit catalog number which may be used with this particular switch unit.

**Note:** The third digit in both the switch unit and transducer unit catalog number must be identical. For example, a switch unit Catalog No.PA10A can be used with transducer unit Catalog No.KB10A4. The mating produces a complete temperature switch Catalog No. PA10A/KB10A4.

<table>
<thead>
<tr>
<th>SWITCH UNITS</th>
<th>TEMPERATURE TRANSDUCER UNITS</th>
<th>See Notes1 and 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series: PA, PB, PC, &amp; PG Followed by Numbers Below</td>
<td>Direct Probe</td>
<td>6' Capillary &amp; Bulb</td>
</tr>
<tr>
<td>General</td>
<td>Watertight</td>
<td>Watertight</td>
</tr>
<tr>
<td>Purpose</td>
<td>Type 1</td>
<td>Type 5, 6</td>
</tr>
<tr>
<td>10A</td>
<td>11A</td>
<td>15A</td>
</tr>
<tr>
<td>10A</td>
<td>11A</td>
<td>15A</td>
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<td>10A</td>
<td>11A</td>
<td>15A</td>
</tr>
<tr>
<td>10A</td>
<td>11A</td>
<td>15A</td>
</tr>
</tbody>
</table>

**NOTES:**
1. All transducers used with general purpose and watertight switch units are UL Listed as Temperature — Indicating and Regulating Equipment, Guide XAPX.
2. All transducers used with open frame (no enclosure) switch units are considered UL Recognized Components as Temperature — Indicating and Regulating Equipment, Guide XAPX2.

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**Form No. P7047R1**

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**Automatic Switch Co.**

D-22

**CENTROX Instruction Manual**
Installation & Maintenance Instructions

OPEN—FRAME SOLENOIDS

NOTICE: See separate valve installation and maintenance instructions for information on: Operation, Positioning, Mounting, Piping, Strainer or Filter Requirements, Flow Controls, Cleaning, Preventive Maintenance, Causes of Improper Operation, Disassembly and Reassembly of Basic Valve.

DESCRIPTION

Series U8016 are open—frame, pull type solenoid operators. When installed just as a solenoid and not as part of an ASCO valve, the core has a 0.250—28 UNF—2B tapped hole with 0.38 minimum full thread. Series US8016 open—frame solenoid operators are the same as Series U8016 except they are provided with spade terminal coils.

OPERATION

When the solenoid is energized, the core is drawn into the solenoid base sub—assembly.

IMPORTANT: When the solenoid is de—energized, the initial return force for the core, whether developed by spring, pressure or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force for AC construction is 11 ounces; 5 ounces for DC construction.

INSTALLATION

Check nameplate for correct catalog number, voltage, frequency, wattage and service.

⚠️ CAUTION: To protect the solenoid valve or operator, install a strainer or filter, suitable for the service involved in the inlet side as close to the valve or operator as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601 and 8602 for strainers.

⚠️ WARNING: To prevent the possibility of electrical shock from the accessibility of live parts, install the open—frame solenoid in an enclosure.

Positioning

This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub—assembly area.

If open—frame solenoid is supplied on an ASCO valve, check basic valve instructions for positioning.

Mounting

Refer to Figure 1 (below) for mounting.

![Yoke mounting dimension](image)

⚠️ CAUTION: Be sure mounting screws do not penetrate yoke far enough to damage coil.

Figure 1. Yoke mounting dimension (partial view).

Wiring

Wiring must comply with local codes and the National Electrical Code. Coils are provided with lead wires or 1/4" spade terminals. The solenoid yoke is provided with a hole for a grounding screw, see Figure 2. Grounding screw not supplied with solenoid. To facilitate wiring, the solenoid may be rotated 360° by removing the retaining cap, clip or hi—shock clip.

⚠️ CAUTION: When metal retaining clip disengages, it will spring upward.

Rotate solenoid enclosure to desired position. Then replace retaining cap, clip or hi—shock clip before operating. Be sure hi—shock retaining clip seats in the circular groove around side wall of solenoid base sub—assembly. Tighten retaining clip securely so that the retaining clip ends meet.

![147 diameter hole](image)

147 diameter hole for a No. 8 thread cutting screw with a maximum length of .31 [8 mm].

Figure 2. Hole for grounding screw (partial view).

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Note: Alternating current (AC) and direct current (DC) solenoids are built differently. To convert from one to the other, it is necessary to change the complete solenoid including the core and solenoid base sub—assembly, not just the coil. Consult ASCO.

Solenoid Enclosure Assembly
Catalog Numbers US0161, US0162, US80161 and US80162 open—frame solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid.

▲ CAUTION: Care must be taken not to mar the upper core surface, when installing core or positioning solenoid.

Solenoid Temperature
Standard solenoids are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid yoke becomes hot. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

MAINTENANCE

▲ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize solenoid operator or valve, and vent fluid to a safe area before servicing.

Cleaning
All solenoid operators and valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty operation will occur and the solenoid operator or valve may fail to shift. Clean strainer or filter when cleaning the operator or valve.

Preventive Maintenance
• Keep the medium flowing through the solenoid operator or valve as free from dirt and foreign material as possible.
• While in service, the solenoid operator or valve should be operated at least once a month to insure proper opening and closing.
• Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any worn or damaged parts.

Causes of Improper Operation
• Faulty Control Circuits: Check the electrical system by energizing the solenoid. A metallic click signifies that the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown fuses, open—circuit or grounded solenoid, broken lead wires or splice connections.
• Burned—Out Coils: Check for open—circuit coil. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate and marked on the coil. Check ambient temperature and check the core is not jammed.
• Low Voltage: Check voltage across the coil leads. Voltage must be at least 85% of rated voltage.

Coil Replacement/Solenoid Disassembly
1. Disassemble solenoid in an orderly fashion using exploded views for identification and placement of parts.
2. Disconnect coil lead wires from power supply and grounding wire from yoke.
3. Remove retaining cap, clip or hi—shock clip and spacer (if present) from top of solenoid.

▲ CAUTION: When metal retaining clip disengages, it will spring upward.

4. Slip yoke containing coil, sleeves and insulating washers off the solenoid base sub—assembly. Insulating washers are omitted when a molded coil is used.
5. Remove coil, sleeves (2) and insulating washers (if present) from yoke.

Note: for panel mount (Figure 6) or hi—shock (Figure 5) construction, remove additional parts as required.

6. For additional disassembly, unscrew solenoid base sub—assembly or bonnet. The bonnet requires a special wrench adapter which is supplied in ASCO Rebuild Kits. For wrench adapter only, order Wrench Kit No. K425945.

7. Refer to basic valve instructions for further disassembly.

Coil Replacement/Solenoid Reassembly
1. Install solenoid base sub—assembly or plugnut/core tube sub—assembly with bonnet gasket and bonnet. Torque solenoid base sub—assembly to 175 ± 25 in—lbs [19.8 ± 2.8 Nm]. Torque valve bonnet to 90 ± 10 in—lbs [10.2 ± 1.1 Nm].
2. Reassemble open—frame solenoid following exploded views.
3. For solenoid using a hi—shock retaining clip be sure retaining clip seats in circular groove around side wall of solenoid base sub—assembly. Then tighten retaining clip securely so that the retaining clip ends meet.
4. Make electrical connections to solenoid, see Wiring section.

▲ CAUTION: Solenoid must be fully reassembled because the yoke and internal parts complete the magnetic circuit. Be sure to replace insulating washer at each end of non—molded coil.

ORDERING INFORMATION
FOR SOLENOID OPERATORS OR COILS
When Ordering Solenoid Operators or Coils, specify Catalog Number, Serial Number, Voltage and Frequency. For Coils, specify number stamped on coil (if visible).
Figure 3. Series U8016 open—frame solenoid with leached coil.

Figure 4. Series US8016 open—frame solenoid with 1/4" space terminal coil.
Figure 5. Series U8016 hi-shock clip construction – open-frame solenoid with leaded coil.

Figure 6. Series U8016 open-frame panel mount solenoid with leaded coil.
DESCRIPTION
This sheet is specifically designed to provide general installation and maintenance instructions for specially designed valves. Not all paragraphs on this sheet are applicable to each design. You must review this sheet and select the paragraphs which apply to the valves you have. This sheet is designed to cover a wide range of valve designs, for example: solenoid operated valves, air operated valves, manual operated valves, special designs for special applications and conditions. Refer to the offset assembly drawing which is packaged with your valve for information on size, type, material, and operation.

OPERATION
Refer to assembly drawing for flow diagrams and general instructions on operation.

INSTALLATION
Check nameplate for correct catalog number, pressure, voltage, service and valve for any other special instruction tags or labels. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

FOR VALVES WITH LEVER TYPE OPERATING MOVEMENTS

WARNING: Do not obstruct movement of lever. Lever must be free to move or valve will not shift position.

Future Service Considerations
Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid after disassembly and reassembly.

Temperature Limitations
Refer to assembly drawing for ambient and fluid temperature limitations.

Positioning
Refer to assembly drawing for positioning.

Piping
Connect piping to valve according to markings on valve body (consult flow diagrams on assembly drawings). Apply pipe compound sparingly to male pipe threads only. If applied to valve threads the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

CAUTION: To avoid damage to the valve body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If TEFLO: tape, paste, spray or similar lubricant is used, use extra care when tightening due to reduced friction. This applies mainly to valves with aluminum or zinc bodies.

CAUTION: For the protection of the solenoid valve (all valves in general) install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Periodic cleaning is required depending on service conditions. See Series 8600, 8601 and 8602 for strainers.

Minimum Operating Pressure Differential
For all valves requiring a minimum operating pressure differential, the pressure and exhaust lines must be full size without restriction. Minimum operating pressure differential as stamped on the nameplate must be maintained for dependable operation. For 3 and 4-way valves minimum operating pressure differential must be maintained between pressure and exhaust at the amount of changeover. Hydraulic pumps or air reservoirs must have adequate capacity to maintain the minimum pressure during changeover. To check pressure during changeover, install a pressure gage in the pressure connection as close as possible to the valve.

MAINTENANCE

WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power and depressurize valve. If the valve handles combustible fluid, extinguish all open flames and avoid any type of sparking or ignition. Vent fluid to a safe area before servicing the valve.

NOTE: For most valves it is not necessary to remove valve from pipeline for repair. For air operated valves the auxiliary pressure line must be disconnected.

Cleaning
All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to shift. Clean strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep medium flowing through valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history in the past is the best indication of a proper interval between service cycles.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete rebuild kit.
- For special designs where an operating movement is utilized, periodic inspection of the movement should be carried out. Operating movement should be kept clean and free from paint, foreign matter, corrosion, freezing and icing conditions.

Causes Of Improper Operation

- Faulty Control Circuits: Check the electrical system by energizing the solenoid. A metallic click signifies that the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown fuses, open circuited or grounded coil, broken lead wires, or splice connections.
- Burned-Out Coil: Check for open-circuited coil. Replace coil as necessary. Check supply voltage; it must be the same as specified on nameplate and as marked on the coil.
- Low Voltage: Check coil voltage across coil leads. Voltage must be at least 85% of nameplate rating.
- Incorrect Pressure: Check valve pressure. Pressure to valve must be within range specified on nameplate.
- Air Operator: Check line pressure to air operator.
- Excessive Leakage: Disassemble valve and clean all parts. Replace worn or damaged parts with a complete ASCO Rebuild Kit for best results.

ORDERING INFORMATION

FOR ASCO REBUILD KITS AND COILS
Parts marked with an asterisk (*) on the assembly drawing are supplied in Rebuild Kits. When ordering Rebuild Kits for ASCO valves, order the Rebuild Kit number stamped on the valve nameplate. When Ordering Coils for ASCO valves, order the number stamped on your coil. If the number of the kit or the coil is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.

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GENERAL INSTALLATION AND MAINTENANCE INSTRUCTIONS

Note: These General Installation and Maintenance Instructions are to be used only in conjunction with the instruction sheet for the specific product.

INSTALLATION

The ACSU/ACOMATIKI products are intended to be used only within the technical characteristics as specified on the nameplate. Changes to the equipment are strictly forbidden. It is the user's responsibility to ensure that the equipment is installed in accordance with local codes and standards. If any doubts exist, please consult a qualified electrician.

The equipment may be installed in any position provided that it cannot obstruct the flow of air over the equipment or interfere with the operation of safety devices. The equipment should be installed so that it is accessible for maintenance and repair.

The installation should be carried out in accordance with the instructions provided in the instruction sheet for the specific product.

ELECTRICAL CONNECTION

When connecting the equipment, ensure that the voltage and frequency of the supply match those specified on the nameplate.

Ensure that the equipment is connected to a properly grounded electrical system. If the equipment is to be installed in a hazardous location, it should be connected to a properly grounded electrical system.

The equipment can be supplied from either the following electrical terminals:
- The equipment can be supplied from a 3-phase, 230V, 50Hz electrical system.
- The equipment can be supplied from a 1-phase, 230V, 50Hz electrical system.

PUTTING INTO SERVICE

Before putting the equipment into service, ensure that the equipment is properly installed and that all safety devices are functioning properly. If in doubt, consult the manufacturer.

Most of the electrical equipment is equipped with fuses for protection against overload. The fuses should be replaced only with fuses of the same rating and type. If the fuses are blown, the cause of the overload should be determined and corrective action taken.

SOUND EMISSION

The noise level of the equipment is determined by the manufacturer. It is important to ensure that the equipment is installed in a manner that will not cause excessive noise. If a noise level is exceeded, appropriate measures should be taken to reduce the noise level.

MAINTENANCE

The ACSU/ACOMATIKI products are designed to require minimal maintenance. However, it is recommended that the equipment be inspected regularly to ensure that all safety devices are operating properly.

A service agreement with the manufacturer is recommended to ensure that the equipment is maintained in accordance with the manufacturer's specifications.

A service maintenance agreement should be established with the manufacturer to ensure that the equipment is maintained in good condition.

Instructions for cleaning the equipment are available from the manufacturer. It is important to ensure that the equipment is cleaned regularly to maintain its efficiency and reliability.

ENTRETIEN

Les composants ACSU/ACOMATIKI sont conçus pour ne nécessiter une maintenance que dans les cas de défaillances. Il est recommandé de se rapprocher du fabricant pour obtenir des instructions d'entretien. Les composants doivent être inspectés régulièrement pour s'assurer qu'ils fonctionnent correctement.

Les instructions de nettoyage sont disponibles auprès du fabricant. Il est important de nettoyer régulièrement l'équipement pour maintenir son efficacité et sa fiabilité.

SERVICE

Les composants ACSU/ACOMATIKI sont conçus pour ne nécessiter une maintenance que dans les cas de défaillances. Il est recommandé de se rapprocher du fabricant pour obtenir des instructions d'entretien. Les composants doivent être inspectés régulièrement pour s'assurer qu'ils fonctionnent correctement.

Les instructions de nettoyage sont disponibles auprès du fabricant. Il est important de nettoyer régulièrement l'équipement pour maintenir son efficacité et sa fiabilité.

NOTE: These General Installation and Maintenance Instructions are to be used only in conjunction with the instruction sheet for the specific product.

INSTRUCTIONS GENERALES D'INSTALLATION ET D'ENTRETIEN

Note: Ces instructions générales d'installation et d'entretien concernent le mode d'emploi du produit. Il est recommandé de se rapprocher du fabricant pour obtenir des instructions d'entretien. Les composants doivent être inspectés régulièrement pour s'assurer qu'ils fonctionnent correctement.

Les instructions de nettoyage sont disponibles auprès du fabricant. Il est important de nettoyer régulièrement l'équipement pour maintenir son efficacité et sa fiabilité.