

Suggested List Price \$75.00 (U.S.D.)

**AirSep<sup>®</sup> Corporation  
PSA Oxygen Generator  
Models AS-A – AS-L**

***Instruction Manual***

MN011-1    A05/09



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# Ownership Data

Please take a moment to note below important information about your AirSep® Corporation PSA Oxygen Generator. Retain this instruction manual, along with your invoice, to serve as a permanent record of your purchase.

## ***PSA Oxygen Generator***

Model Number:

Serial Number:

Invoice Date:

Start-up Date:

## ***AirSep Representative***

Company:

Contact:

Address:

City/Town:

State:

Zip:

Country:

Fax:

Phone:

Telex:



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



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## 1.0 Introduction

### 1.1 General

This instruction manual provides description of the AirSep Corporation PSA Oxygen Generator Models AS-A, AS-B, AS-D, AS-E, AS-G, AS-J, AS-K, and AS-L, as well as instructions for their installation, operation, and maintenance. The Appendix of this instruction manual also includes pertinent drawings and component literature.

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

### 1.2 Warnings, Cautions, and Notes

As you read this instruction manual, pay special attention to the WARNING, CAUTION, and NOTE messages. They identify safety guidelines or other important information as follows:



Provides information that can prevent severe bodily injury or death.



Cautions against the risk of electric shock.



Provides information important enough to emphasize or repeat.

### **1.3 References to Controls and Indicators with Tags or Labels**

This instruction manual uses uppercase characters (e.g., ON/OFF switch) to refer to controls and indicators identified by tags or labels. Numbers inside parentheses (e.g., V-2) identify manually operated flow controls (e.g., manual valves). Refer to Chapter 4 for description of the oxygen generator components for each model.

## 2.0 Safety

### 2.1 General

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

To ensure your safety, thoroughly read and familiarize yourself with the entire section of this instruction manual. In addition, AirSep Corporation strongly recommends that you review this section periodically.

### 2.2 Potential Hazards



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 reduce the risk of fire or explosion, keep gasoline, kerosene, oil, grease, cotton fibers, wood, paint, and other combustible material away from all parts of the oxygen generator.

Do not allow smoking, open flame, or usage of electronic devices that may generate sparks (e.g., cellular telephones) near the oxygen generator.

Post "NO SMOKING OR OPEN FLAMES" signs conspicuously near the location of the oxygen generator.



Take extreme care to keep all oxygen piping and vessels clean. To avoid fire or explosion, oxygen clean all surfaces that can come in contact with the product oxygen. Check all oxygen fittings for leaks with an oxygen-compatible, leak-detecting solution.



To prevent fire or electrical shock, locate the oxygen generator indoors, away from rain or any other type of moisture.



Before you attempt to install, operate, or repair the oxygen generator, read and thoroughly understand this instruction manual and the component manuals located in the Appendix D of this instruction manual. Improper installation, operation, or repairs can result in severe bodily injury, damage to the oxygen generator, or poor performance.



The interior of the oxygen generator control cabinet contains electrical parts that can produce an electrical shock hazard if not handled properly. To prevent electrical shock, read and thoroughly understand Section 8 — Troubleshooting in this instruction manual before you service the oxygen generator.



AirSep oxygen generators are sold for use in industrial applications only. Contact AirSep Corporation or an authorized AirSep representative before you use this unit for any medical application.



Disconnect power before servicing oxygen generator.



Do not disconnect protective earth

## 2.3 Safety Publications

The safety section of this instruction manual is not a complete summary of required safety precautions. 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 General**

Air Contains 21 % oxygen, 78% nitrogen, 0.9% argon, and 0.1% other gases. AirSep PSA Oxygen units separate oxygen from compressed air through a unique Pressure Swing Adsorption (PSA) process. The compressed air flows through a filter assembly before the air enters the adsorber vessels. A particulate filter removes condensed water, oil, dirt, scale, etc. from the feed air, and then, a separate coalescing filter (mounted on most of the models) removes additional oil and water vapor.

The oxygen generator uses, in its adsorber vessels, an inert ceramic material called molecular sieve to separate compressed air into 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. The process valves on the oxygen generator then direct the oxygen to the oxygen receiver for storage until needed by your application.

While one adsorber produces oxygen, the other depressurizes to exhaust the waste gases it adsorbed (collected) during the oxygen production cycle. 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 the standard AS-A through AS-L models. Refer to the illustrations, located in the Appendix A of this instruction manual, for the detailed flow diagram, electrical schematic, and the general arrangement drawings of all the oxygen generator models referenced in this instruction manual.





## 4.0 Components Description

The drawings in this section illustrate the location of the main components of the various oxygen generator models. All models include similar components unless noted otherwise; however, the location and size of these components varies among the different models. Refer to Appendix of this instruction manual for general layout drawings and specifications for all the oxygen generator models referenced in this instruction manual. In addition, the oxygen generator requires use of an oxygen receiver to provide stable flow and purity for short-term surges of feed oxygen above the rated capacity of the oxygen generator.

### 4.1 External Components

Figure 4-1 below illustrates on two models the external components viewed from the front of the oxygen generator.

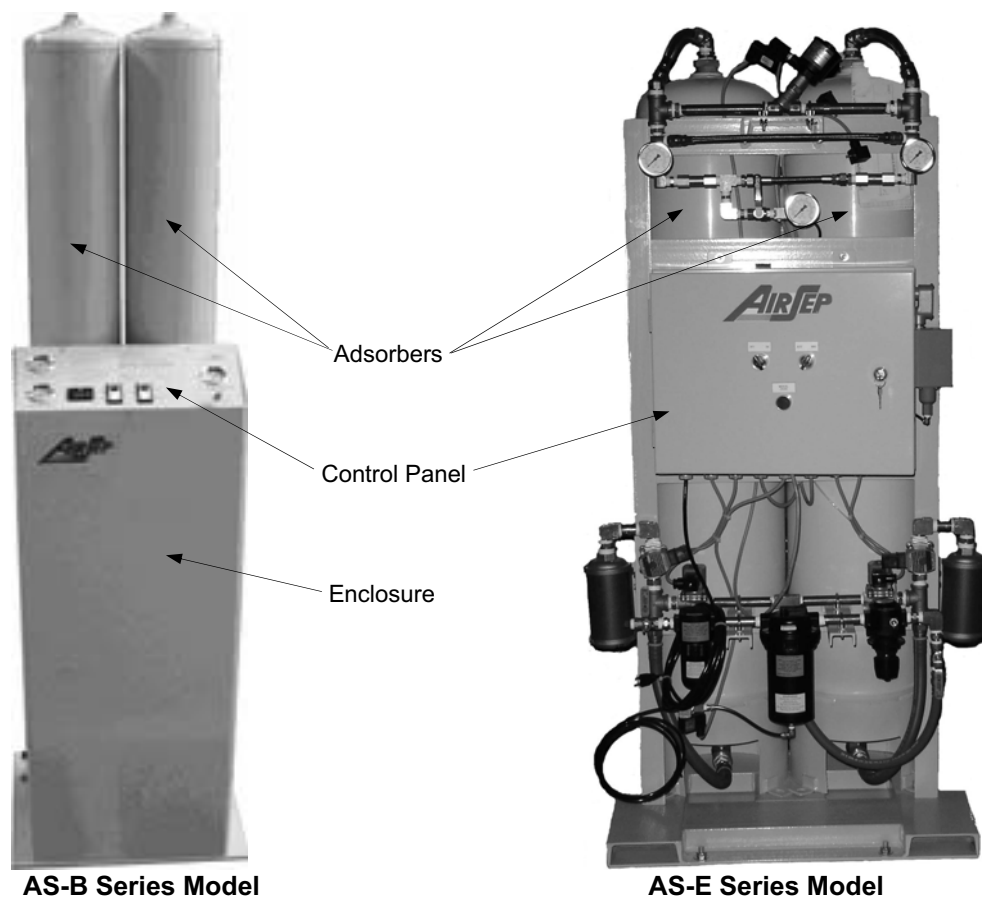


Figure 4.1: External Components — Front View

### 4.1.1 Adsorbers

The adsorbers, or beds, are vessels that contain the molecular sieve used to adsorb (attract) nitrogen from compressed air and allow oxygen to pass through as the product gas.

### 4.1.2 Enclosure

The enclosure protects the control system components of the unit (e.g., circuit board, pressure switch, fuses, and transformer). It is present only in AS-A thru AS-D models. The control system components are inside the control panel in the AS-E thru AS-L models.



Disconnect power before opening and/or removing enclosure.

### Power Cord

The power cord, and its grounded plug, connects the oxygen generator to a properly grounded electrical outlet to supply electrical power to the oxygen generator. In the event of different type electrical connection, a fully qualified electrician must install the appropriate electrical connection on the end of the power cord for a properly grounded electrical outlet to supply electrical power to the oxygen generator.

### Fuse Holder

The fuse holders contain fuses to protect the electrical components of the oxygen generator. On the AS-E through AS-L series models, the fuse holders are mounted in the control panel.



Fuses must be replaced with the same type and amp rating as the original fuses.

### 4.1.3 Connections

The oxygen generator provides the connections described below.

#### Air Inlet

The feed air inlet provides a connection for the feed air hose from the air compressor.

## Oxygen Outlet

The oxygen outlet provides a connection for the oxygen hose to the oxygen receiver.

## Condensate Drain Outlet

The condensate drain outlet provides a connection for a hose to drain condensate from the oxygen generator filters (not applied for all the models).

## 4.2 Control Panel

The control panel on the oxygen generator contains the controls needed to operate the oxygen generator and monitor its operation. An example of a typical control panel is shown in Figure 4-2. Not all components are available on every generator. On the AS-E through AS-L models, the gauges are mounted directly on the manifolds and the hour meter is inside the control panel.

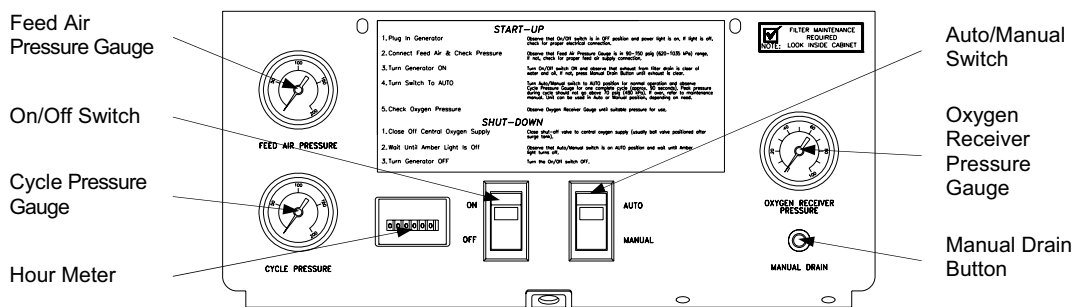


Figure 4.2: Control Panel — AS-B and AS-D Models

### On/Off Switch

The I/O power switch starts and stops the operation of the unit. The green indicator light illuminates to indicate that the oxygen generator is receiving electrical power.

### Auto/Manual Switch

The AUTO/MANUAL switch selects the operating mode for the oxygen generator. In the AUTO position, the oxygen generator cycles on and off to meet the oxygen demand. In the MANUAL position, the oxygen generator cycles continuously. The amber/yellow indicator light on the AUTO/MANUAL switch illuminates only when the oxygen generator produces oxygen.

### Manual Drain Button

The oxygen generator uses an automatic valve to periodically drain excess moisture extracted from the feed air. The manual drain button allows you to operate the automatic drain valve manually at any time during operation.

**Hour Meter (Not available on AS-A models)**

The hour meter indicates the total number of hours the oxygen generator cycles.

**FEED AIR PRESSURE Gauge (Not available on AS-E — AS-L models)**

The FEED AIR PRESSURE gauge indicates the pressure of the feed air as the air enters the generator prior to the feed air regulator.

**CYCLE PRESSURE Gauge (Not available on AS-E — AS-L models)**

The CYCLE PRESSURE gauge indicates the pressure of the feed air before the air enters the adsorbers. The feed air regulator controls the pressure indicated on the CYCLE PRESSURE gauge.

**ADSORBER PRESSURE Gauges (AS-E — AS-L models only)**

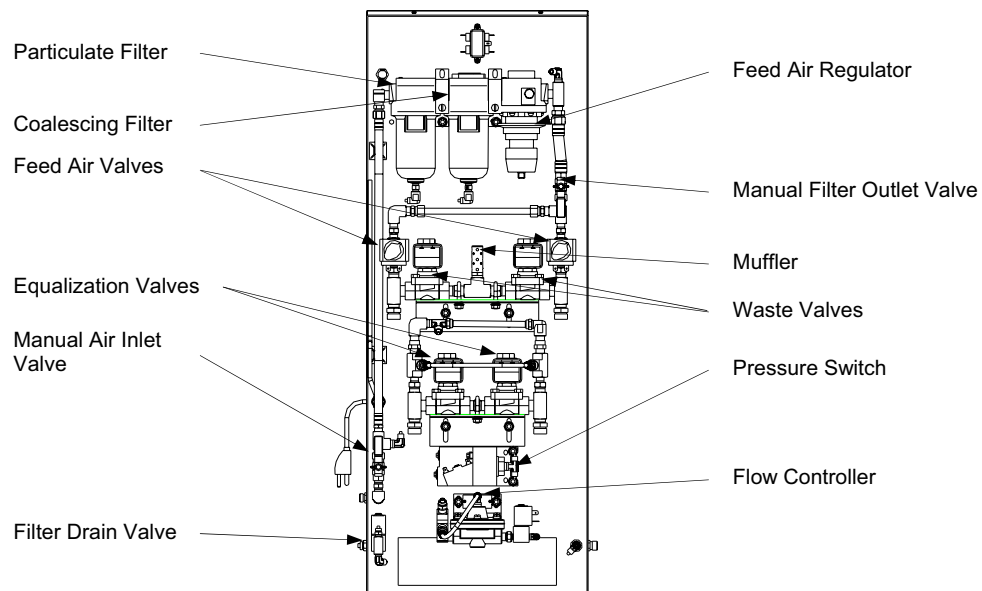
The adsorber pressure gauges indicate the pressure in the two adsorbers.

**OXYGEN RECEIVER/PRODUCT OXYGEN PRESSURE Gauge**

The OXYGEN RECEIVER/PRODUCT OXYGEN PRESSURE gauge indicates the oxygen pressure at the oxygen receiver/product manifold outlet.

### 4.3 Manifold Components

Figures 4-3 and 4-4 below illustrate the manifold components of the oxygen generator. The location and the presence of components may vary between the various models of the generators.



**Figure 4.3: Manifold Components — AS-B Model**

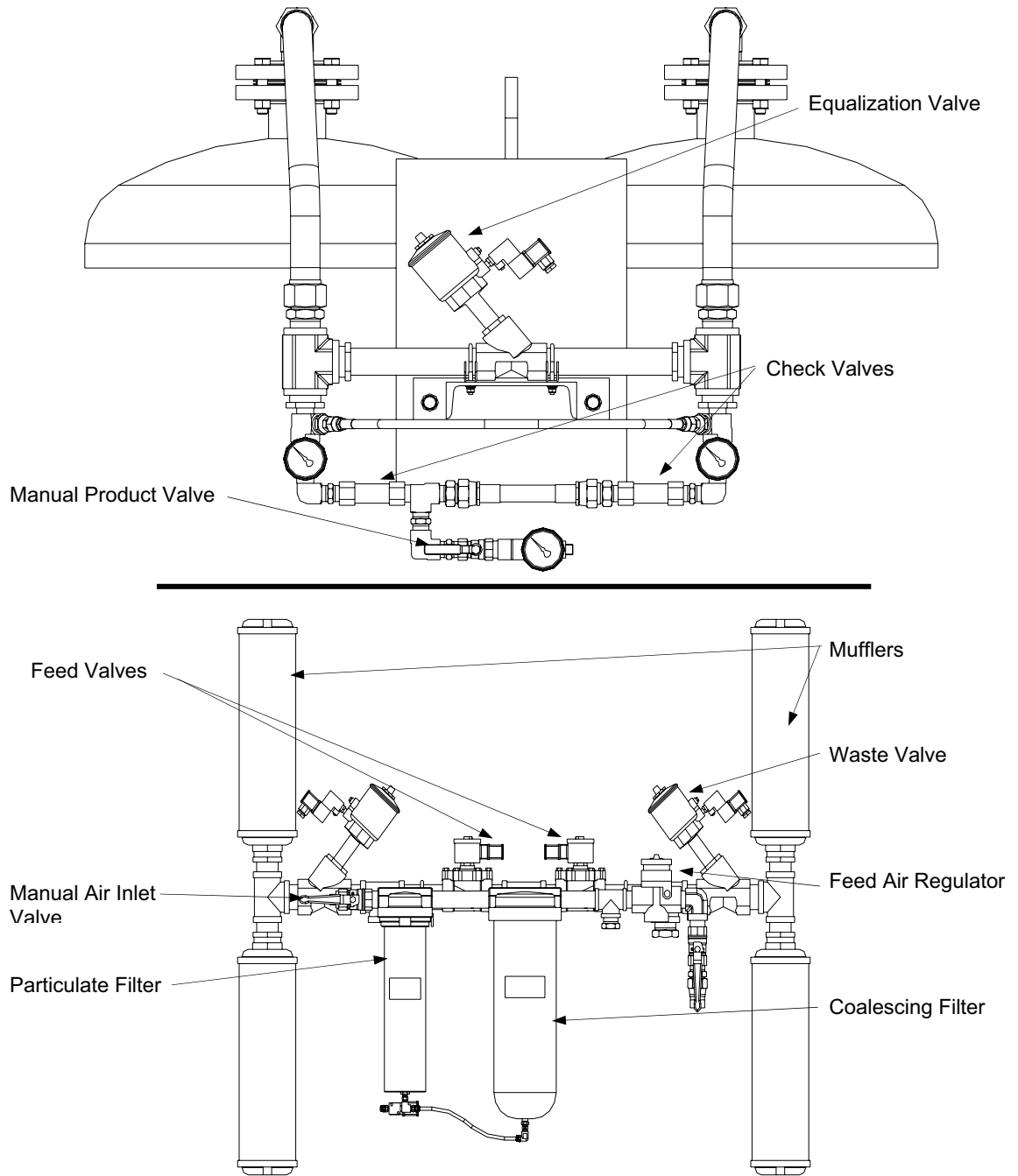


Figure 4.4: Manifold Components — AS-L Model

### Manual Inlet Valve

This manual valve controls the flow of feed air from the air compressor to the filter assembly. It is named manual feed# 1 valve (V-1).

**Particulate Filter (Not available on AS-A models)**

The particulate filter, or prefilter, removes particulates from the feed air before the air enters the coalescing filter and then the adsorbers.

**Coalescing Filter**

The coalescing filter removes condensed water, oil vapor, and other contaminants from the feed air before the air enters the adsorbers.

**Feed Air Regulator**

The feed air regulator is set at the AirSep Corporation factory. It controls the maximum oxygen generator cycle pressure. The setting of the regulator is customized as per the demand of oxygen for your application. Please ensure that the feed air regulator setting is not changed without consulting AirSep Corporation.



Setting the Feed air regulator to a value such that the maximum oxygen generator cycle pressure is 80 psig or more can cause severe damage to the molecular sieve in the adsorbers which will not be covered under AirSep's warranty.

**Filter Drain Valve**

This automatic valve removes moisture from the filters through tubing connected to an outlet of the filters. In higher series models, the automatic valve is not present instead the moisture removal operation is controlled by the PLC.

**Manual Filter Outlet Valve**

This manual valve controls the flow of feed air from the feed air regulator after the filters to the automatic feed air valves. It is named manual feed # 2 valve (V-2).

**Automatic Feed Air Valves**

The automatic feed air valves control the flow of the feed air as the air enters the adsorbers.

**Automatic Waste Valves**

The automatic waste valves control the flow of waste gas as it exits the adsorbers.

**Pneumatic Equalization Valve (AS-E — AS-L models only)**

The pneumatic equalization valve enables the pressure in the adsorbers to equalize after the product oxygen exits from one of the adsorbers.

**Automatic Product Valve**

The automatic product valve controls the flow of product oxygen from the adsorbers. This valve is manual in AS-E thru AS-L models and is named manual product valve (V-3).

**Check Valves**

The check valves ensure that product gas does not flow back into the adsorbers.

### **Circuit Board/PLC**

The circuit board/PLC controls the cycle time and sequence of operation of the solenoid and the drain valves.

### **Flow Controller (Not available on AS-A and AS-E — AS-L models)**

The flow controller ensures consistent flow of the delivered product oxygen.

### **Pressure Switch**

When the oxygen generator operates in Auto mode, the pressure switch monitors the oxygen pressure in the oxygen receiver. When the pressure in the oxygen receiver increases to the pressure switch upper setpoint, the pressure switch circuit closes and the oxygen generator starts a timed shutdown that stops the unit at the end of the shutdown sequence. When the pressure in the oxygen receiver decreases to the lower setpoint of the switch, the pressure switch opens to activate the oxygen generator, and the oxygen production begins. When the oxygen generator operates in Manual mode, the pressure switch circuit is bypassed and the oxygen generator cycles continuously.

### **Relief Valves (not shown)**

The relief valves, one on each adsorber, ensure that the pressure in the adsorbers does not exceed the rated maximum pressure of the adsorbers.

### **Transformer**

The transformer provides the proper voltage for the electrical components of the oxygen generator.





## 5.0 Installation

### 5.1 Handling and Unpacking

AirSep Corporation ships the oxygen generator on a covered skid. The skid also includes an accessory box (only in AS-A through AS-J Models) containing all the accessories for the unit and an instruction manual needed to install the unit properly. The oxygen receiver, if supplied, is shipped on a separate skid.

To unpack the oxygen generator, follow these guidelines:

- 1) Inspect the shipping container, and open it immediately upon receipt.
- 2) If the exterior packaging is severely damaged, note it on the freight bill before you sign it.



You must submit a damage claim **within 24 hours of receipt**. In the case of concealed or hidden damage, a claim must be filed **within 15 days of receipt**. Only the consignee can file a claim. The AirSep Product Warranty does **not** cover shipping damage.

- 3) Unpack the unit, and remove any protective wrapping and packaging. Retain the carton and packaging to facilitate the future shipping and transporting of the unit.
- 4) Place the unit in an upright position, and thoroughly inspect the enclosure and all the external components (e.g., control panel) for damage.
- 5) Open the enclosure or control panel, and inspect the interior for loose or damaged parts.



To prevent electrical shock, make sure the main power supply is disconnected when you remove the enclosure, inspect the internal components, and install the oxygen generator and oxygen receiver.

- 6) Inspect all the wiring to ensure that no wires are broken and no push-on connector is off its terminal. If a wire is disconnected, reconnect the wire according to the electrical schematic.
- 7) After inspecting the interior, close the enclosure or control panel on the unit.
- 8) Locate the instruction manual inside the accessory box. Read the entire manual before installing and operating the unit.

## 5.2 Pre-installation Guidelines

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



**NOTE**

The oxygen generator may use feed air at specifications outside those shown in the Appendix of this instruction manual; however, use of such feed air may require modification of the oxygen generator at the AirSep Corporation factory to ensure the product oxygen meets the specifications. Consult your sales representative to determine whether your oxygen generator requires modifications for your application.



Locate the oxygen generator in an area where the ambient air temperature remains between 5°C (41°F) and 40°C (104°F) to prevent damage not covered under the AirSep Corporation Product Warranty.



To prevent fire or electrical shock, locate the oxygen generator away from rain or any other type of moisture.

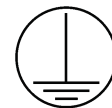


**NOTE**

AirSep oxygen generators are sold for indoor use only. Make sure the area that surrounds the oxygen generator is well ventilated, and provide sufficient space around the unit [at least one meter (three feet)] to allow for cool air flow as well as to allow safe operation and maintenance.

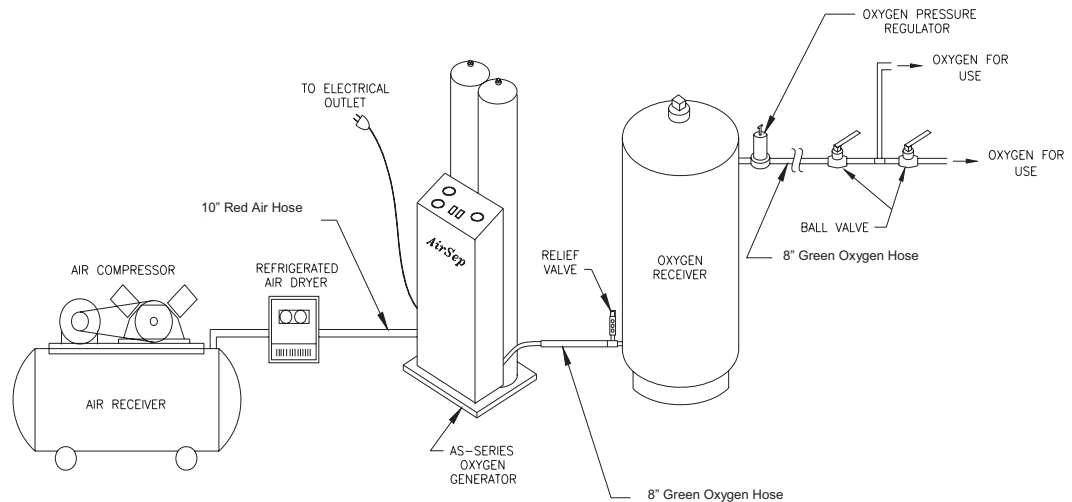


Do not disconnect protective earth:



### 5.3 Installation Instructions

Refer to Figure 5-1 below for the recommended installation arrangement for the oxygen generator.



**Figure 5.1: Typical Installation Arrangement**

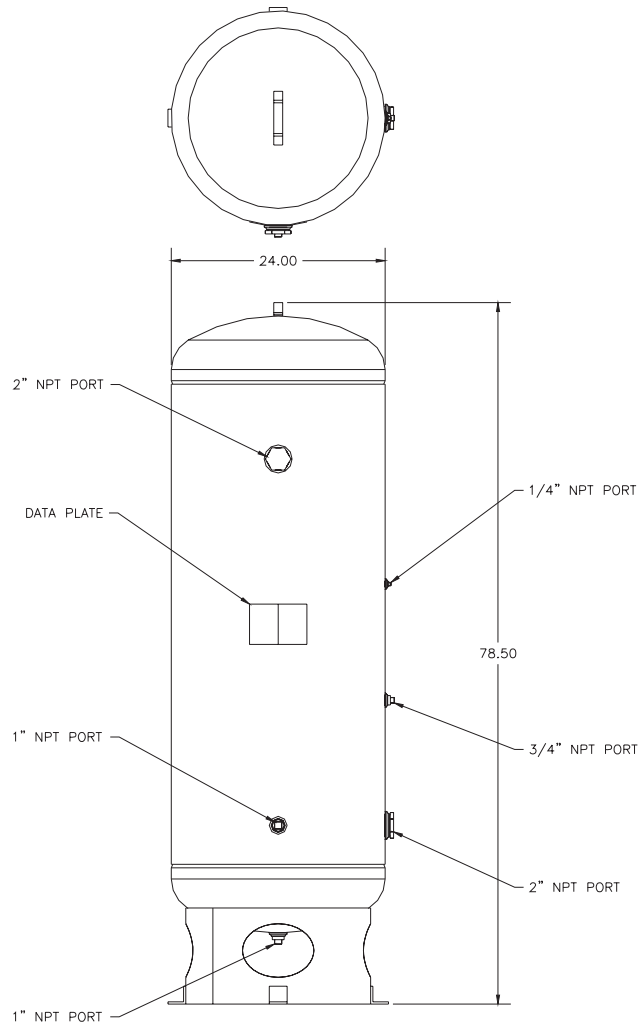
- 1) Connect the red air hose provided with the oxygen generator accessories from the on-site air supply to the feed air inlet connection on the oxygen generator. Refer to the Table 5-1 to determine the proper size for the feed air inlet connection and feed air hose for your model.

<b>Series</b>	<b>Feed Air Inlet Connection Size</b>	<b>Feed Air Hose Size</b>
AS-A, AS-B	1/4" NPT female bulkhead fitting with a 1/4" NPT male x 1/4" NPSM ball-end joint adapter	1/4" ID minimum
AS-D	1/4" NPT female bulkhead fitting with a 1/4" NPT male x 3/8" NPSM ball-end joint adapter	3/8" ID minimum
AS-E	1/2" NPT female fitting	1/2" ID minimum
AS-G, AS-J	3/4" NPT female fitting	3/4" ID minimum
AS-K	1" NPT Female fitting	1" ID minimum*
AS-L	1" NPT Female fitting	1" ID minimum*

**Table 5-1 Feed Air Connection Sizes and Hose Sizes**

\* Hose not supplied by AirSep Corp.

- 2) Install your oxygen receiver. If AirSep Corporation provided your oxygen receiver; assemble the receiver as follows (if not assembled):



**Figure 5.2: 120 Gallon Oxygen Receiver**

- a) Connect the relief valve assembly to the oxygen inlet port on the oxygen receiver. Tighten the connection fully.
- b) Connect the hex nipple to the oxygen outlet port on the oxygen receiver. Tighten the connection fully.
- c) Connect the oxygen regulator to the hex nipple at the oxygen outlet port on the oxygen receiver. Tighten the connection fully.



Use Teflon™ tape to seal the threaded connections on the oxygen receiver. If AirSep Corporation provided your oxygen receiver; the threaded connections in the accessory kit were shipped with Teflon™ tape wrapping already applied.

If AirSep Corporation did not provide your oxygen receiver; make sure your oxygen receiver is sized properly as specified in the Appendix of this instruction manual to meet the requirements of your oxygen generator model. In addition, AirSep Corporation recommends that the oxygen inlet on the oxygen receiver contain a relief valve and that the oxygen outlet on the oxygen receiver contain a pressure regulator and pressure gauge or a manual ball valve and pressure gauge.

- 3) Connect the green oxygen hose provided with the oxygen generator accessories from the oxygen outlet connection on the oxygen generator to the relief valve assembly at the oxygen inlet port on the oxygen receiver. Refer to the following table to determine the proper size for the oxygen outlet connection.

<b>Series</b>	<b>Oxygen Outlet Connection Size</b>
AS-A, AS-B, AS-D	1/4" NPT female bulkhead fitting with a 1/4" NPT male x B size oxygen adapter
AS-E, AS-G, AS-J	3/8" NPT female fitting
AS-K, AS-L	3/4" NPT female on tee behind PI-3 (Hose not supplied by AirSep)

**Table 5-2 Oxygen Outlet Connection Sizes**

- 4) Connect the 1/4" ID nylon tubing provided with the oxygen generator accessories to the condensate outlet at the rear of the oxygen generator (Not available on AS-K and AS-L models).



Make sure the condensate outlet and nylon tubing do not become obstructed at any time. This may require a daily drain system check.

- 5) Connect the power cord to a grounded electrical outlet. On CE units, a qualified electrician should install the appropriate grounded electrical connector on the end of the power cord.



Provide proper voltage from a grounded outlet to the oxygen generator. Improper voltage causes damage not covered under the AirSep Corporation Product Warranty.

The oxygen generator is now ready for operation. Refer to Chapter 6 of this instruction manual before you operate the oxygen generator.

## 6.0 Operation

When you complete installation as described in the previous section, the oxygen generator is ready for easy start-up and operation. This section of this instruction manual provides the procedures for start-up and shutdown of the oxygen generator. Before you start the oxygen generator, read and thoroughly understand any literature or instruction manuals for the air compressor that will provide the feed air to the oxygen generator.

### 6.1 Initial Start-up

To start the oxygen generator for the first time or after an extended or unexpected shutdown, follow the steps below:

- 1) Make sure the ON/OFF switch on the control panel is set to *OFF*.
- 2) Set the AUTO/MANUAL switch on the control panel to *MANUAL*.
- 3) Connect the grounded power cord to a grounded electrical outlet. Make sure the power circuit cannot be turned off accidentally.



If the power is turned off unexpectedly, the unit will stop cycling. If your application is using oxygen when the power is off, the oxygen receiver will depressurize.

When you connect the oxygen generator's plug to a power circuit, the green light on the ON/OFF switch illuminates to indicate that the oxygen generator is receiving electrical power.

- 4) Fully close the manual feed #2 valve (V-2).
- 5) Provide feed air to the oxygen generator that meets the specification for your model. Make sure the FEED AIR PRESSURE gauge registers pressure within the range of feed air pressures specified in the Appendix A of this instruction manual.
- 6) Set the ON/OFF switch on the control panel to *ON*.
- 7) Slowly open the manual feed #2 valve (V-2) until it is open completely.
- 8) **For AS-E through AS-L models ONLY:** Close the manual product valve (refer to Figure 4-4 for location of valve). The manual product valve on these units has been configured to enable a predetermined amount of flow through the valve when closed. This allows the product pressure to build up even when the valve is closed.

- 9) Press the manual drain button and make sure the exhaust from the filter drain does not contain water or oil. If the exhaust contains water or oil, press and hold the manual drain button on the control panel until the exhaust no longer contains liquid.



While venting oxygen, do not allow smoking or open flame. Do not allow venting oxygen to come in contact with clothing or hydrocarbon-based materials.

- 10) Allow the oxygen generator to operate until the OXYGEN RECEIVER PRESSURE gauge registers approximately 276-310 kPa (40-45 psig) and then fully open the manual product valve on AS-E through AS-L models.
- 11) To purge oxygen at less than design purity from the oxygen receiver, while the oxygen generator is running in manual mode, open the manual vent valve on the oxygen receiver to vent oxygen gas. Opening of manual vent valve must not overdraw the oxygen generator. In other words, flowrate of the product oxygen being vented through the manual vent valve on the oxygen receiver must be within the design specifications.
- 12) Fully close the manual vent valve on the oxygen receiver if the low purity oxygen gas no longer discharges from the receiver.
- 13) Set the AUTO/MANUAL switch on the control panel to *AUTO*.



When the oxygen generator cycles, i.e., it produces oxygen; the amber/yellow light on the AUTO/MANUAL switch illuminates. When the unit enters standby, i.e., generator remains *ON* but does not produce oxygen; the amber/yellow light on the AUTO/MANUAL switch shuts off.

- 14) Observe the OXYGEN RECEIVER PRESSURE gauge on the control panel. When the pressure in the oxygen receiver increases to approximately pressure switch upper set point, the oxygen generator runs for five more cycles and then enters standby. When delivery of product oxygen reduces the pressure in the oxygen receiver below pressure switch lower set point, the oxygen generator begins to cycle and the amber/yellow light on the AUTO/MANUAL switch illuminates.



Under normal use, the pressure switch in the oxygen generator does not require adjustment. If you need to adjust the pressure switch, refer to the maintenance chapter of this instruction manual.



- 15) After the oxygen receiver pressurizes and the oxygen generator enters the standby mode, adjust the pressure regulator at the outlet of the oxygen receiver until the pressure of the product oxygen meets the needs of your application.

## 6.2 Operation

The oxygen generator can be operated in auto or manual mode depending on the requirements of your application. To use product oxygen that meets the specifications for your model listed in the Appendix A of this instruction manual, set the AUTO/MANUAL switch to *AUTO* to produce oxygen only during times of the oxygen demand.

## 6.3 Shutdown

- 1) Stop the flow of product oxygen from the oxygen receiver to your application by fully closing all manual valves between the outlet of the oxygen receiver and the inlet to your application.
- 2) Make sure the AUTO/MANUAL switch on the control panel is set to *AUTO*.
- 3) Allow the oxygen receiver to repressurize fully. When the oxygen receiver repressurizes, after a time delay of five cycles, the oxygen generator stops cycling and the amber/yellow indicator light on the AUTO/MANUAL switch shuts off.



**NOTE**

Allow the oxygen generator to enter standby during shutdown to ensure that the oxygen receiver contains oxygen at design purity during the subsequent restart and also ensure that the unit shuts down at the proper point in the cycle. Failure to wait until the oxygen generator enters standby results in temporarily reduced purity oxygen during the subsequent restart.

- 4) Set the ON/OFF switch on the control panel to *OFF*.
- 5) Set the AUTO/MANUAL switch on the control panel to *MANUAL*.

## 6.4 Normal Start-up



To perform a normal start-up, the oxygen generator first requires a shutdown as described in Section 6.3 — Shutdown. If the oxygen generator shuts down due to a power loss, follow the procedure in Section 6.1 — Initial Start-Up to restart the oxygen generator.

- 1) Provide feed air that meets the specification for your model to the oxygen generator. Make sure the FEED AIR PRESSURE gauge on the control panel registers pressure within the range of feed air pressures specified in the Appendix of this instruction manual.
- 2) Set the ON/OFF switch on the control panel to *ON*.
- 3) Start the flow of product oxygen from the oxygen receiver to your application by fully opening all manual valves between the outlet of the oxygen receiver and the inlet to your application.
- 4) Make sure the exhaust from the filter drain does not contain water or oil. If the exhaust contains water or oil, press the manual drain button on the control panel until the exhaust no longer contains liquid.
- 5) Set the AUTO/MANUAL switch on the control panel to *AUTO*.

## 6.5 Extended Shutdown

To shut down the oxygen generator for 24 hours or longer, complete all the steps in Section 6.3 — Shutdown. In addition, perform the following steps:

- 1) Fully close all manual valves on the oxygen receiver to isolate the oxygen in the oxygen receiver, to prevent the loss of pressure in the oxygen receiver and enable a normal start-up.
- 2) Turn the oxygen generator off and disconnect power.

## 6.6 Start-up after an Extended Shutdown

After an extended shutdown or an unexpected shutdown, such as a loss of electrical power, you must purge the oxygen receiver of any low purity oxygen before the oxygen generator can supply oxygen within purity specifications. To purge the oxygen receiver, follow all the steps in Section 6.1 — Initial Start-Up.



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

The most important maintenance you can perform on the oxygen generator is to make sure the automatic drain valve for the filters functions properly. Routinely monitor the operation of this drain valve to ensure the long life of the oxygen generator. Follow the procedures described in this section of the instruction manual for daily, semi-annual, and annual maintenance. It should be noted that few procedural steps in the sub-sections might apply to a specific model.

Use the following chart as a guide to perform maintenance on a regular schedule:

Time Period	Action
Daily	Make sure automatic drain functions properly.
Monthly	Inspect filters and bowls. Clean bowls or replace filters as necessary.
Six Months	Replace particulate filter element.
Annually	Replace coalescing filter element.
	Check performance of automatic valves and actuators.
	Clean and lubricate feed air regulator.

*Table 7-1 Maintenance Chart*

### 7.1 Daily Monitoring

- 1) Make sure the condensate outlet and tubing for the drain valve is not obstructed. Condensate should discharge from this outlet or tubing for approximately three to five seconds every 10 minutes when the ON/OFF switch on the control panel is set to *ON* and the green indicator light on the switch illuminates.
- 2) Press the MANUAL DRAIN button on the control panel and observe the discharge. The discharge should flow freely and be clear of oil and water within five seconds.

### 7.2 Monthly Monitoring

Monthly monitoring requires inspection of the filters and testing the performance of the automatic drain valve. To perform this procedure, remove the front cover of the enclosure, depressurize the unit and remove the filter bowls as described in the following procedures. (See Section 7.3, Removing the Front Cover of the Enclosure, Section 7.4, Depressurizing the Filters, and Section 7.5, Changing Filter Elements.) When the filter bowls have been removed and cleaned, perform the following steps:

- 1) Inspect the filter element(s). Replace any element(s) that appear damaged or excessively dirty.
- 2) Reconnect the drain tubing to the bottom of the bowls.
- 3) Add approximately two ounces of water to the filter bowls.

- 4) Re-install the filter bowls, making sure the bowls lock firmly into place.
- 5) Slowly open fully the manual inlet valve to pressurize the filter bowls.
- 6) While observing the drain tubing, set the ON/OFF switch on the control panel to *ON* and determine whether the automatic drain valve discharges moisture.
- 7) Fully close the manual inlet valve and depressurize the unit as described below. (See Section 7.4, Depressurizing the Filters.)
- 8) Remove the filter bowls as described below. (See Section 7.5, Changing Filter Elements.) Observe whether the water drained from the bowls.

If the filter bowls still contain water, refer to the troubleshooting chapter of this instruction manual. If the bowls do not contain water, re-install the bowls, repressurize the system, and replace the front cover of the enclosure as described below. (See Section 7.5, Changing Filter Elements.)

### 7.3 Removing the Front Cover of the Enclosure (Not available on AS-E — AS-L models)



Disconnect power to the oxygen generator before removing the front cover of the enclosure.



The front cover of the enclosure protects the components of the unit from damage and dirt. The cover should remain on the enclosure at all times and should only be removed for maintenance or servicing as described in this chapter.

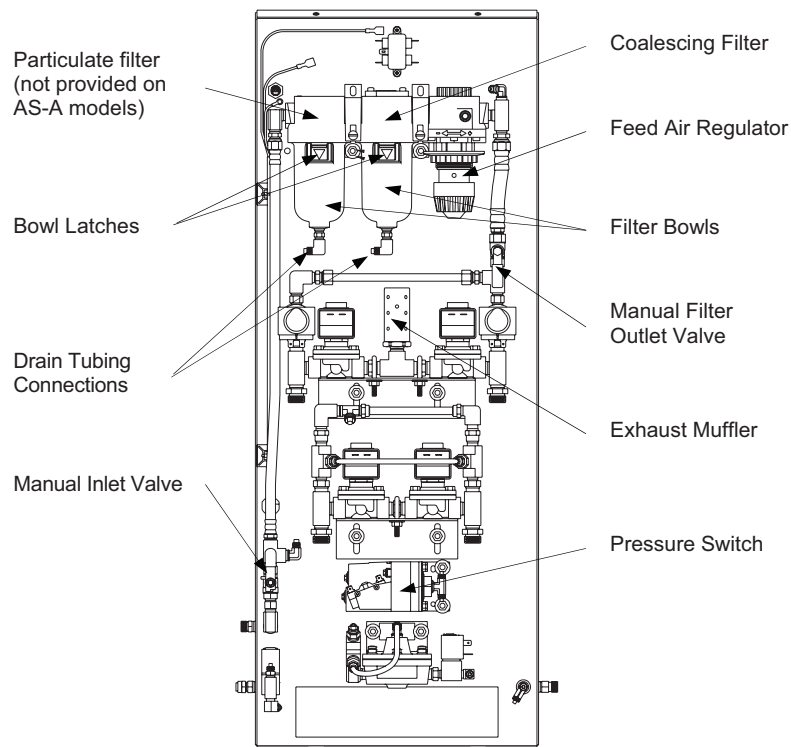
- 1) Remove the slotted screws that connect the top of the cover to the bottom of the control panel.
- 2) Release the four latches on the sides of the cover by pulling the release levers towards the front of the unit.
- 3) Carefully grasp the cover and slide it off the unit towards the front of the unit. The cover is freestanding, so it can be set aside in any location.

## 7.4 Depressurizing the Filters



The oxygen generator filters contain pressurized air. To perform monthly maintenance or change filter elements safely, fully depressurize the filter assembly as described in the procedure in this section. To safely depressurize all oxygen generator components, refer to the procedure described later in this chapter. (See Section 7.6, Depressurizing the Oxygen Generator.)

- 1) Make sure the AUTO/MAN switch is set to *AUTO* and allow the oxygen generator to stop cycling when the oxygen receiver pressurizes fully.
- 2) Set the ON/OFF switch to *OFF*.
- 3) Disconnect the oxygen generator from the power supply.
- 4) Remove the front cover of the enclosure, if applicable. (See Section 7.3, Removing the Front Cover of the Enclosure.)
- 5) Fully close the manual inlet valve (V-1) and manual filter outlet valve (V-2).



**Figure 7.1: Interior View of AS-B Model**

- 6) Shut off the feed air supply at the air compressor or air header.
- 7) Re-install the front cover of the enclosure, if applicable.
- 8) Reconnect the oxygen generator to the power supply.
- 9) Press the MANUAL DRAIN button on the control panel until the CYCLE PRESSURE gauge indicates zero pressure or the air no longer exits from the drain tubing.



If the pressure gauge does not decrease to zero, shut down the unit and call the AirSep Corporation Commercial Products Division.

- 10) Set the ON/OFF switch on the control panel to *OFF*.

## 7.5 Changing Filter Elements

The following procedure describes how to change the filter elements for either the particulate filter (not available on the AS-A models) semi-annually or the coalescing filter annually.

- 1) Depressurize the filter assembly and shut down the oxygen generator. (See Section 7.4, Depressurizing the Filters.)



Do not attempt to remove the filter bowls until the filter assembly fully depressurizes as described in Section 7.4.

- 2) While the unit is depressurized and the power supply is disconnected, remove the front cover of the enclosure. (See Section 7.3, Removing the Front Cover of the Enclosure.)
- 3) To remove the bowl from either filter, push down the bowl latch and rotate the bowl slight right or left while pulling down on the bowl. If filter has screws, loosen them up.
- 4) When the bowl is free, disconnect the drain tubing from the bottom of the bowl. There may be a retainer nut which has to be disconnected to remove the filter element for the filter models with screws.
- 5) Wash the bowl in warm, soapy water, then rinse the bowl.
- 6) Gently unscrew the old filter element and discard it.



- 7) If you are replacing a coalescing filter element, remove and discard the black gasket where the top of the filter element connects to the filter housing.
- 8) If you are replacing a coalescing filter element, make sure a black gasket is attached to the top of the new element.
- 9) Taking care not to touch the filter portion of the new filter element, screw it into the position from which the old filter was removed.
- 10) Reconnect the drain tubing to the bottom of the bowl.
- 11) Re-install the filter bowl, making sure the bowl locks firmly into place.
- 12) Slowly open fully the manual inlet valve and manual filter outlet valve.
- 13) Turn on the feed air at the air compressor or air header.
- 14) Re-install the front cover of the enclosure.
- 15) Connect the oxygen generator to the power supply.
- 16) Set the ON/OFF switch on the control panel to *ON* to operate the oxygen generator.

## 7.6 Depressurizing the Oxygen Generator



The oxygen generator operates with pressurized air and oxygen. To perform maintenance on the unit safely, fully depressurize the oxygen generator components as described in the procedure in this section.

- 1) Shut down the oxygen generator and disconnect the power supply. (See Section 6.3, Shutdown.)
- 2) Remove the front cover of the enclosure. (See Section 7.3, Removing the Front Cover of the Enclosure.) (Not Available on AS-E – AS-L Models)
- 3) Fully close the manual filter outlet valve on AS-A – AS-D models or manual feed# 2 valve (V-2) and the manual product valve (V-3) on AS-E-AS-L models.
- 4) Re-install the front cover of the enclosure, if applicable.
- 5) Connect the oxygen generator to the power supply.
- 6) Set the ON/OFF switch to *ON* and set the AUTO/MAN switch to *MAN*.
- 7) Allow the unit to operate until gas no longer exhausts from the muffler and both the FEED AIR and CYCLE PRESSURE gauges indicate zero pressure.



To fully depressurize the oxygen generator components, follow the steps 2-9 to depressurize the filter assembly as described in section 7.4.



If the pressure gauges do not decrease to zero, shut down the unit and call the AirSep Corporation Commercial Products Division.

- 8) If the unit is depressurized, power down the unit if required and proceed to perform the maintenance.

## 7.7 Adjusting the Feed Air Regulator

The feed air regulator may require re-adjustment after any maintenance is performed. Please ensure that the feed air regulator setting is not changed during re-adjustment.



Setting the Feed air regulator to a value such that the maximum oxygen generator cycle pressure is 80 psig or more can cause severe damage to the molecular sieve in the adsorbers which will not be covered under AirSep's warranty.

If the feed air regulator requires adjustment, perform the following procedure. If applicable, remove the front cover of the enclosure to gain access to the regulator. (See Section 7.3, Removing the Front Cover of the Enclosure.)



Use extreme caution when performing this procedure since it requires removal of the front cover of the enclosure while the unit receives electrical power.

- 1) Unlock the lock nut on the adjustment knob.
- 2) To increase feed air pressure, rotate the knob clockwise. To decrease feed air pressure, rotate the knob counterclockwise.



The numbers on the dial of the feed air regulator do not always directly correspond to the actual cycle pressure in the system. Always rely on the cycle pressure gauge when adjusting the regulator.



Make slight adjustments and allow the unit to run through at least one cycle before making another adjustment. If pressure readings remain incorrect after the cycle completes, continue making slight adjustments and cycling the unit until the pressure is within the specifications listed in the Appendix A.

## 7.8 Adjusting the Pressure Switch

In AUTO mode, the pressure switch controls the starting and stopping of the oxygen generator. When the pressure in the oxygen receiver increases to approximately pressure switch upper set point, the oxygen generator runs for five more cycles and then enters standby. At this time, the amber/yellow light on the AUTO/MANUAL switch goes off. When delivery of product oxygen reduces the pressure in the oxygen receiver below pressure switch lower set point, the oxygen generator begins to cycle and the amber/yellow light on the AUTO/MANUAL switch illuminates.

Although preset at the AirSep Corporation factory to the minimum and maximum specified pressures, the pressure switch may require adjustment if the pressure of the oxygen in the oxygen receiver registers outside the range specified. Follow the procedures in this section to adjust the pressure switch settings when required.



Use extreme caution when performing this procedure since it requires removal of the front cover of the enclosure while the unit receives electrical power.

### AS-A – AS-D Oxygen Generators

Typically the normally open contact of the pressure switch is used for the wiring purposes. Please refer to the Figure 7.2 for the following adjustment procedure:

- 1) If the pressure switch is in the line of the final application when adjustment (signal setting) is made, be sure that the switch can be test operated without affecting 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 7.2.



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

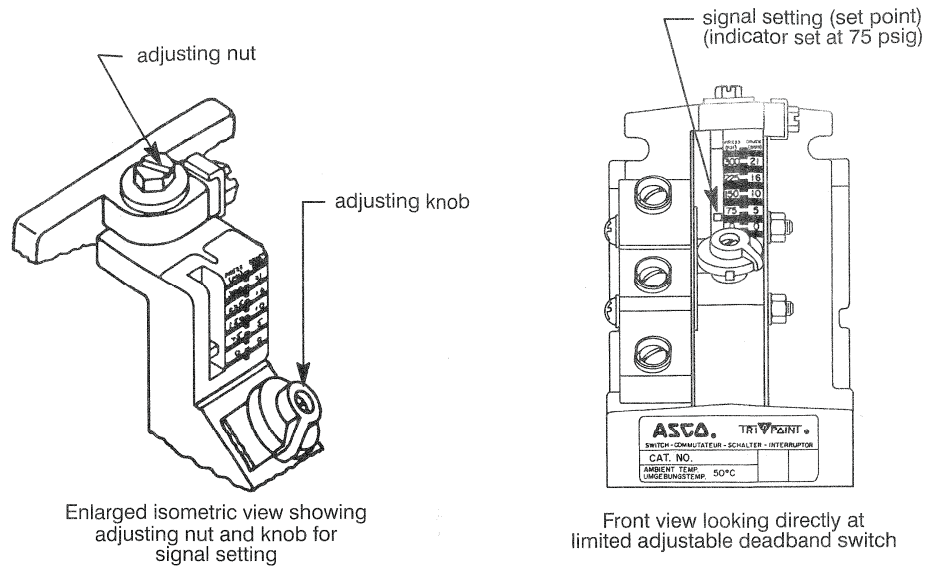


Figure 7.2: Pressure Switch for AS-A – AS-D

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

Adjustment Procedure	Normally Open	
	Electrical Connection to Switch	Position of Test Lamp On-Off
1. Starting with zero signal, connect the test lamp to common.	Normally Open Terminal	Off (Open Circuit)
2. Apply desired actuation signal. Then back off (counter-clockwise) top adjusting nut until switch actuates (set point increasing).	Normally Open Terminal	On (Closed Circuit)
3. Lower signal to desired reactivation signal. Then turn deadband adjusting knob counterclockwise until switch reactivates (set point decreasing).	Normally Open Terminal	Off (Open Circuit)

Table 7-2 Signal Setting Chart

- 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.



If the adjustment of the switch has been made outside 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.

### **AS-E – AS-L Oxygen Generators**



Refer to the Appendix D of this instruction manual for additional information on the pressure switch.

- 1) Set the ON/OFF switch on the oxygen generator control panel to ON.
- 2) Open the front cover of the enclosure and locate the pressure switch. (On AS-E – AS-L models, the pressure switch is mounted on the side of the control panel.)

Locate the two adjustment screws for the high pressure setting and the low pressure setting respectively. Use a ¼-inch wrench or screwdriver to make adjustments.



The adjustment screw normally requires less than a ¼ turn.



Turn either the high or low adjustment screw ¼-turn clockwise to increase its pressure setting. Turn either screw counterclockwise to decrease its pressure setting.



To prevent damage to the pressure switch, do not force the adjustment screws past their stopping points.

- 3) Set the AUTO/MAN switch on the oxygen generator control panel to *AUTO*.
- 4) Close the oxygen outlet valve on the oxygen receiver. (This valve controls oxygen flow from the oxygen receiver to your application.)
- 5) Observe the AUTO/MAN switch. When the amber/yellow indicator light on the switch shuts off to indicate when the oxygen generator stops cycling, note the pressure on the OXYGEN RECEIVER PRESSURE gauge. If the oxygen generator continues to cycle after the timed five cycles and the amber/yellow indicator light remains illuminated when the oxygen receiver pressure exceeds the pressure switch maximum set pressure, perform the step 8. If the oxygen generator stops cycling at approximately the pressure switch maximum set pressure (after the timed five cycles delay), perform the step 9. Otherwise, perform step 6.



A cycle of the oxygen generator consists of the time taken by a particular step (say pressurization of Bed A) to repeat itself.

- 6) Turn the high pressure adjustment screw  $\frac{1}{4}$ -turn clockwise to increase the pressure setting.
- 7) Repeat step 5.
- 8) Turn the high pressure adjustment screw  $\frac{1}{4}$ -turn counterclockwise to decrease the pressure setting.



If the oxygen generator stops cycling after the timed five cycles, proceed to step 9. If the oxygen generator does not stop cycling after five cycles, repeat step 8.

- 9) Open the oxygen vent valve on the oxygen receiver.
- 10) Observe the AUTO/MAN switch on the oxygen generator control panel. When the amber/yellow indicator light on the switch illuminates to indicate when the oxygen generator starts to cycle, note the pressure on the OXYGEN RECEIVER PRESSURE gauge. If the oxygen generator does not start to cycle when the oxygen pressure in the oxygen receiver decreases below the

pressure switch minimum set pressure, perform the step 13. If the oxygen generator starts to cycle while the oxygen pressure remains greater than the pressure switch minimum set pressure, perform the step 11. If the oxygen generator starts to cycle at approximately the pressure switch minimum set pressure, the pressure switch is adjusted properly. Perform the step 15.

- 11) Turn the low pressure adjustment screw ¼-turn counterclockwise to decrease the pressure setting.
- 12) Repeat step 10.
- 13) Slowly turn the low adjustment screw clockwise in ¼-turn increments until the oxygen generator starts to cycle and the amber/yellow indicator light on the AUTO/MAN switch illuminates.
- 14) Repeat the complete procedure till the desired settings are achieved.
- 15) Fully close the oxygen vent valve on the oxygen receiver.
- 16) Close the front cover of the enclosure and resume normal operation of the oxygen generator.





## 8.0 Troubleshooting

### 8.1 Technical Support

For assistance in troubleshooting or repairing the unit, or to order replacement parts, contact the AirSep Commercial Products Service Department by telephone Monday through Friday between 7:30 a.m. and 4:30 p.m. Eastern Time. In the USA or Canada, call **1-800-320-0303**. Outside the USA or Canada, call **(716) 691-0202**. Send fax inquiries anytime to **(716) 691-1255**. Address written inquiries to:

AirSep Corporation  
 260 Creekside Drive  
 Buffalo  
 NY 14228-2075 USA  
 Attention: Commercial Products Service Department

Visit [www.airsep.com](http://www.airsep.com) to know about our complete range of standard Oxygen Generators.

### 8.2 Troubleshooting Chart

Use the following chart as a guide to troubleshoot the oxygen generator.

Problem	Probable Cause	Solution
Oxygen generator does not cycle. Green light on ON/OFF switch does not illuminate.	No electrical power to control cabinet or blown fuse on unit.	Make sure unit is plugged into wall outlet and that wall outlet receives power.
	Blown fuse on unit.	Replace fuse in unit.
Oxygen generator operates. Green light on ON/OFF switch does not illuminate.	Light bulb on ON/OFF switch burned out.	Replace switch or replace the bulb in AS-E – AS-L models.
	Loose or defective wire to switch.	Repair or replace wire.
Oxygen generator does not operate and green light on ON/OFF switch illuminates. AUTO/MAN switch set to MAN and amber/yellow light on AUTO/MAN switch does not illuminate.	ON/OFF switch set to OFF.	Set ON/OFF switch to ON.
	Defective ON/OFF switch.	Replace switch.
	Loose or defective power wire to circuit board/PLC.	Repair or replace wire.

<b>Problem</b>	<b>Probable Cause</b>	<b>Solution</b>
	Defective circuit board/PLC.	Replace circuit board/PLC.
	Low voltage.	Check power supply.
Oxygen generator cycles with AUTO/MAN switch set to <i>MAN</i> . Amber/yellow light on AUTO/MAN switch does not illuminate.	Light bulb on AUTO/MAN switch burned out.	Replace switch or replace the bulb in AS-E – AS-L models.
	Loose or defective wire to switch.	Repair or replace wire.
	Defective circuit board/PLC.	Replace circuit board/PLC.
Oxygen generator does not operate and green light on ON/OFF switch illuminates. Amber/yellow light on AUTO/MAN switch does not illuminate and switch set to <i>AUTO</i> . Pressure of oxygen is less than pressure switch lower set point.	ON/OFF switch set to <i>OFF</i> .	Set ON/OFF switch to <i>ON</i> .
	Defective ON/OFF switch.	Replace switch.
	Loose or defective power wire to circuit board.	Repair or replace wire.
	Pressure switch improperly set.	Adjust pressure switch as described in Chapter 7.
	Defective pressure switch.	Replace pressure switch.
	Defective circuit board/PLC.	Replace circuit board/PLC.
Oxygen generator operates continuously. Amber/yellow light on AUTO/MAN switch illuminates and switch set to <i>AUTO</i> . Pressure of oxygen exceeds pressure switch upper set point.	Pressure switch improperly set.	Adjust pressure switch as described in Chapter 7.
	Defective pressure switch.	Replace pressure switch.
	Loose or defective power wire to pressure switch.	Repair or replace wire.
	Defective AUTO/MAN switch.	Replace switch.
	Defective circuit board/PLC.	Replace circuit board/PLC.
Oxygen generator operates continuously. Pressure of oxygen at specified purity is less than the pressure switch lower set point.	Inadequate feed air pressure.	Make sure feed air valves remain fully open and lines are not obstructed.

<b>Problem</b>	<b>Probable Cause</b>	<b>Solution</b>
	Inadequate cycle pressure.	Adjust or replace feed air regulator.
	Oxygen demand exceeds oxygen generator capacity.	Check oxygen usage or check unit and oxygen hoses and piping for leaks.
Oxygen purity below specified purity (50–70%).	Low purity oxygen during initial start-up.	Start unit as described in Chapter 6.
	Unit shut down for extended period—no pressure in oxygen system.	Start unit as described in Chapter 6.
	Momentary power loss.	Vent low purity oxygen from system as described in Chapter 6.
	Inadequate feed air.	Check air lines for obstructions or adjust or replace feed air regulator.
	Valves not cycling properly.	See valve sequence in Appendix A.
	Improperly wired or defective circuit board/PLC.	Check the wiring or replace circuit board/PLC.
	Torn valve diaphragm.	Identify defective valve and rebuild valve.
	Solenoid valve not functioning properly. Check for the following causes:	
	Defective coil.	Replace coil.
	Loose or defective wire to valve.	Repair or replace wire.
	Defective circuit board/PLC. (No power output to valve.)	Replace circuit board/PLC.
	Valve remains energized and open.	Check the valve or the circuit board/PLC.
	Defective valve.	Rebuild valve.
	Worn internal parts on valve.	Rebuild valve.
Valve makes loud “chattering” noise.	Low voltage.	Check power supply.
	Low voltage circuit board/PLC output.	Replace circuit board/PLC.
	Dirty valve.	Clean or rebuild valve.
	Worn valve core.	Rebuild valve.
	Defective EMI filter.	Replace EMI filter.
Very low purity oxygen output (21–50%).	Leaking check valves.	Clean or replace check valves.
	Plugged muffler.	Replace muffler.

<b>Problem</b>	<b>Probable Cause</b>	<b>Solution</b>
	Contaminated molecular sieve in adsorbers.	Replace molecular sieve.
Oxygen generator outputs particulates (dusting).	Feed air regulator set improperly set.	Adjust feed air regulator.
	Contaminated molecular sieve in adsorbers.	Contaminated molecular sieve in adsorbers.
	System not cycling properly.	Check and repair or replace faulty wiring and/or circuit board.
Feed air regulator leaks out bleed orifice.	Stuck feed air regulator main valve assembly.	Clean and lubricate main regulator valve assembly.
	Defective main valve assembly seat.	Rebuild or replace regulator.
Oxygen generator relief valves open.	Cycle pressure exceeds the maximum pressure specified.	Adjust feed air regulator.
	Stuck feed air regulator main valve assembly.	Rebuild or replace regulator.
	Frozen feed air regulator main valve assembly.	Make sure ambient temperature exceeds 40°F.
	Defective cycle pressure gauge.	Replace gauge and adjust feed air regulator.
	Defective relief valve.	Replace relief valve.
Filter drain valve remains open. (Valve not energized.)	Valve obstructed.	Clean or replace valve.
Filter drain valve remains energized.	MANUAL DRAIN valve button stuck.	Replace button.
	Defective circuit board.	Replace circuit board.
Filter drain valve does not energize.	Defective MANUAL DRAIN valve button.	Replace button.
	Loose or defective wire to valve.	Repair or replace wire.
	Defective valve coil.	Replace valve.
	Valve core stuck in closed position.	Replace valve.
	Defective circuit board/PLC. (No power output to valve.)	Replace circuit board/PLC.
Filter drain valve energizes with unit pressurized, but no air exhausts.	Drain valve obstructed or stuck in closed position.	Clean or replace valve.
	Drain tubing obstructed or pinched.	Clean or replace tubing.

## A Appendix

## Technical Data

### Specifications

Data in this section refer to standard AS-A through AS-L model oxygen generators. The oxygen generators may use feed air at specifications outside those shown; however, use of such feed air may require modification of the oxygen generators at the AirSep Corporation factory to ensure the product oxygen meets the design specifications. Consult your sales representative to determine whether your oxygen generator requires modifications for your application.



Provide proper voltage from a grounded outlet to the oxygen generator. Main power supply voltage fluctuation must not exceed 10% of the nominal supply voltage.



### AS-A

Oxygen output:	20-25 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C (-100°F)
Dimensions:	13 x 11 x 57 in. (W x D x H) 33 x 28 x 145 cm (W x D x H)
Approximate weight:	134 lb 61 kg

#### Feed Air Requirements

Pressure:	90 psig (620 kPa) (min)
Temperature:	50°C (122°F) (max)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 46 - 48 psig Maximum: 54 - 56 psig

#### Other Specifications:

Pollution Degree	2
Installation Category	II
Altitude	2000 m

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\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.

**AS-B**

Oxygen output:	45-55 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C -100°F
Dimensions:	17 x 15 x 58 in. (W x D x H) 43 x 38 x 147 cm (W x D x H)
Approximate weight:	238 lb 108 kg
<b>Feed Air Requirements</b>	
Pressure:	90 psig (min) 620 kPa (min)
Temperature:	50°C (max) 122°F (max)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 46 - 48 psig Maximum: 54 - 56 psig
<b>Other Specifications:</b>	
Pollution Degree	2
Installation Category	II
Altitude	2000 m

\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.



**AS-D**

Oxygen output:	80-90 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C -100°F
Dimensions:	20 x 16 x 60 in. (W x D x H) 51 x 41 x 152 cm (W x D x H)
Approximate weight:	338 lb 153 kg
<b>Feed Air Requirements</b>	
Pressure:	90 psig (min) 620 kPa (min)
Temperature:	50°C (max) 122°F (max)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 46 - 48 psig Maximum: 54 - 56 psig
<b>Other Specifications:</b>	
Pollution Degree	2
Installation Category	II
Altitude	2000 m

\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.

**AS-E**

Oxygen output:	160-195 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C -100°F
Dimensions:	27 x 33 x 68 in. (L x W x H) 69 x 84 x 173 cm (L x W x H)
Approximate weight:	734 lb 333 kg
<b>Feed Air Requirements</b>	
Pressure:	90 psig (min) 620 kPa (min)
Temperature:	50°C (max) 122°F (max)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 65 - 68 psig Maximum: 70 - 72 psig
<b>Other Specifications:</b>	
Pollution Degree	2
Installation Category	II
Altitude	2000 m

\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.

### AS-G

Oxygen output:	250-320 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C -100°F
Dimensions:	29 x 36 x 75 in. (L x W x H) 74 x 91 x 191 cm (L x W x H)
Approximate weight:	970 lb 440 kg
Feed Air Requirements	
Pressure:	90 psig (min) 620 kPa (min)
Temperature:	50°C (max) 122°F (max)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 65 - 68 psig Maximum: 70 - 72 psig
Other Specifications:	
Pollution Degree	2
Installation Category	II
Altitude	2000 m

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\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.

**AS-J**

Oxygen output:	450-600 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C -100°F
Dimensions:	34 x 42 x 78 in. (L x W x H) 86 x 107 x 198 cm (L x W x H)
Approximate weight:	1764 lb 800 kg
<b>Feed Air Requirements</b>	
Pressure:	90 psig (min) 620 kPa (min)
Temperature:	50°C (max) 122°F (max)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 65 - 68 psig Maximum: 70 - 72 psig
<b>Other Specifications:</b>	
Pollution Degree	2
Installation Category	II
Altitude	2000 m

\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.

**AS-K**

Oxygen output:	750-900 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C -100°F
Dimensions:	38 x 58 x 91 in. (L x W x H) 97 x 147 x 231 cm (L x W x H)
Approximate weight:	2455 lb 1114 kg
<b>Feed Air Requirements</b>	
Pressure:	90 psig (min) 620 kPa (min)
Temperature:	50°C (max) 122°F (max)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 65 - 70 psig Maximum: 72 - 75 psig
<b>Other Specifications:</b>	
Pollution Degree	2
Installation Category	II
Altitude	2000 m

\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.

**AS-L**

Oxygen output:	1000-1300 SCF/hr*
Oxygen Delivery Pressure:	65 psig (max) 448 kPa (max)
Oxygen purity:	90% (min)
Oxygen dew point:	-73°C -100°F
Dimensions:	40 x 62 x 100 in. (L x W x H) 102 x 158 x 254 cm (L x W x H)
Approximate weight:	3023 lb 1371 kg
<b>Feed Air Requirements</b>	
Pressure:	90 psig (min) 620 kPa (min)
Temperature:	50°C (max) 122°F (maximum)
Power requirements:	120 (± 10%) VAC, 50/60 Hz, Single Phase, 3 Amp 220 (± 10%) VAC, 50/60 Hz, Single Phase, 1 Amp
Pressure Switch Setting***:	Minimum: 65 - 70 psig Maximum: 72 - 75 psig
<b>Other Specifications:</b>	
Pollution Degree	2
Installation Category	II
Altitude	2000 m

\*SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F.

\*\*\*Data may vary as per the customer's requirements.

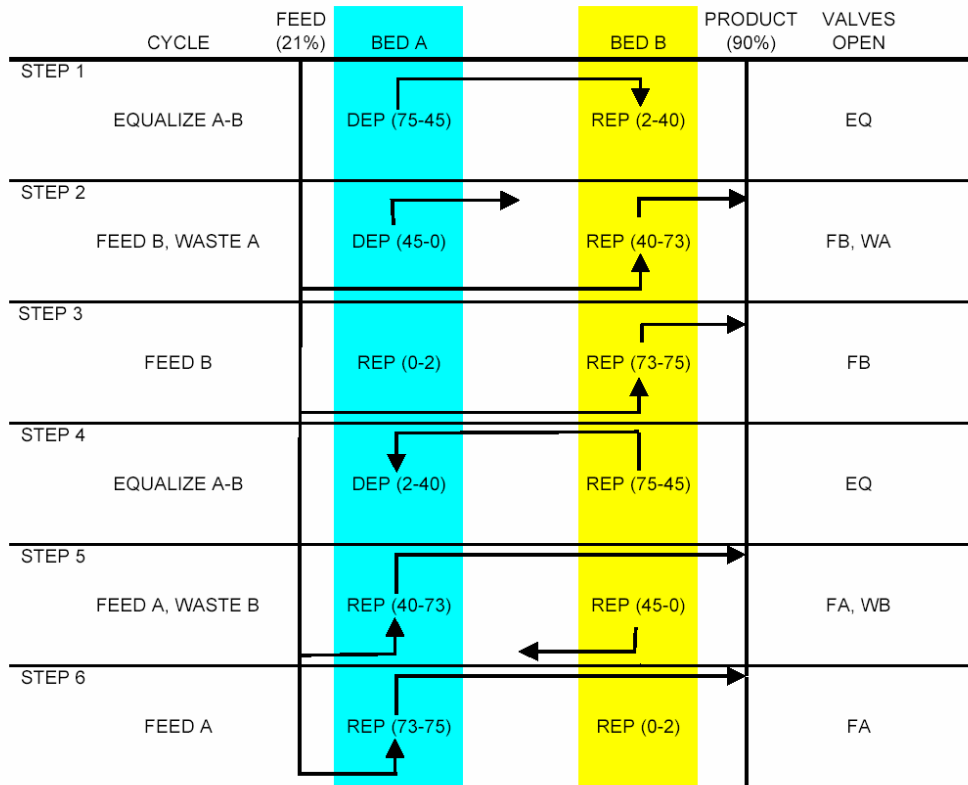
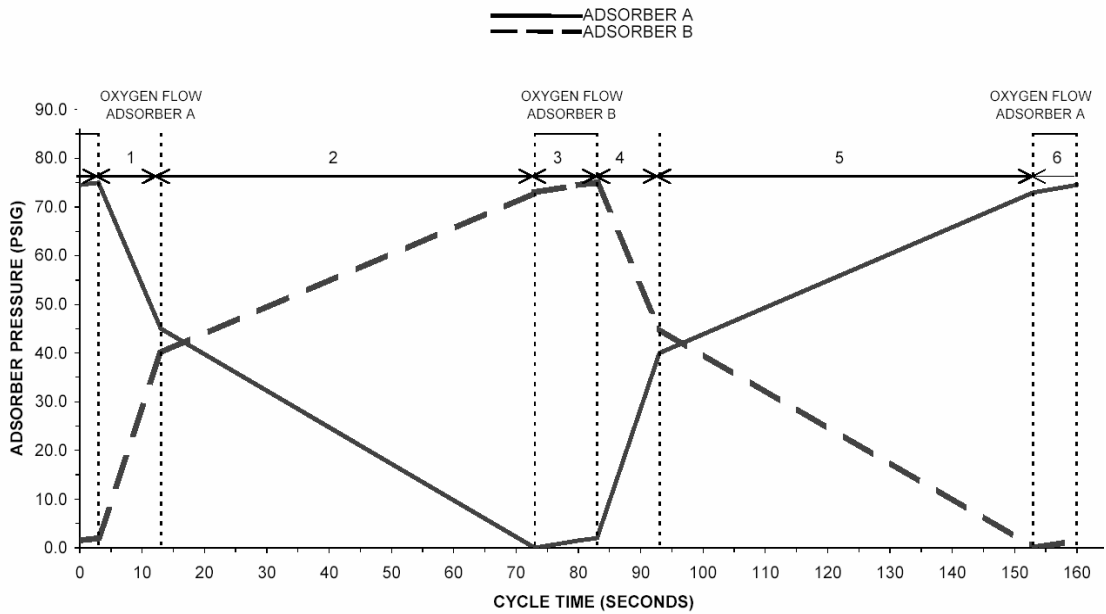


Figure A.1: Typical Pressure Profile and Valves Cycle Sequence





## **Drawings and Schematics**



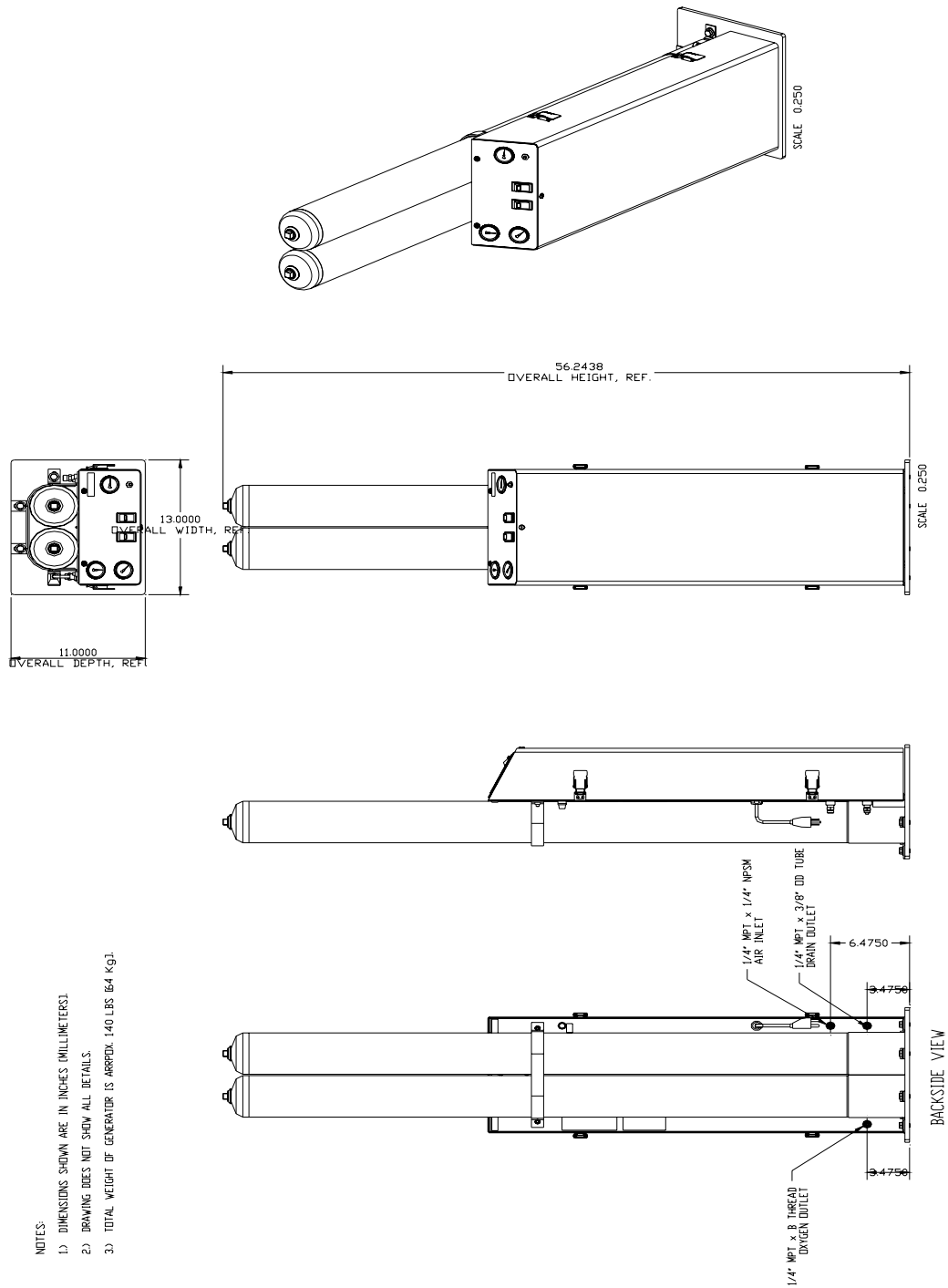
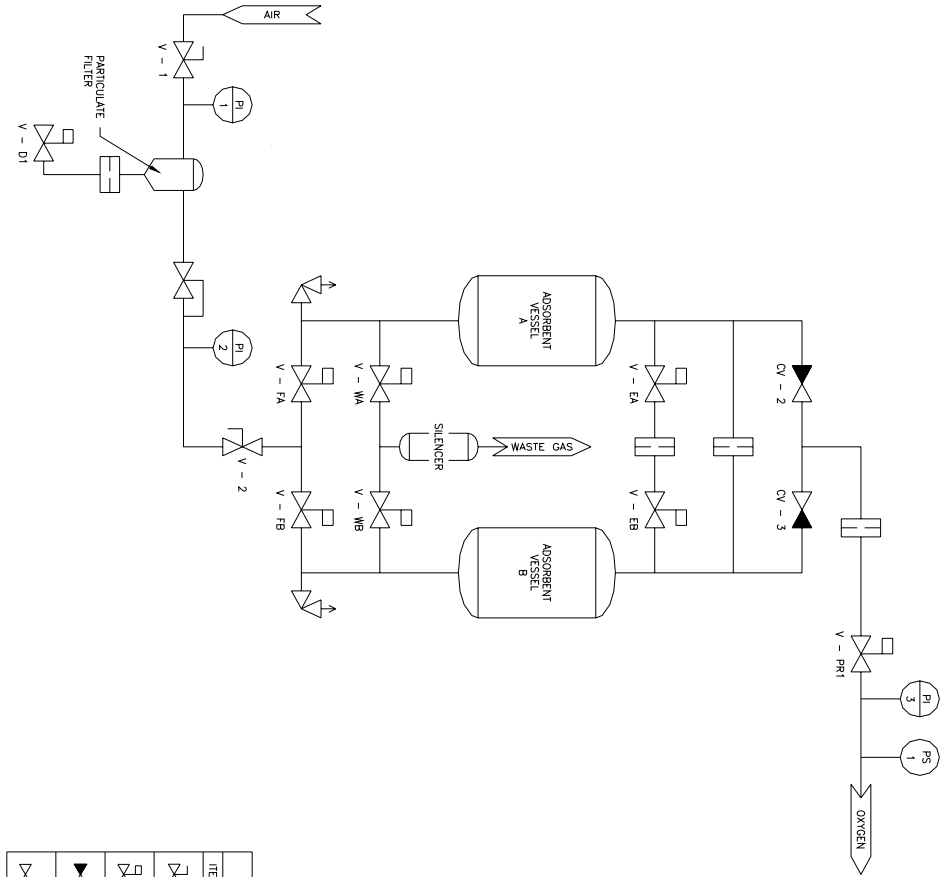


Figure A.2: General Arrangement Drawing – AS-A



**VALVE IDENTIFICATIONS:**

- V - FA/B = FEED AIR VALVES
- V - WA/WB = WASTE NITROGEN VALVES
- V - EA/EB = EQUALIZATION VALVES
- V - SA/SB = FILTER ASSURANCE DRAIN VALVE
- V - PR1 = PRESSURE RECEIVER VALVE
- V - 1 = MANUAL FEED #1 VALVE
- V - 2 = MANUAL FEED #2 VALVE
- CV - 2 = PRODUCT CHECK VALVE
- CV - 3 = PRODUCT CHECK VALVE

**PRESSURE GAUGE IDENTIFICATIONS:**

- PI 1 = FEED AIR PRESSURE
- PI 2 = O<sub>2</sub> PRESSURE
- PI 3 = OXYGEN RECEIVER PRESSURE

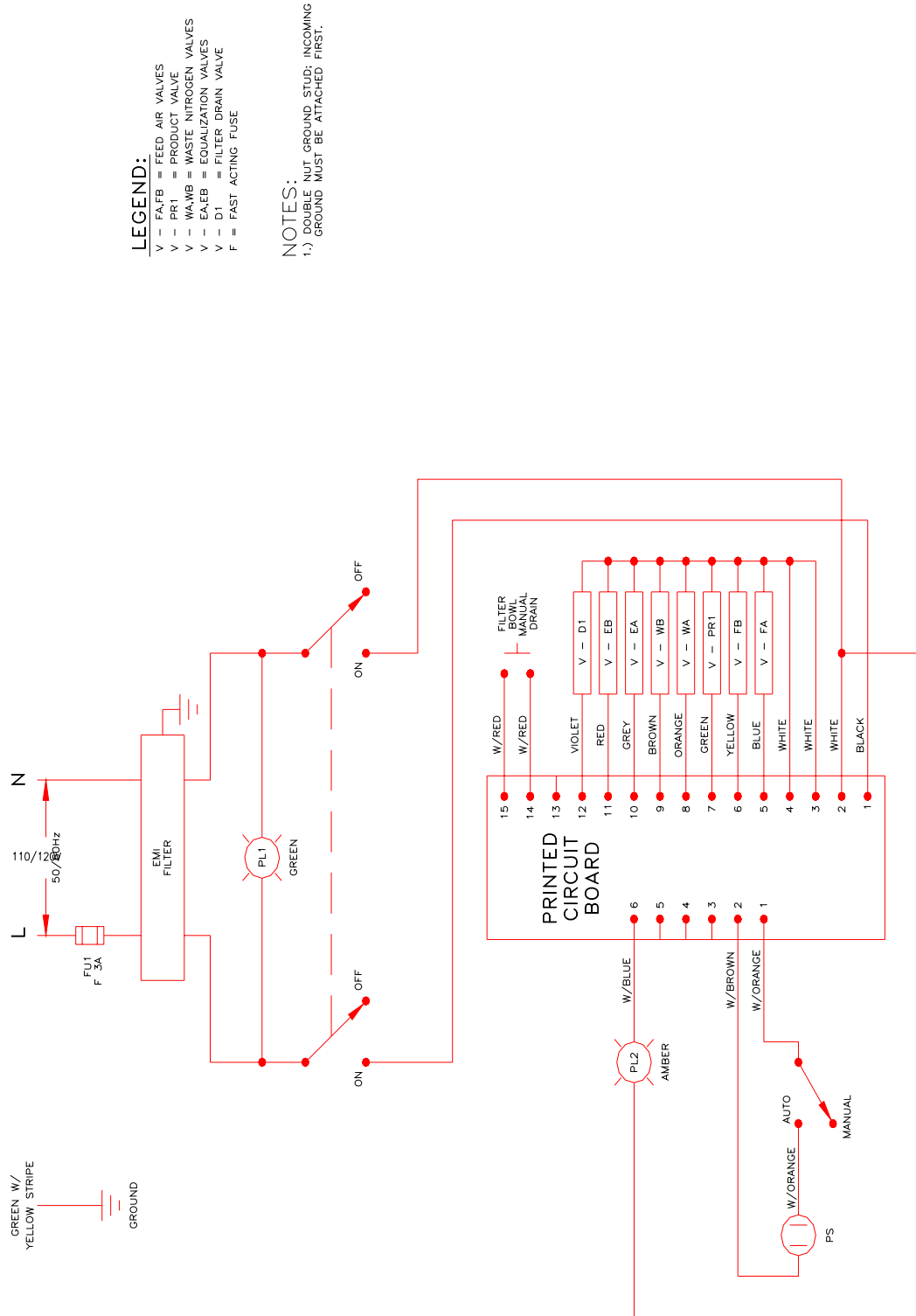
**PRESSURE SWITCH IDENTIFICATIONS:**

- PS 1 = AUTO/MANUAL

**LEGEND**

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
	MANUAL VALVE		PNEUMATIC VALVE		PRESSURE REGULATOR
	SOLENOID OPERATED VALVE		RELIEF VALVE		FLOW CONTROL ORIFICE
	CHECK VALVE		PANEL MOUNTED PRESSURE GAUGE		PANEL MOUNTED PRESSURE SWITCH
	FLOW CONTROLLER		LOCAL MOUNTED PRESSURE GAUGE		LOCAL MOUNTED PRESSURE SWITCH

Figure A.3: Flow Schematic – AS-A



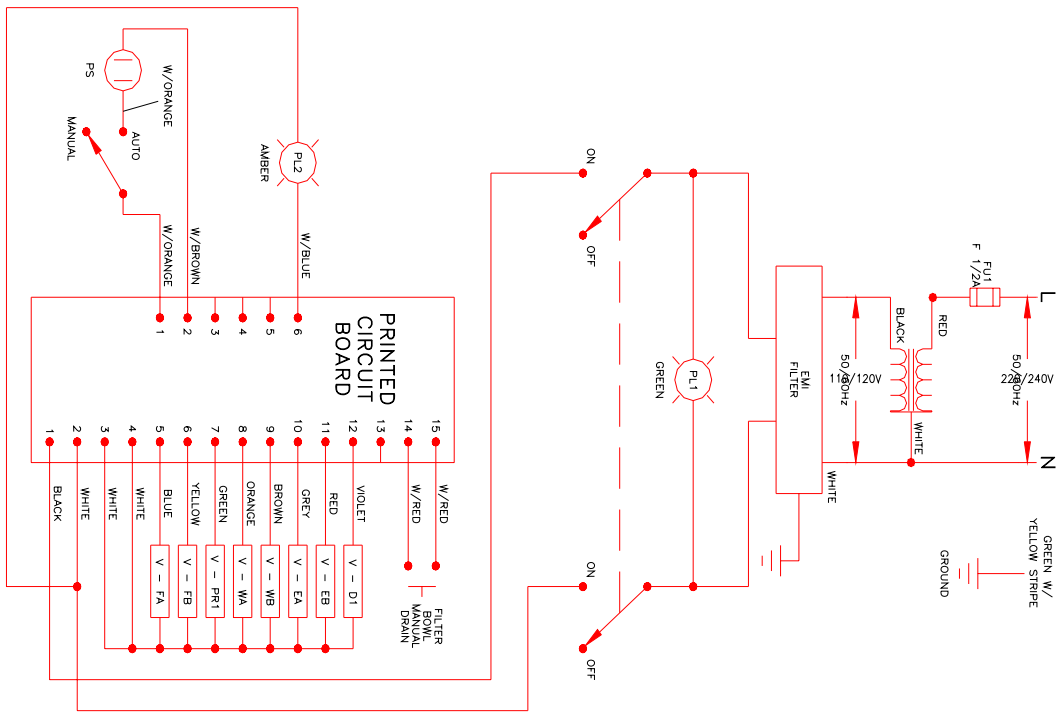
**LEGEND:**

- V - FA,FB = FEED AIR VALVES
- V - PR1 = PRODUCT VALVE
- V - WA,WB = WASTE NITROGEN VALVES
- V - EA,EB = EQUALIZATION VALVES
- V - D1 = FILTER DRAIN VALVE
- F = FAST ACTING FUSE

**NOTES:**

- 1.) DOUBLE NUT GROUND STUD; INCOMING GROUND MUST BE ATTACHED FIRST.

Figure A.4: Electrical Schematic – AS-A (120 V)



**LEGEND:**  
 V - FA,FB = FEED AIR VALVES  
 V - PR1 = PRODUCT VALVE  
 V - WA,WB = WASTE NITROGEN VALVES  
 V - EA,EB = EQUALIZATION VALVES  
 V - D1 = FILTER DRAIN VALVE  
 F = FASTER ACTING FUSE

**NOTES:**  
 1.) DOUBLE NUT GROUND STUD; INCOMING GROUND MUST BE ATTACHED FIRST.

Figure A.5: Electrical Schematic – AS-A (220 V)

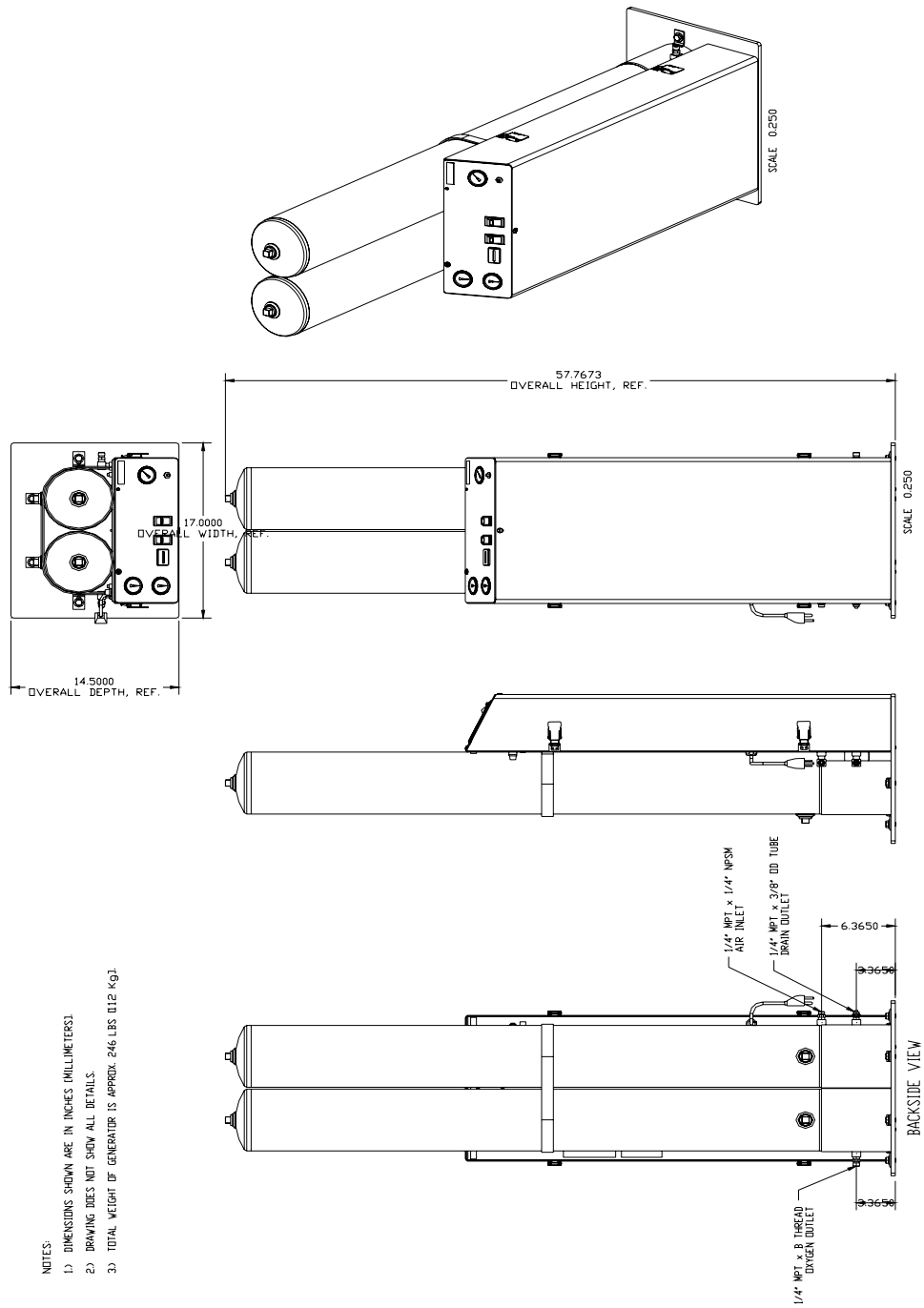
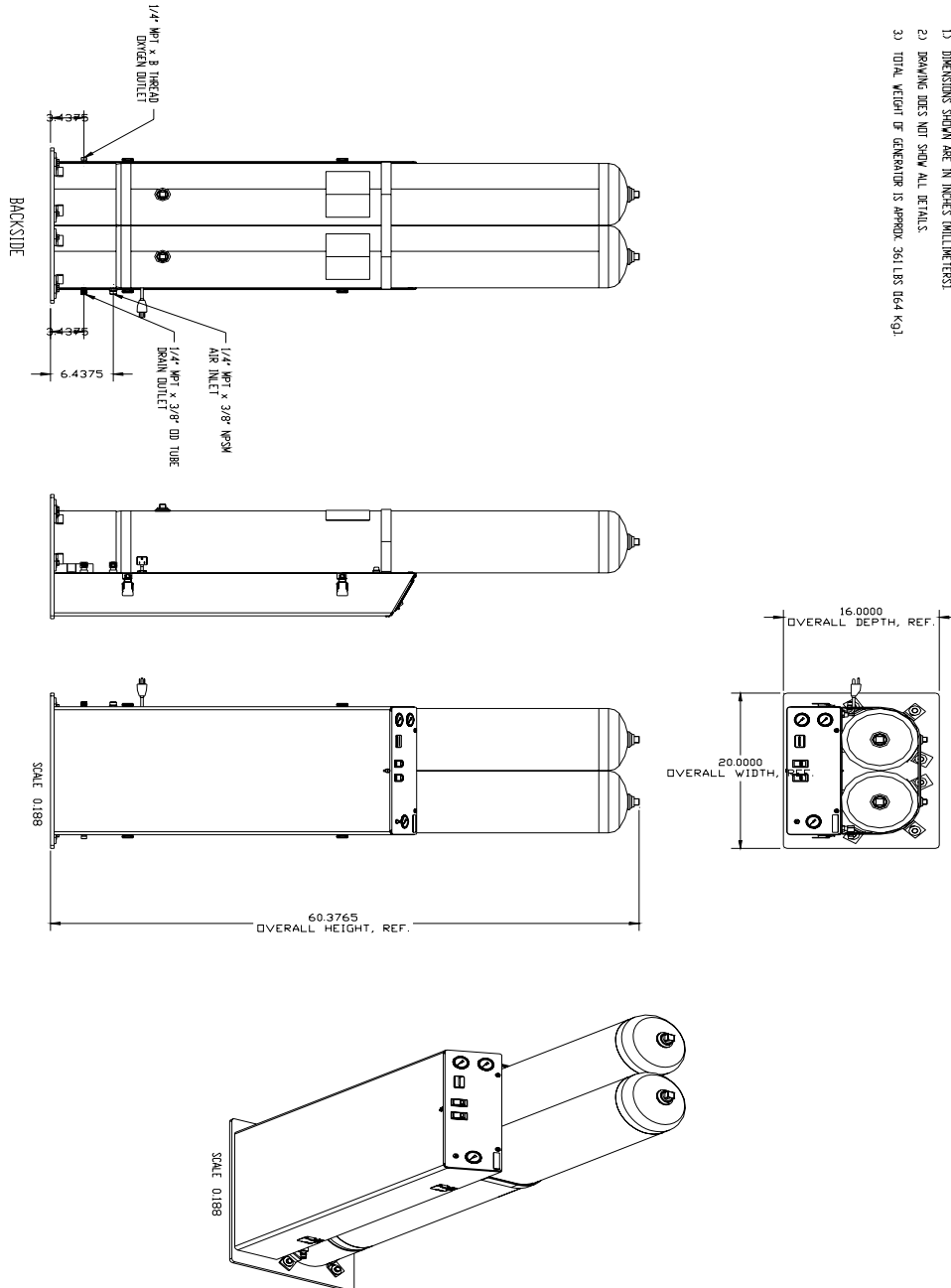


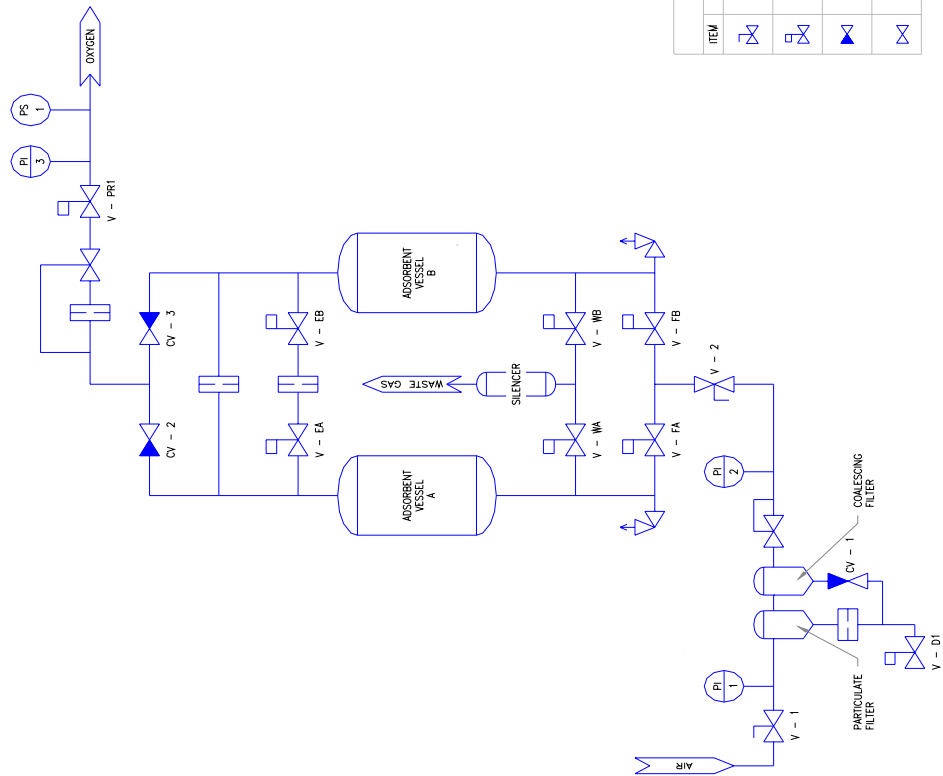
Figure A.6: General Arrangement Drawing – AS-B



- NOTES:
- 1) DIMENSIONS SHOWN ARE IN INCHES (MILLIMETERS)
  - 2) DRAWING DOES NOT SHOW ALL DETAILS
  - 3) TOTAL WEIGHT OF GENERATOR IS APPROX. 361 LBS (164 KG)

Figure A.7: General Arrangement Drawing – AS-D





**VALVE IDENTIFICATIONS:**

- V - FA/FB = FEED AIR VALVES
- V - WA/WB = WASTE NITROGEN VALVES
- V - EA/EB = EQUALIZATION VALVES
- V - PR1 = PRODUCT DRAIN VALVE
- V - 1 = PRODUCT VALVE
- V - 2 = MANUAL FEED #1 VALVE
- V - 3 = MANUAL FEED #2 VALVE
- CV - 1 = FEED AIR CHECK VALVE
- CV - 2 = PRODUCT CHECK VALVE
- CV - 3 = PRODUCT CHECK VALVE

**PRESSURE GAUGE IDENTIFICATIONS:**

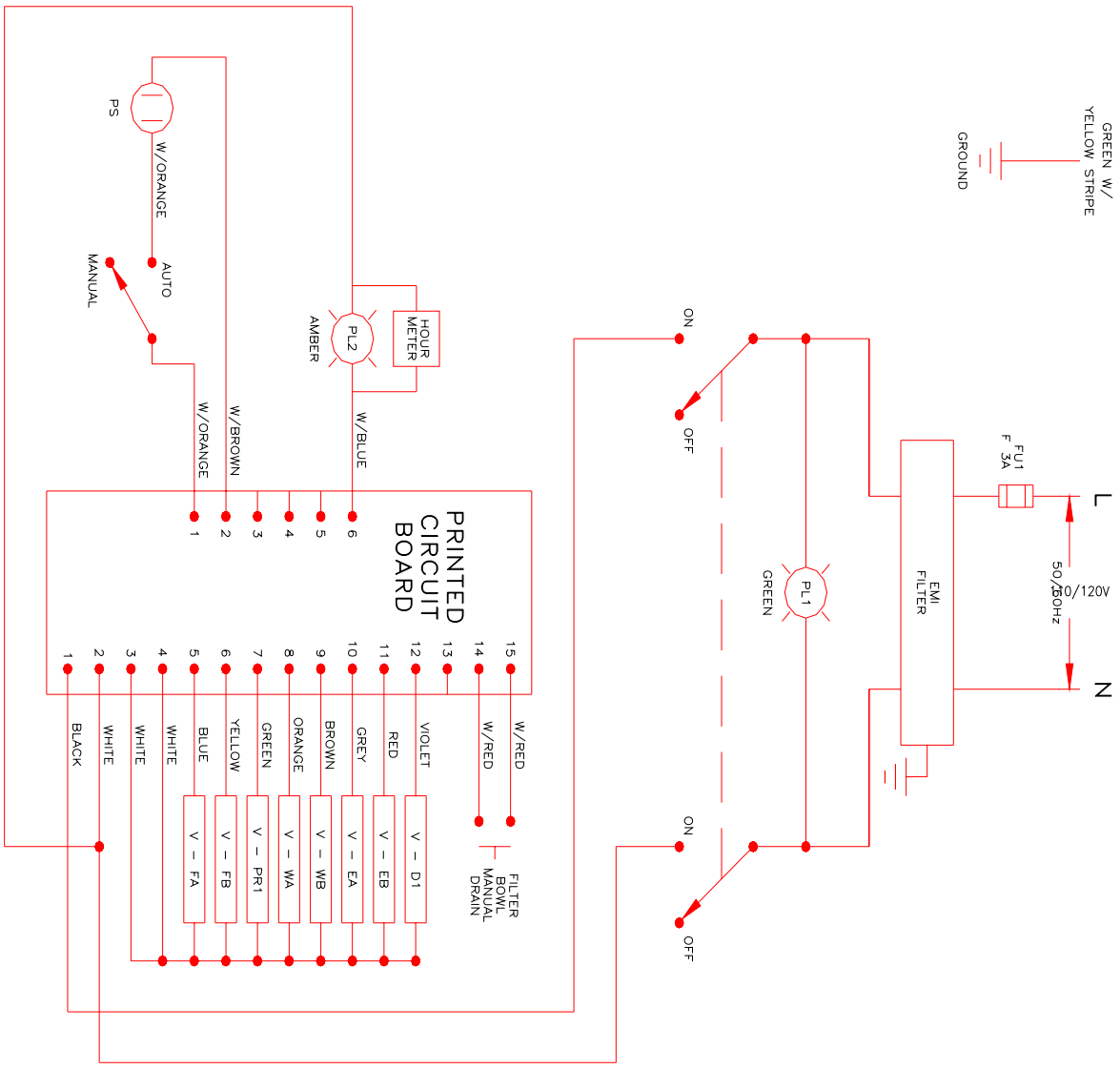
- PI 1 = FEED AIR PRESSURE
- PI 2 = CYCLE PRESSURE
- PI 3 = OXYGEN RECEIVER PRESSURE

**PRESSURE SWITCH IDENTIFICATIONS:**

- PS 1 = AUTO/MANUAL

LEGEND			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
	MANUAL VALVE		PNEUMATIC VALVE
	SOLENOID OPERATED VALVE		RELIEF VALVE
	CHECK VALVE		PANEL MOUNTED PRESSURE GAUGE
	FLOW CONTROLLER		LOCAL MOUNTED PRESSURE GAUGE
	PRESSURE REGULATOR		FLOW CONTROL ORIFICE
	PANEL MOUNTED PRESSURE SWITCH		LOCAL MOUNTED PRESSURE SWITCH

Figure A.8: Flow Schematic – AS-B and AS-D

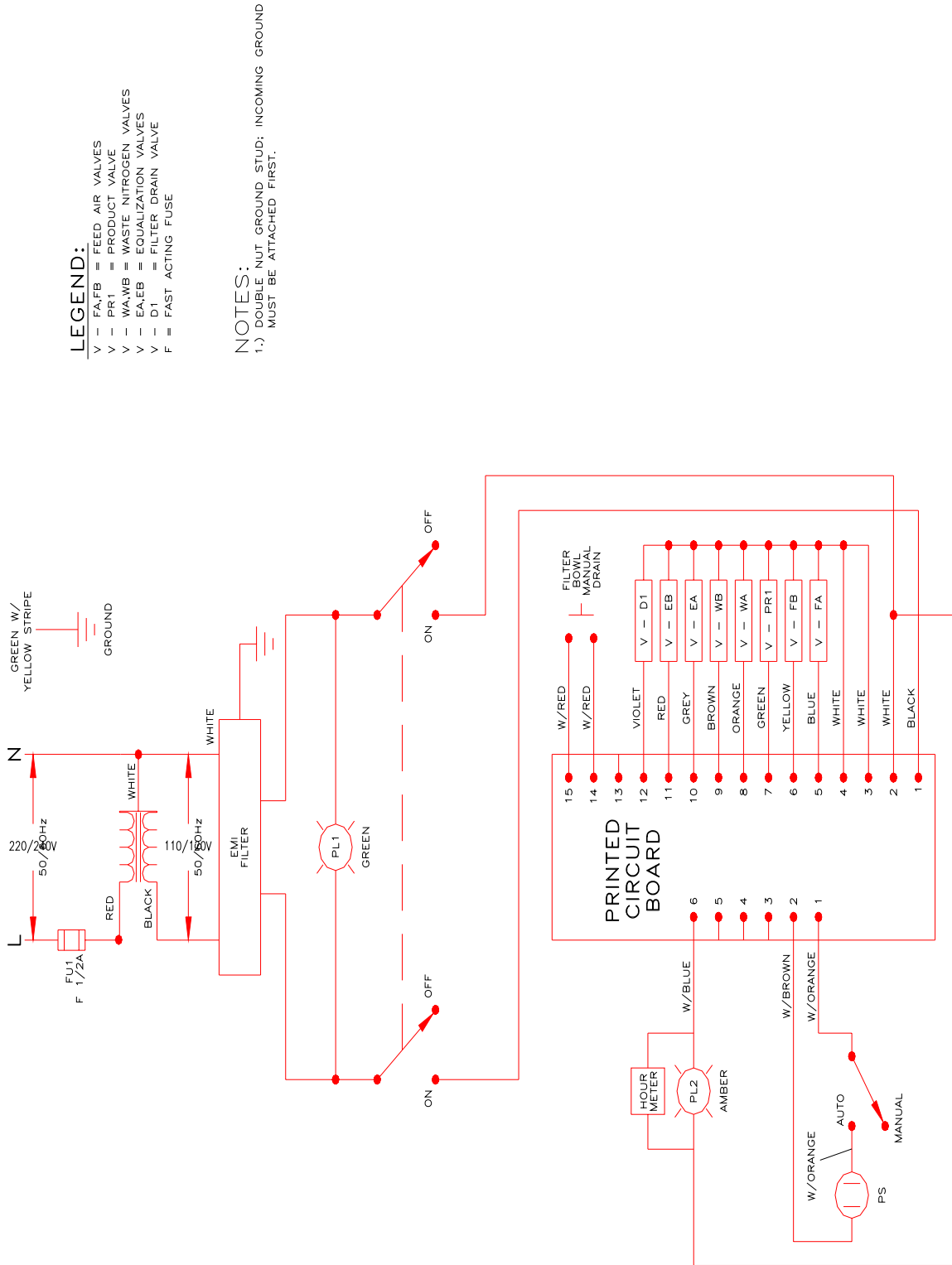


- LEGEND:**
- V - FA,FB = FEED AIR VALVES
  - V - PR1 = PRODUCT VALVE
  - V - WA,WB = WASTE NITROGEN VALVES
  - V - EA,EB = EQUALIZATION VALVES
  - V - D1 = FILTER DRAIN VALVE
  - F = FAST ACTING FUSE

**NOTES:**

1.) DOUBLE NUT GROUND STUD: INCOMING GROUND MUST BE ATTACHED FIRST.

**Figure A.9: Electrical Schematic – AS-B and AS-D (120 V)**



**LEGEND:**

- V - FA,FB = FEED AIR VALVES
- V - PR1 = PRODUCT VALVE
- V - WA,WB = WASTE NITROGEN VALVES
- V - EA,EB = EQUALIZATION VALVES
- V - D1 = FILTER DRAIN VALVE
- F = FAST ACTING FUSE

**NOTES:**

- 1.) DOUBLE NUT GROUND STUD; INCOMING GROUND MUST BE ATTACHED FIRST.

Figure A.10: Electrical Schematic – AS-B and AS-D (220 V)

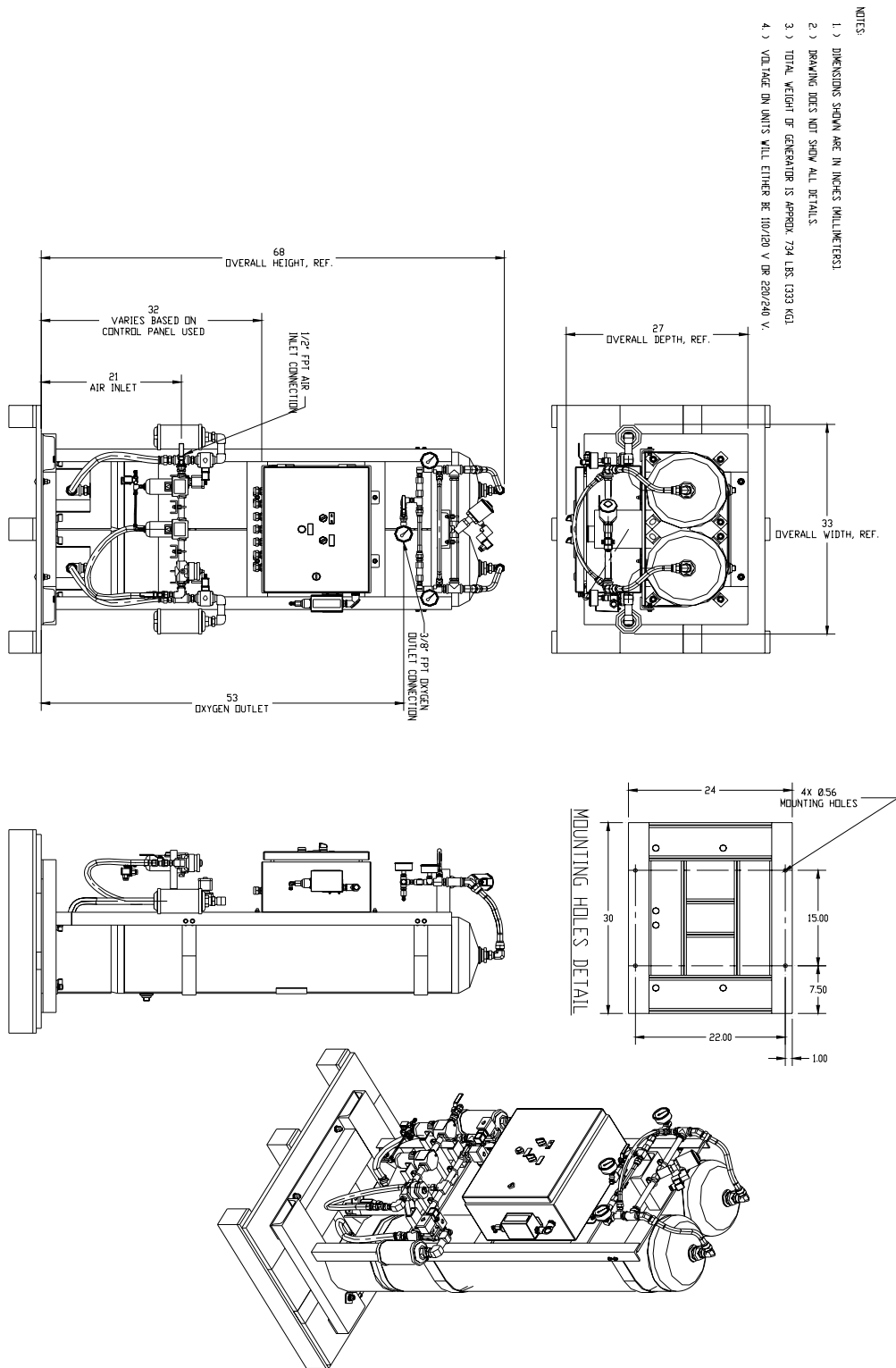
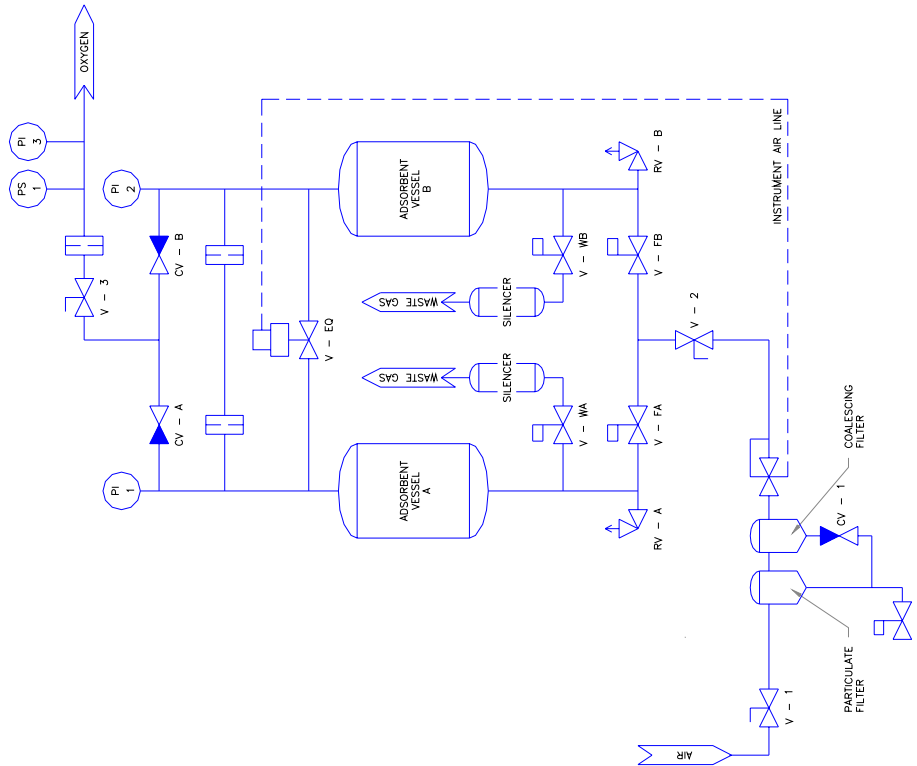


Figure A.11: General Arrangement Drawing – AS-E



**VALVE IDENTIFICATIONS:**

- V - 1 - FB = FEED AIR VALVES
- V - 1 - WB = WASTE NITROGEN VALVES
- V - 1 - EO = EQUALIZATION VALVE
- V - 1 - D1 = WATER ASSEMBLY DRAIN VALVE
- V - 1 - 2 = MANUAL FEED #2 VALVE
- V - 1 - 3 = MANUAL PRODUCT VALVE
- V - 1 - 4 = MANUAL FEED #1 VALVE
- V - 1 - 5 = PRODUCT CHECK VALVE
- V - 1 - 6 = PRODUCT CHECK VALVE
- CV - 1 - A = RELIEF VALVE
- CV - 1 - B = RELIEF VALVE
- RV - 1 - A = RELIEF VALVE
- RV - 1 - B = RELIEF VALVE

**PRESSURE GAUGE IDENTIFICATIONS:**

- PI 1 = ADSORBENT A PRESSURE
- PI 2 = ADSORBENT B PRESSURE
- PI 3 = PRODUCT OXYGEN PRESSURE

**PRESSURE SWITCH IDENTIFICATIONS:**

- PS 1 = AUTO/MANUAL

LEGEND		ITEM	DESCRIPTION	ITEM	DESCRIPTION
	MANUAL VALVE		PNEUMATIC VALVE		PRESSURE REGULATOR
	SOLENOID OPERATED VALVE		RELIEF VALVE		FLOW CONTROL ORIFICE
	CHECK VALVE		PANEL MOUNTED PRESSURE GAUGE		PANEL MOUNTED PRESSURE SWITCH
	FLOW CONTROLLER		LOCAL MOUNTED PRESSURE GAUGE		LOCAL MOUNTED PRESSURE SWITCH

Figure A.12: Flow Schematic – AS-E

- NOTES:
- 1.) DIMENSIONS SHOWN ARE IN INCHES (MILLIMETERS)
  - 2.) DRAWING DOES NOT SHOW ALL DETAILS
  - 3.) TOTAL WEIGHT OF GENERATOR IS APPROX. 970 LBS (440 KG)
  - 4.) VOLTAGE ON UNITS WILL EITHER BE 100/120 V OR 220/240 V.

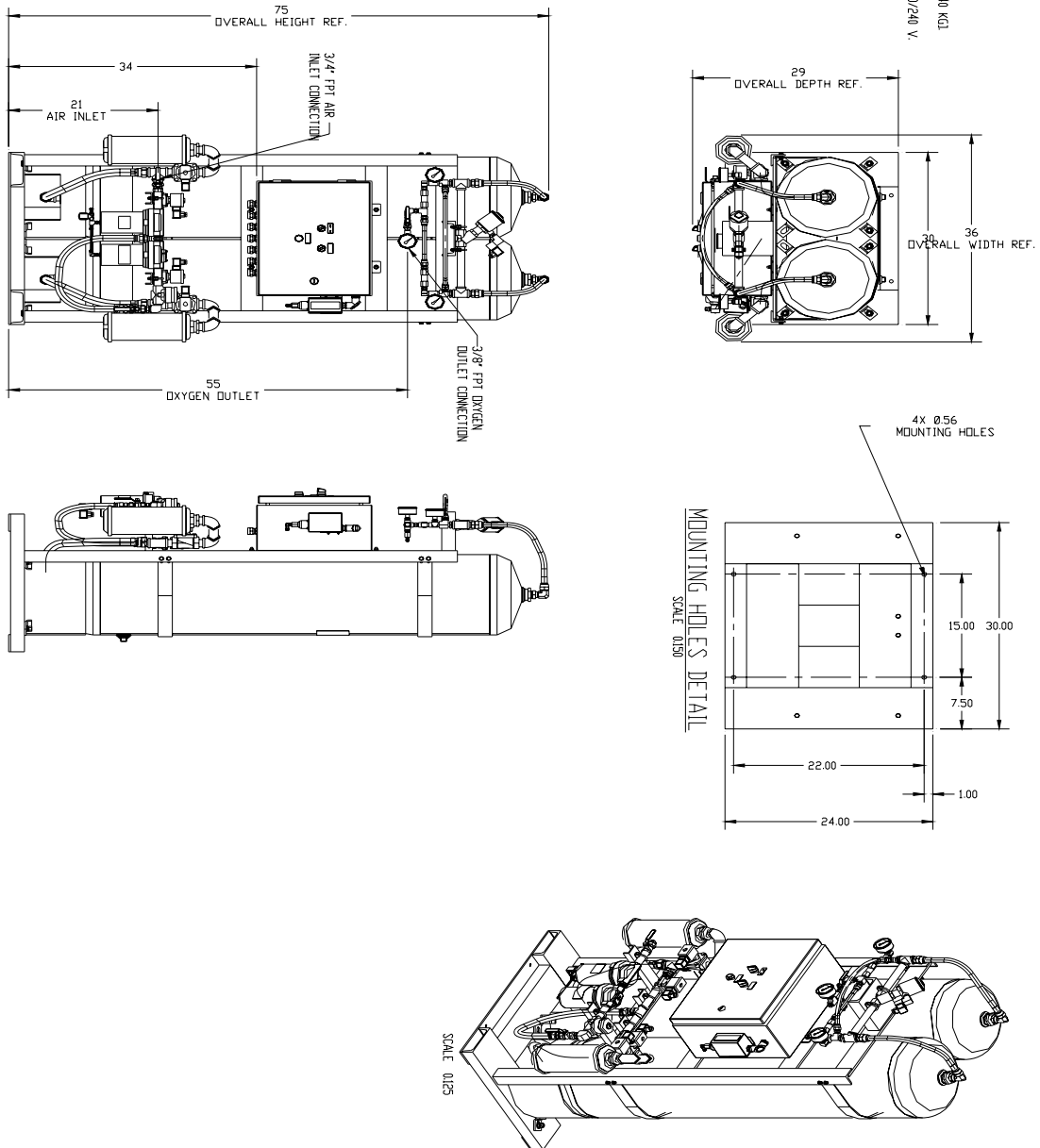
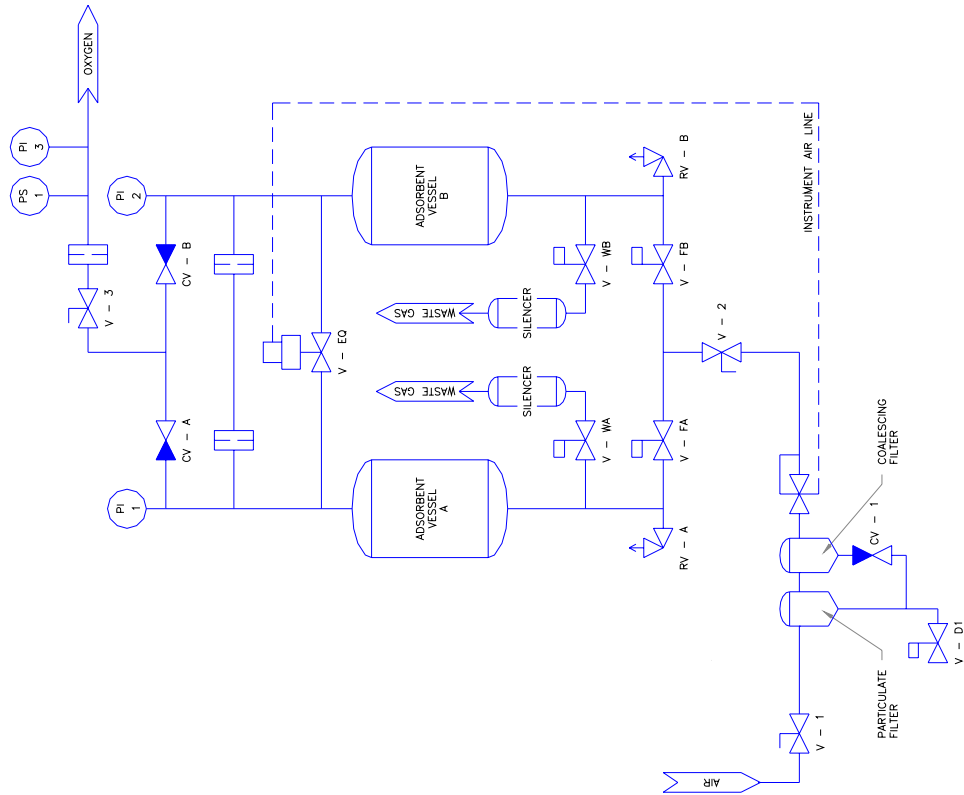


Figure A.13: General Arrangement Drawing – AS-G



**VALVE IDENTIFICATIONS:**

- V - FA,FB = FEED AIR VALVES
- V - MC = MANUAL CONTROL VALVE
- V - WB = EQUALIZATION VALVE
- V - DT = FILTER ASSEMBLY DRAIN VALVE
- V - 1 = MANUAL FEED #1 VALVE
- V - 2 = MANUAL FEED #2 VALVE
- V - 3 = MANUAL PRODUCT VALVE
- CV - 1 = FILTER ASSEMBLY CHECK VALVE
- CV - A = PRODUCT CHECK VALVE
- CV - B = PRODUCT CHECK VALVE
- RV - A = RELIEF VALVE
- RV - B = RELIEF VALVE

**PRESSURE GAUGE IDENTIFICATIONS:**

- PI 1 = ADSORBENT A PRESSURE
- PI 2 = ADSORBENT B PRESSURE
- PI 3 = PRODUCT OXYGEN PRESSURE

**PRESSURE SWITCH IDENTIFICATIONS:**

- PS 1 = AUTO/MANUAL

LEGEND			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
	MANUAL VALVE		PNEUMATIC VALVE
	SOLENOID OPERATED VALVE		RELIEF VALVE
	CHECK VALVE		PANEL MOUNTED PRESSURE GAUGE
	FLOW CONTROLLER		LOCAL MOUNTED PRESSURE GAUGE
			PRESSURE REGULATOR
			FLOW CONTROL ORIFICE
			PANEL MOUNTED PRESSURE SWITCH
			LOCAL MOUNTED PRESSURE SWITCH

Figure A.14: Flow Schematic – AS-G

- NOTES
- 1 ) DIMENSIONS SHOWN ARE IN INCHES (MILLIMETERS)
  - 2 ) DRAWING DOES NOT SHOW ALL DETAILS
  - 3 ) TOTAL WEIGHT OF GENERATOR IS APPROX. 1764 LBS (800 KG)
  - 4 ) VOLTAGE ON UNITS WILL EITHER BE 100/230 V OR 220/240 V

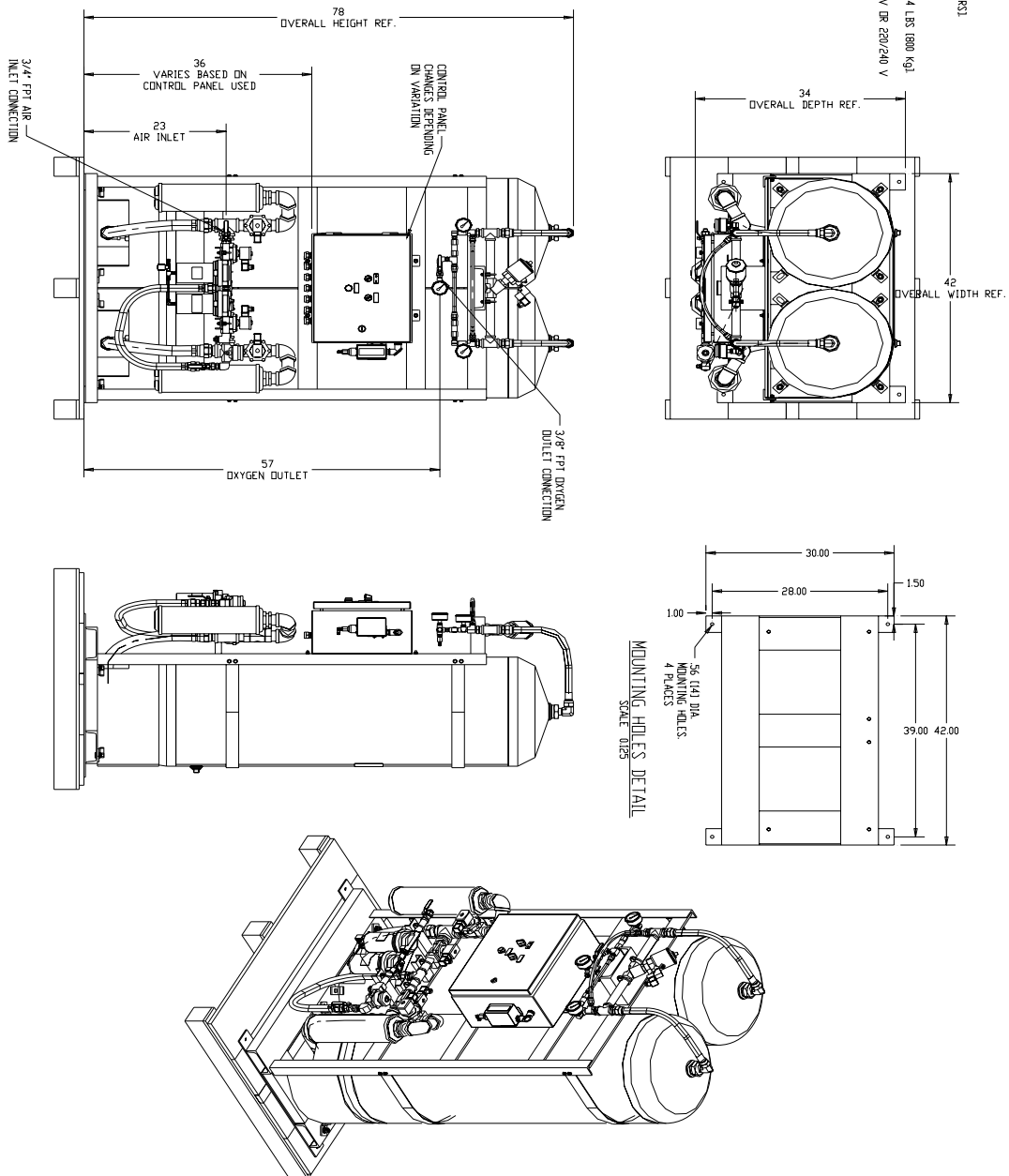


Figure A.15: General Arrangement Drawing – AS-J



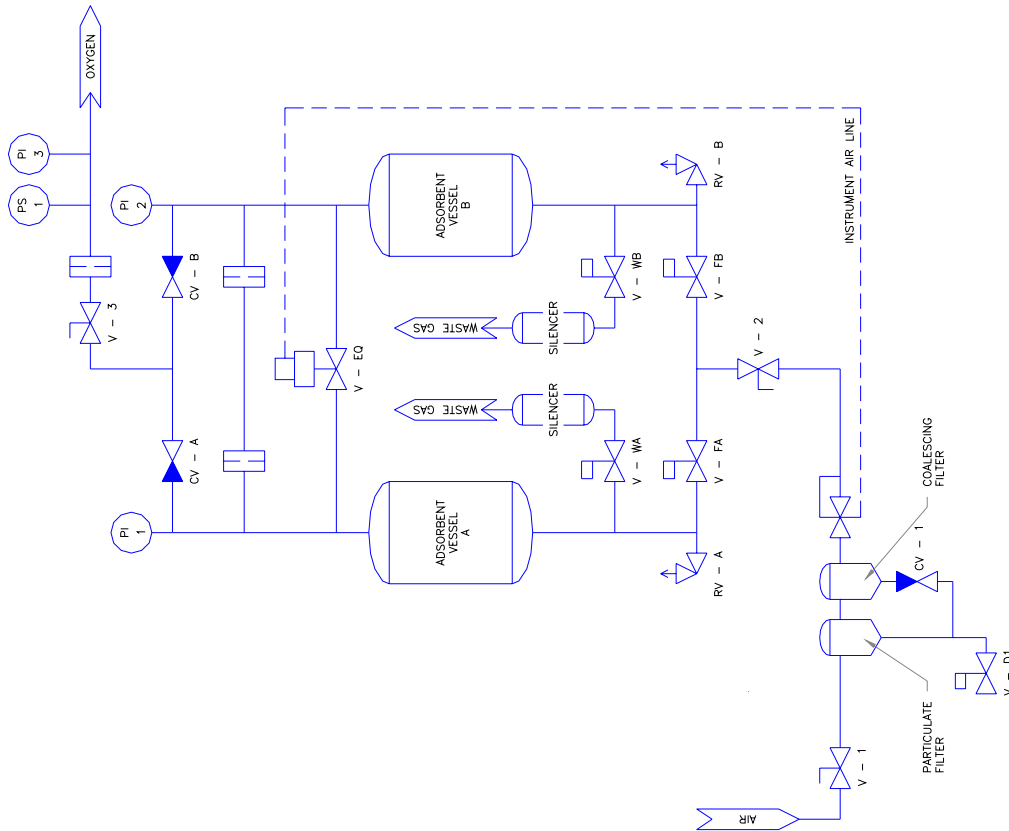


Figure A.16: Flow Schematic – AS-J

**VALVE IDENTIFICATIONS:**

- V - FAFB = FEED AIR VALVES
- V - WAWB = WASTE NITROGEN VALVES
- V - D1 = FILTER ASSEMBLY DRAIN VALVE
- V - D2 = FILTER ASSEMBLY #1 VALVE
- V - M1 = MANUAL FEED #1 VALVE
- V - M2 = MANUAL FEED #2 VALVE
- V - W1 = WASTE NITROGEN VALVE
- V - W2 = WASTE NITROGEN VALVE
- CV - 1 = FILTER ASSEMBLY CHECK VALVE
- CV - A = PRODUCT CHECK VALVE
- CV - B = PRODUCT CHECK VALVE
- RV - A = RELIEF VALVE
- RV - B = RELIEF VALVE

**PRESSURE GAUGE IDENTIFICATIONS:**

- PI 1 = ADSORBENT A PRESSURE
- PI 2 = ADSORBENT B PRESSURE
- PI 3 = PRODUCT OXYGEN PRESSURE

**PRESSURE SWITCH IDENTIFICATIONS:**

- PS 1 = AUTO/MANUAL

LEGEND			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
	MANUAL VALVE		PNEUMATIC VALVE
	SOLENOID OPERATED VALVE		RELIEF VALVE
	CHECK VALVE		PANEL MOUNTED PRESSURE GAUGE
	FLOW CONTROLLER		LOCAL MOUNTED PRESSURE GAUGE
			PRESSURE REGULATOR
			FLOW CONTROL ORIFICE
			PANEL MOUNTED PRESSURE SWITCH
			LOCAL MOUNTED PRESSURE SWITCH

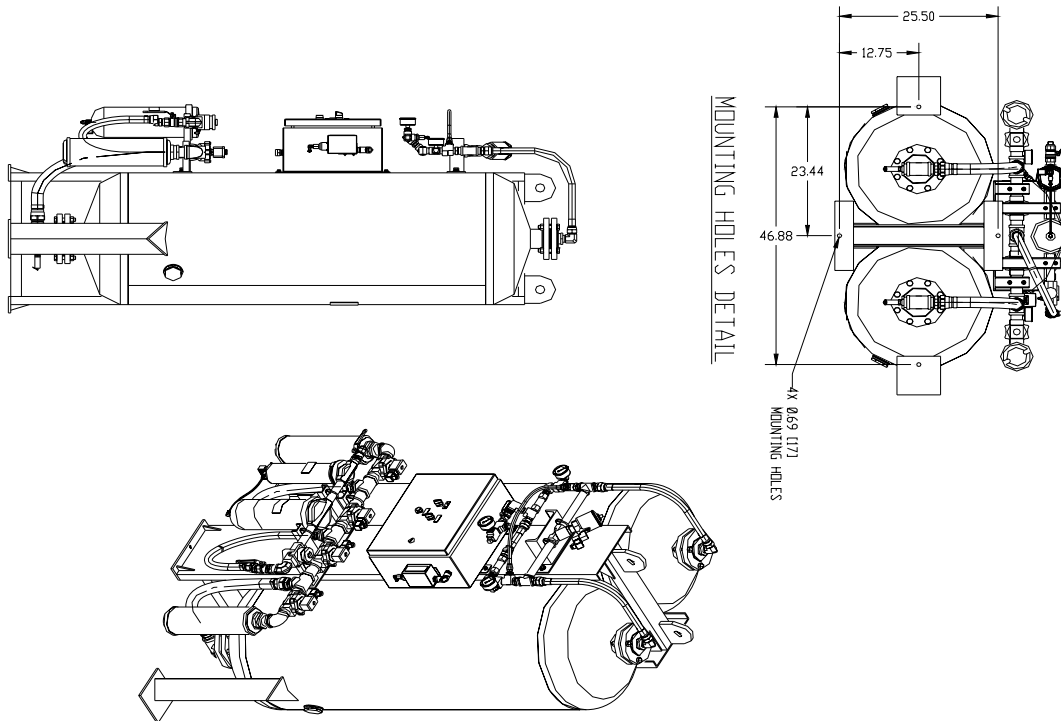
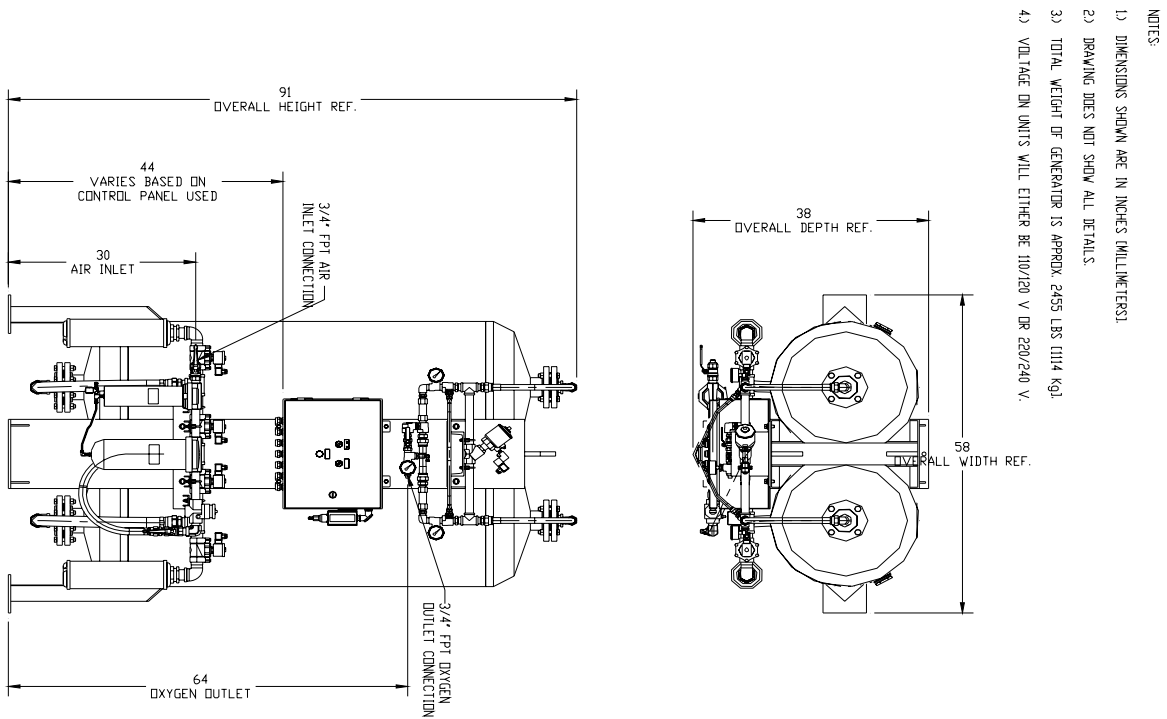
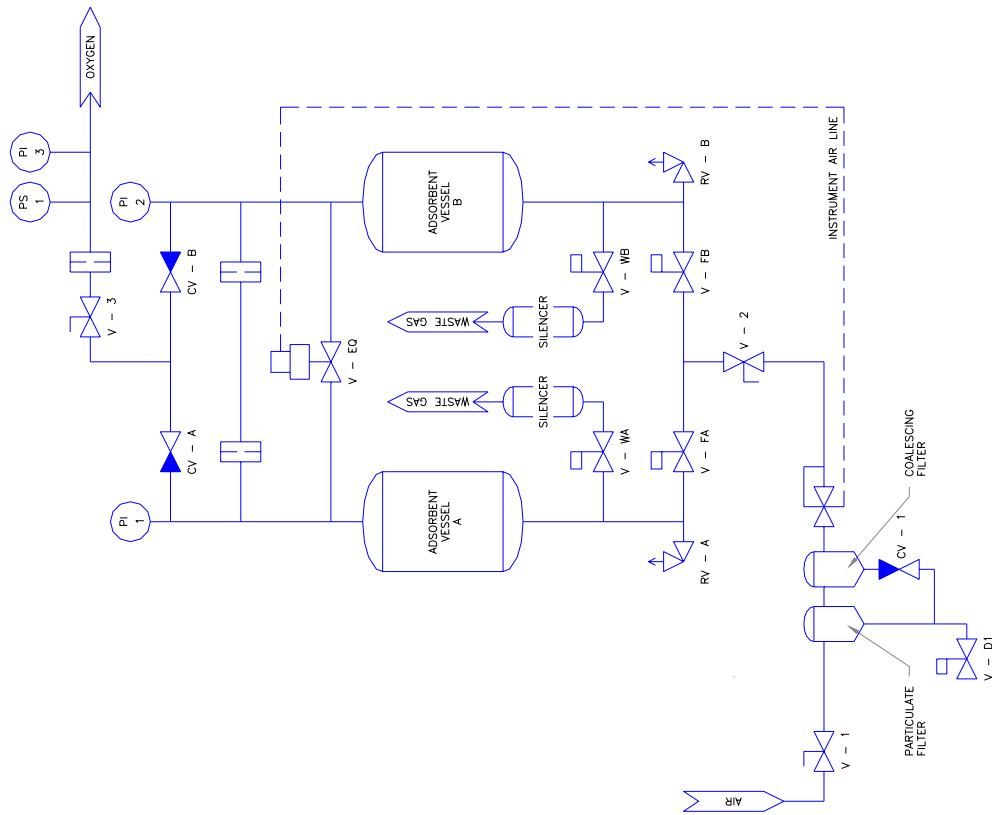


Figure A.17: General Arrangement Drawing – AS-K



**VALVE IDENTIFICATIONS:**

- V - FA,FB = FEED AIR VALVES
- V - WA,WB = WASTE NITROGEN VALVES
- V - EQ = EQUALIZATION VALVE
- V - D1 = DRAIN VALVE
- V - 1 = MANUAL FEED #1 VALVE
- V - 2 = MANUAL FEED #2 VALVE
- V - 3 = MANUAL PRODUCT VALVE
- CV - A = CONTROL CHECK VALVE
- CV - B = PRODUCT CHECK VALVE
- RV - A = RELIEF VALVE
- RV - B = RELIEF VALVE

**PRESSURE GAUGE IDENTIFICATIONS:**

- PI 1 = ADSORBENT A PRESSURE
- PI 2 = ADSORBENT B PRESSURE
- PI 3 = PRODUCT OXYGEN PRESSURE

**PRESSURE SWITCH IDENTIFICATIONS:**

- PS 1 = AUTO/MANUAL

LEGEND			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
	MANUAL VALVE		PNEUMATIC VALVE
	SOLENOID OPERATED VALVE		RELIEF VALVE
	CHECK VALVE		PANEL MOUNTED PRESSURE GAUGE
	FLOW CONTROLLER		LOCAL MOUNTED PRESSURE GAUGE
			PRESSURE REGULATOR
			FLOW CONTROL ORIFICE
			PANEL MOUNTED PRESSURE SWITCH
			LOCAL MOUNTED PRESSURE SWITCH

Figure A.18: Flow Schematic – AS-K

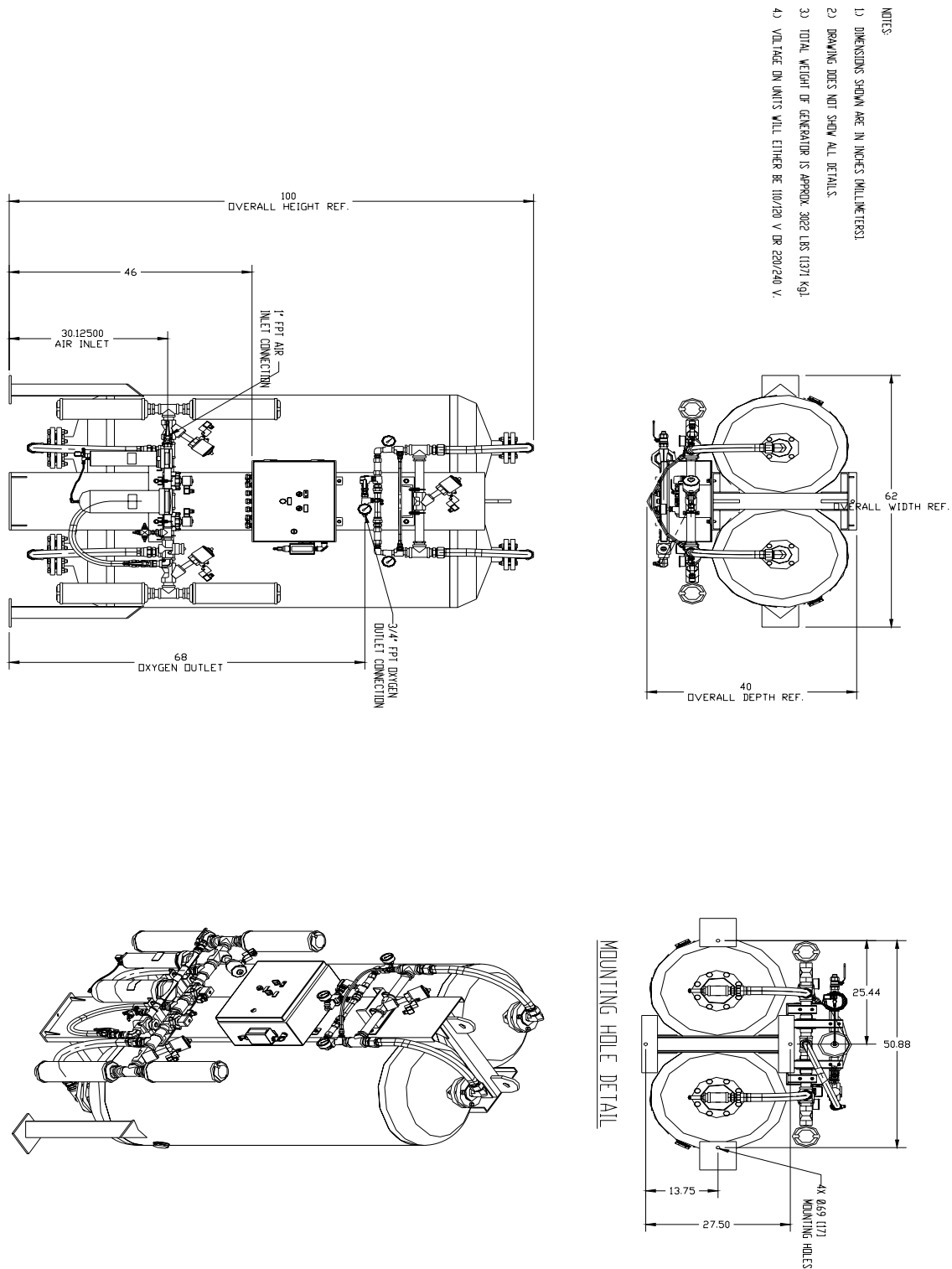
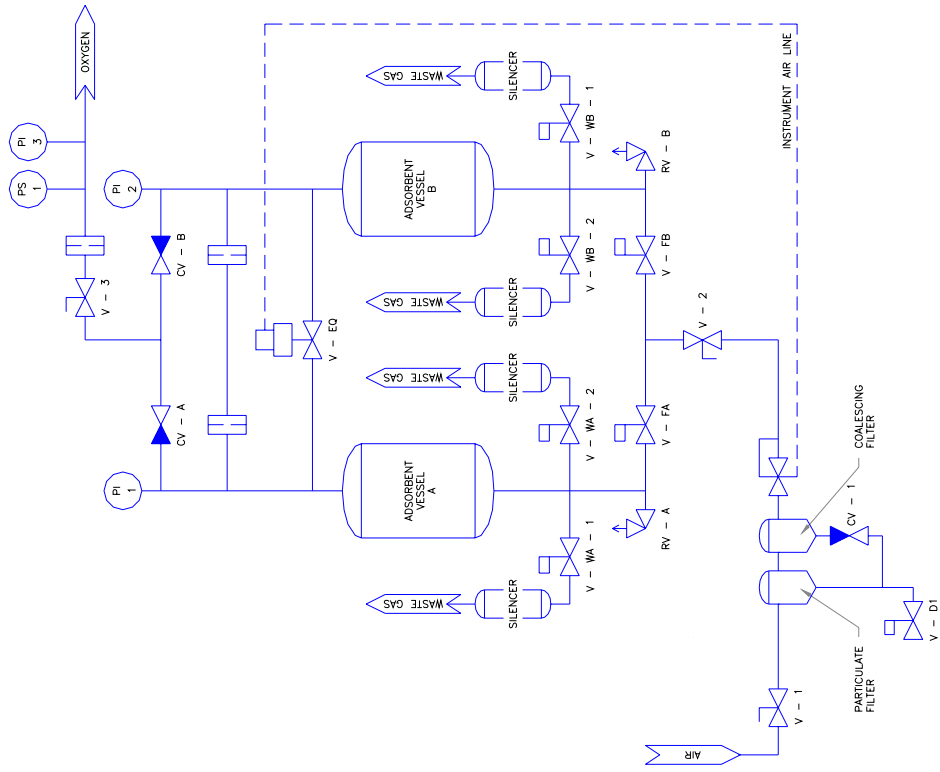


Figure A.19: General Arrangement Drawing – AS-L



**VALVE IDENTIFICATIONS:**

- V - FA/FB = FEED AIR VALVES
- V - WA/WB = WASTE GAS VALVES
- V - EQ = EQUALIZATION VALVE
- V - DT = FILTER ASSEMBLY DRAIN VALVE
- V - 1 = MANUAL FEED #1 VALVE
- V - 2 = MANUAL FEED #2 VALVE
- V - 3 = MANUAL PRODUCT VALVE
- CV - 1 = FILTER ASSEMBLY CHECK VALVE
- CV - 2 = PRODUCT CHECK VALVE
- CV - 3 = PRODUCT CHECK VALVE
- RV - A = RELIEF VALVE
- RV - B = RELIEF VALVE

**PRESSURE GAUGE IDENTIFICATIONS:**

- PI 1 = ADSORBENT A PRESSURE
- PI 2 = ADSORBENT B PRESSURE
- PI 3 = PRODUCT OXYGEN PRESSURE

**PRESSURE SWITCH IDENTIFICATIONS:**

- PS 1 = AUTO/MANUAL

LEGEND		ITEM	DESCRIPTION	ITEM	DESCRIPTION
	MANUAL VALVE		PNEUMATIC VALVE		PRESSURE REGULATOR
	SOLENOID OPERATED VALVE		RELIEF VALVE		FLOW CONTROL ORIFICE
	CHECK VALVE		PANEL MOUNTED PRESSURE GAUGE		PANEL MOUNTED PRESSURE SWITCH
	FLOW CONTROLLER		LOCAL MOUNTED PRESSURE GAUGE		LOCAL MOUNTED PRESSURE SWITCH

Figure A.20: Flow Schematic – AS-L

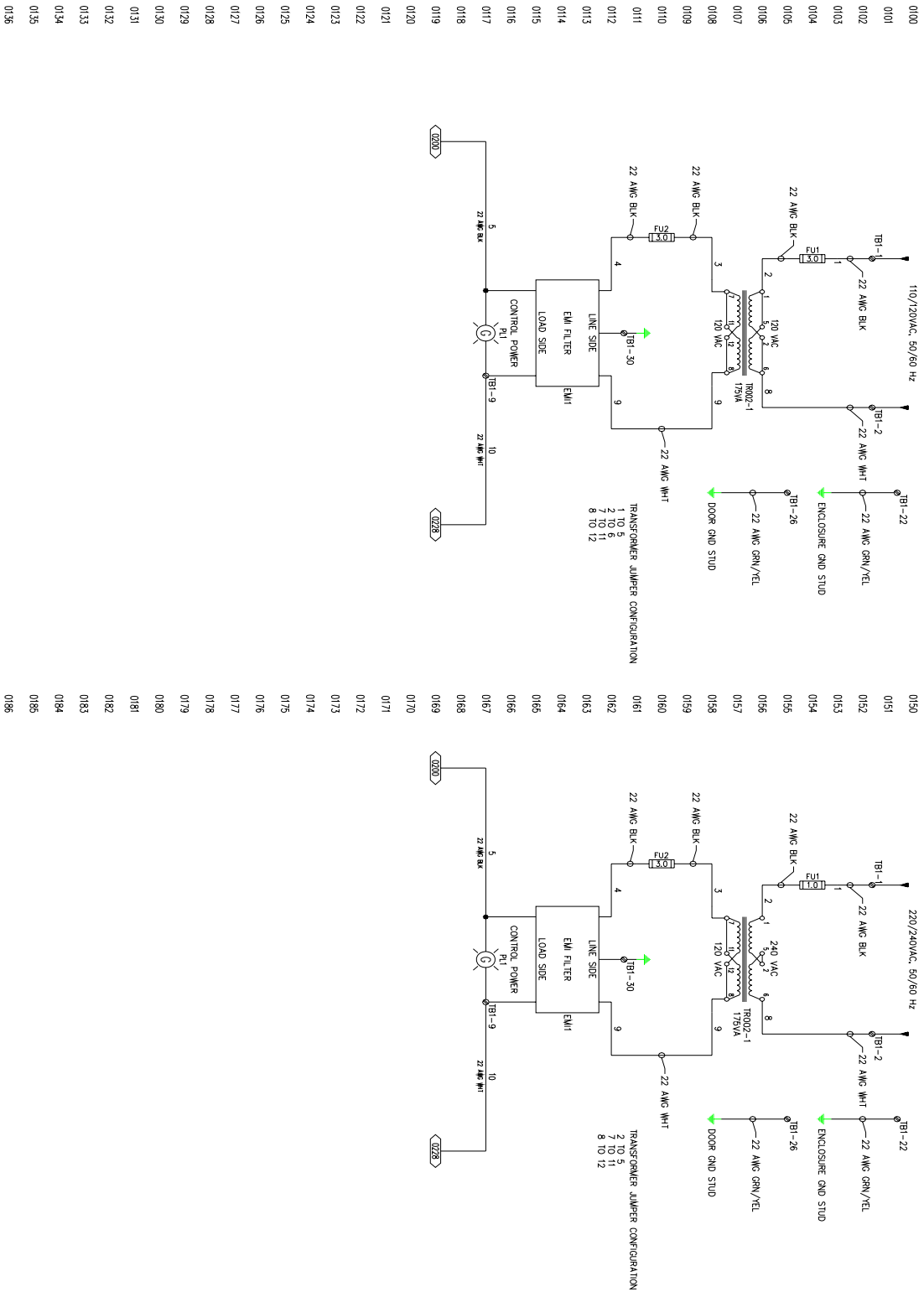


Figure A.21: Electrical Schematic – AS-E thru AS-L - I

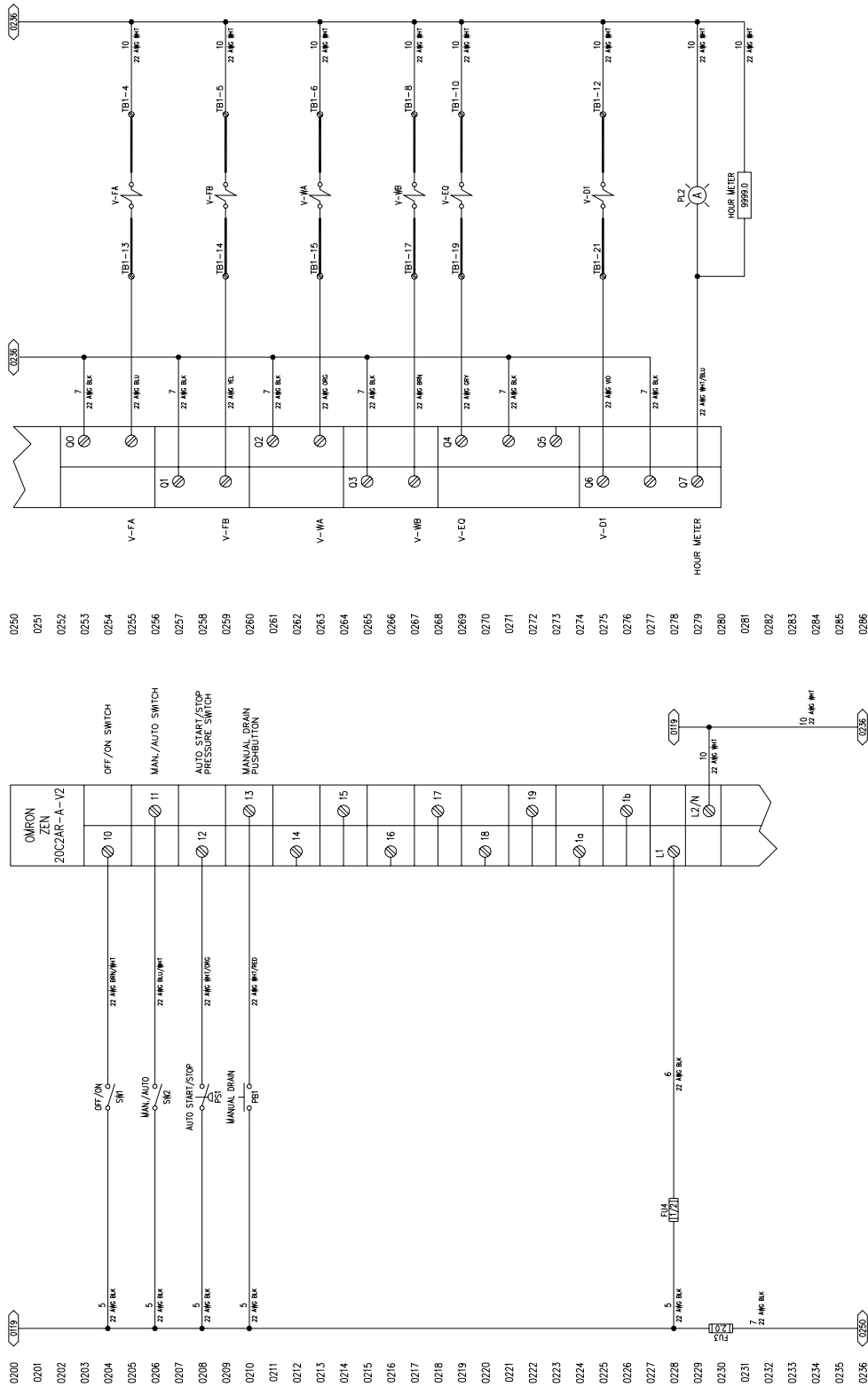
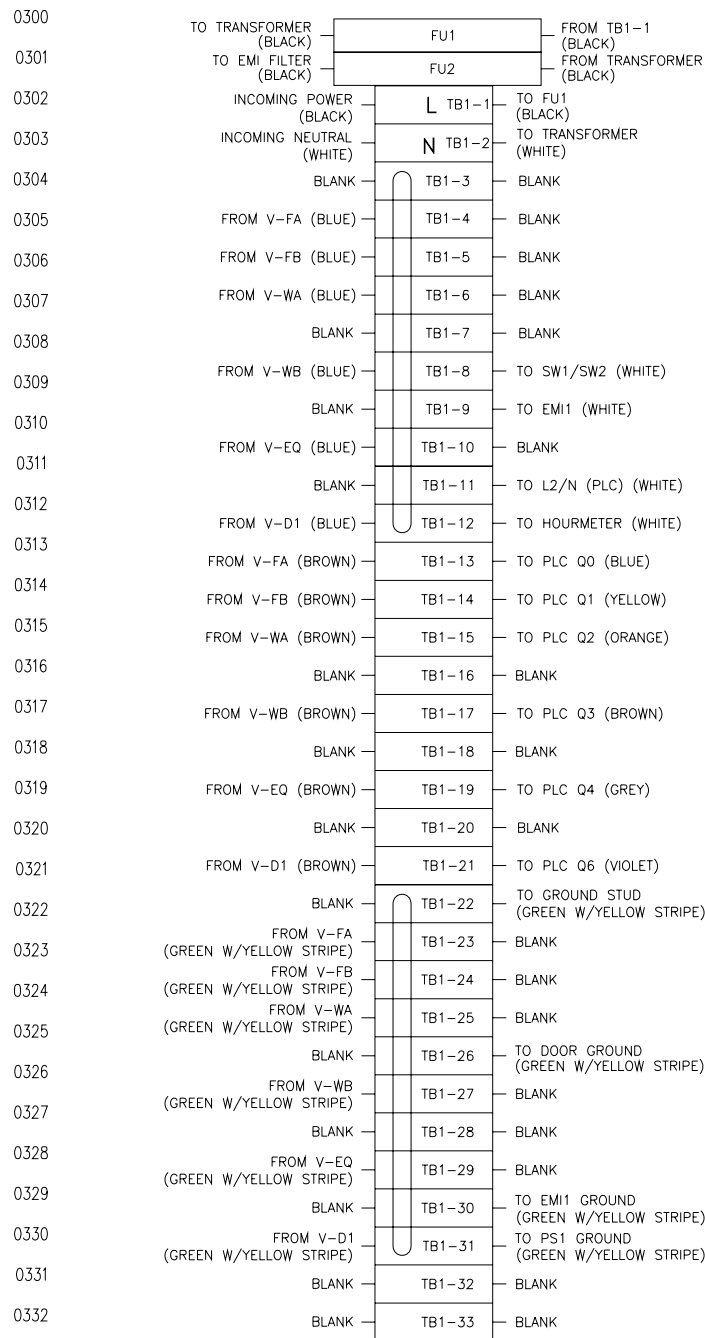


Figure A.22: Electrical Schematic – AS-E thru AS-L – II



TERMINAL BLOCK CONNECTIONS

**Figure A.23: Electrical Schematic – AS-E thru AS-L – III**



## **B Appendix**

## **Warranty>Returns**

### **Product Warranty**

AirSep Corporation (“AirSep”) warrants to the party purchasing from AirSep (the “original purchaser”) the PSA oxygen generator 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.

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\* 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).



AirSep oxygen generators are sold for use in industrial applications only. Contact AirSep Corporation or an authorized AirSep Corporation representative before you use this unit for any medical application.

## Returning the Oxygen Generator or a Component for Service

If the oxygen generator 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 generator 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 Generator 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 generator, 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 generator 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.



**C Appendix****Parts List**

Use the following lists to order parts for the oxygen generator. 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.

**AS-A Parts****Spare Parts**

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Microalescer Element MTP-95-548	1	FI019-1
<b>16,000 Hour Kit/2 Year</b>		
Microalescer Element MTP-95-548	2	FI019-1
1/4" Feed Valve Rebuild Kit 304817	2	VA089-1
1/4" Waste Valve Rebuild Kit 304817	2	VA089-1
1/4" Equalization Valve Rebuild Kit 304817N	2	VA088-1
1/8" Product Valve SC8225B004V	1	VA495-3
1/8" Drain Valve SC82253V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Microalescer Element MTP-95-548	5	FI019-1
1/4" Feed Valve Rebuild Kit 304817	4	VA089-1
1/4" Waste Valve Rebuild Kit 304817	4	VA089-1
1/4" Equalization Valve Rebuild Kit 304817N	4	VA088-1
1/8" Product Valve SC8225B004V	2	VA495-3
1/8" Drain Valve SC82253V	2	VA495-2
<b>Emergency spares</b>		
PC Board		CB039-1
3 Amp Fuse		FU004-1
Check Valve		VA141-2
1/4" Equalization, Feed, Waste Valve Coil 2184101		VA110-1
MagnaLube		PS211-1
Pressure switch		SW003-3
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2

## AS-B Parts

### Spare Parts

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	2	FI029-1
Microaescer Element MTP-95-549 1/8000 hrs	1	FI020-1
<b>16,000 Hour Kit/2 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	4	FI029-1
Microaescer Element MTP-95-549 1/8000 hrs	2	FI020-1
1/4" Feed Valve Rebuild Kit 304817	2	VA089-1
3/8" Waste Valve Rebuild Kit 302272	2	VA096-1
3/8" Equalization Valve Rebuild Kit 302272N	2	VA095-1
1/8" Product Valve SC8225B004V	1	VA495-3
1/8" Drain Valve SC82253V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	10	FI029-1
Microaescer Element MTP-95-549 1/8000 hrs	5	FI020-1
1/4" Feed Valve Rebuild Kit 304817	4	VA089-1
3/8" Waste Valve Rebuild Kit 302272	4	VA096-1
3/8" Equalization Valve Rebuild Kit 302272N	4	VA095-1
1/8" Product Valve SC8225B004V	2	VA495-3
1/8" Drain Valve SC82253V	2	VA495-2
MagnaLube		PS211-1
<b>Emergency spares</b>		
PC Board		CB039-2
3 Amp Fuse		FU004-1
Check Valve		VA141-2
1/4" Feed Valve Coil 2184101		VA110-1
3/8" Waste, Equalization Valve Coil 2184103		VA112-1
Pressure switch		SW003-3
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2

## AS-D Parts

### Spare Parts

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	2	FI029-1
Microalescer Element MTP-95-549 1/8000 hrs	1	FI020-1
<b>16,000 Hour Kit/2 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	4	FI029-1
Microalescer Element MTP-95-549 1/8000 hrs	2	FI020-1
3/8" Feed Valve Rebuild Kit 302272	2	VA096-1
3/8" Waste Valve Rebuild Kit 302272	2	VA096-1
3/8" Equalization Valve Rebuild Kit 302272N	2	VA095-1
1/4" Product Valve Rebuild Kit 304817N	1	VA088-1
1/8" Drain Valve SC82253V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	10	FI029-1
Microalescer Element MTP-95-549 1/8000 hrs	5	FI020-1
3/8" Feed Valve Rebuild Kit 302272	4	VA096-1
3/8" Waste Valve Rebuild Kit 302272	4	VA096-1
3/8" Equalization Valve Rebuild Kit 302272N	4	VA095-1
1/4" Product Valve Rebuild Kit 304817N	2	VA088-1
1/8" Drain Valve SC82253V	2	VA495-2
<b>Emergency spares</b>		
PC Board		CB039-3
3 Amp Fuse		FU004-1
Check Valve		VA141-2
1/4" Product Valve Coil 2184101		VA110-1
3/8" Feed, Waste, Equalization Valve Coil 2184103		VA112-1
MagnaLube		PS211-1
Pressure switch		SW003-3
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2

## AS-E Parts

### Spare Parts

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	2	FI029-1
Microalescer Element MTP-95-549 1/8000 hrs	1	FI020-1
<b>16,000 Hour Kit/2 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	4	FI029-1
Microalescer Element MTP-95-549 1/8000 hrs	2	FI020-1
1/2" Feed Valve Rebuild Kit 302272	2	VA096-1
3/4" Waste Valve Rebuild Kit 302276	2	VA101-1
1/2" Equalization Valve Rebuild Kit C131204	1	VA432-1
1/8" Drain Valve SC8225B003V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Prefilter Element FRP-95-115 1/4000 hrs	10	FI029-1
Microalescer Element MTP-95-549 1/8000 hrs	5	FI020-1
1/2" Feed Valve Rebuild Kit 302272	4	VA096-1
3/4" Waste Valve Rebuild Kit 302276	4	VA101-1
1/2" Equalization Valve Rebuild Kit C131204	2	VA432-1
1/8" Drain Valve SC8225B003V	2	VA495-2
<b>Emergency spares</b>		
Muffler Element 1"		MU055-1
Lamp LED green		IL057-2
Lamp LED yellow		IL057-3
Gauge 0-100 PSIG		GA052-1
1/2" EQ Valve & Operator		VA426-1
SOL Valve for Operator		VA430-1
PLC Timer OMRON		CM089-1
3 Amp Fuse		FU004-1
2 Amp Fuse		FU015-1
.5 Amp Fuse		FU024-1
3/8" Check Valve		VA027-1
Feed, Waste Valve Coil 238612032		VA389-1
MagnaLube		PS211-1
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2



## AS-G Parts

### Spare Parts

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	2	FI030-1
Microalescer Element MTP-95-551 1/8000 hrs	1	FI016-1
<b>16,000 Hour Kit/2 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	4	FI030-1
Microalescer Element MTP-95-551 1/8000 hrs	2	FI016-1
3/4" Feed Valve Rebuild Kit 302276	2	VA101-1
1" Waste Valve Rebuild Kit 302283	2	VA103-1
3/4" Equalization Valve Rebuild Kit C131205	1	VA433-1
1/8" Drain Valve SC8225B003V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	10	FI030-1
Microalescer Element MTP-95-551 1/8000 hrs	5	FI016-1
3/4" Feed Valve Rebuild Kit 302276	4	VA101-1
1" Waste Valve Rebuild Kit 302283	4	VA103-1
3/4" Equalization Valve Rebuild Kit C131205	2	VA433-1
1/8" Drain Valve SC8225B003V	2	VA495-2
<b>Emergency spares</b>		
Muffler Element 1 1/2"		MU056-1
Lamp LED green		IL057-2
Lamp LED yellow		IL057-3
3/4" EQ Valve & Operator		VA427-1
SOL Valve for Operator		VA430-1
PLC Timer OMRON		CM090-1
3 Amp Fuse		FU004-1
2 Amp Fuse		FU015-1
.5 Amp Fuse		FU024-1
3/8" Check Valve		VA027-1
3/4" Feed Valve Coil 238612032		VA389-1
1" Waste Valve Coil 272612032		VA360-1
MagnaLube		PS211-1
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2

## AS-J Parts

### Spare Parts

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	2	FI030-1
Microalescer Element MTP-95-551 1/8000 hrs	1	FI016-1
<b>16,000 Hour Kit/2 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	4	FI030-1
Microalescer Element MTP-95-551 1/8000 hrs	2	FI016-1
1" Feed Valve Rebuild Kit 302283	2	VA103-1
1 1/2" Waste Valve Rebuild Kit 302286N	2	VA104-1
1" Equalization Valve Rebuild Kit C131206	1	VA434-1
1/8" Drain Valve SC8225B003V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	10	FI030-1
Microalescer Element MTP-95-551 1/8000 hrs	5	FI016-1
1" Feed Valve Rebuild Kit 302283	4	VA103-1
1 1/2" Waste Valve Rebuild Kit 302286N	4	VA104-1
1" Equalization Valve Rebuild Kit C131206	2	VA434-1
1/8" Drain Valve SC8225B003V	2	VA495-2
<b>Emergency spares</b>		
Muffler Element 2"		MU057-1
Lamp LED green		IL057-2
Lamp LED yellow		IL057-3
1" EQ VALVE & OPERATOR		VA428-1
SOL FOR OPERATOR		VA430-1
PLC Timer OMRON		CM083-1
3 Amp Fuse		FU004-1
2 Amp Fuse		FU015-1
.5 Amp Fuse		FU024-1
3/8" Check Valve		VA027-1
Feed, Waste Valve Coil 272612032		VA360-1
MagnaLube		PS211-1
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2

## AS-K Parts

### Spare Parts

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	2	FI030-1
Microalescer Element MTP-95-559 1/8000 hrs	1	FI017-1
<b>16,000 Hour Kit/2 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	4	FI030-1
Microalescer Element MTP-95-559 1/8000 hrs	2	FI017-1
1 1/2" Feed Valve Rebuild Kit 302286N	2	VA104-1
1 1/2" Waste Valve Rebuild Kit 302286N	2	VA104-1
1" Equalization Valve Rebuild Kit C131206	1	VA434-1
1/8" Drain Valve SC8225B003V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	10	FI030-1
Microalescer Element MTP-95-559 1/8000 hrs	5	FI017-1
1 1/2" Feed Valve Rebuild Kit 302286N	4	VA104-1
1 1/2" Waste Valve Rebuild Kit 302286N	4	VA104-1
1" Equalization Valve Rebuild Kit C131206	2	VA434-1
1/8" Drain Valve SC8225B003V	2	VA495-2
<b>Emergency spares</b>		
PLC Timer OMRON		CM084-1
3 Amp Fuse		FU004-1
2 Amp Fuse		FU015-1
.5 Amp Fuse		FU024-1
3/4" Check Valve		VA027-3
1 1/2" Feed, Waste Valve Coil 272612032		VA360-1
1" EQ VALVE & OPERATOR		VA428-1
SOL VALVE FOR OPERATOR		VA430-1
GAUGE 0-100 PSIG		GA052-1
Muffler Element 2"		MU057-1
MagnaLube		PS211-1
Lamp LED green		IL057-2
Lamp LED yellow		IL057-3
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2

## AS-L Parts

### Spare Parts

Item	Qty	Part #
<b>8,000 Hour Kit/1 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	2	FI030-1
Microalescer Element MTP-95-559 1/8000 hrs	1	FI017-1
<b>16,000 Hour Kit/2 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	4	FI030-1
Microalescer Element MTP-95-559 1/8000 hrs	2	FI017-1
1 1/2" Feed Valve Rebuild Kit 302286N	2	VA104-1
1 1/2" Waste Valve Rebuild Kit 302286N	4	VA104-1
1 1/4" Equalization Valve Rebuild Kit C131207	1	VA435-1
1/8" Drain Valve SC8225B003V	1	VA495-2
<b>40,000 Hour Kit/5 Year</b>		
Prefilter Element FRP-95-209 1/4000 hrs	10	FI030-1
Microalescer Element MTP-95-559 1/8000 hrs	5	FI017-1
1 1/2" Feed Valve Rebuild Kit 302286N	4	VA104-1
1 1/2" Waste Valve Rebuild Kit 302286N	8	VA104-1
1 1/4" Equalization Valve Rebuild Kit C131207	2	VA435-1
1/8" Drain Valve SC8225B003V	2	VA495-2
<b>Emergency spares</b>		
Muffler Element 2"		MUO57-1
Lamp LED green		IL057-2
Lamp LED yellow		IL057-3
Gauge 0-100psig		GA052-1
1 1/4" EQ Valve & Operator		VA431-1
SOL Valve for Operator		VA430-1
PLC Timer OMRON		CM085-1
3 Amp Fuse		FU004-1
2 Amp Fuse		FU015-1
.5 Amp Fuse		FU024-1
3/4" Check Valve		VA027-3
1 1/2" Feed, Waste Valve Coil 272 612 032		VA360-1
MagnaLube		PS211-1
<b>Supplemental Equipment</b>		
Oxygen Analyzer		AN009-2

## D Appendix

## Component Literature

### Programmable Logic Controller

- OMRON  
ZEN V2 Units  
Programmable Logic Controller (PLC)  
[Data Sheets](#)

### Filters

- Wilkerson Corporation  
½" FPT, Type C  
MICROalescer Filter  
[Installation and Maintenance Sheet](#)
- Standard Filter  
½", ¾" and 1" FPT, 83-531-000 REV 1  
[Installation and Maintenance Sheet](#)
- Wilkerson Corporation  
¾" FPT, Type C  
MICROalescer Filter  
[Installation and Maintenance Sheet](#)
- Wilkerson Corporation  
Filter Model M32  
[Installation and Maintenance Sheet](#)

### Regulators

- Wilkerson Corporation  
½" FPT, Flow Regulator  
[Installation and Maintenance Sheet](#)
- Wilkerson Corporation  
¾" FPT, Dial-Air™ Regulator  
[Installation and Maintenance Sheet](#)
- Wilkerson Corporation  
1" FPT, Dial-Air™ Regulator  
[Installation and Maintenance Sheet](#)
- Siemens Energy & Automation  
Moore Constant Differential Type Flow Controllers  
[Installation, Operation and Maintenance Sheet](#)

## Pressure Switches

- ASCO Switch Co.  
Tri-point pressure switches  
PG-Series  
[Installation and Maintenance Sheet](#)
- Allen-Bradley  
Style C pressure switches  
Bulletin 836  
[Instruction Sheet](#)

## Valves

- Neles-Jamesbury  
½-inch–2-inch Series 4000  
3 Piece Ball Valves  
[Installation, Maintenance and Operating Instructions](#)
- ASCO Valves  
1/8", ¼", or 3/8" NPT Solenoid Valves  
Series 8262 and 8263  
[Installation and Maintenance Instructions](#)
- ASCO Valves  
Open-Frame Solenoids  
Series U8003 and US8003  
[Installation and Maintenance Instructions](#)
- ASCO Valves  
3/8", ½" and ¾" Solenoid Valves  
Series 8210 and 8211  
[Installation and Maintenance Instructions](#)
- ASCO Valves  
1", 1 –1/4" and 1-1/2" Solenoid Valves  
Series 8210 and 8211  
[Installation and Maintenance Instructions](#)
- ASCO Valves  
Red-Hat II  
Series 8017G and 8014  
[Installation, Maintenance and Operating Instructions](#)
- ASCO Valves  
2-way Auxiliary-Operated Pilot  
Controlled Piston Valves  
Series 8290  
[Installation and Maintenance Instructions](#)

## Miscellaneous

- Banjo  
Direct Mounted Control Solenoid Valve  
[Installation Instructions](#)
- Gasket Material for Oxygen Service  
Durabla Manufacturing Company  
Durabla Black Compressed Gasket Material  
[Material Safety Data Sheets](#)





## Programmable Relay ZEN V2 Units

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments. Refer to "Warranty and Application Considerations" on page 36, and "Precautions for Safe Use" on page 34.

### Even Broader Applications with Increased Functionality and Higher Precision

- Increased functionality in a compact body (70 mm wide × 90 mm high).
- Easy programming is available using the LCD and operation buttons. (See note 1.)
- This single Unit easily provides relay, timer, counter, and time switch functions.
- Expansion is easy with Expansion I/O Units, allowing up to 44 I/O points. (See note 2.)
- Economy-type and Communications-type CPU Units have been added to series.
- Improved Weekly Timers (See note 1.)  
Increased timing accuracy with a monthly deviation of ±15 s max. Multiple-day operation and pulse output operation have been added.
- Select from two power supply options:  
100 to 240 VAC or 12 to 24 VDC.

**Note:** 1. Not supported for ZEN-□C2□□-□V2 models.  
2. When using CPU Units with 20 I/O points.



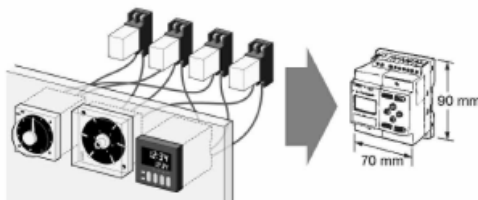
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## Features

### ■ Easy and Simple Programming for Automatic Small-scale Control

#### Saves Space, Wiring, and Installation Steps

- Versatile functionality in a compact body (70 mm wide × 90 mm high).
- This single Unit easily provides relay, timer, counter, and time switch functions. Wiring work is greatly reduced because separate wiring is not required for devices such as timers and counters.



#### Easy Programming

The LCD screen comes with 8 operation buttons on the front panel to enable programming in ladder view format. The LCD screen also has a backlight, making it easier to see when the ZEN is used in dark locations.

**Note:** Not supported for ZEN-□C2□□-□V2 models.



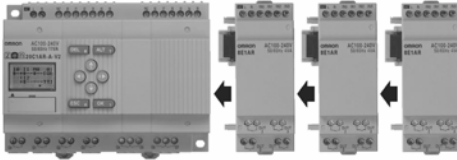
Programmable Relay **ZEN V2 Units**

OMRON

### Flexible Expansion Enables Up to 44 I/O Points

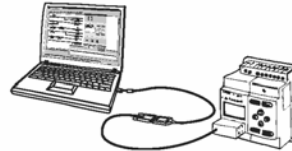
Up to three Expansion I/O Units can be connected if there are not enough I/O points. Expansion I/O Units are only 35 mm wide.

**Note:** CPU Units with 10 I/O points can be expanded to 34 I/O points. Expansion I/O Units cannot be connected to Economy-type CPU Units.



### Support Software with Simulation Function

- Programs can be easily written, saved, and monitored by personal computer.
- Programs can be simulated on the personal computer without connecting to the ZEN.



**Note:** For notebook computers that do not have an RS-232C serial port, connect the computer to the ZEN by connecting an OMRON CS1W-CIF31 USB-Serial Conversion Cable to the ZEN-CIF01 Connecting Cable.

### Other Versatile Functions

- Use of a Memory Cassette makes it easy to copy and save programs.
- Equipped with two analog input channels (CPU Units with DC power supply only).
- Password function ensures security. (See note.)
- Multi-language display in six languages (English, Japanese, German, French, Spanish, Italian). (See note.)
- Display user-set messages or analog-converted values. (See note.)

**Note:** Not supported for ZEN-C2□□-V2 models.

## ■ Enhanced Features of V2 CPU Units

### Improved Weekly Timer and Calendar Timer Functions

**Note:** Not supported for ZEN-C2□□-V2 models.

- The time precision has been increased.  
Conventional model: 2-min difference/month  
↓  
-V2 models:  $\pm 15$ -s difference/month (at 25°C)
- Multiple-day operation and pulse-output operation are now possible.
- These improved functions are convenient for time-controlled applications such as lighting and air conditioning control.



Lighting control



Air conditioning control

### Economy-type Added to the Series

- Economy-type CPU Units with a more affordable price have been added to the series, although Expansion I/O Units cannot be added.

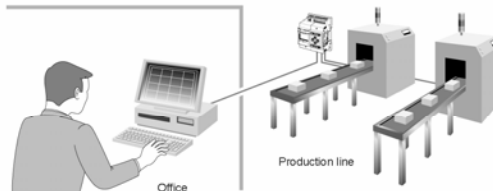
### 12 to 24 VDC Line Voltage Operation

Operation is now possible with 12 VDC.

**Expansion I/O Units have been reduced to half-size (35 mm wide).**

### RS-485 Communications Model Added to Series

Production line conditions can be remotely monitored by monitoring the ZEN control status.



### More Precise Analog Input

Conventional model:  $\pm 10\%$  FS → -V2 models:  $\pm 1.5\%$  FS  
DC power supply models are equipped with two analog inputs (0 to 10 V). There are four analog comparators. The increased precision makes it even easier to use the Unit in simple control applications with voltage, current, temperature, and other analog values.

### 8-digit Counter, 150-Hz Counter

- An 8-digit counter and 8-digit comparator have been added.
- The maximum count for DC power supply models is 150 Hz.

### Twin-timer Operation Added

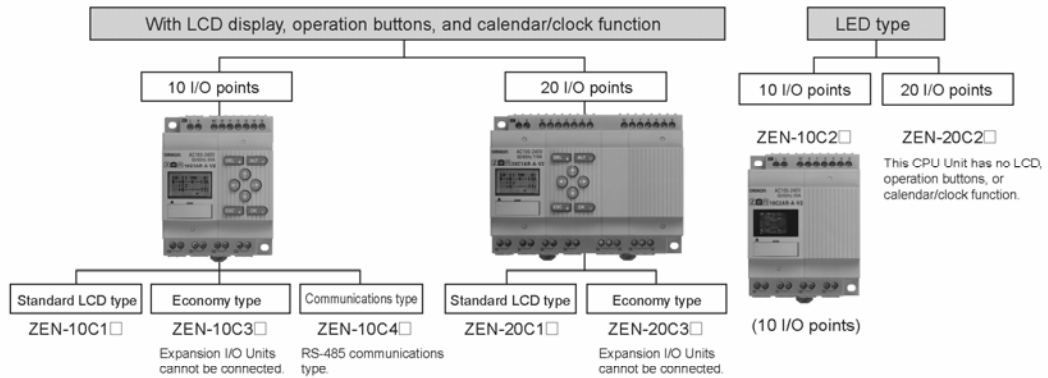
Twin-timer operation allows you to set ON and OFF times separately, greatly simplifying intermittent operation.

Programmable Relay **ZEN V2 Units**

## ■ Series Configuration

### CPU Units

Power supply voltage: 100 to 240 VAC, 12 to 24 VDC, Output: Relay, transistor output



### Expansion I/O Units

Only 35-mm wide.  
4 input, 4 output points



### Power Supply Unit

Same shape and design as ZEN.  
24 VDC, 30 W



### Support Software

Allows easy programming and  
operation simulation.



OMRON

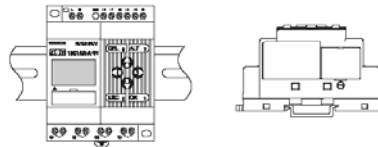
## Specifications

### ■ Ratings

Item	Specification	
	ZEN-□C□AR-A-V2/ZEN-8E1AR	ZEN-□C□D□-D-V2/ZEN-8E1D□
Rated supply voltage	100 to 240 VAC, 50/60 Hz	12 to 24 VDC (DC ripple rate: 5% max.)
Operating voltage range	85 to 264 VAC	10.8 to 28.8 VDC
Power consumption	CPU Units without Expansion I/O Units <ul style="list-style-type: none"> <li>• ZEN-10C1AR-A-V2/ZEN-10C2AR-A-V2/ ZEN-10C3AR-A-V2 100 V AC: 5 VA max. 240 V AC: 7 VA max.</li> <li>• ZEN-10C4AR-A-V2 100 V AC: 6 VA max. 240 V AC: 8 VA max.</li> <li>• ZEN-20C□AR-A-V2 100 V AC: 7 VA max. 240 V AC: 10 VA max.</li> </ul> CPU Units with three Expansion I/O Units <ul style="list-style-type: none"> <li>• ZEN-10C1AR-A-V2/ZEN-10C2AR-A-V2 100 V AC: 6 VA max. 240 V AC: 8 VA max.</li> <li>• ZEN-10C4AR-A-V2 100 V AC: 7 VA max. 240 V AC: 9 VA max.</li> <li>• ZEN-20C□AR-A-V2 100 V AC: 8 VA max. 240 V AC: 11 VA max.</li> </ul> Expansion I/O Units <ul style="list-style-type: none"> <li>• ZEN-8E1AR 100 V AC: 3 VA max. 240 V AC: 4 VA max.</li> </ul>	CPU Units without Expansion I/O Units <ul style="list-style-type: none"> <li>• ZEN-10C□DR-D-V2 12/24 V DC: 3 W max. (ZEN-10C3DR-D-V2: 2.8 W max.)</li> <li>• ZEN-10C□DT-D-V2 12/24 V DC: 2 W max.</li> <li>• ZEN-20C□DR-D-V2 12/24 V DC: 4 W max.</li> <li>• ZEN-20C□DT-D-V2 12/24 V DC: 2 W max.</li> </ul> CPU Units with three Expansion I/O Units <ul style="list-style-type: none"> <li>• ZEN-10C□DR-D-V2 12/24 V DC: 4 W max.</li> <li>• ZEN-10C□DT-D-V2 12/24 V DC: 3 W max.</li> <li>• ZEN-20C□DR-D-V2 12/24 V DC: 5 W max.</li> <li>• ZEN-20C□DT-D-V2 12/24 V DC: 3 W max.</li> </ul> Expansion I/O Units <ul style="list-style-type: none"> <li>• ZEN-8E1DR 12/24 V DC: 2 W max.</li> </ul>
Inrush current	ZEN-10C□AR-A-V2: 4.5 A max. ZEN-20C□AR-A-V2: 4.5 A max. ZEN-8E1AR: 4 A max.	ZEN-10C□D□-D-V2: 30 A max. ZEN-20C□D□-D-V2: 30 A max. ZEN-8E1DR: 15 A max.
Ambient temperature	0 to 55°C (-25 to 55°C for ZEN-□C2□□-□-V2 models)	
Ambient storage temperature	-20 to 75°C (-40 to 75°C for ZEN-□C2□□-□-V2 models)	
Ambient humidity	10% to 90% (with no condensation)	
Ambient conditions	No corrosive gases	
Mounting method	Surface mounting, DIN track mounting (standard (vertical) installation and horizontal installation) (See notes 1 and 2.)	
Terminal block	Solid-line terminal block (use solid wire or fine-stranded wire)	
Terminal screw tightening torque	0.565 to 0.6 N·m (5 to 5.3 in-lb)	
Degree of protection	IP20 (Mounted inside a control panel)	

Note: 1. Can be mounted to 35-mm DIN Track.

2. Standard (Vertical) installation      Horizontal installation



Programmable Relay **ZEN V2 Units**

# WILKERSON<sup>®</sup>

CORPORATION

## MANUFACTURER'S WARRANTY

Manufacturer's products are warranted to be free from defects in material and workmanship under proper use, installation, application and maintenance in accordance with manufacturer's written recommendations and specifications for one year from the date of shipment from the factory. Manufacturer's obligation under this warranty is limited to and the sole remedy for any such defect shall be the repair or replacement (at manufacturer's option) of unaltered products returned to manufacturer and proven to have such defect, provided such defect is promptly reported to manufacturer within said one year period.

**THIS IS THE ONLY AUTHORIZED MANUFACTURER'S WARRANTY AND IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS, OR OF ANY OTHER OBLIGATIONS ON THE PART OF MANUFACTURER.** Warranty claims must be submitted and shall be processed in accordance with manufacturer's established warranty claim procedure. In no event will manufacturer be liable for business interruptions, loss of profits, personal injury, costs of delay or for any other special indirect, incidental or consequential losses, costs or damages.

## WARNING

USE LIMITATIONS

Manufacturer's warranties are void and manufacturer assumes no responsibility for any resulting cost, loss injury or any other damages whatsoever with respect to any plastic bowl unit for which a bowl guard is standard equipment if the unit is placed in service without the bowl guard and except as otherwise specified in writing by manufacturer with respect to any manufacturer's products which are used in other than compressed air service. Specific warnings with respect to these and other use limitations appear elsewhere in this product instruction sheet.

**ATTENTION:** Make sure bowl is fully inserted into body, and then fully turned to lock bowl in place before applying air pressure to unit. When bowl is properly installed, the alignment markings on the bowl/bowlguard assembly and the marks on the body will line up, indicating proper assembly. Failure to do so may cause air pressure to blow bow off of unit, resulting in serious personal injury or death. Depressurize unit before attempting to service.

**YOU** have selected a quality product, and we appreciate it... To be assured of maximum performance and satisfaction please read these instructions before installing this product.

### WARNING: IF YOUR UNIT HAS A PLASTIC BOWL:

- DO NOT** use plastic bowl units without a bowl guard installed.\* Plastic bowl units are sold only with bowl guards to minimize the danger of flying fragments in the event of bowl failure. If this unit is in service without a bowl guard installed, manufacturer's warranties are void, and the manufacturer assumes no responsibility for any resulting loss. (\*EXCEPT M00 MODEL)
- DO NOT** install the unit where it will be subjected to temperatures higher than 125°F (52°C).
- DO NOT** install the unit where it will be subjected to pressures higher than 150 psig (10,3 bar).
- CAUTION:** Certain compressor oils, household cleaners, chemicals, solvents, paints and fumes will attack plastic bowls and can cause plastic bowl failure. See manufacturer's list shown elsewhere on this sheet.
- WHEN BOWL** becomes dirty replace bowl or wipe only with a clean, dry cloth.
- DO NOT** install on a compressed air line where the compressor is lubricated with, or the air contains, a material that will attack plastic bowls.
- DO** inspect plastic bowls to detect crazing, cracking, damage or other deterioration. Immediately replace any crazed, cracked, damaged or deteriorated bowl with a metal bowl or a new plastic bowl and bowl guard.
- IF A UNIT HAS BEEN IN SERVICE AND DOES NOT HAVE A BOWL GUARD, ORDER ANOTHER ONE AND INSTALL BEFORE PLACING BACK IN SERVICE.**

### IMPORTANT INSTALLATION INSTRUCTIONS FOR MICROALESCER® FILTERS (TYPE C)

- DO NOT** install the unit until you have read this entire product information sheet. If your unit has a plastic bowl, note the special warning information listed above.
- EXCEPT** as otherwise specified by manufacturer, this product is specifically designed for compressed air

service, and use with any other fluid (liquid or gas) is a misapplication. For example, use with or injection of certain hazardous liquids or gases in the system (such as alcohol or liquid petroleum gas) could be harmful to the unit or result in a combustible condition or hazardous external leakage. Before using with fluids other than air, or for non-industrial applications, or for life support systems, consult manufacturer for written approval. Manufacturer's warranties are void in the event of misapplication and manufacturer assumes no responsibility for any resulting loss. Maximum pressure and temperature ratings for plastic bowls are 150 psig (10,3 bar) and 125°F (52°C); and for metal bowls 200 psig (14 bar) and 175°F (79°C). [(08/18/28 Series-250 psig (17 bar) and 175°F (79°C)]

- INSTALL** as close as possible to point where air is being used.
- REDUCING THE PIPE SIZE** down to accommodate a smaller inlet/outlet pipe size of a MICROALESCER® filter does not affect proper operation of filter. **DO NOT** select MICROALESCER® filters by inlet and outlet port sizes. MICROALESCER® filters should be selected by the airflow and inlet pressure required.
- INSTALL** a 5-micron prefilter ahead of the MICROALESCER® filter to prolong life of the element.
- INSTALL** a pressure differential gauge (available from the manufacturer) to determine when to change the disposable elements, or install an air pressure gauge at inlet and another at outlet of MICROALESCER® filter. When the pressure differential reaches 10 psig (0,7 bar), change the element.
- PURGE** all traces of oil on the downstream side of coalescing filter prior to installation.
- DO NOT INSTALL** MICROALESCER® filter on an air line if there are any chemicals in the compressed air that will attack the polyurethane foam cover of the element.
- WHEN INSTALLING** filter element **DO NOT** touch the foam plastic cover. Always handle it by the end plates. **DO NOT** touch the MICROALESCER® element once it has been placed in service. Pressure on the outer foam cover can damage it once it is in service.
- WHEN INSTALLING** a chemical dryer, mount it after the MICROALESCER® filter.
- WHEN INSTALLING** a refrigerated air dryer, it may be installed before a MICROALESCER® filter. (See schematic elsewhere in these instructions.)
- WHEN INSTALLING** a Type D filter with an AC Pak element (Activated Carbon for oil vapor adsorption), mount filter after air dryer.
- DO NOT INSTALL** a quick-opening valve if this causes a flow surge beyond the flow rating of the unit.

### WHEN TO CHANGE THE TYPE C ELEMENT

- CHANGE ELEMENT** when pressure differential reaches 10 psig (0,7 bar). Units with differential pressure indicator will move to red at 10 psid.
- DO NOT** change element if oil stains appear on lower 1/5 of element. This is normal; oil or water stains on the outer foam cover do not indicate a need to change the element.
- WHEN INSTALLING** element using bottom retainer nut, tighten nut to 5-6 ft. lbs.
- DO NOT** use oils or grease on element or bowl seals. NOTE: Only excessive pressure drop requires the replacement of the element. Excessive pressure drop indicates that the filter has been removing solid contaminants as well as oil and water particulates.

### TROUBLE-SHOOTING MICROALESCER® FILTER INSTALLATIONS

#### IF OIL AEROSOLS APPEAR DOWNSTREAM FROM MICROALESCER® FILTER

- This could indicate lines were not properly purged of previous contaminants.
- Check to see if sealing gasket/o-ring (depending on model) is in place and making proper seal

## MICROALESCER® Filter

between the top of the element and the cover casting. Make sure element is tightened firmly in place.

- Make sure you are not flowing more air through the unit than its rated capacity. Momentary high flows could cause oil bypass.
- For maximum efficiency, air inlet temperature should be between 70°F (21°C) and 90°F (32°C).
- If inlet temperatures up to the maximum of 125°F (52°C) cannot be avoided, install the Type C filter with a Type D element downstream. This will catch the oil vapors that are usually responsible for oil downstream at higher temperatures. Check that compressor is not drawing air at the intake contaminated with harmful chemicals or hydrocarbons.
- If the foam sock is torn or ruptured, oil may pass downstream from the element. If this should occur, replace the element.
- In compressors which have been running for a long time without changing of oil, most oils will gradually change their chemical compositions and may develop impurities which attack the plastic bowl, filter seals, or outer foam sock. Periodic replacement of the compressor oil will prevent this occurrence and extend compressor life.

## FRENCH CANADIAN

**VOUS** avez choisi un produit de qualité et nous l'apprécions. Pour être assuré d'obtenir des performances et un fonctionnement parfait, lisez ces instructions avant l'installation de notre matériel.

### ATTENTION: SI VOTRE APPAREIL A UN BOL PLASTIQUE

- NE PAS** utiliser les unités à bol en plastique sur lesquelles il n'y a pas de dispositif de protection installé.\* Toutes les unités à bol en plastique sont vendues équipées d'un dispositif de protection afin de minimiser le danger que présente la projection de fragments résultant de l'éclatement du bol. La mise en service de cette unité sans dispositif de protection installé annule les garanties accordées par le fabricant. Le fabricant décline alors toute responsabilité pour toute perte qui en résulterait. (\*SAUF MODÈLE M00)
- NE PAS** installer l'appareil dans un endroit où la température est supérieure à 52°C.
- NE PAS** utiliser l'appareil à des pressions supérieures à 10,3 bar.
- ATTENTION:** certaines huiles de compresseur, produits d'entretien, produits chimiques, solvants, peintures et vapeurs, attaquent les bols plastiques et sont cause de détérioration. Voir la liste sur cette feuille, à ne pas utiliser à proximité de ces produits.
- QUAND LE BOL** devient sale le remplacer ou le nettoyer avec un chiffon propre et sec.
- NE PAS** installer l'appareil sur une ligne d'air comprimé où le compresseur est lubrifié avec un produit qui attaque les bols plastiques, ou si l'air en contient.
- INSPECTER** pour détecter fêlures, craquelures ou autres détériorations. Remplacer immédiatement tout bol fêlé, craquelé, endommagé ou détérioré par un bol métal ou un nouveau bol plastique avec bol de protection métallique.
- SI UNE UNITÉ MISE EN SERVICE NE POSSÈDE PAS DE DISPOSITIF DE PROTECTION, COMMANDEZ-EN UN ET INSTALLEZ-LE AVANT DE CONTINUER À VOUS SERVIR DE L'UNITÉ.**

### INSTRUCTIONS IMPORTANTES POUR L'INSTALLATION DES FILTRES SUBMICRONIQUES.

- NE PAS** installer l'appareil sans avoir préalablement lu la présente notice d'installation. Si l'appareil a un bol en plastique, tenir compte des avertissements spéciaux ci-haut.
- SAUF** spécifications contraires du constructeur, cet appareil est prévu pour l'air comprimé, un emploi avec

- NO** instale la unidad hasta que haya leído completamente esta hoja de información sobre el producto. Si su unidad tiene una taza de plástico, observe la información de precauciones especiales indicada anteriormente.
- SALVO** que el fabricante especifique lo contrario, este producto está diseñado específicamente para el uso con aire comprimido, y su uso con cualquier otro fluido (líquido o gas) es una aplicación indebida. Por ejemplo, el uso con o la inyección de ciertos líquidos o gases peligrosos en el sistema (tales como el alcohol o el gas de petróleo líquido) podría ser nocivo para la unidad o resultar en una condición de combustión o una fuga externa peligrosa. Antes de utilizar con fluidos que no sean aire, para aplicaciones no industriales, o para sistemas de soporte de vida, consulte al fabricante para obtener una aprobación por escrito. Las garantías del fabricante no tendrán validez en el caso de aplicación indebida y éste no asume ninguna responsabilidad por cualquier pérdida resultante. Los valores máximos de presión y temperatura de las tazas de plástico son 150 lbs/pulgada<sup>2</sup> (10.3 barías) y 125°F (52°F); y de las tazas de metal 200 lbs/pulgada<sup>2</sup> (14 barías) y 175°F (79°C). [Serie 08/18/28-250 lbs/pulgada<sup>2</sup> (17 barías) y 175°F (79°C)]
- INSTALE** el producto lo más cerca posible del punto donde se está utilizando el aire.
- REDUCIR EL TAMAÑO DEL CAÑO** para acomodar un caño de entrada/salida de tamaño más pequeño de un filtro MICROalescer® no afecta el buen funcionamiento del filtro. **NO** seleccione los filtros MICROalescer® por los tamaños de orificio de entrada y salida. Los filtros MICROalescer® se deben seleccionar por el flujo de aire y la presión de entrada requeridos.
- INSTALE** un prefiltro de 5 micrones delante del filtro MICROalescer® para prolongar la vida útil del elemento.
- INSTALE** un manómetro diferencial (disponible del fabricante) para determinar cuándo cambiar los elementos desechables o instale un manómetro en la entrada y otro en la salida del filtro MICROalescer®. Cuando la diferencia de presiones llegue a 10

- lbs/pulgada<sup>2</sup> (0,7 barías), cambie el elemento.
- PURGUE** todos los vestigios de aceite dentro de los conductos antes de la instalación del filtro.
- NO INSTALE** el filtro MICROalescer® en una línea de aire si hubiera algún producto químico en el aire comprimido que dañe la cubierta de plástico celular de poliuretano del elemento.
- CUANDO INSTALE** el elemento de filtro, **NO** toque la cubierta de plástico celular. Siempre tómelo por las placas terminales. **NO** toque el elemento MICROnaught® una vez que se le haya puesto en uso. La presión sobre la cubierta de plástico celular exterior puede dañarlo una vez que esté en uso.
- CUANDO INSTALE** un secador químico, móntelo después del filtro MICROalescer®.
- CUANDO INSTALE** un secador de aire refrigerado, puede instalarse antes de un filtro MICROalescer®. (Vea el esquema correspondiente en otra parte de estas instrucciones.)
- CUANDO INSTALE** un filtro de Tipo C con un elemento AC Pak (carbón activado para adsorción de vapor de aceite), monte el filtro después del secador de aire.
- NO INSTALE** una válvula de apertura rápida si esto causara un flujo excesivo que sobrepase la capacidad de flujo de la unidad.

**CUANDO SE DEBE CAMBIAR EL ELEMENTO DE TIPO C**

- CAMBIE EL ELEMENTO** cuando la diferencia de presiones llegue a 10 lbs/pulgada<sup>2</sup> (0,7 barías). Las unidades con indicador de diferencia de presiones se moverán al rojo a 0,7 barías.
- NO** cambie el elemento si aparecen manchas de aceite en la parte inferior equivalente a 1/5 del elemento. Esto es normal; las manchas de aceite o agua en la cubierta de plástico celular exterior no indican una necesidad de cambiar el elemento.
- CUANDO INSTALE** el elemento utilizando la tuerca inferior de sujeción, apriete la tuerca entre 5 y 6 libras/pié.
- NO** utilice aceites o grasa en el elemento o las juntas de la taza. **NOTA:** Sólo una caída excesiva de presión

requiere el cambio del elemento. La caída excesiva de presión indica que el filtro ha filtrado contaminantes sólidos, así como partículas de aceite y agua.

**LOCALIZACION DE FALLAS EN LAS INSTALACIONES DEL FILTRO**

**MICROALESCKER® SI LOS AEROSOLIOS DE ACEITE APARECIERAN EN EL CIRCUITO DESPUES DEL FILTRO MICROALESCKER®**

- Esto podría indicar que los conductos no fueron debidamente purgados de contaminantes anteriores.
- Verifique que la junta obturadora/anillo tórico (según el modelo) esté en su lugar y que haya un sellado adecuado entre la parte superior del elemento y la tapa moldeada. Asegúrese de que el elemento esté sujetado firmemente en su lugar.
- Controle que el flujo de aire a través de la unidad no sea superior a su capacidad. Los flujos elevados momentáneos podrían ser la causa de un paso de aceite.
- Para una mayor eficiencia, la temperatura de entrada del aire debe ser entre 70°F (21°C) y 90°F (32°C).
- Si no pueden evitarse las temperaturas de entrada de hasta el máximo de 125°F (52°C), instale el filtro de Tipo C con un elemento de Tipo D. Esto captará los vapores de aceite que normalmente son responsables del aceite que aparece a temperaturas más altas. Verifique que el compresor no esté aspirando en la entrada, aire contaminado con productos químicos nocivos.
- Si la funda de espuma está rasgada o rota, el aceite podría filtrarse desde el elemento. Si ocurriera esto, cambie el elemento.
- En compresores que han estado funcionando durante largo tiempo sin cambiarle el aceite, la mayoría de los aceites cambiarán gradualmente sus composiciones químicas y pueden acumular impurezas que dañan a la taza de plástico, las juntas de los filtros o la funda exterior de espuma. El cambio periódico del aceite del compresor evitará que esto suceda y prolongará la vida útil del compresor.

**SOME OF THE MATERIALS THAT WILL ATTACK POLYCARBONATE PLASTIC BOWLS.**

Acetaldehyde	Benzoic acid	Cresol	Ethylene glycol	Perchloroethylene	Thiophene
Acetic acid (conc.)	Cyclohexanol	Cyclohexanone	Formic acid (conc.)	Phenol	Toluene
Acetone	Brake fluids	Cyclohexene	Freon (refrig and propell)	Phosphorous hydroxy chloride	Turpentine
Acrylonitrile	Bromobenzine	Dimethyl formamide	Gasoline (high aromatic)	Phosphorous trichloride	Sulfuric acid (conc.)
Ammonia	Butyric acid	Dioxane	Hydrazine	Propionic acid	Sulphural chloride
Ammonium flouride	Carbolic acid	Ethane tetrachloride	Hydrochloric acid (conc.)	Pyridine	Tetrahydronaphtalene
Ammonium hydroxide	Carbon disulfide	Ethyl acetate	Methylene chloride	Sodium hydroxide	Thiophene
Ammonium sulfide	Carbon tetrachloride	Ethyl ether	Methylene salicylate	Sodium sulfide	Toluene
Anaerobic adhesives and sealants	Caustic potash solution	Ethylamine	Milk of lime (CaOH)	Styrene	Turpentine
Antifreeze	Caustic soda solution	Ethylene chlorohydrin	Nitric acid (conc.)	Sulfuric acid (conc.)	Xylene and others
Benzene	Chlorobenzine	Ethylene dichloride	Nitrobenzine	Sulphural chloride	
	Chloroform		Nitrocellulose laquer		

**TRADE NAMES OF SOME COMPRESSOR OILS, RUBBER COMPOUNDS AND OTHER MATERIALS THAT WILL ATTACK POLYCARBONATE PLASTIC BOWLS**

Aflas "Perma-Guard"	Haskel #568-023	Keystone penetrating oil #2	Petron PD287	Stillman #269-75	Telar
Buna N *	Hilgard Co's hil phene	Marvel Mystery Oil	Prestone	(polyurethane)	Tenneco anderol #495
Cellulube #510 and #250	Houghton and Co. oil #1120	Minn. Rubber 366Y	Pydraul AC	Stillman #SR-513 (neoprene)	and #500 oils
Crylex #5 cement	#1130 & #1055	National Compound #N11	Sears Regular Motor Oil	Stauffer Chemical	Titon
*Eastman 910	Houlsate 1000	"Nylock" VC 3	Sinclair oil "Lily White"	FYRQUEL #150	Zerex
Garlock #96403 (polyurethane)	Kano Krol	Parco #1306 Neoprene	Some Locite Compounds	Tannergas	

**WE CANNOT POSSIBLY LIST ALL HARMFUL SUBSTANCES. CHECK WITH A MOBAY CHEMICAL OR GENERAL ELECTRIC OFFICE FOR FURTHER INFORMATION ON POLYCARBONATE PLASTIC**

**LISTA DE MATERIALES QUE DAÑAN LAS TAZAS DE PLASTICO DE POLICARBONATO**

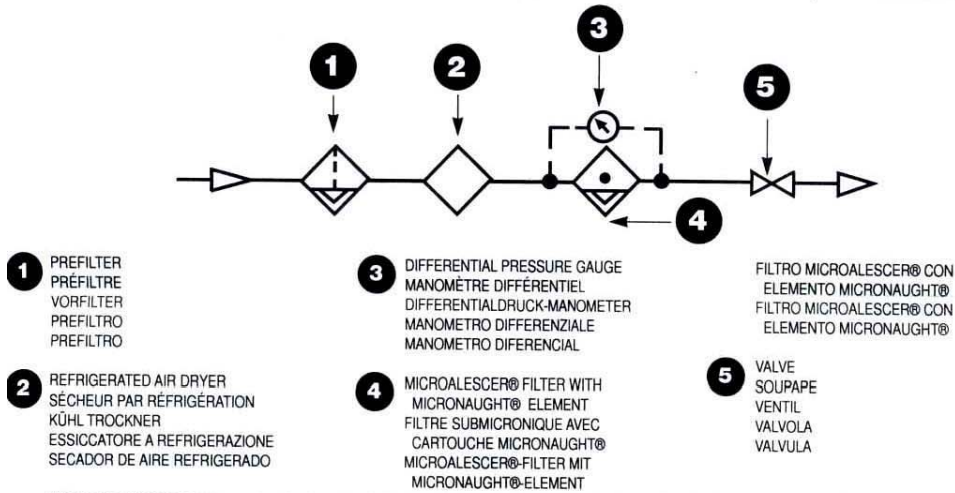
Acetaldehído	Acido sulfúrico (conc.)	Ciclohexanona	Estireno	Hidróxido sódico	Sulfuro sódico
Acetato etílico	Acilnitrilo	Clorobenceno	Eter etílico	Laca nitrocelulosa	Tetracloruro de carbono
Acetona	Adhesivos y compuestos obturadores anaeróbicos	Clorofórmio	Etilamina	Lechada de cal (CaOH)	Tetracloruro de etano
Acido acético (conc.)	Alcohol bencílico	Clorohidrina de etileno	Fenol	Líquidos para frenos	Tetrahidronaftaleno
Acido benzoico	Amoniaco	Cloruro de azufre	Fluoruro amónico	Nitrobenzeno	Tolueno
Acido butílico	Anticongelante	Cloruro de metileno	Freón (refrig. y propolente)	Perclorotileno	Tolueno
Acido carbólico	Benceno	Creosol	Gasolina (altamente aromática)	Piridina	Trementina
Acido clorhídrico (conc.)	Bromobenceno	Dicloruro de etileno	Glicol etilénico	Salicilato de metileno	Tricloruro de fósforo
Acido fórmico (conc.)	Ciclohexano	Dimetil formamida	Hidrazina	Solución de potasa cáustica	Xileno y otros
Acido nítrico (conc.)	Ciclohexanol	Dioxano	Hidroxiduro de fósforo	Solución de soda cáustica	
Acido propiónico		Disulfuro de carbono	Hidróxido amónico	Sulfuro amónico	

**NOMBRES COMERCIALES DE ALGUNOS LUBRICANTES PARA COMPRESORES, COMPUESTOS DE CAUCHO Y OTROS MATERIALES QUE DAÑAN LAS TAZAS DE PLASTICO DE POLICARBONATO**

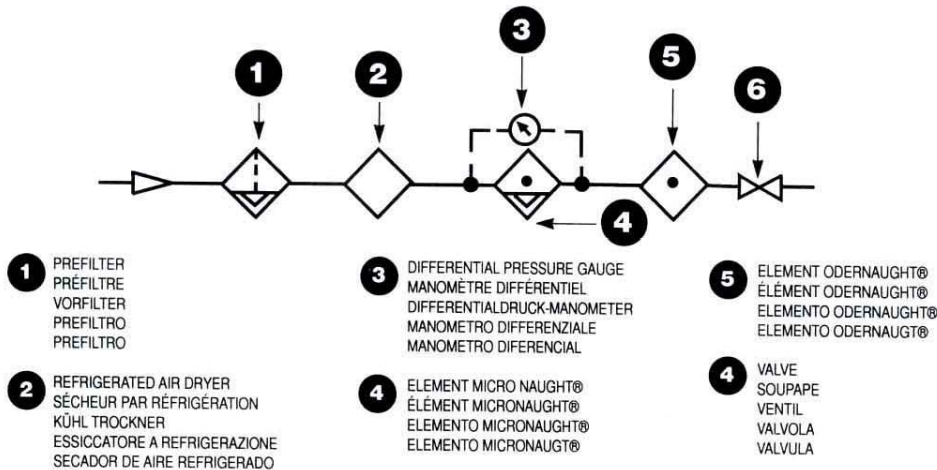
Acete #1120, #1130 y #1055 de Houghton y Co.	Aceites Tenneco anderol #495 y #500	Caucho Minn 366 y Cellulube #510 y #250	Hilgard Co's hi phene Houtosafe 1000	Petron PD287	Stillman #269-75 (poliuretano)
Acete Marvel Mystery	Algunos compuestos Loctite	Cemento Croylex #5	Kano Kroll	Prestone	Stillman #SR-513 (neopreno)
Acete penetrante Keystone #2	Atlas "Perma-Guard"	Eastman 910	National Compound #N11	Pydraul AC	Tannergas
Acete Sinclair "Lily White"	Buna N	Carlock #98403 (poliuretano)	Neopreno Parco #1306	Aceite de motor regular Sears	Tellar
		Haskel #568-023	Nylock VC-3	Stauffer Chemical	Tison
				FYRQUEL #150	Zerex

OBVIAMENTE, NO PODEMOS LISTAR TODAS LAS SUSTANCIAS NOCIVAS; CONSULTE A UNA OFICINA DE MOBAY CHEMICAL O DE GENERAL ELECTRIC PARA OBTENER MAS INFORMACION SOBRE EL PLASTICO DE POLICARBONATO

**Typical Installation • Exemple d'installation • Typische Installation • Installazione tipica • Instalación normal**



**MICROalescer® Filter Combination • Combinaison Filtre MICROalescer® • MICROalescer®-Filter-Kombination  
Combinazione Filtro MICROalescer® • Combinación de Filtros MICROalescer®**











**WILKERSON®**

83-536-000 REV 1 08/02

**MANUFACTURER'S WARRANTY**

Manufacturer's products are warranted to be free from defects in material and workmanship under proper use, installation, application and maintenance in accordance with manufacturer's written recommendations and specifications for one year from the date of shipment from the factory. Manufacturer's obligation under this warranty is limited to and the sole remedy for any such defect shall be the repair or replacement (at manufacturer's option) of unaltered products returned to manufacturer and proven to have such defect, provided such defect is promptly reported to manufacturer within said one year period.

**THIS IS THE ONLY AUTHORIZED MANUFACTURER'S WARRANTY AND IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS, OR OF ANY OTHER OBLIGATIONS ON THE PART OF MANUFACTURER.** Warranty claims must be submitted and shall be processed in accordance with manufacturer's established warranty claim procedure. In no event will manufacturer be liable for business interruptions, loss of profits, personal injury, costs of delay or for any other special indirect, incidental or consequential losses, costs or damages.

**WARNING****USE LIMITATIONS**

Manufacturer's warranties are void and manufacturer assumes no responsibility for any resulting cost, loss injury or any other damages whatsoever with respect to any plastic bowl unit for which a bowl guard is standard equipment if the unit is placed in service without the bowl guard and except as otherwise specified in writing by manufacturer with respect to any manufacturer's products which are used in other than compressed air service. Specific warnings with respect to these and other use limitations appear elsewhere in this product instruction sheet.

**ATTENTION:** Make sure bowl is fully inserted into body, and then fully turned to lock bowl in place before applying air pressure to unit. When bowl is properly installed, the alignment markings on the bowl/bowlguard assembly and the marks on the body will line up, indicating proper assembly. Failure to do so may cause air pressure to blow bowl off of unit, resulting in serious personal injury or death. Depressurize unit before attempting to service.

**YOU** have selected a quality product, and we appreciate it... To be assured of maximum performance and satisfaction please read these instructions before installing this product.

**WARNING: IF YOUR UNIT HAS A PLASTIC BOWL:**

- DO NOT** use plastic bowl units without a bowl guard installed.\* Plastic bowl units are sold only with bowl guards to minimize the danger of flying fragments in the event of bowl failure. If this unit is in service without a bowl guard installed, manufacturer's warranties are void, and the manufacturer assumes no responsibility for any resulting loss. (\*EXCEPT M00 MODEL)
- DO NOT** install the unit where it will be subjected to temperatures higher than 125°F (52°C).
- DO NOT** install the unit where it will be subjected to pressures higher than 150 psig (10.3 bar).
- CAUTION:** Certain compressor oils, household cleaners, chemicals, solvents, paints and fumes will attack plastic bowls and can cause plastic bowl failure. See manufacturer's list shown elsewhere on this sheet.
- WHEN BOWL** becomes dirty replace bowl or wipe only with a clean, dry cloth.
- DO NOT** install on a compressed air line where the compressor is lubricated with, or the air contains, a material that will attack plastic bowls.
- DO** inspect plastic bowls to detect crazing, cracking, damage or other deterioration. Immediately replace any crazed, cracked, damaged or deteriorated bowl with a metal bowl or a new plastic bowl and bowl guard.
- IF A UNIT HAS BEEN IN SERVICE AND DOES NOT HAVE A BOWL GUARD, ORDER ANOTHER ONE AND INSTALL BEFORE PLACING BACK IN SERVICE.**

**IMPORTANT INSTALLATION INSTRUCTIONS FOR MICROALESCEER® FILTERS (TYPE C)**

- DO NOT** install the unit until you have read this entire product information sheet. If your unit has a plastic bowl, note the special warning information listed above.
- EXCEPT** as otherwise specified by manufacturer, this product is specifically designed for compressed air

service, and use with any other fluid (liquid or gas) is a misapplication. For example, use with or injection of certain hazardous liquids or gases in the system (such as alcohol or liquid petroleum gas) could be harmful to the unit or result in a combustible condition or hazardous external leakage. Before using with fluids other than air, or for non-industrial applications, or for life support systems, consult manufacturer for written approval. Manufacturer's warranties are void in the event of misapplication and manufacturer assumes no responsibility for any resulting loss. Maximum pressure and temperature ratings for plastic bowls are 150 psig (10.3 bar) and 125°F (52°C); and for metal bowls 200 psig (14 bar) and 150°F (65.5°C). [(08/18/28 Series-250 psig (17 bar) and 150°F (65.5°C)]

- INSTALL** as close as possible to point where air is being used.
- REDUCING THE PIPE SIZE** down to accommodate a smaller inlet/outlet pipe size of a MICROALESCEER® filter does not affect proper operation of filter. **DO NOT** select MICROALESCEER® filters by inlet and outlet port sizes. MICROALESCEER® filters should be selected by the airflow and inlet pressure required.
- INSTALL** a 5-micron prefilter ahead of the MICROALESCEER® filter to prolong life of the element.
- INSTALL** a pressure differential gauge (available from the manufacturer) to determine when to change the disposable elements, or install an air pressure gauge at inlet and another at outlet of MICROALESCEER® filter. When the pressure differential reaches 7 psig (0.7 bar), change the element.
- PURGE** all traces of oil on the downstream side of coalescing filter prior to installation.
- DO NOT INSTALL** MICROALESCEER® filter on an air line if there are any chemicals in the compressed air that will attack the polyurethane foam cover of the element.
- WHEN INSTALLING** filter element **DO NOT** touch the foam plastic cover. Always handle it by the end plates. **DO NOT** touch the MICROALESCEER® element once it has been placed in service. Pressure on the outer foam cover can damage it once it is in service.
- WHEN INSTALLING** a chemical dryer, mount it after the MICROALESCEER® filter.
- WHEN INSTALLING** a refrigerated air dryer, it may be installed before a MICROALESCEER® filter. (See schematic elsewhere in these instructions.)
- WHEN INSTALLING** a Type D filter with an AC Pak element (Activated Carbon for oil vapor adsorption), mount filter after air dryer.
- DO NOT INSTALL** a quick-opening valve if this causes a flow surge beyond the flow rating of the unit.

**WHEN TO CHANGE THE TYPE C ELEMENT**

- CHANGE ELEMENT** when pressure differential reaches. Units with differential pressure indicator will move to red at 7 psid.
- DO NOT** change element if oil stains appear on lower 1/5 of element. This is normal; oil or water stains on the outer foam cover do not indicate a need to change the element.
- WHEN INSTALLING** element using bottom retainer nut, tighten nut to 5-6 ft. lbs.
- DO NOT** use oils or grease on element or bowl seats. **NOTE:** Only excessive pressure drop requires the replacement of the element. Excessive pressure drop indicates that the filter has been removing solid contaminants as well as oil and water particulates.

**TROUBLE-SHOOTING MICROALESCEER® FILTER INSTALLATIONS****IF OIL AEROSOLS APPEAR DOWNSTREAM FROM MICROALESCEER® FILTER**

- This could indicate lines were not properly purged of previous contaminants.
- Check to see if sealing gasket/o-ring (depending on model) is in place and making proper seal

**MICROALESCEER® Filter**

- between the top of the element and the cover casting. Make sure element is tightened firmly in place.
- Make sure you are not flowing more air through the unit than its rated capacity. Momentary high flows could cause oil bypass.
  - For maximum efficiency, air inlet temperature should be between 70°F (21°C) and 90°F (32°C).
  - If inlet temperatures up to the maximum of 125°F (52°C) cannot be avoided, install the Type C filter with a Type D element downstream. This will catch the oil vapors that are usually responsible for oil downstream at higher temperatures. Check that compressor is not drawing air at the intake contaminated with harmful chemicals or hydrocarbons.
  - If the foam sock is torn or ruptured, oil may pass downstream from the element. If this should occur, replace the element.
  - In compressors which have been running for a long time without changing of oil, most oils will gradually change their chemical compositions and may develop impurities which attack the plastic bowl, filter seals, or outer foam sock. Periodic replacement of the compressor oil will prevent this occurrence and extend compressor life.

**FRENCH CANADIAN**

**VOUS** avez choisi un produit de qualité et nous l'apprécions. Pour être assuré d'obtenir des performances et un fonctionnement parfait, lisez ces instructions avant l'installation de notre matériel.

**ATTENTION: SI VOTRE APPAREIL A UN BOL PLASTIQUE**

- NE PAS** utiliser les unités à bol en plastique sur lesquelles il n'y a pas de dispositif de protection installé.\* Toutes les unités à bol en plastique sont vendues équipées d'un dispositif de protection afin de minimiser le danger que présente la projection de fragments résultant de l'éclatement du bol. La mise en service de cette unité sans dispositif de protection installé annule les garanties accordées par le fabricant. Le fabricant décline alors toute responsabilité pour toute perte qui en résulterait. (\*SAUF MODÈLE M00)
- NE PAS** installer l'appareil dans un endroit où la température est supérieure à 52°C.
- NE PAS** utiliser l'appareil à des pressions supérieures à 10,3 bar.
- ATTENTION:** certains huiles de compresseur, produits d'entretien, produits chimiques, solvants, peintures et vapeurs, attaquent les bols plastiques et sont cause de détérioration. Voir la liste sur cette feuille. à ne pas utiliser à proximité de ces produits.
- QUAND LE BOL** devient sale le remplacer ou le nettoyer avec un chiffon propre et sec.
- NE PAS** installer l'appareil sur une ligne d'air comprimé où le compresseur est lubrifié avec un produit qui attaque les bols plastiques, ou si l'air en contient.
- INSPECTER** pour détecter fêlures, craquelures ou autres détériorations. Remplacer immédiatement tout bol fêlé, craquelé, endommagé ou détérioré par un bol métal ou un nouveau bol plastique avec bol de protection métallique.
- SI UNE UNITÉ MISE EN SERVICE NE POSSEDE PAS DE DISPOSITIF DE PROTECTION, COMMANDEZ-EN UN ET INSTALLEZ-LE AVANT DE CONTINUER À VOUS SERVIR DE L'UNITÉ.**

**INSTRUCTIONS IMPORTANTES POUR L'INSTALLATION DES FILTRES SUBMICRONIQUES.**

- NE PAS** installer l'appareil sans avoir préalablement lu la présente notice d'installation. Si l'appareil a un bol en plastique, tenir compte des avertissements spéciaux ci-haut.
- SAUF** spécifications contraires du constructeur, cet appareil est prévu pour l'air comprimé, un emploi avec

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- 1 **NO** instale la unidad hasta que haya leído completamente esta hoja de información sobre el producto. Si su unidad tiene una taza de plástico, observe la información de precauciones especiales indicada anteriormente.
2. **SALVO** que el fabricante especifique lo contrario, este producto está diseñado específicamente para el uso con aire comprimido, y su uso con cualquier otro fluido (líquido o gas) es una aplicación indebida. Por ejemplo, el uso con o la inyección de ciertos líquidos o gases peligrosos en el sistema (tales como el alcohol o el gas de petróleo líquido) podría ser nocivo para la unidad o resultar en una condición de combustión o una fuga externa peligrosa. Antes de utilizar con fluidos que no sean aire, para aplicaciones no industriales, o para sistemas de soporte de vida, consulte al fabricante para obtener una aprobación por escrito. Las garantías del fabricante no tendrán validez en el caso de aplicación indebida y éste no asume ninguna responsabilidad por cualquier pérdida resultante. Los valores máximos de presión y temperatura de las tazas de plástico son 150 lbs/pulgada<sup>2</sup> (10.3 barías) y 125°F (52°F); y de las tazas de metal 200 lbs/pulgada<sup>2</sup> (14 barías) y 150°F (65.5°C). [Serie 08/18/28-250 lbs/pulgada<sup>2</sup> (17 barías) y 150°F (65.5°C)]
3. **INSTALE** el producto lo más cerca posible del punto donde se está utilizando el aire.
4. **REDUCIR EL TAMAÑO DEL CAÑO** para acomodar un caño de entrada/salida de tamaño más pequeño de un filtro MICROalescer® no afecta el buen funcionamiento del filtro. **NO** seleccione los filtros MICROalescer® por los tamaños de orificio de entrada y salida. Los filtros MICROalescer® se deben seleccionar por el flujo de aire y la presión de entrada requeridos.
5. **INSTALE** un prefiltro de 5 micrones delante del filtro MICROalescer® para prolongar la vida útil del elemento.
6. **INSTALE** un manómetro diferencial (disponible del fabricante) para determinar cuándo cambiar los elementos desechables o instale un manómetro en la entrada y otro en la salida del filtro MICROalescer®. Cuando la diferencia de presiones llegue a 10

- lbs/pulgada<sup>2</sup> (0,7 barías), cambie el elemento.
7. **PURGUE** todos los vestigios de aceite dentro de los conductos antes de la instalación del filtro.
  8. **NO INSTALE** el filtro MICROalescer® en una línea de aire si hubiera algún producto químico en el aire comprimido que dañe la cubierta de plástico celular de poliuretano del elemento.
  9. **CUANDO INSTALE** el elemento de filtro, **NO** toque la cubierta de plástico celular. Siempre tómelo por las placas terminales. **NO** toque el elemento MICROnaught® una vez que se le haya puesto en uso. La presión sobre la cubierta de plástico celular exterior puede dañarlo una vez que esté en uso.
  10. **CUANDO INSTALE** un secador químico, móntelo después del filtro MICROalescer®.
  11. **CUANDO INSTALE** un secador de aire refrigerado, puede instalarse antes de un filtro MICROalescer®. (Vea el esquema correspondiente en otra parte de estas instrucciones.)
  12. **CUANDO INSTALE** un filtro de Tipo C con un elemento AC Pak (carbón activado para adsorción de vapor de aceite), monte el filtro después del secador de aire.
  13. **NO INSTALE** una válvula de apertura rápida si ésta causara un flujo excesivo que sobrepase la capacidad de flujo de la unidad.

**CUANDO SE DEBE CAMBIAR EL ELEMENTO DE TIPO C**

1. **CAMBIE EL ELEMENTO** cuando la diferencia de presiones llegue a 10 lbs/pulgada<sup>2</sup> (0,7 barías). Las unidades con indicador de diferencia de presiones se moverán al rojo a 0,7 barías.
2. **NO** cambie el elemento si aparecen manchas de aceite en la parte inferior equivalente a 1/5 del elemento. Esto es normal; las manchas de aceite o agua en la cubierta de plástico celular exterior no indican una necesidad de cambiar el elemento.
3. **CUANDO INSTALE** el elemento utilizando la tuerca inferior de sujeción, apriete la tuerca entre 5 y 6 libras/pie.
4. **NO** utilice aceites o grasa en el elemento o las juntas de la taza. **NOTA:** Sólo una caída excesiva de presión

requiere el cambio del elemento. La caída excesiva de presión indica que el filtro ha filtrado contaminantes sólidos, así como partículas de aceite y agua.

**LOCALIZACION DE FALLAS EN LAS INSTALACIONES DEL FILTRO**

**MICROALESCEER® SI LOS AEROSOLLES DE ACEITE APARECIERAN EN EL CIRCUITO DESPUES DEL FILTRO MICROALESCEER®**

1. Esto podría indicar que los conductos no fueron debidamente purgados de contaminantes anteriores
2. Verifique que la junta obturadora/anillo tórico (según el modelo) esté en su lugar y que haya un sellado adecuado entre la parte superior del elemento y la tapa moldeada. Asegúrese de que el elemento esté sujetado firmemente en su lugar.
3. Controle que el flujo de aire a través de la unidad no sea superior a su capacidad. Los flujos elevados momentáneos podrían ser la causa de un paso de aceite.
4. Para una mayor eficiencia, la temperatura de entrada del aire debe ser entre 70°F (21°C) y 90°F (32°C).
5. Si no pueden evitarse las temperaturas de entrada de hasta el máximo de 125°F (52°C), instale el filtro de Tipo C con un elemento de Tipo D. Esto captará los vapores de aceite que normalmente son responsables del aceite que aparece a temperaturas más altas. Verifique que el compresor no esté aspirando en la entrada, aire contaminado con productos químicos nocivos.
6. Si la lunda de espuma está rasgada o rota, el aceite podría filtrarse desde el elemento. Si ocurriera esto, cambie el elemento.
7. En compresores que han estado funcionando durante largo tiempo sin cambiarle el aceite, la mayoría de los aceites cambiarán gradualmente sus composiciones químicas y pueden acumular impurezas que dañan a la taza de plástico, las juntas de los filtros o la lunda exterior de espuma. El cambio periódico del aceite del compresor evitará que esto suceda y prolongará la vida útil del compresor.

**SOME OF THE MATERIALS THAT WILL ATTACK POLYCARBONATE PLASTIC BOWLS.**

Acetaldehyde	Benzoic acid	Cresol	Ethylene glycol	Perchloroethylene	Thiophene
Acetic acid (conc.)	Benzyl alcohol	Cyclohexanol	Formic acid (conc.)	Phenol	Toluene
Acetone	Brake fluids	Cyclohexanone	Freon (refrig. and propell)	Phosphorous hydroxy chloride	Turpentine
Acrylonitrile	Bromobenzene	Cyclohexene	Gasoline (high aromatic)	Phosphorous trichloride	Sulfuric acid (conc.)
Ammonia	Butyric acid	Dimethyl formamide	Hydrazine	Propionic acid	Sulphural chloride
Ammonium flouride	Carbonic acid	Dioxane	Hydrochloric acid (conc.)	Pyridine	Tetrahydronaphthalene
Ammonium hydroxide	Carbon disulfide	Ethane tetrachloride	Methylene chloride	Sodium hydroxide	Thiophene
Ammonium sulfide	Carbon tetrachloride	Ethyl acetate	Methylene salicylate	Sodium sulfide	Toluene
Anaerobic adhesives and sealants	Caustic potash solution	Ethyl ether	Milk of lime (CaOH)	Styrene	Turpentine
Antifreeze	Caustic soda solution	Ethylamine	Nitric acid (conc.)	Sulfuric acid (conc.)	Xylene and others
Benzene	Chlorobenzene	Ethylene chlorohydrin	Nitrobenzine	Sulphural chloride	
	Chloroform	Ethylene dichloride	Nitrocellulose laquer		

**TRADE NAMES OF SOME COMPRESSOR OILS, RUBBER COMPOUNDS AND OTHER MATERIALS THAT WILL ATTACK POLYCARBONATE PLASTIC BOWLS**

Atlas "Perma-Guard"	Haskel #568-023	Keystone penetrating oil #2	Petron PD287	Stilman #269-75 (polyurethane)	Telar
Buna N *	Hilgard Co's hll phene	Marvel Mystery Oil	Prestone	Sillman #SR-513 (neoprene)	Tenneco and/or #495 and #500 oils
Cellulube #510 and #250	Houghton and Co. oil #1120, #1130 & #1055	Minn. Rubber 366Y	Pydraul AC	Stauffer Chemical	Tilon
Crylax #5 cement	Houtosafe 1000	National Compound #N11	Sears Regular Motor Oil	FYRQUEL #150	Zerex
*Eastman 910	Kano Krol	"Nylock" VC 3	Sinclair oil "Lily White"	Tannergas	
Garlock #98403 (polyurethane)		Parco #1306 Neoprene	Some Loctite Compounds		

**WE CANNOT POSSIBLY LIST ALL HARMFUL SUBSTANCES. CHECK WITH A MOBAY CHEMICAL OR GENERAL ELECTRIC OFFICE FOR FURTHER INFORMATION ON POLYCARBONATE PLASTIC**

**LISTA DE MATERIALES QUE DAÑAN LAS TAZAS DE PLASTICO DE POLICARBONATO**

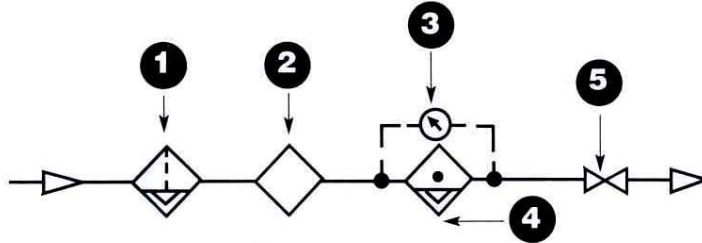
acetileno	Acido sulfúrico (conc.)	Ciclohexanona	Estireno	Hidróxido sódico	Sulfuro sódico
acetato etílico	Acilnitrilo	Clorobenceno	Eter etílico	Laca nitrocelulosa	Tetracloruro de carbono
acetona	Adhesivos y compuestos	Clorotorno	Etilamina	Lechada de cal (CaOH)	Tetracloruro de etano
ácido acético (conc.)	obturadores anaeróbicos	Clorhidrina de etileno	Fenol	Líquidos para frenos	Tetrahidronaftaleno
ácido benzoico	Alcohol bencílico	Cloruro de azufre	Fluoruro amónico	Nitrobenenceno	Tolueno
ácido butírico	Amoniaco	Cloruro de metileno	Freón (refrig. y propelente)	Percloroetileno	Tolueno
ácido carbónico	Anticongelante	Creosol	Gasolina (altamente aromática)	Prindina	Tremantina
ácido clorhídrico (conc.)	Benceno	Dicloruro de etileno	Glicol etilénico	Salicilato de metileno	Tricloruro de fosforo
ácido formico (conc.)	Bromobenceno	Dimetil formamida	Hidrazina	Solución de potasa cáustica	Xileno y otros
ácido nítrico (conc.)	Ciclohexano	Dioxano	Hidroxloruro de fosforo	Solución de soda cáustica	
ácido propiónico	Ciclohexanol	Disulfuro de carbono	Hidróxido amónico	Sulfuro amónico	

**TIPOLOGÍAS COMERCIALES DE ALGUNOS LUBRICANTES PARA COMPRESORES, COMPUESTOS DE CAUCHO Y OTROS MATERIALES QUE DAÑAN LAS TAZAS DE PLASTICO DE POLICARBONATO**

ite #1120, #1130 y #1055	Aceites Tenneco anderol #495 y #500	Caucho Minn 366 y #500	Hilgard Co's hill phene	Petron PD287	Stilman #269-75 (poliuretano)
Houghton y Co	Algunos compuestos Loctite	Cellulube #510 y #250	Houtosale 1000	Prestona	Stilman #SR-513 (neopreno)
ite Marvel Mystery	Atlas "Perma-Guard"	Cemento Crylex #5	Kano Krol	Pydraul AC	Tannergas
ite penetrante Keystone #2	Buna N	Eastman 910	National Compound #N11	Aceite de motor regular Sears	Telar
ite Sinclair "Lily White"		Garlock #98403 (poliuretano)	Neopreno Parco #1306	Stauffer Chemical	Titon
		Haskel #568-023	Nylock VC-3	FYROUEL #150	Zerex

OBVIAMENTE, NO PODEMOS LISTAR TODAS LAS SUSTANCIAS NOCIVAS; CONSULTE A UNA OFICINA DE MOBAY CHEMICAL O DE GENERAL ELECTRIC PARA OBTENER MAS INFORMACION SOBRE EL PLASTICO DE POLICARBONATO

Typical Installation • Exemple d'installation • Typische Installation • Installazione tipica • Instalación normal



**1** PREFILTER  
PRÉFILTRE  
VORFILTER  
PREFILTRO  
PREFILTRO

**2** REFRIGERATED AIR DRYER  
SÉCHEUR PAR RÉFRIGÉRATION  
KÜHL TROCKNER  
ESSICCATORE A REFRIGERAZIONE  
SECADOR DE AIRE REFRIGERADO

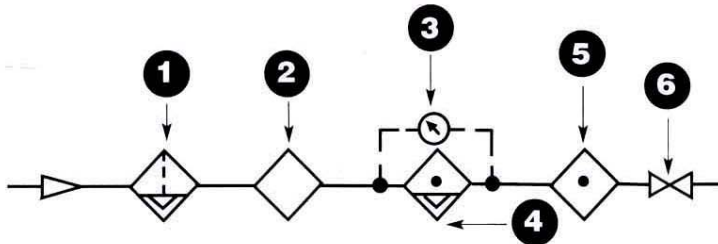
**3** DIFFERENTIAL PRESSURE GAUGE  
MANOMÈTRE DIFFÉRENTIEL  
DIFFERENTIALDRUCK-MANOMETER  
MANOMETRO DIFFERENZIALE  
MANOMETRO DIFERENCIAL

**4** MICROALESCECER® FILTER WITH  
MICRONAUGHT® ELEMENT  
FILTRE SUBMICRONIQUE AVEC  
CARTOUCHE MICRONAUGHT®  
MICROALESCECER®-FILTRE MIT  
MICRONAUGHT®-ELEMENT

FILTRO MICROALESCECER® CON  
ELEMENTO MICRONAUGHT®  
FILTRO MICROALESCECER® CON  
ELEMENTO MICRONAUGHT®

**5** VALVE  
SOUPAPE  
VENTIL  
VALVOLA  
VALVULA

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**1** PREFILTER  
PRÉFILTRE  
VORFILTER  
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PREFILTRO

**2** REFRIGERATED AIR DRYER  
SÉCHEUR PAR RÉFRIGÉRATION  
KÜHL TROCKNER  
ESSICCATORE A REFRIGERAZIONE  
SECADOR DE AIRE REFRIGERADO

**3** DIFFERENTIAL PRESSURE GAUGE  
MANOMÈTRE DIFFÉRENTIEL  
DIFFERENTIALDRUCK-MANOMETER  
MANOMETRO DIFFERENZIALE  
MANOMETRO DIFERENCIAL

**4** ELEMENT MICRO NAUGHT®  
ÉLÉMENT MICRONAUGHT®  
ELEMENTO MICRONAUGHT®  
ELEMENTO MICRONAUGHT®

**5** ELEMENT ODERNAUGHT®  
ÉLÉMENT ODERNAUGHT®  
ELEMENTO ODERNAUGHT®  
ELEMENTO ODERNAUGHT®

**6** VALVE  
SOUPAPE  
VENTIL  
VALVOLA  
VALVULA



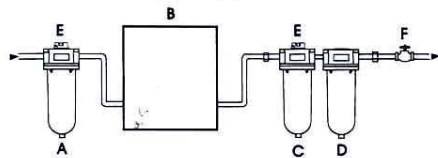
# WILKERSON®

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## INSTALLATION

1. Purge downstream air line of oil.
2. Install as close as possible to where regulated air is being used.
3. Install the unit with the air flowing in the direction indicated by the arrow on the body.
4. A drain line with 1/8" NPT connection (with red automatic drain) or 1/8" BSPT connection (with green automatic drain) or 1/4" NPT connection (without automatic drain) may be attached to drain port if desired. Drain line should be 1/4" tubing or larger, as short as possible, and crimp free.
5. Maximum inlet pressure and operating temperature ratings are: transparent plastic bowls, 150 psig (10,3 bar) and 125°F (52°C); metal bowls, 150 psig (10,3 bar) and 150°F (66°C).

## TYPICAL INSTALLATION (not to scale)



- A. PREFILTER** - It is recommended that a "B" Element coalescing (0.5 ppm) prefilter be installed upstream from the coalescer filter to prolong element life.
- B. AIR DRYER** - (Refrigerated or Desiccant). An air dryer is generally preferred for optimal results, but is optional.
- C. HIGH EFFICIENCY COALESCER FILTER** - It is recommended that a "C" element coalescer (.01 ppm) filter be installed to protect the compressed air system from oil and particulate contamination.
- D. OIL VAPOR FILTER** - The Type D element filter (0.003 PPM) is an adsorption type for removing oil vapors, oil-associated odors, whether petroleum base or synthetic base and nearly 100% of any remaining solid contaminants.
- E. DIFFERENTIAL PRESSURE INDICATOR** - Maximum recommended pressure drop across coalescer filters is 7 psi (0,5 bar). This can be monitored by installing a Wilkerson differential pressure indicator.
- F. VALVE** - Do not use a valve or shutoff device in conjunction with a coalescer filter that will allow a momentary or surge pressure drop greater than 50 psi (3,4 bar). To avoid high surges which can either ruin the element or momentarily allow downstream contamination, use a slow-opening type valve.

## MAINTENANCE

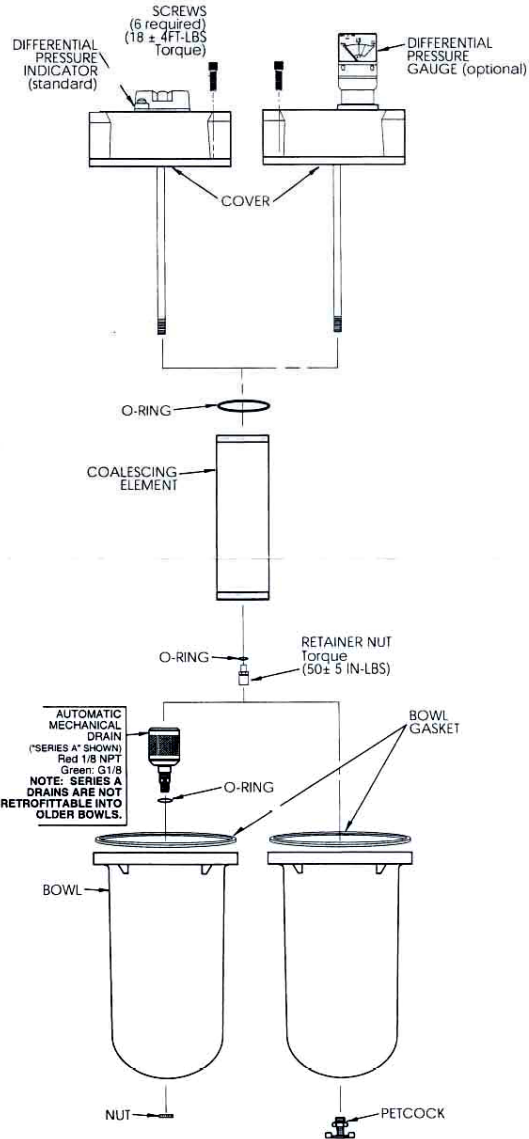
1. The element operates effectively when it is saturated. The element's useful life will end only when the differential pressure indicator is completely red. The element cannot be cleaned or reused and must be replaced at the end of its useful life.
2. IF THE UNIT HAS A MANUAL DRAIN, DRAIN THE UNIT ONCE EVERY 8 HOURS. If the unit is equipped with an automatic drain clean the screen around the drain or replace the element by removing the nut and removing the drain assembly. Clean screen by blowing off with air blow gun.
3. When bowl becomes dirty, clean by wiping with a clean, dry cloth.
4. Before placing the unit in service, make sure that the bowl is properly installed, and securely bolted in place.

## REPAIR KITS AND REPLACEMENT PARTS

Filter Element Kit Type D Element (carbon adsorption) (includes filter element and o-rings) .....	<b>MXP-95-558</b>
Filter Element Kit Type C Element (.01 ppm/wt) (includes filter element and o-rings) .....	<b>MTP-95-559</b>
Filter Element Kit Type B Element (includes filter element and o-rings) .....	<b>MSP-95-873</b>
Bowl Gasket Kit .....	<b>GRP-95-288</b>
Automatic Mechanical Drain ("Series A", 1/8" NPT; red color)—(includes Fluorocarbon seals, o-ring and nut) .....	<b>GRP-95-981</b>
Automatic Mechanical Drain ("Series A", G 1/8"; green color)—(includes Fluorocarbon seals, o-ring and retainer nut) .....	<b>GRP-95-300</b>
Automatic Mechanical Drain (includes Fluorocarbon seals, o-ring and retainer nut) .....	<b>GRP-95-914</b>
Differential Pressure Indicator (Standard) .....	<b>DP2-01-000</b>
Differential Pressure Gauge (Optional) .....	<b>DP3-01-000</b>

## INSTALLATION AND MAINTENANCE SHEET

### Coalescing Filter Model M32 With Variations and Accessories



83-212-000 REV 1 04/02  
Printed in the U.S.A.





**MANUFACTURER'S WARRANTY**

Manufacturer's products are warranted to be free from defects in material and workmanship under proper use, installation, application and maintenance in accordance with manufacturer's written recommendations and specifications for one year from the date of shipment from the factory. Manufacturer's obligation under this warranty is limited to and the sole remedy for any such defect shall be the repair or replacement (at manufacturer's option) of unaltered products returned to manufacturer and proven to have such defect provided such defect is promptly reported to manufacturer within one year period.

**THIS IS THE ONLY AUTHORIZED MANUFACTURER'S WARRANTY AND IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OF FITNESS, OR OF ANY OTHER OBLIGATIONS ON THE PART OF MANUFACTURER.** Warranty claims must be submitted and shall be processed in accordance with manufacturer's established warranty claim procedure. In no event will manufacturer be liable for business interruptions, loss of profits, personal injury, costs of delay or for any other special indirect incidental or consequential losses, costs or damages.

**WARNING: USE LIMITATIONS**

Manufacturer's warranties are void, and manufacturer assumes no responsibility for any resulting cost, loss, injury or any other damages whatsoever with respect to any plastic bowl unit for which a metal bowl guard is standard equipment if the unit is placed in service without the metal bowl guard and except as otherwise specified in writing by manufacturer with respect to any manufacturer's products which are used in other than compressed air service. Specific warnings with respect to these and other use limitations appear elsewhere in this product instruction sheet.

**E N G L I S H****IMPORTANT INSTALLATION INSTRUCTIONS FOR REGULATORS**

- DO NOT** install the unit until you have read this entire product information sheet.
- EXCEPT** as otherwise specified by manufacturer, this product is specifically designed for compressed air service, and use with any other fluid (liquid or gas) is a misapplication. For example, use with or injection of certain hazardous liquids or gases in the system (such as alcohol or liquid petroleum gas) could be harmful to the unit or result in a combustible condition or hazardous external leakage. Manufacturer's warranties are void in the event of misapplication and manufacturer assumes no responsibility for any resulting loss. Maximum pressure and temperature ratings are 300 psig (21 bar) 150°F (65.5°C).
- INSTALL** a filter before the regulator for maximum trouble-free operation.
- INSTALL** regulator after the filter when mounting in a combination.
- INSTALL** regulator in any convenient position.
- MOUNT** gauge in either gauge port.
- GAUGE PORTS** may be used as additional regulated air pressure outlet ports.
- TO ADJUST** air pressure turn adjustment knob/handle clockwise to raise the regulated pressure, and counterclockwise to lower the regulated pressure.

**IMPORTANT MAINTENANCE INSTRUCTIONS FOR REGULATORS**

- TURN** air pressure off and vent air from system.
- REMOVE** the bottom plug and clean valve and seat. It is not necessary to remove regulator from the air line to remove plug.

**F R E N C H C A N A D I A N****INSTRUCTIONS IMPORTANTES POUR L'INSTALLATION DES REGULATEURS DE PRESSION**

- NE PAS** installer l'appareil avant d'avoir lu en entier cette notice d'information sur le produit.
- SAUF** spécifications contraires du constructeur, cet appareil est prévu pour l'air comprimé, un emploi avec d'autres fluides (liquides ou gaz) est contre-indiqué. Par exemple, l'utilisation avec certains liquides ou gaz dangereux, ou leur injection, (tels que alcool, gaz de pétrole liquéfié) peut être dangereux pour l'appareil ou peut entraîner des risques d'explosion ou des fuites dangereuses. Les garanties du constructeur sont nulles dans le cas d'une mauvaise utilisation et le constructeur dégage sa responsabilité dans le cas d'accident. La pression et la température maximales sont de (21 bar) et (65.5°C).
- INSTALLER** un filtre avant le régulateur pour une utilisation maximale sans problèmes.
- INSTALLER** le régulateur après le filtre quand il est monté dans une combinaison
- INSTALLER** le régulateur dans n'importe quelle position.
- MONTÉ** le manomètre sur l'un ou l'autre des orifices de raccordement du manomètre.
- LES ORIFICES** de raccordement du manomètre peuvent être utilisés comme des sorties additionnelles d'air régulé.
- POUR REGLER** la pression tourner le bouton de réglage dans le sens des aiguilles d'une montre pour augmenter la pression régulée, et dans le sens inverse des aiguilles d'une montre pour diminuer la pression régulée.

**INSTRUCTIONS IMPORTANTES POUR LA MAINTENANCE DES REGULATEURS DE PRESSION**

- COUPER** l'air comprimé et purger l'installation.
- OTER** le bouchon inférieur et nettoyer la valve et le siège. Il n'est pas nécessaire d'ôter le régulateur de la ligne d'air pour enlever le bouchon.

**YOU**

have selected a quality product, and we appreciate it. To be assured of maximum performance and satisfaction please read these instructions before installing this product.

**VOUS**

Avez choisi un produit de qualité et nous l'apprecions. Pour être assuré d'obtenir des performances et un fonctionnement parfait, lisez ces instructions avant l'installation de notre matériel.

**SIE**

Haben ein Qualitätsprodukt ausgewählt und wir danken Ihnen für das uns erwiesene Vertrauen. Damit das Gerät mit optimaler Leistung und Sicherheit arbeitet, bitten wir Sie, vor dem Einbau die nachfolgenden Anweisungen zu lesen.

**VOI**

avete scelto un prodotto di qualità e noi lo abbiamo apprezzato.

Per ottenere le massime prestazioni e la massima soddisfazione da questi prodotti, Vi consigliamo di leggere queste istruzioni prima dell'installazione.

**USTED**

ha seleccionado un producto de calidad y lo apreciamos. Para asegurar un máximo rendimiento y satisfacción, sírvase leer estas instrucciones antes de instalar este producto.

**G E R M A N****WICHTIGE INSTALLATIONSANLEITUNG FÜR REGLER**

- LESEN SIE** diese Informationsbroschüre genau durch, bevor Sie das Gerät installieren.
- FALLS** vom Hersteller nicht ausdrücklich anders angegeben, wurde dieses Erzeugnis ausschließlich für den Betrieb mit Druckluft konstruiert. Die Verwendung eines anderen Mediums ist daher falsch. So kann zum Beispiel die Verwendung bzw. Einspritzung von bestimmten gefährlichen Flüssigkeiten oder Gasen in der Anlage (wie etwa Alkohol oder Petroleum) das Gerät beschädigen bzw. Explosionsgefahr oder ein gefährliches Außenleck verursachen. Im Falle einer solchen Fehlanwendung erlischt die Herstellergarantie und der Erzeuger übernimmt keine Verantwortung für einen etwa sich daraus ergebenden Verlust. Der zulässige Höchstdruck beträgt 21 bar, die zulässige Höchsttemperatur 65.5°C.
- INSTALLIEREN SIE** zur Gewährleistung eines störungsfreien Betriebes einen Filter vor dem Regler.
- MONTIEREN SIE** bei einer Kombination den Regler nach dem Filter.
- INSTALLIEREN SIE** den Regler in einer bequemen Position.
- MONTIEREN SIE** ein Manometer in einer beliebigen Manometer-Öffnung.
- DIE MANOMETER-ÖFFNUNGEN** können als zusätzliche geregelte Druckluft-Auslaßöffnungen verwendet werden.
- DRUCKREGELUNG:** Knopf/Hebel im Uhrzeigersinn: höherer Druck; Knopf/Hebel gegen Uhrzeigersinn: niedrigerer Druck.

**WICHTIGE WARTUNGSANLEITUNG FÜR REGLER**

- DRUCK** abstellen und System entlüften.
- ENTFERNEN**, Ventil und Sitz reinigen. Um schraubstopfen entfernen zu können, braucht Regler nicht aus der Druckluftleitung ausgebaut werden.

**I T A L I A N****IMPORTANTI INFORMAZIONI PER L'INSTALLAZIONE DE REGOLATORI**

- NON INSTALLARE** l'unità prima di avere interamente letto tutte le informazioni contenute in questo foglio.
- SE** non altrimenti precisato dal costruttore, questo prodotto è specificatamente costruito per essere usato con aria compressa, e l'uso con ogni altro tipo di fluido (liquido o gas) è errato. Per esempio l'uso o l'iniezione nel sistema di certi liquidi o gas pericolosi (come alcool o gas liquido di petrolio) può essere dannoso all'apparecchio o portare a condizioni di combustione causando fughe pericolose. Nel caso di errate applicazioni, le garanzie di costruzione decadono ed il costruttore declina ogni responsabilità per qualsiasi tipo di danno. I valori massimi di pressione e temperatura sono 21 bar e 65.5°C.
- INSTALLARE** un filtro prima del regolatore per operazioni con la massima sicurezza.
- INSTALLARE** il regolatore dopo il filtro quando si tratta di una combinazione.
- INSTALLARE** il regolatore in ogni posizione conveniente.
- MONTARE** il manometro in uno degli appositi fori.
- I FORI LIBERI** possono essere usati come fori addizionali per uscita d'aria regolata.
- PER REGOLARE** la pressione: ruotare la manopola di regolazione in senso orario per aumentare la pressione e in senso antiorario per ridurla.

**IMPORTANTI INFORMAZIONI PER LA MANUTENZIONE DEI REGOLATORI**

- CHIUDERE** la pressione e scaricare aria dal sistema.
- TOGLIERE** il tappo e pulire la valvola e la sede. Non è necessario staccare il regolatore dalla linea per togliere il tappo.



# WILKERSON®

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## WARNING

### USE LIMITATIONS

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**YOU** have selected a quality product, and we appreciate it... To be assured of maximum performance and satisfaction please read these instructions before installing this product.

### IMPORTANT INSTALLATION INSTRUCTIONS FOR DIAL-AIR™ REGULATORS

- DO NOT** install the unit until you have read this entire product information sheet.
- EXCEPT** as otherwise specified by manufacturer, this product is specifically designed for compressed air service, and use with any other fluid (liquid or gas) is a misapplication. For example, use with or injection of certain hazardous liquids or gases in the system (such as alcohol or liquid petroleum gas) could be harmful to unit or result in a combustible condition or hazardous external leakage. Manufacturer's warranties are void in the event of misapplication and manufacturer assumes no responsibility for any resulting loss. Maximum pressure and temperature ratings are 300 psig (21 bar) and 150°F (65.5°C).
- INSTALL** upstream of and as close as possible to where regulated air is needed.
- INSTALL** with air flow in direction of arrow on casting.
- DO NOT** restrict the air flow with undersize piping or fittings, unless maximum air flow is not needed.
- INSTALL** regulator in any rotational position.
- GAUGE PORTS** may be used for installing gauge or they may be used as additional regulated air outlet ports. Plug all unused ports.
- PANEL MOUNTING** requires a 2 11/16" (69 mm) diameter hole, and 4 7/32" (5.5 mm) screw holes. Unit can be mounted on material up to 1 1/4" (32 mm) thick.
- INSTALLATION** of a 5-micron rated filter upstream of regulator is recommended.
- TO REGULATE AIR** turn adjustment knob clockwise to raise the regulated air pressure and counterclockwise to lower the regulated air pressure.

### IMPORTANT MAINTENANCE INSTRUCTIONS FOR DIAL-AIR™ REGULATORS

- BEFORE SERVICING THIS UNIT, READ THIS ENTIRE PRODUCT INFORMATION SHEET AND TURN OFF AIR SUPPLY AND VENT BOTH SIDES OF REGULATOR.**

### LUBRICATION OF DIAL-AIR™ REGULATORS

- FOR TROUBLE-FREE OPERATION**, proper lubrication of the Dial-Air™ regulator is essential.
- WHEN ANY** of the following symptoms occur, lubricate regulator with Magnalube-G®. (See note) If Magnalube-G® is not available, use a heavy grease such as Parker O-ring Lube, Lubriplate, or Molykote, however, these lubricants "wash out" much sooner than Magnalube-G®. **NOTE: Never use oil as a lubricant.**
  - Excessive relief venting.
  - Inability to attain high secondary pressure.
  - Erratic secondary pressures.
  - Excessive hysteresis (a retardation of desired effect: in this case because of the lack of lubrication).
- Refer to "Figure A" for steps 1 thru 10.
  - Remove bottom plug (1), main valve spring (2), main valve (3), pilot valve spring (4), and pilot valve (5).
  - Clean main valve molded rubber seat (Do not lubricate).
  - Clean and lubricate bottom plug seal, main valve seal and pilot valve seal.
  - Reassemble unit.
  - If problem is not remedied, lubricate remaining seals. (See steps 6 thru 10)
  - Remove retaining ring (6) and pull bonnet assembly (7) from unit.
  - Remove upper piston (8), upper piston cup (9), lower piston (10), needle valve (11), and needle valve spring (12).
  - Clean and lightly lubricate inside of body.
  - Clean and lubricate upper piston seal, upper piston cup seal, lower piston seal, needle valve seal and main valve slide seal (13).
  - Reassemble unit. If symptoms still exist, contact manufacturer.

### RECALIBRATION OF DIAL-AIR™ REGULATORS

- DO NOT ATTEMPT TO CALIBRATE UNIT UNTIL ALL EIGHT SEALS HAVE BEEN PROPERLY LUBRICATED.**
- TO RECALIBRATE Dial-Air™ REGULATOR:**
  - INSTALL** regulator on air line with at least 110 psig (7.5 bar) air pressure at the inlet port.
  - INSTALL** an air pressure gauge to one of the gauge ports. Plug remaining gauge port with plug (supplied).
  - REMOVE** lock button (Figure A, Item 14) from unit.
  - TURN** adjusting knob to 100 psi (7 bar) setting.
  - CHECK** the gauge for 100 psig (7 bar) reading. If gauge reads other than 100 psig (7 bar) adjust screw "A" (Fig. B) with a screwdriver while holding adjusting knob on 100 psi (7 bar) setting. If more than one-half turn of screw "A" is required to achieve 100 psig (7 bar), see "G" below.
  - TO CHECK CALIBRATION ADJUSTMENT:** when dial and gauge are reading the same (100 psig ± 2 psig; 7 bar ± 0.14 bar), turn adjusting knob to 20 psi (1.4 bar). Unit is calibrated when gauge reads 20 psig ± 5 psig (1.4 bar ± 0.34). (The ± 2 psig and ± 5 psig are accepted tolerances of the most commonly used gauges.)
  - DO NOT** adjust screw "A" more than one-half turn when calibrating unit. If unit has been properly lubricated and more than one-half turn is required to calibrate it, additional problems with unit are involved and unit should be returned to the vendor.

## Dial-Air™ Regulators

## FRENCH

### GARANTIE DU FABRICANT

Les produits du fabricant sont garantis contre toute malfaçon ou tout défaut d'exécution, lorsqu'on les emploie, les installe, les applique et les entretient en respectant les recommandations et spécifications écrites formulées par le fabricant. La garantie dure un an, à compter de la date d'expédition de l'usine. En vertu de cette garantie, l'obligation du fabricant et le seul recours contre une telle malfaçon ou un tel défaut, se limite à la réparation ou au remplacement (au gré du fabricant) des produits n'ayant subi aucune modification qui lui sont restitués, et sur lesquels on constate la malfaçon ou le défaut, sous réserve que ces derniers soit rapportés sans délai au fabricant au cours de ladite période d'un an.

**IL S'AGIT DE LA SEULE GARANTIE QUE PERMET LE FABRICANT, ELLE REMPLACE TOUTE AUTRE GARANTIE OU DÉCLARATION EXPLICITE OU IMPLICITE, Y COMPRIS TOUTE GARANTIE IMPLICITE CONCERNANT LA VALEUR LOYALE ET MARCHANDE OU L'ADAPTABILITÉ À UN CERTAIN BUT, OU TOUTE AUTRE OBLIGATION DE LA PART DU FABRICANT.** Les réclamations en vertu de la garantie doivent être présentées et seront traitées conformément à la procédure relative aux réclamations en vertu de la garantie établie chez le fabricant. Le fabricant ne saurait en aucun cas être tenu responsable d'une interruption des affaires, de pertes de bénéfices, de lésions physiques, des coûts découlant d'un retard, comme de toute autre perte, tout autre coût ou dommage déterminé, indirect, accessoire ou consécutif.

### AVERTISSEMENT

#### LIMITATIONS DE L'USAGE

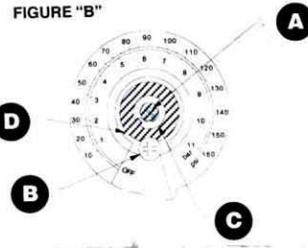
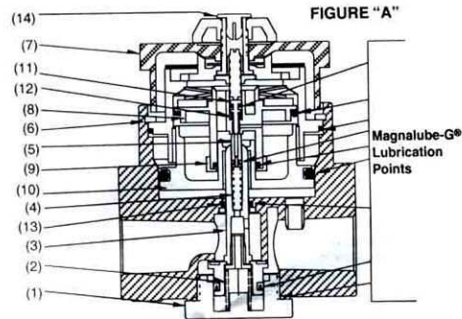
Les garanties que présente le fabricant sont nulles et non avenues, et le fabricant décline la responsabilité relative à une perte, lésion, à un coût ou à un autre dommage quelconque en résultant, pour une unité de godet en plastique dont un protecteur de godet constitue l'équipement standard, et sauf indication contraire donnée par écrit par le fabricant en ce qui concerne des produits du fabricant servant à d'autres fins que le service d'air comprimé. Les avertissements spécifiques relatifs à ces limitations sur l'emploi, et toute autre limitation, figurent ailleurs dans cette notice.

**VOUS** avez choisi un produit de qualité et nous vous en remercions. Pour vous assurer d'un rendement et d'un fonctionnement parfaits, lisez ces instructions avant d'installer cet équipement.

### INSTRUCTIONS IMPORTANTES CONCERNANT L'INSTALL DES RÉGULATEUR DIAL-AIR™

- NE PAS** installer l'appareil avant d'avoir lu dans son intégralité cette notice d'information sur le produit.
- SAUF** indication contraire du fabricant, cet appareil est prévu pour l'air comprimé. Tout emploi avec d'autres fluides (liquides ou gaz) est contre-indiqué. Ainsi, l'utilisation avec certains liquides ou gaz dangereux, ou leur injection, (alcool, gaz de pétrole liquéfié) peut être dangereux pour l'appareil, ou entraîner des risques d'explosion ou des fuites dangereuses. Les garanties du fabricant sont nulles en cas de mauvaise utilisation. Le fabricant dégage sa responsabilité en cas d'accident en découlant. La pression et la température maximales sont de 300 psig (21 bars) et 150°F (65.5°C).
- INSTALLER** l'appareil en amont et aussi près que possible de l'endroit où l'air régulé est nécessaire.
- INSTALLER** l'appareil de sorte que l'air circule dans le sens indiqué par la flèche sur la fondene.
- NE PAS** diminuer le débit d'air par l'emploi de tuyauterie ou de raccords de dimensions insuffisantes, sauf si l'on désire un débit minimum.
- INSTALLER** le régulateur dans n'importe quelle position de rotation.
- LES ORIFICES DE RACCORDEMENT DU MANOMÈTRE** peuvent soit servir à monter un manomètre, soit servir de sortie supplémentaire pour l'air régulé. Obturer tout orifice non utilisé.
- LE MONTAGE SUR PANNEAU** impose un trou de 69 mm de diamètre, plus 4 trous de 5,5 mm pour les vis. L'appareil peut être monté sur des matériaux de 32 mm d'épaisseur maximum.
- NOUS CONSEILLONS** d'installer un filtre de 5 microns en amont du régulateur.
- POUR RÉGULER L'AIR**, tourner le bouton de réglage dans le sens des aiguilles d'une montre afin

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**A** CALIBRATION ADJUSTMENT SCREW  
VIS DE RÉGLAGE DE LA CALIBRATION  
EICHUNGSEINSTELLSCHRAUBE  
VITE DI REGOLAZIONE DELLA TARATURA  
TORNILLO DE AJUSTE DE CALIBRACIÓN

**B** DIAL SCREW  
VIS DU CADRAN  
SKALENSCHRAUBE  
VITE DEL QUADRANTE  
TORNILLO DEL CUADRANTE

**C** ADJUSTMENT COUPLING  
ASSEMBLAGE DE LA SOUPAPE  
VENTILAUFBAU  
ACCOPPIAMENTO DI REGOLAZIONE  
CUERPO DE LA VÁLVULA

**D** TIP  
EMBOUT  
SPITZE  
ESTREMITÀ  
LENGUETA

**IMPORTANT NOTE:** As with any new product, everyone seems to have an urge to see how it works. All Dial-Air™ regulators have been factory-calibrated. Any "finkering" with calibration settings easily can throw the unit out of calibration. For example, removing dial screw "B" and rotating "C" in either direction so that tip "D" passes the dial screw "B" will throw unit out of calibration.

**REMARQUE IMPORTANTE:** D'ordinaire, on désire savoir rapidement comment marche un nouvel article. Tous les régulateurs Dial-Air™ ont été calibrés en usine. Toute modification des réglages du calibrage peut facilement décalibrer l'appareil. Ainsi, enlever la vis du cadran B et tourner de telle façon que l'embout D dépasse la vis du cadran B, risque de décalibrer l'appareil.

**WICHTIGER HINWEIS:** Wir raten davon ab, die Regler zu verstellen. Alle Dial-Air™-Regler wurden in der Fabrik geeicht. Jedes Verstellen der Eicheinstellungen kann die Eichung des Geräts zerstören. Dies kann zum Beispiel dann geschehen, wenn die Skalenschraube „B“ entfernt und „C“ in eine beliebige Richtung gedreht wird, so daß dabei die Spitze „D“ die Skalenschraube „B“ passiert.

**NOTA IMPORTANTE:** Come capita per ogni nuovo prodotto, ognuno sembra avere urgenza di conoscerne il funzionamento. Tutti i regolatori Dial-Air™ sono stati tarati in fabbrica. Ogni tentativo di riparazione sull'apparecchio può facilmente metterlo fuori taratura. Per esempio, l'unità è fuori taratura se si toglie la vite del quadrante "B", si ruota "C" in entrambe le direzioni in modo che l'estremità "D" oltrepassi il punto "B".

**NOTA IMPORTANTE:** Al igual que con cualquier producto nuevo, el comprador deseará saber inmediatamente cómo funciona esta unidad. Todos los reguladores de aire Dial-Air™ se calibran en fábrica. Cualquier intento de "corrección" de la calibración podría fácilmente descalibrar completamente la unidad. Por ejemplo, si quitara el tornillo del cuadrante "B" y girara "C" en cualquier dirección, de modo que "D" pasara el tornillo del cuadrante "B", la unidad se descalibraría.

# WILKERSON

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## WARNING



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**YOU** have selected a quality product, and we appreciate it...

To be assured of maximum performance and satisfaction please read these instructions before installing this product.

### IMPORTANT INSTALLATION INSTRUCTIONS FOR DIAL-AIR™ REGULATORS

1. **DO NOT** install the unit until you have read this entire product information sheet.
2. **EXCEPT** as otherwise specified by manufacturer, this product is specifically designed for compressed air service, and use with any other fluid (liquid or gas) is a misapplication. For example, use with or injection of certain hazardous liquids or gases in the system (such as alcohol or liquid petroleum gas) could be harmful to unit or result in a combustible condition or hazardous external leakage. Manufacturer's warranties are void in the event of misapplication and manufacturer assumes no responsibility for any resulting loss. Maximum pressure and temperature ratings are 300 psig (21 bar) and 150°F (65.5°C).
3. **INSTALL** upstream of and as close as possible to where regulated air is needed.
4. **INSTALL** with air flow in direction of arrow on casting.
5. **DO NOT** restrict the air flow with undersize piping or fittings, unless maximum air flow is not needed.
6. **INSTALL** regulator in any rotational position.
7. **GAUGE PORTS** may be used for installing gauge or they may be used as additional regulated air outlet ports. Plug all unused ports.
8. **PANEL MOUNTING** requires a 2 11/16" (69 mm) diameter hole, and 4 7/32" (5.5 mm) screw holes. Unit can be mounted on material up to 1 1/4" (32 mm) thick.
9. **INSTALLATION** of a 5-micron rated filter upstream of regulator is recommended.
10. **TO REGULATE AIR** turn adjustment knob clockwise to raise the regulated air pressure and counterclockwise to lower the regulated air pressure.

### IMPORTANT MAINTENANCE INSTRUCTIONS FOR DIAL-AIR™ REGULATORS

1. **BEFORE SERVICING THIS UNIT, READ THIS ENTIRE PRODUCT INFORMATION SHEET AND TURN OFF AIR SUPPLY AND VENT BOTH SIDES OF REGULATOR.**

### LUBRICATION OF DIAL-AIR™ REGULATORS

1. **FOR TROUBLE-FREE OPERATION**, proper lubrication of the Dial-Air™ regulator is **essential**.
2. **WHEN ANY** of the following symptoms occur, lubricate regulator with Magnalube-G®. (See note) If Magnalube-G® is not available, use a heavy grease such as Parker O-ring Lube, Lubriplate, or Molykote, however, these lubricants "wash out" much sooner than Magnalube-G®. **NOTE:** Never use oil as a lubricant.
  - A. Excessive relief venting.
  - B. Inability to attain high secondary pressure.
  - C. Erratic secondary pressures.
  - D. Excessive hysteresis (a retardation of desired effect: in this case because of the lack of lubrication).
3. Refer to "Figure A" for steps 1 thru 10.
  1. Remove bottom plug (1), main valve spring (2), main valve (3), pilot valve spring (4), and pilot valve (5).
  2. Clean main valve molded rubber seat (Do not lubricate).
  3. Clean and lubricate bottom plug seal, main valve seal and pilot valve seal.
  4. Reassemble unit.
  5. If problem is not remedied, lubricate remaining seals. (See steps 6 thru 10)
  6. Remove retaining ring (6) and pull bonnet assembly (7) from unit.
  7. Remove upper piston (8), upper piston cup (9), lower piston (10), needle valve (11), and needle valve spring (12).
  8. Clean and lightly lubricate inside of body.
  9. Clean and lubricate upper piston seal, upper piston cup seal, lower piston seal, needle valve seal and main valve slide seal (13).
  10. Reassemble unit. If symptoms still exist, contact manufacturer.

### RECALIBRATION OF DIAL-AIR™ REGULATORS

1. **DO NOT ATTEMPT TO CALIBRATE UNIT UNTIL ALL EIGHT SEALS HAVE BEEN PROPERLY LUBRICATED.**
2. **TO RECALIBRATE Dial-Air™ REGULATOR:**
  - A. **INSTALL** regulator on air line with at least 110 psig (7.5 bar) air pressure at the inlet port.
  - B. **INSTALL** an air pressure gauge to one of the gauge ports. Plug remaining gauge port with plug (supplied).
  - C. **REMOVE** lock button (Figure A, Item 14) from unit.
  - D. **TURN** adjusting knob to 100 psi (7 bar) setting.
  - E. **CHECK** the gauge for 100 psig (7 bar) reading. If gauge reads other than 100 psig (7 bar) adjust screw "A" (Fig. B) with a screwdriver while holding adjusting knob on 100 psi (7 bar) setting. If more than one-half turn of screw "A" is required to achieve 100 psig (7 bar), see "G" below.
  - F. **TO CHECK CALIBRATION ADJUSTMENT:** when dial and gauge are reading the same (100 psig ± 2 psig; 7 bar ± 0.14 bar), turn adjusting knob to 20 psi (1.4 bar). Unit is calibrated when gauge reads 20 psig ± 5 psig (1.4 bar ± 0.34). (The ± 2 psig and ± 5 psig are accepted tolerances of the most commonly used gauges.)
  - G. **DO NOT** adjust screw "A" more than one-half turn when calibrating unit. If unit has been properly lubricated and more than one-half turn is required to calibrate it, additional problems with unit are involved and unit should be returned to the vendor.

## Dial-Air™ Regulators

### FRENCH

## GARANTIE DU FABRICANT

Les produits du fabricant sont garantis contre toute malfaçon ou tout défaut d'exécution, lorsqu'on les emploie, les installe, les applique et les entretient en respectant les recommandations et spécifications écrites formulées par le fabricant. La garantie dure un an, à compter de la date d'expédition de l'usine. En vertu de cette garantie, l'obligation du fabricant et le seul recours contre une telle malfaçon ou un tel défaut, se limite à la réparation ou au remplacement (au gré du fabricant) des produits n'ayant subi aucune modification qui lui sont restitués, et sur lesquels on constate le malfaçon ou le défaut, sous réserve que ces derniers soit rapportés sans délai au fabricant au cours de ladite période d'un an.

**IL S'AGIT DE LA SEULE GARANTIE QUE PERMET LE FABRICANT. ELLE REMPLACE TOUTE AUTRE GARANTIE OU DÉCLARATION EXPLICITE OU IMPLICITE, Y COMPRIS TOUTE GARANTIE IMPLICITE CONCERNANT LA VALEUR LOYALE ET MARCHANDE OU L'ADAPTABILITÉ À UN CERTAIN BUT, OU TOUTE AUTRE OBLIGATION DE LA PART DU FABRICANT.** Les réclamations en vertu de la garantie doivent être présentées et seront traitées conformément à la procédure relative aux réclamations en vertu de la garantie établie chez le fabricant. Le fabricant ne saurait en aucun cas être tenu responsable d'une interruption des affaires, de pertes de bénéfices, de lésions physiques, des coûts découlant d'un retard, comme de toute autre perte, tout autre coût ou dommage déterminé, indirect, accessoire ou consécutif.



## AVERTISSEMENT



### LIMITATIONS DE L'USAGE

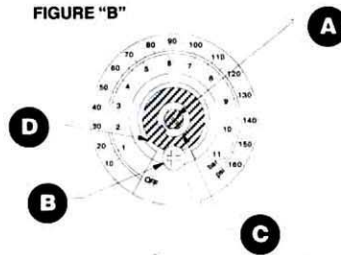
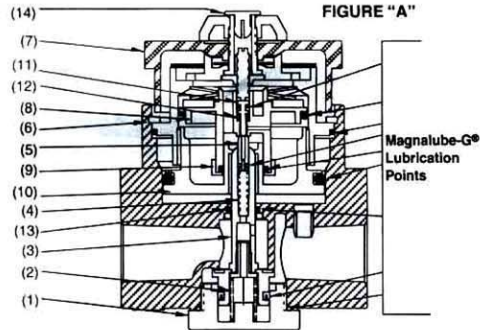
Les garanties que présente le fabricant sont nulles et non avenues, et le fabricant décline la responsabilité relative à une perte, lésion, à un coût ou à un autre dommage quelconque en résultant, pour une unité de godet en plastique dont un protecteur de godet constitue l'équipement standard, et sauf indication contraire donnée par écrit par le fabricant en ce qui concerne des produits du fabricant servant à d'autres fins que le service d'air comprimé. Les avertissements spécifiques relatifs à ces limitations sur l'emploi, et toute autre limitation, figurent ailleurs dans cette notice.

**VOUS** avez choisi un produit de qualité et nous vous en remercions. Pour vous assurer d'un rendement et d'un fonctionnement parfaits, lisez ces instructions avant d'installer cet équipement.

### INSTRUCTIONS IMPORTANTES CONCERNANT L'INSTALL DES RÉGULATEUR DIAL-AIR™

1. **NE PAS** installer l'appareil avant d'avoir lu dans son intégralité cette notice d'information sur le produit.
2. **SAUF** indication contraire du fabricant, cet appareil est prévu pour l'air comprimé. Tout emploi avec d'autres fluides (liquides ou gaz) est contre-indiqué. Ainsi, l'utilisation avec certains liquides ou gaz dangereux, ou leur injection, (alcool, gaz de pétrole liquéfié) peut être dangereux pour l'appareil, ou entraîner des risques d'explosion ou des fuites dangereuses. Les garanties du fabricant sont nulles en cas de mauvaise utilisation. Le fabricant dégage sa responsabilité en cas d'accident en découlant. La pression et la température maximales sont de 300 psig (21 bars) et 150°F (65.5°C).
3. **INSTALLER** l'appareil en amont et aussi près que possible de l'endroit où l'air régulé est nécessaire.
4. **INSTALLER** l'appareil de sorte que l'air circule dans le sens indiqué par la flèche sur la fondrie.
5. **NE PAS** diminuer le débit d'air par l'emploi de tuyauterie ou de raccords de dimensions insuffisantes, sauf si l'on désire un débit minimum.
6. **INSTALLER** le régulateur dans n'importe quelle position de rotation.
7. **LES ORIFICES DE RACCORDEMENT DU MANOMÈTRE** peuvent soit servir à monter un manomètre, soit servir de sortie supplémentaire pour l'air régulé. Obturer tout orifice non utilisé.
8. **LE MONTAGE SUR PANNEAU** impose un trou de 69 mm de diamètre, plus 4 trous de 5,5 mm pour les vis. L'appareil peut être monté sur des matériaux de 32 mm d'épaisseur maximum.
9. **NOUS CONSEILLONS** d'installer un filtre de 5 microns en amont du régulateur.
10. **POUR RÉGULER L'AIR**, tourner le bouton de réglage dans le sens des aiguilles d'une montre afin

83-528-000 REV 1 08/02  
Printed in U.S.A



**A** CALIBRATION ADJUSTMENT SCREW  
VIS DE RÉGLAGE DE LA CALIBRATION  
EICHUNGSEINSTELLSCHRAUBE  
VITE DI REGOLAZIONE DELLA TARATURA  
TORNILLO DE AJUSTE DE CALIBRACIÓN

**B** DIAL SCREW  
VIS DU CADRAN  
SKALENSCHRAUBE  
VITE DEL QUADRANTE  
TORNILLO DEL CUADRANTE

**C** ADJUSTMENT COUPLING  
ASSEMBLAGE DE LA SOUPAPE  
VENTILAUFBAU  
ACCOPPIAMENTO DI REGOLAZIONE  
CUERPO DE LA VÁLVULA

**D** TIP  
EMBOUT  
SPITZE  
ESTREMITÀ  
LENGÜETA

**IMPORTANT NOTE:** As with any new product, everyone seems to have an urge to see how it works. All Dial-Air™ regulators have been factory-calibrated. Any "tinkering" with calibration settings easily can throw the unit out of calibration. For example, removing dial screw "B" and rotating "C" in either direction so that tip "D" passes the dial screw "B" will throw unit out of calibration.

**REMARQUE IMPORTANTE :** D'ordinaire, on désire savoir rapidement comment marche un nouvel article. Tous les régulateurs Dial-Air™ ont été calibrés en usine. Toute modification des réglages du calibrage peut facilement décalibrer l'appareil. Ainsi, enlever la vis du cadran B et tourner de telle façon que l'embout D dépasse la vis du cadran B, risque de décalibrer l'appareil.

**WICHTIGER HINWEIS:** Wir raten davon ab, die Regler zu verstellen. Alle Dial-Air™-Regler wurden in der Fabrik geeicht. Jedes Verstellen der Eicheinstellungen kann die Eichung des Geräts zerstören. Dies kann zum Beispiel dann geschehen, wenn die Skalenschraube „B“ entfernt und „C“ in eine beliebige Richtung gedreht wird, so daß dabei die Spitze „D“ die Skalenschraube „B“ passiert.

**NOTA IMPORTANTE:** Come capita per ogni nuovo prodotto, ognuno sembra avere urgenza di conoscerne il funzionamento. Tutti i regolatori Dial-Air™ sono stati tarati in fabbrica. Ogni tentativo di riparazione sull'apparecchio può facilmente metterlo fuori taratura. Per esempio, l'unità è fuori taratura se si toglie la vite del quadrante "B", si ruota "C" in entrambe le direzioni in modo che l'estremità "D" oltrepassi il punto "B".

**NOTA IMPORTANTE:** Al igual que con cualquier producto nuevo, el comprador deseará saber inmediatamente cómo funciona esta unidad. Todos los reguladores de aire Dial-Air™ se calibran en fábrica. Cualquier intento de "corrección" de la calibración podría fácilmente descalibrar completamente la unidad. Por ejemplo, si quitara el tornillo del cuadrante "B" y girara "C" en cualquier dirección, de modo que "D" pasara el tornillo del cuadrante "B", la unidad se descalibraría.

<b>Siemens Energy &amp; Automation</b>	<b>INSTRUCTIONS FOR INSTALLATION, OPERATION, AND MAINTENANCE OF MOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLERS</b>
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WARNING: Read instructions before installing to prevent personal injury or damage to equipment.

SD63UL  
Issue: 7  
Date: 9/91

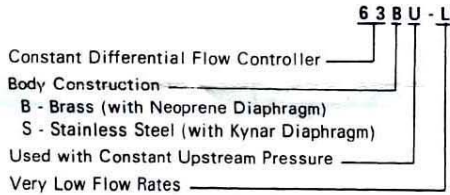
**GENERAL INFORMATION**

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**



**SPECIFICATIONS**

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

MODEL	NEEDLE VALVE	
	CLOSED	OPEN
63BU	50 psig	250 psig
63BUL	50 psig	250 psig
63SU	100 psig	500 psig
63SUL	50 psig	500 psig

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

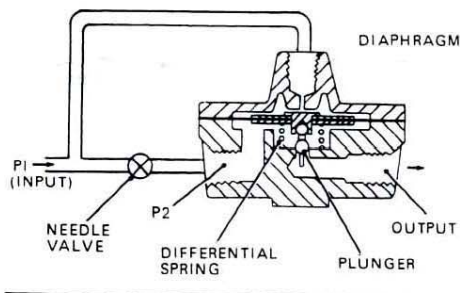
**PRINCIPLE OF OPERATION**

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 ( $\Delta P$ ) across the needle valve is held constant by the flow controller as follows:

1. The input pressure ( $P_1$ ) 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 ( $P_2$ ) 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  $P_1$  equals the forces due to  $P_2$  and  $K$  (i.e.,  $P_1 = P_2 + K$ ). Since the pressure drop ( $\Delta P$ ) across the needle valve equals  $P_1 - P_2$ , and since  $P_1 - P_2$  equals  $K$ , then the pressure drop ( $\Delta P$ ) must equal  $K$ ; therefore flow is constant.

**SCHEMATIC**



**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 these points. The supply to the controller should be filtered to remove any solids.

**Caution**

When installing the constant up stream flow controller, be sure the external needle valve is open. (See Installation Dwg.). 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, there-

fore, 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**

	Higher Range Models 63BD and 63SD; 63BU and 63SU	Low Flow Models 63BD-L and 63SD-L; 63BU-L and 63SU-L
<b>GAS FLOW-CAPACITY</b>		
Maximum at less than critical flow*	$SCCM = 4000 \sqrt{\frac{\Delta P \times Pd \times 530}{SG \times T}}$	$SCCM = 400 \sqrt{\frac{\Delta P \times Pd \times 530}{SG \times T}}$
Maximum at critical flow*	$SCCM = 2000 P_u \sqrt{\frac{1 \times 530}{SG \times T}}$	$SCCM = 200 P_u \sqrt{\frac{1 \times 530}{SG \times T}}$
Minimum controllable flow	Approximately 1/200 of maximum	$SCCM = 8 \frac{\Delta P (P_u \pm Pd)}{R_v \times T}$
<b>LIQUID FLOW-CAPACITY</b>		
Maximum	$CCM = 470 \sqrt{\frac{\Delta P}{SG}}$	$CCM = 47 \sqrt{\frac{\Delta P}{SG}}$
Minimum	Approximately 1/200 of maximum	$CCM = .06 \frac{\Delta P}{R_v}$
<b>NEEDLE VALVE SIZING (With 3 psi drop across valve)</b>		
For any liquid	$K_n = \frac{CCM}{6550 \sqrt{\frac{1}{SG}}}$	
For any gas	$K_n = \frac{SCCM}{49000 \sqrt{\frac{1 \times P_n \times 530}{SG \times T}}}$	

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

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

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 SCF = 28,317 SCC.

ΔP = psi pressure drop across the controller valve = total drop minus 3 psi.

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

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

Pn = psia pressure at outlet of needle valve.

SG = 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.

Rv = Ratio of viscosities of gas referred to air; or Ratio of viscosities of liquid at operating temperature to water at 4° C.

Kn = 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 permit 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-RANGE EXAMPLES**

**Conditions:**

- 15 psig (29.7 psia) at inlet of controller
- 10 psi drop across controller (not including 3 psi needle-valve drop)
- 70° F process temperature

	Max. Flow	Min. Flow
<b>Higher-range units (Series 63)</b>		
On air	56,000 scc/min	280 scc/min
On water	1,500 cc/min	7.5 cc/min
<b>Low-range units (Series 63L)</b>		
On air	5,600 scc/min	7 scc/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.

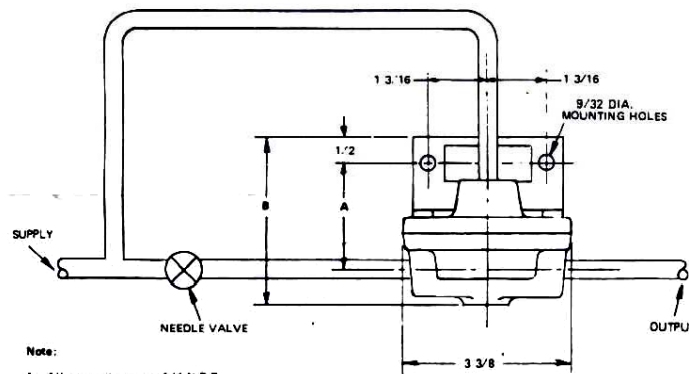
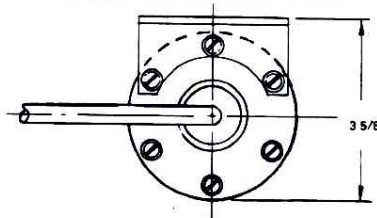
**MAINTENANCE**

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.

MODEL	DIM. A	DIM. B
63BU	2 1/8	3 1/4
63BUL	2 1/8	3 1/4
63BU	2 3/8	3 1/2
63BUL	2 3/8	3 1/2



- Note:
1. All connections are 1/4 N.P.T.
  2. Unless otherwise specified, needle valve and all piping supplied by customer.

Installation Dwg. Model 63U Constant Flow Controller

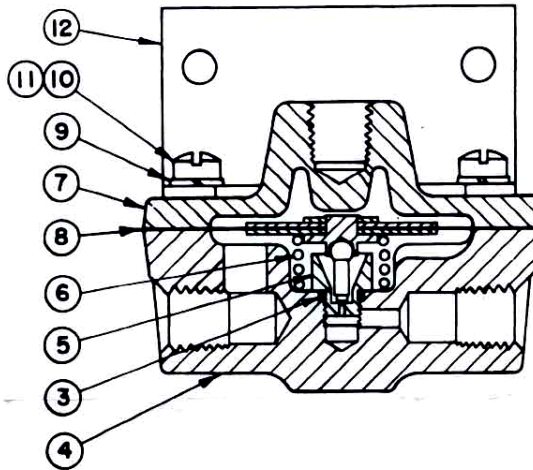
**PARTS LIST**

**Siemens  
Energy & Automation**

**MOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLER  
FOR SMALL FLOWS — MODEL 63BU-L**

Drawing No. 10746PL

**MODEL 63BU-L  
B/M 10746S6**



Item No.	Part No.	Description	Req'd
3	2938-1	"O" Ring	1
4	10746-10	Bottom Forging	1
* 5	10917-24	Valve Seat	1
* 6	1518-5	Differential Spring	1
7	2881-9	Top Forging	1
* 8	10746-2	Diaphragm and Valve Assembly	1
9		1/4" Lockwasher	6
10	Screw	1/4-20 x 3/4" Lg. Fil. Hd.	3
11	Screw	1/4-20 x 5/8" Lg. Fil. Hd.	3
12	1145-19	Mounting Bracket	1

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

3/78 Supersedes Dwg. 10746-20 Dated 6/75

REF. S063UL

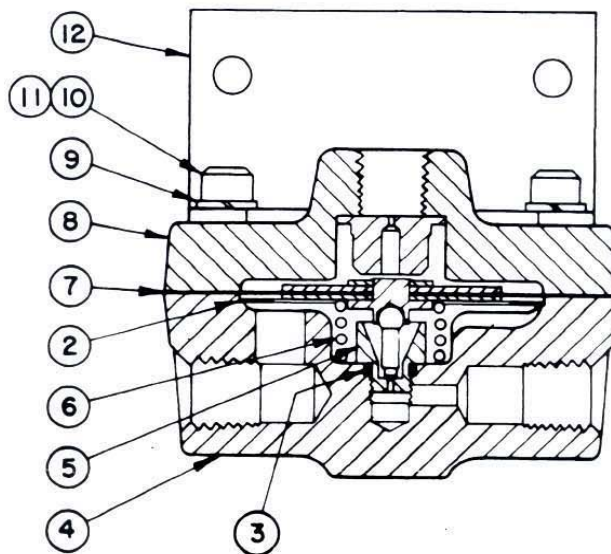
# PARTS LIST

Siemens  
Energy & Automation

MOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLER  
FOR SMALL FLOWS — MODEL 63SU-L

Drawing No. 12046PL

MODEL 63SU-L  
B/M 12046S11



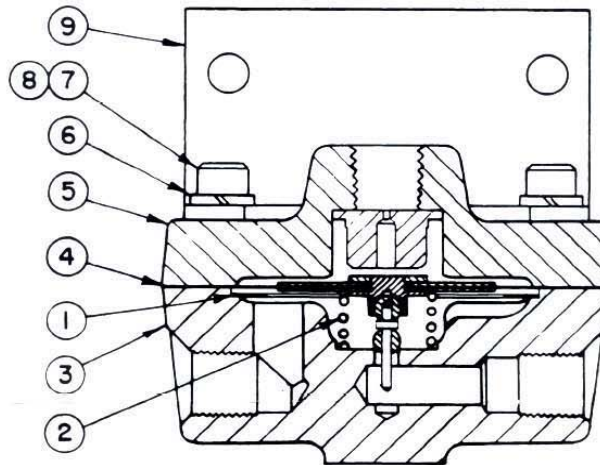
Item No.	Part No.	Description	Req'd
2	12041-23	Protecting Ring	1
3	2938-120	"O" Ring	1
4	12046-16	Bottom Forging	1
* 5	12046-8	Valve Seat	1
* 6	3131-22	Differential Spring	1
* 7	12046-9	Diaphragm and Valve Assembly	1
8	12041-42	Top Housing Assembly	1
9		1/4" Lockwasher	6
10	Screw	1/4-20 x 1-1/4" Lg. Soc. Hd.	3
11	Screw	1/4-20 x 1" Lg. Soc. Hd.	3
12	1145-19	Mounting Bracket	1

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

## PARTS LIST

Siemens  
Energy & AutomationMOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLER  
(CONSTANT UPSTREAM PRESSURE)

Drawing No. 12041PL

MODEL 63SU  
B/M 12041510

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

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

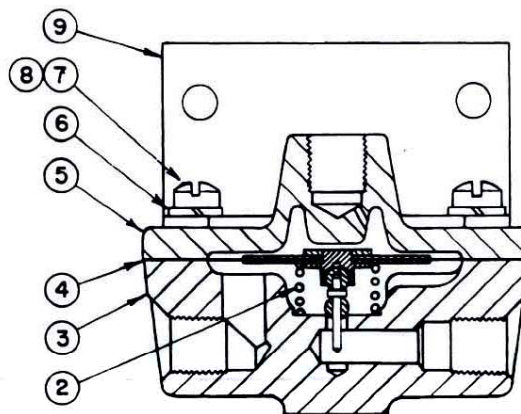
**PARTS LIST**

**Siemens  
Energy & Automation**

**MOORE CONSTANT DIFFERENTIAL TYPE FLOW CONTROLLER  
(CONSTANT UPSTREAM PRESSURE)**

**Drawing No. 2882PL**

**MODEL 63BU  
B/M 2882S9**



Item No.	Part No.	Description	Req'd
*2	1518-5	Differential Spring	1
3	2882-18	Bottom Forging	1
*4	2882-8	Valve and Diaphragm Assy.	1
5	2881-9	Top Forging	1
6	Lockwasher	1/4" Neverslip, Steel, W.N.P.	6
7	Screw	1/4-20 x 3/4 Lg. Fil. Hd. Steel, W.N.P.	3
8	Screw	1/4-20 x 5/8 Lg. Fil. Hd. Steel, W.N.P.	3
9	1145-19	Mounting Bracket	1

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

3/78 Supersedes Dwg. 2882-23 Dated 6/76

REF. S063UL



# Installation & Maintenance Instructions

**ASCO® TRIPPOINT® SWITCH UNITS**  
**LIMITED ADJUSTABLE DEADBAND SWITCH UNITS**

**PG—SERIES**

**OPEN—FRAME TYPE, GENERAL PURPOSE OR EXPLOSIONPROOF SWITCH ENCLOSURE**

Form No. P7080R1

## 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, adjustments, 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 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 range, temperature range, media, and proof pressure or rated overrange 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  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ) to  $122^{\circ}\text{F}$  ( $50^{\circ}\text{C}$ ). To determine fluid temperature limitations, see Form No.P7090 for pressure transducer catalog numbers and construction materials, then refer to chart below.

TRANSDUCER CONSTRUCTION MATERIALS	RATINGS FLUID TEMPERATURE
Buna N or Neoprene	$-4^{\circ}\text{F}$ ( $-20^{\circ}\text{C}$ ) to $180^{\circ}\text{F}$ ( $82^{\circ}\text{C}$ )
VITON*	$-4^{\circ}\text{F}$ ( $-20^{\circ}\text{C}$ ) to $250^{\circ}\text{F}$ ( $121^{\circ}\text{C}$ )
316 Stainless Steel	$-50^{\circ}\text{F}$ ( $-45^{\circ}\text{C}$ ) to $300^{\circ}\text{F}$ ( $149^{\circ}\text{C}$ )
All Nylon	Maximum $180^{\circ}\text{F}$ ( $82^{\circ}\text{C}$ )
All Nylon For Water Service	Maximum $130^{\circ}\text{F}$ ( $55^{\circ}\text{C}$ )

For steam service, the fluid temperature with a pigtail (siphon tube or condensate loop) installed directly into the transducer will be below  $180^{\circ}\text{F}$  ( $82^{\circ}\text{C}$ ).

**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 crisscross manner to  $80 \pm 10$  in—lbs [ $9.0 \pm 1.1$  Nm].
4. Remove backing paper from range scale and install on the 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.

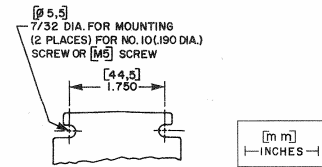


Figure 1. Open—Frame Mounting

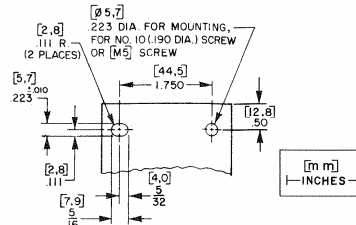


Figure 2. General Purpose Enclosure

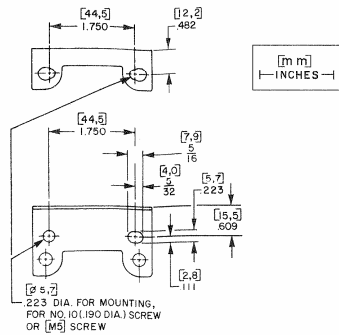


Figure 3. Optional Mounting Bracket

**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 loop (pigtail or steam syphon tube) directly into the pressure transducer.

**CAUTION:** To avoid damage to the transducer body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. IF TEFLON\* 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 cooper wire rated for 60°C minimum. The switch housing has a wire clamp and ground in screw. Switch is marked *NO* for Normally Open, *NC* 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 hub 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.

\*DuPont's Registered Trademark

ELECTRICAL RATINGS		
Switch Unit	Ratings for Limit Controls and Pressure Operated Switches	Ratings for Industrial Controls and Temperature Indicating and Regulating Equipment
Standard Switch Rating	5 Amps Res., 125 VAC 5 Amps Res., 250 VAC 1/8 HP 125 VAC 1/4 HP 250 VAC	15 Amps Res., 125 VAC 10 Amps Res., 250 VAC 1/8 HP 125 VAC 1/4 HP 250 VAC

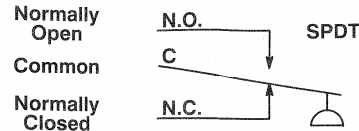


Figure 4. Schematic

**INSTALLATION OF TEMPERATURE TRANSDUCERS**

**Direct Probe**

The direct probe (local) temperature transducer is provided with 1/2" 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 3/8" 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, jam nuts may be obtained to adapt the capillary and bulb to the existing thermal well. The existing thermal well must be for a 3/8" 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 temperature gage (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 or ohmmeter 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:



**Adjustment (Signal Setting) of Normally Closed or Normally Open Limited Adjustable Deadband Switch**

(Refer to Figure 5)

1. If the limited adjustable deadbands switch is in the line of final application when adjustment (signal setting) is made, be sure switch can be test operated without affecting other equipment.
2. On general purpose and raintight constructions, remove switch cover.
3. Turn adjusting nut at top of switch clockwise until setting inductor 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 torquing may cause damage.**

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

Adjustment Procedures	NORMALLY CLOSED		NORMALLY OPEN	
	Switch Terminal	Test Lamp On-Off	Switch Terminal	Test Lamp On-Off
1. Starting with zero signal, connect test lamp to common.	NC	On (Closed Circuit)	NO	Off (Open Circuit)
2. Apply desired actuation signal. Then back off (counterclockwise) top adjusting nut until switch actuates (set point increasing).	NC	Off (Open Circuit)	NO	On (Closed Circuit)
3. Lower signal to desired reactivation signal. Then turn dead band adjusting knob counterclockwise until switch reactivates (set point decreasing).	NC	On (Closed Circuit)	NO	Off (Open Circuit)

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, Florham Park, New Jersey) or serviced only by an authorized factory representative. Address all service inquiries to Automatic Switch Company, 50-60 Hanover Road, Florham 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 insure proper operation. If necessary, electrical wiring and pipe connection 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 reactivates undesirable.

- **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 nameplate for electrical rating 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 install 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 nameplate.
- **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 paragraphs 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.**

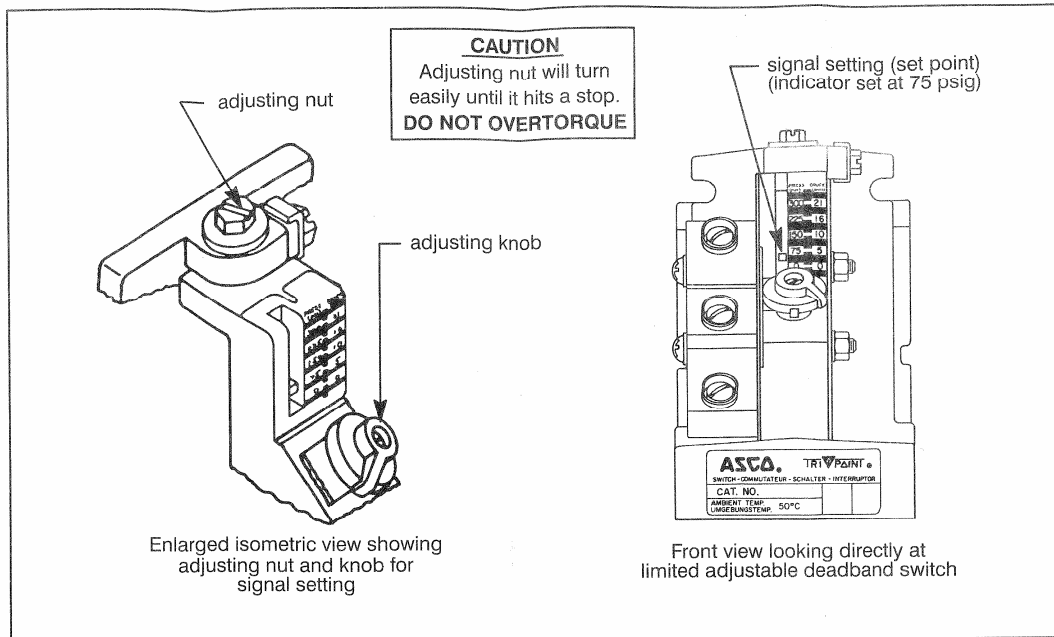


Figure 5. Adjustment (Signal Setting) of Limited Adjustable Deadband Switch.

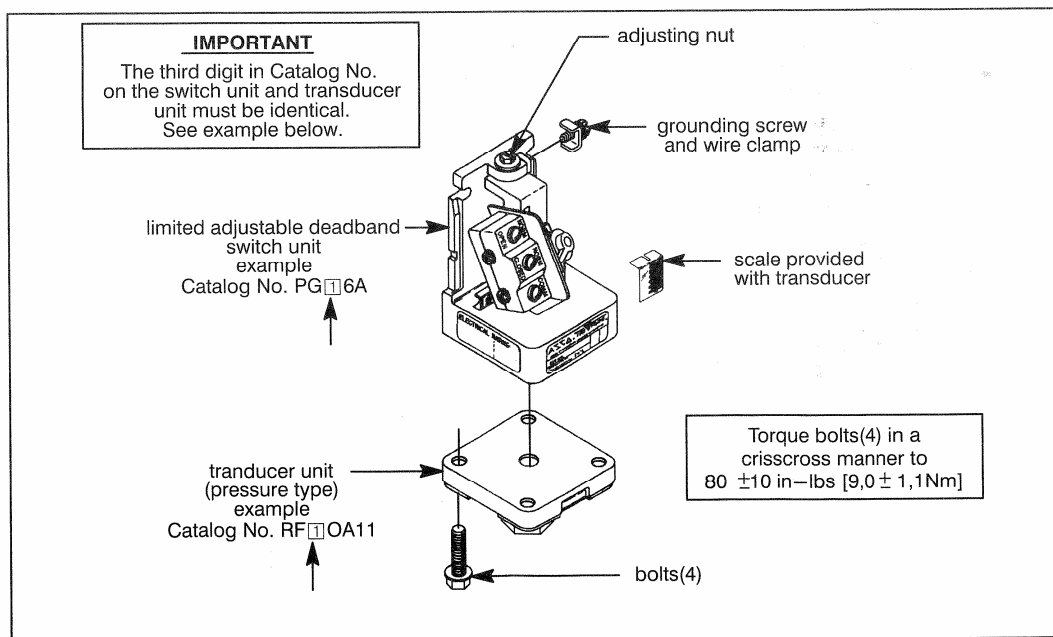


Figure 6. Open-Frame Switch Unit and Transducer Unit to be assembled.

# INSTALLATION & MAINTENANCE INSTRUCTIONS

## ASCO® TRIPPOINT® Pressure Switches

SWITCH UNIT AND TRANSDUCER UNIT COMBINATIONS LIMITED ADJUSTABLE  
DEADBAND COMPACT LINE PRESSURE SWITCHES  
OPEN-FRAME, GENERAL PURPOSE, RAIN-TIGHT OR WATERTIGHT SWITCH ENCLOSURES

SERIES

PG10 PG20 PG30  
PG11 PG21 PG31  
PG14 PG24 PG34  
PG16 PG26 PG36

Form No. P7090

### DESCRIPTION

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

In Table I 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. 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 mate 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 <sup>®</sup> Stainless Steel Watertight Enclosure	Open-Frame	Adjustable Operating Range (P.S.I.G.)	Rated Overage Pressure (P.S.I.G.)	Adjustable Deadband (P.S.I.G.)	Aluminum and Buna "N"	Nylon with Threaded Brass Insert and Buna "N"	Brass and Buna "N"	303 Stainless Steel and VITON*	All 316 Stainless Steel ④
Catalog Number	Catalog Number	Catalog Number	Catalog Number								
PG30A	PG31A	PG34A	PG36A	0 - 9	60	0.7 - 1.3	RD30A11	RD30A71	RD30A21 ②	RD30A32 ②	—
PG20A	PG21A	PG24A	PG26A	2 - 18	60	0.8 - 2.1	RD20A11	RD20A71	RD20A21 ③	RD20A32 ②	—
PG30A	PG31A	PG34A	PG36A	2 - 18	100	1.8 - 3.1	—	—	—	—	RE30A44
PG20A	PG21A	PG24A	PG26A	4 - 36	150	2.0 - 4.0	RE20A11	RE20A71	RE20A21 ②	RE20A32 ②	RE20A44
PG10A	PG11A	PG14A	PG16A	6 - 60	150	2.1 - 4.6	RE10A11	RE10A71	RE10A21 ②	RE10A32 ②	RE10A44
PG10A	PG11A	PG14A	PG16A	10 - 100	200 ①	4.0 - 8.0	RF10A11	RF10A71 ①	RF10A21 ②	RF10A32 ②	RF10A44
PG10A	PG11A	PG14A	PG16A	20 - 200	400 ①	8.0 - 17	RG10A11	RG10A71 ①	RG10A21 ②	RG10A32 ②	RG10A44
PG10A	PG11A	PG14A	PG16A	30 - 300	450	15 - 25	RH10A11	—	RH10A21 ②	RH10A32 ②	RH10A44
PG10A	PG11A	PG14A	PG16A	40 - 400	500	22 - 45	RJ10A11	—	RJ10A21 ②	RJ10A32 ②	RJ10A44
PG20A	PG21A	PG24A	PG26A	60 - 600	2000	35 - 75	—	—	RL20A21	RL20A42 ③	—
PG10A	PG11A	PG14A	PG16A	100 - 1000	2000	65 - 110	—	—	RL10A21	RL10A42 ③	—
PG20A	PG21A	PG24A	PG26A	160 - 1650	4500	190 - 290	—	—	RN20B21	RN20B42 ③	—
PG10A	PG11A	PG14A	PG16A	270 - 2700	4500	200 - 300	—	—	RN10B21	RN10B42 ③	—
PG10A	PG11A	PG14A	PG16A	600 - 6000	7500	300 - 500	—	—	—	RQ10B42 ③	—
PG30A	PG31A	PG34A	PG36A	0-30" Hg (VAC)	50	1.2-2.7" Hg	RV34A11	—	RV34A21	RV34A32	—
PG20A	PG21A	PG24A	PG26A	30"Hg(V)-14 psig	50	2.4-5.4" Hg	RV24A11	—	RV24A21	RV24A32	—

**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 on RG10A71 is 300 psig.
- ② These transducers are acceptable for steam service if used with pigtail (condensate loop) between steam line and transducer.
- ③ Transducers ending in 42 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 enclosure Type 4 watertight, a watertight conduit hub must be installed in the 7/8" diameter hole. Use conduit hub part No.PP01 or equivalent.

Form No. P7090

Printed in U.S.A.

Automatic Switch Co. 50-60 Hanover Road, Florham Park, New Jersey 07932



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**UNDERWRITERS LABORATORIES, INC. LISTED  
AND/OR RECOGNIZED COMPONENTS**

**ASCO® TRIPPOINT® Compact Line  
Pressure Switches**



Form No. P7047R1

**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 insure 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 complete 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 numbers 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 ④					PRESSURE TRANSDUCER UNITS See Notes ①, ② & ③			
Series: PA, PB, PC & PG Followed by Numbers Below								
General Purpose Enclosure Type 1	Watertight Enclosure Types 3 & 3S	Watertight Enclosure Types 3, 3S, 4 & 6	Open-Frame (No Enclosure)	Applicable Options	Air - Non-Hazardous Oil & Gas Aluminum/Buna N Construction	Air - Water Non-Hazardous Gas & Oil Polyester, Brass & Buna N Construction	Air - Water Non-Hazardous Gas, Oil & Steam Brass, Buna N & VITON* Construction	Corrosive Fluids Air - Water Non-Hazardous Gas & Oil 303 Stainless Steel & VITON* Construction
40A	41A	44A	48A	46A	RD40A11	RD40A71	RD40A21	RD40A32
30A	31A	34A	38A	36A	RV34A11	—	RV34A21	RV34A32
20A	21A	24A	28A	26A	RV24A11	—	RV24A21	RV24A32
30A	31A	34A	38A	36A	RD30A11	RD30A71	RD30A32 ②	RD30A32 ②
20A	21A	24A	28A	26A	RD20A11	RD20A71	RD20A21 ②	RD20A32 ②
30A	31A	34A	38A	36A	—	—	—	—
20A	21A	24A	28A	26A	RE20A11	RE20A11	RE20A21 ②	RE20A32 ②
10A	11A	14A	18A	16A	RE10A11	RE10A71	RE10A21 ②	RE10A32 ②
10A	11A	14A	18A	16A	RF10A11	RF10A71	RF10A21 ②	RF10A32 ②
10A	11A	14A	18A	16A	RG10A11	RG10A71	RG10A21 ②	RG10A32 ②
10A	11A	14A	18A	16A	RH10A11	—	RH10A21 ②	RH10A32 ②
10A	11A	14A	18A	16A	RJ10A11	—	RJ10A21	RJ10A32 ②
20A	21A	24A	28A	26A	—	—	316 St. St. & VITON*	—
10A	11A	14A	18A	16A	—	—	RL20A21	RL20A42
20A	21A	24A	28A	26A	—	—	RL10A21	RL10A42
10A	11A	14A	18A	16A	—	—	RN20B21	RN20B42
10A	11A	14A	18A	16A	—	—	RN10B21	RN10B42
10A	11A	14A	18A	16A	—	—	—	RQ10B42

**NOTES:**

- ① All transducers used with general purpose and watertight switch units are UL Listed as Industrial Control Equipment—Enclosed, Motor Controllers—Pressure Operated, Guide NKPZ. 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.
- ② All transducers used with open-frame (no enclosure) switch units are considered UL Recognized Components as Industrial Control Equipment, Motor Controllers—Pressure Operated, Guide NKPZ. Transducers which end in 11, 21, 32, or 42 and 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.

③ When used for steam service, these transducers with general purpose and watertight switch units are also UL Listed as Limit Controls, Guide MBPR.

④ Transducers used with open-frame (no enclosure) switch units are considered UL Recognized Component Limit Controls, Guide MBPR2.

⑤ Suffix B is an applicable option.

⑥ Series PC10A, PC11A, PC16A, PC20A, PC21A, PC26A, PC30A, PC31A & PC36A are UL Recognized Components for use as Motor Controller—Pressure Operated (NKPZ2).

Form No. P7047R1

PRINTED IN MEXICO

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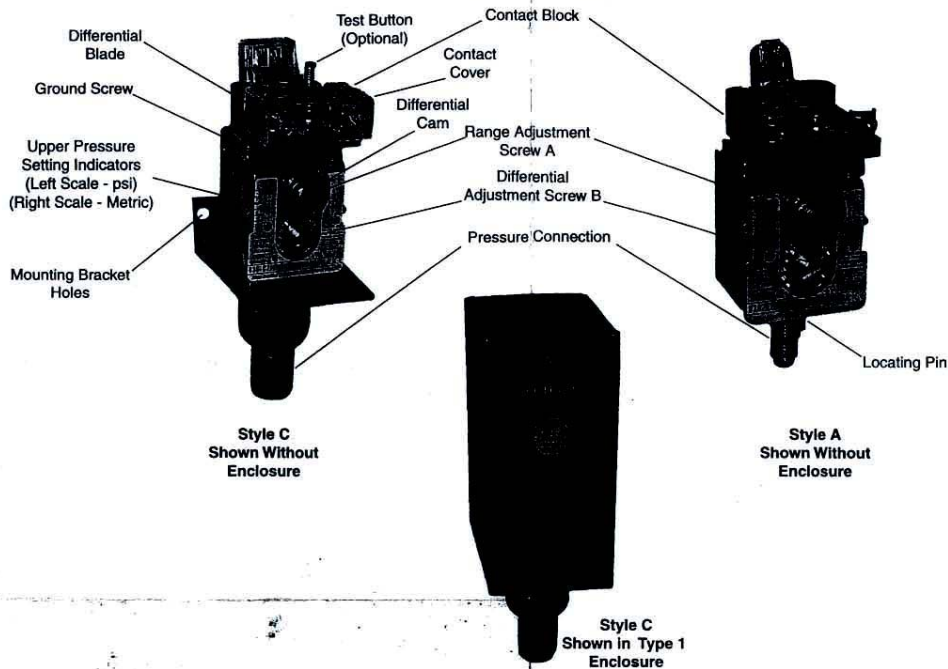


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**BULLETIN 836  
INSTRUCTIONS**

**Pressure Controls**



**DESCRIPTION** - Bulletin 836 Pressure Controls are designed for use with air, water, oil and other noncorrosive liquids, vapors, and gasses. (Type 316 stainless steel bellows are available for more corrosive liquids or gasses in pressure ranges to 375 psi.)

Bulletin 836 Controls are available in Type 1, 4 & 13, 4X, 7 & 9, 4 & 13 combination enclosures in addition to open type. The operating range pressure and differential are adjustable. Fixed differential versions are also available. Pressure ranges available from 30 in. Hg vacuum to 900 psi.

The standard contact block is single pole, double throw and can be wired to open or close on increasing or decreasing pressure.

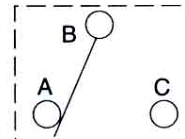
**OPERATION** - A low friction, straight in-line mechanism operates a snap action switch at a predetermined pressure setting. An increase in pressure causes the normally closed circuit A-B to open and normally open circuit B-C to close. This is known as the "Trip" pressure. When the pressure returns to a lower predetermined setting, the circuit A-B will close and circuit B-C will open. This is known as the "Reset" pressure. The difference between the "Trip" and "Reset" pressure is the differential.

For controls which operate in a vacuum, the following sequence occurs: 1) an increase in vacuum (lower pressure toward 30 in Hg) causes circuit A-B to close and B-C to open. This is the "Trip" setting. 2) when the pressure returns to a predetermined lower vacuum (higher pressure toward 0 psi.), circuit A-B will open and B-C will close. This is the "Reset" point. The difference between the "Trip" and "Reset" setting is the differential.

**CONTACT RATINGS**

Non-Inductive Ratings	Control Circuit Ratings
5 Amperes, 250 Volts	AC-125 VA 24 to 600 Volts
3 Amperes, 600 Volts	DC-57.5 VA 115 to 230 Volts

Manual reset, horsepower rated and other contact block modifications are also available on devices manufactured at the factory.



**Standard Contact Arrangement  
For Positive Pressure**

**40060-217-01 (5)**  
Printed in U.S.A.

**ADJUSTMENT** - Generally, unless otherwise specified, controls shipped from the factory are set at the maximum operating range pressure and minimum differential.

The following procedure should be used to set the control to a particular requirement:

**OPERATING RANGE ADJUSTMENT:** Turn range adjustment Screw "A" counterclockwise to lower the upper and lower pressure settings. To increase the upper and lower settings, turn Screw "A" clockwise. The approximate upper pressure setting is shown by indicators on the outer edges of the nameplate.

**DIFFERENTIAL ADJUSTMENT:** When the differential blade is at the low point of the differential cam the control will function at minimum differential. To increase the differential, turn adjustment Screw "B" counterclockwise. This will decrease the lower pressure setting only. To decrease the differential, turn differential adjustment Screw "B" clockwise. This will raise the lower setting only.

Condensed instructions are supplied with open style controls and are on the inside of the cover of enclosed devices.

**NOTE:** The use of a pressure gauge is desirable when setting the control.

**CAUTION:** The range adjustment Screw "A" should not be adjusted beyond the pressure indicated on the pressure scale as this may cause the control to malfunction.

It is recommended that a periodic inspection of gauge pressure be made and the pressure control adjusted to compensate for application variables.

**BELLOWS LIFE:** The pressure applied to a bellows in a normal cycle of operation should not exceed the maximum rated Range Pressure. The bellows will withstand the rated Maximum Line Pressure but should not be cycled at this pressure. The control is designed to operate within published rated Range Pressure. For general applications a control used within 30% to 80% of Range Pressure will provide optimum bellows life and repeatability.

**IMPORTANT:** Bulletin 836 Style A pressure controls are normally supplied with a built in pulsation snubber. Bulletin 836 Style C devices are supplied with a removable snubber. The snubber can be removed for inspection, cleaning, or when using the control with high viscosity fluids. The snubber can be removed with a 1/4 inch nut wrench, or equivalent.

The pulsation snubber is designed to help reduce pressure transients. Transients can vary in amplitude, frequency, and duration and if not controlled with a snubber can reduce bellows life.

Pressure systems and lines must be maintained and kept free of foreign particles in air lines and sludge in fluid lines. A restricted or clogged pulsation snubber can cause the pressure control to become inoperative.

**MOUNTING:** The pressure control should be mounted securely to a firm base using two mounting screws. The mounting holes are provided either in the base of the enclosure or in a convenient mounting bracket which is provided as part of the open Style C control. Mounting brackets are available for the open type Style A control.

**CAUTION:** The control should not be supported by the electrical and pressure connections only. A support wrench should be used when tightening the electrical hub and pressure connections. The enclosed device or open type control using a mounting bracket is not intended to support connecting equipment. This equipment must be secured to support weight and to reduce vibration.

**CAUTION:** If a liquid thread sealant is used on the pressure connection, care must be taken to avoid excess sealant from getting into bellows orifice.

**PILOT LIGHT OPTION** - A high intensity neon glow pilot light is available for 120 volt, 60 hertz applications. A 24 volt DC LED pilot light is also available. The pilot light is factory wired across the N.C. contacts, circuit A-B and can easily be converted to the N.O. contacts, circuit B-C, on the standard contact block.

Unless a third wire is made available, the pilot light is connected across the load contacts which can be either the N.O. or N.C. contacts. The pilot light is on until the load is energized.

Current rating:  
120 VAC high intensity neon glow . . . . . 4 mA  
24 VDC high intensity LED . . . . . 22 mA

**ATTENTION** - To prevent electrical shock, disconnect from power source before installing or servicing.

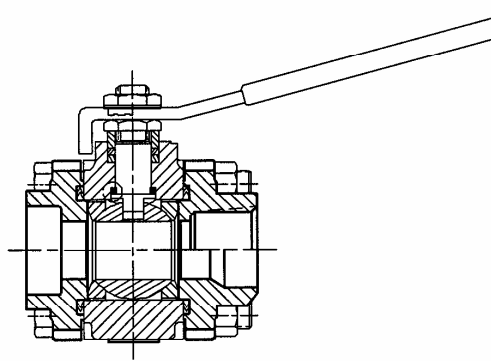
**CAUTION** - For 24 VDC LED pilot lights, polarity must be observed. Red (+) lead of pilot light should always be connected to rear terminal (B)

To order pilot light version add X9 (120VAC), X15 (24VDC) or X18 (24VDC) to catalog number of the selected control.

**REPAIRS** - Due to the integral construction of the Bulletin 836 Pressure Control, only limited repairs can be made in the field. If returned to the factory for repairs, the condition of the control will be evaluated to determine economic feasibility. When practical, the control will be repaired, factory adjustments made for optimum performance and tested to specifications.

**CONTACT BLOCK REPLACEMENT** - To order the Bulletin 836 Contact Block replacement Kit, specify Catalog Number 836-N2.

**Rockwell  
Automation**



**IMO - 202**  
ISSUE 5/97

**1/2" - 2" SERIES 4000**  
**3 PIECE BALL VALVES**

**INSTALLATION, MAINTENANCE**  
**AND OPERATING INSTRUCTIONS**

## WARNING

FOR YOUR SAFETY, TAKE THE FOLLOWING PRECAUTIONS BEFORE REMOVING THE VALVE FROM THE LINE, OR BEFORE ANY DISASSEMBLY:

1. DURING REMOVAL AND DISASSEMBLY, WEAR ANY PROTECTIVE EQUIPMENT NORMALLY REQUIRED TO PROTECT AGAINST DISCHARGE OF TRAPPED FLUID.

2. DEPRESSURIZE THE LINE AND VALVE AS FOLLOWS:

A. PLACE THE VALVE IN THE OPEN POSITION AND DRAIN THE LINE.

B. CYCLE THE VALVE TO RELIEVE RESIDUAL PRESSURE IN THE BODY CAVITY BEFORE REMOVAL FROM THE LINE.

C. AFTER REMOVAL, AND BEFORE ANY DISASSEMBLY, CYCLE THE VALVE AGAIN SEVERAL TIMES.

3. **SEAT AND BODY RATINGS** - THE PRACTICAL AND SAFE USE OF THIS PRODUCT IS DETERMINED BY BOTH THE SEAT AND BODY RATING. READ THE NAME TAG AND CHECK BOTH RATINGS. THIS PRODUCT IS AVAILABLE WITH A VARIETY OF SEAT MATERIALS. SOME OF THE SEAT MATERIALS HAVE PRESSURE RATINGS THAT ARE **LESS THAN** THE BODY RATINGS. ALL OF THE BODY AND SEAT RATINGS ARE DEPENDENT ON **VALVE TYPE AND SIZE, SEAT MATERIAL, BOLTING MATERIAL, AND TEMPERATURE**. DO NOT EXCEED THESE RATINGS.

**NOTE:** OPTIONAL ROUND AND OVAL HANDLES ARE AVAILABLE FOR THESE VALVES IN PLACE OF LEVER HANDLES.

## INSTALLATION

1. **Screwed End Style** - Use standard piping practices to install valves with threaded end caps. When tightening valve to pipe, apply wrench to end cap nearest the pipe being worked.

2. **Weld End Style** - All standard weld end valves must be partially disassembled prior to welding. Follow Steps 1, 2, 4 and 5 of **DISASSEMBLY**. Socket weld ends are per ANSI B16.11 and butt weld ends are per ANSI B16.25. Welding should be done using procedures and welders qualified under Section IX of the ASME Boiler and Pressure Vessel Code. **IMPORTANT: If the body seals (6) are removed for welding, DO NOT MIX THEM. When reassembling the valve, put each seal back into the groove from which it was removed.**

**CAUTION: IF THE VALVE IS BEING DISASSEMBLED FOR WELDING, DO NOT CUT OR SCRATCH THE SEATS, SEALS AND SEALING SURFACES.**

3. After valve is in line, or before testing, tighten stem nuts (16) 1/4 turn.

## MAINTENANCE

Routine maintenance consists of tightening the lower stem nut 1/4 turn periodically to compensate for the wear caused by the stem turning against the stem seals. The upper stem nut should be tightened a corresponding amount. When tightening stem seals on actuated valves, where the valve is connected to the actuator with a no-play (clamped) coupling, loosen the coupling before tightening the stem nut. Retighten the coupling. Overhaul maintenance consists of replacing seats and seals. A standard service kit consisting of these parts may be obtained from your Neles-Jamesbury, Inc distributor (see Table 3).

## DISASSEMBLY

The Series 4000 ball valve is designed to be serviced in or out of the line. The following instructions are for in-line disassembly. (For bench disassembly, which may be more convenient, follow a similar sequence).

1. Comply fully with the instructions in the WARNING section on page one.
2. Be sure to cycle the valve. Leave in the open position. The body center section will not swing out in the closed position.
3. Remove the top stem nut (16), spring tab washer (9) and handle (15).
4. Loosen all four body bolts/tie rods (20). Remove three from the valve. Leave the remaining bolt in place with the nut backed off at least 1/4".
5. For positive alignment and ease of in-line assembly, each end cap is interlocked approximately 1/16" into the body as shown in Figure 3. To overcome this feature during in-line disassembly it is necessary to separate each cap at least 1/16" from the body. Sharply rap body and caps with a block of wood or plastic mallet to break loose body seal. Spread end caps and swing the body out of the line. If pipe does not allow simple spreading, remove the remaining body bolt and rotate center section per Figure 1. This will improve access to the end cap flange for ease of spreading. Swing the valve body (1) out from between the end caps (2). Be careful not to damage the sealing surfaces "A" (see Figure 3) at each end of the valve.
6. Turn the stem (4) so that the valve is fully closed. Remove body seals (6) and seats (5). Body seals may be tightly compressed in their grooves. Use extreme care when prying them out. Damage such as scratches to the bottom of the groove will cause leaks. If the seats are not easily removed, gently tap the ball (30) with a piece of wood or other soft material.
7. Remove the ball (3).
8. Remove the lower stem nut (16) and the compression ring (18).
9. Press the stem (4) from the top into the valve body (1) and remove it through the end of the body.
10. Carefully pry out and discard the old stem seals (7), the stem bearings (8), and the secondary seal (13), being careful not to damage the bearing surfaces.

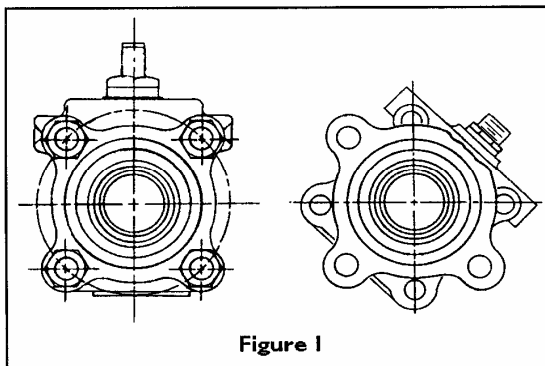


Figure 1

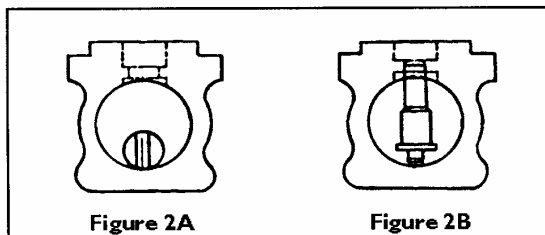


Figure 2A

Figure 2B

## ASSEMBLY

The following instructions are for in-line assembly. For bench assembly, which may be more convenient, follow a similar sequence by holding the valve in a vise by one end cap. Use care not to cut or scratch the seats, seals or sealing surface.

1. With the valve swung to the out-of-line position, insert from the inside of the body a stem bearing (8), a secondary seal (13), then another stem bearing (8) into the stem bore. For non Fire-Tested valves use one stem bearing (8). See Figure 3 and parts list.
2. Insert the stem (4) horizontally into the body bore (threaded end first). The blade at the ball end of the stem must be vertical (see Figure 2A and 2B). Guide the stem into the stem hole being careful not to scratch the bearings.
3. Holding the stem in place from the bottom, install two stem seals (7), a compression ring (18) from the outside and thread on one stem nut (16) until the stem starts to turn.
4. Place a wrench through the body on the bottom stem blade to hold the stem stationary. Place another wrench on the stem nut and turn the nut down until the seals are bottomed and the stem comes snugly into place, applying the torque shown in Table 2. As an alternate to using a torque wrench, tighten until snug plus an additional 1/4-1/2 turn.
5. Align the stem blade with the ball slot. Insert the ball (3), and rotate the stem (4) to the ball closed position.
6. Working at either end of the body (1), place a seat (5) into the body. Fit it snugly against the closed ball. **NOTE:** The sealing surface of the seat is toward the ball (See Figure 4).
7. Place a body seal (6) into the machined sealing groove of the end cap (2) (see Figure 3). Be certain the groove and seal are clean.
8. Repeat instructions 6 and 7 for assembly at the opposite end.
9. Turn the stem to the full ball open position.
10. Swing the entire body assembly back into the properly aligned and interlock position between the end caps, being careful not to scratch the body seals. Caps may have to be spread slightly to accept the body.
11. Close the valve.
12. Bolt the valve together with lubricated body bolts (20) and nuts (19). Tighten these bolts evenly and alternately. (See Table 1 for the torques and lubricant.)
13. Attach the handle (15), the spring tab washer (9) and secure them with the stem nut (16). (See Table 2 for torques.)

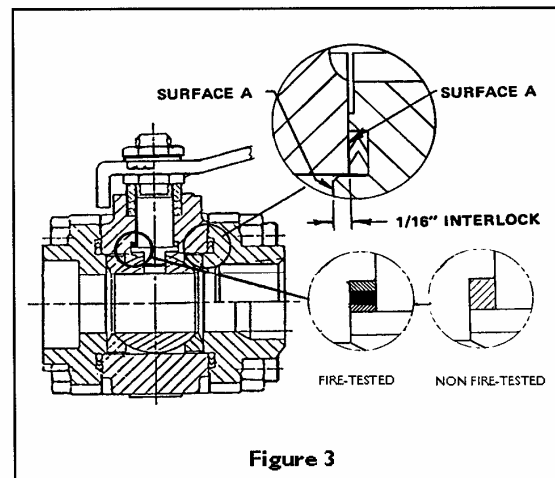


Figure 3



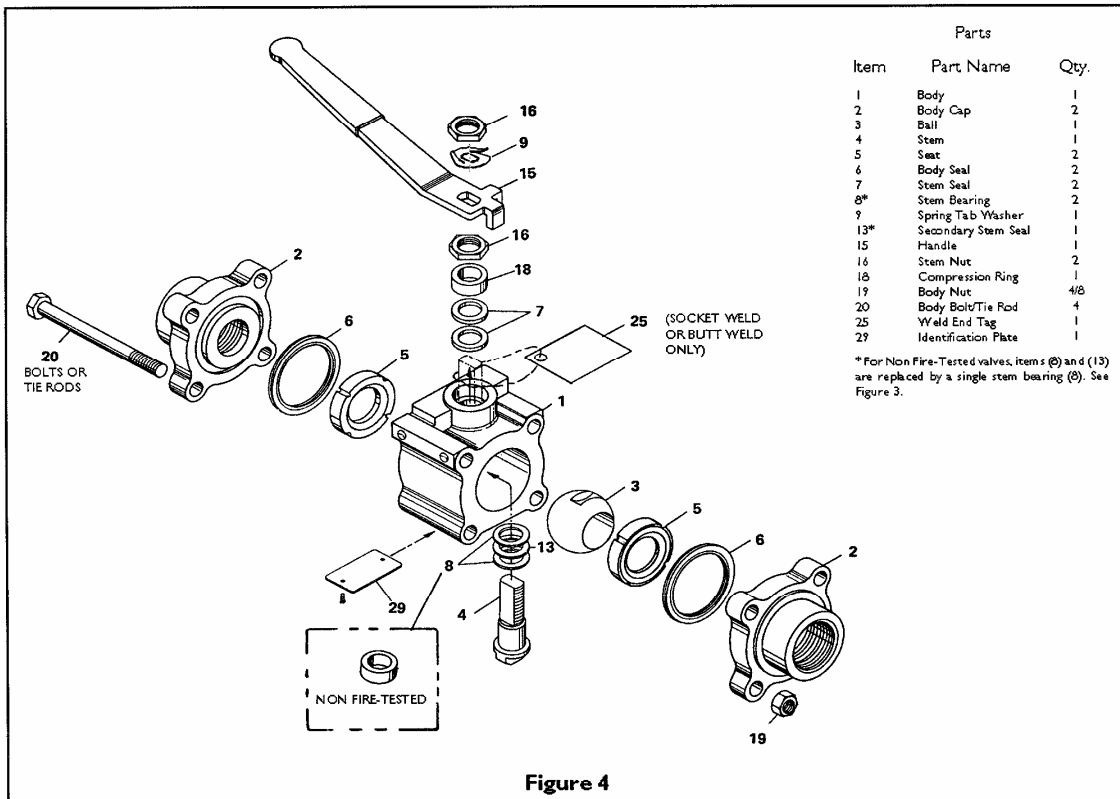
**Table I**

Required Fastener Torque, LB.-FT. (Except as Noted)

Fastener (Last Digit in Fig. No.)	-1	-2	-4	-5	-7	-8	-3
Valve Size-Full Port Size in ( )	AI93 GR.B7	A194 GR.B8	K-Monel®	A193 GR.B7M	A320 GR.L7M.	A453 GR.660	Series 300 St.Stl.
Fastener Ident. Mark	B7	B8	K	B7M	L7M	660A OR 660B	Ⓢ
1/2" (1/2")	8 - 10	8 - 10	7 - 9	6 - 8	6 - 8	6 - 8	48 - 60 LB.-IN.
3/4"	17 - 21	16 - 20	15 - 18	14 - 17	13 - 16	14 - 17	8 - 10
1" (3/4")	31 - 38	29 - 36	26 - 33	25 - 31	23 - 29	25 - 31	14 - 18
1 1/4" (1")	35 - 43	33 - 41	30 - 37	28 - 35	26 - 33	28 - 35	16 - 21
1 1/2" (1 1/4")	74 - 93	71 - 89	64 - 80	60 - 75	57 - 71	60 - 75	35 - 44
2" (1 1/2")	84 - 105	80 - 100	72 - 90	68 - 85	64 - 80	68 - 85	40 - 50

**NOTES:**

1. Lubricate threads with Never-Seez® or equivalent.
  2. Fastener materials have different corrosion, thermal and strength properties and should not be mixed. The fastener identification and coding must be in agreement with the valve identification plate, item 29.
  3. Torque values are for lubricated, unplated fasteners.
- ® **MONEL** is a registered trademark of Inco.



**Figure 4**

## SERVICE KITS

**NOTE: FIRE-TESTED** service kits include two seats (5), two stem seals (7), two stem bearings (8), a secondary seal (13) and two 316 stainless steel/graphite body seals (6). The body seals are suitable for valves with carbon steel or 316 stainless trim.

**NOTE: NON FIRE-TESTED** service kits include two seats (5), one stem bearing (8) and two body seals (6). The body seals are suitable for valves with carbon steel or 316 stainless trim.

**Table 2**

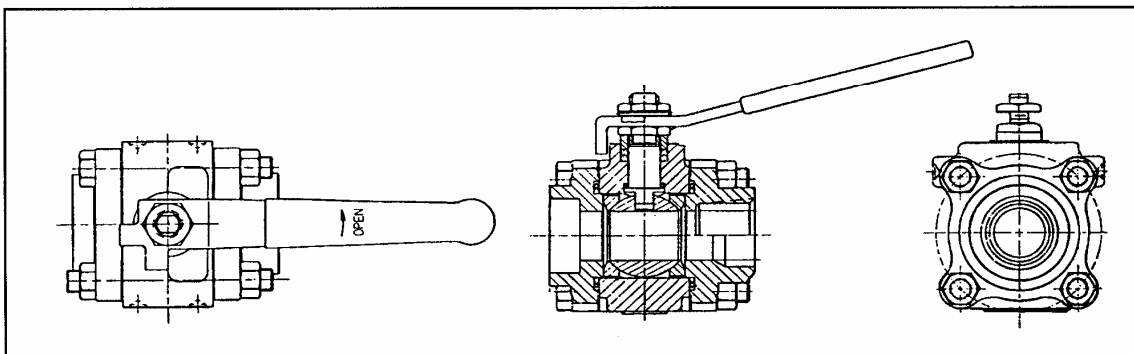
**Stem Nut Torque**

Valve Size - Full Port Size In ( )	LB. - IN.
1/2" - 3/4" (1/2")	50 - 60
1" - 1 1/4" (3/4" - 1")	60 - 72
1 1/2" - 2" (1 1/4" - 1 1/2")	135 - 145

**Table 3**

Service Kits	Valve Size - Full Port Size Shown in ( ) <b>FOR FIRE - TESTED VALVES</b>					
	1/2" (1/2")	3/4"	1" (3/4")	1 1/4" (1")	1 1/2" (1 1/4")	2" (1 1/2")
VALVE SIZE	1/2" (1/2")	3/4"	1" (3/4")	1 1/4" (1")	1 1/2" (1 1/4")	2" (1 1/2")
TFE SEATS	RKN-107-TT	RKN-108-TT	RKN-109-TT	RKN-110-TT	RKN-111-TT	RKN-112-TT
FILLED TFE SEATS	RKN-107-MT	RKN-108-MT	RKN-109-MT	RKN-110-MT	RKN-111-MT	RKN-112-MT
DELTRIN SEATS	RKN-107-RT	RKN-108-RT	RKN-109-RT	RKN-110-RT	RKN-111-RT	RKN-112-RT
PEEK SEATS	RKN-107-LT	RKN-108-LT	RKN-109-LT	RKN-110-LT	RKN-111-LT	RKN-112-LT
METAL SEATS	RKN-107-DH	RKN-108-DH	RKN-109-DH	RKN-110-DH	RKN-111-DH	RKN-112-DH

Service Kits	Valve Size - Full Port Size Shown in ( ) <b>FOR NON FIRE-TESTED VALVES</b>					
	1/2" (1/2")	3/4"	1" (3/4")	1 1/4" (1")	1 1/2" (1 1/4")	2" (1 1/2")
VALVE SIZE	1/2" (1/2")	3/4"	1" (3/4")	1 1/4" (1")	1 1/2" (1 1/4")	2" (1 1/2")
TFE SEATS	RKN-137-TT	RKN-138-TT	RKN-139-TT	RKN-140-TT	RKN-141-TT	RKN-142-TT
FILLED TFE SEATS	RKN-137-MT	RKN-138-MT	RKN-139-MT	RKN-140-MT	RKN-141-MT	RKN-142-MT
UHMW POLY SEATS	RKN-137-UB	RKN-138-UB	RKN-139-UB	RKN-140-UB	RKN-141-UB	RKN-142-UB



**JAMESBURY**  
NELES CONTROLS GROUP

<h2 style="margin: 0;">Installation &amp; Maintenance Instructions</h2> <p style="margin: 0;">2-WAY DIRECT-ACTING SOLENOID VALVES NORMALLY OPEN OR NORMALLY CLOSED OPERATION BRASS OR STAINLESS STEEL CONSTRUCTION – 1/8", 1/4", OR 3/8" NPT</p>	<p><b>SERIES</b></p> <p><b>8262</b> <b>8263</b></p> <p>Form No.V5256R8</p>
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**IMPORTANT:** See separate solenoid installation and maintenance instructions for information on: **Wiring, Solenoid Temperature, Causes of Improper Operation, and Coil or Solenoid Replacement.**

**DESCRIPTION**

Series 8262 and 8263 valves are 2-way direct-acting general service solenoid valves. Valves bodies are of rugged brass or stainless steel. Series 8262 or 8263 valves may be provided with a general purpose or explosionproof solenoid enclosure. Series 8262 and 8263 valves with suffix "P" in the catalog number are designed for dry inert gas and non-lubricated air service.

**OPERATION**

**Normally Open:** Valve is open when solenoid is de-energized; closed when is energized.

**Normally Closed:** Valve is closed when solenoid is de-energized; open when energized.

**IMPORTANT:** No minimum operating pressure required.

**Manual Operation**

Manual operator allows manual operation when desired or during an electrical power outage. Depending upon basic valve construction, three types of manual operators are available:

**Push Type Manual Operator**

To engage push type manual operator, push stem at base of valve body upward as far as possible. Valve will now be in the same position as when the solenoid is energized. To disengage manual operator, release stem. Manual operator will return to original position.

**Screw Type Manual Operator**

To engage screw type manual operator, rotate stem at base of the valve body clockwise until it hits a stop. Valve will now be in the same position as when the solenoid is energized. To disengage, rotate stem counterclockwise until it hits a stop.

**▲ CAUTION:** For valve to operate electrically, manual operator stem must be fully rotated counterclockwise.

**Stem/Lever Type Manual Operator**

To engage manual operator, turn stem/lever clockwise until it hits a stop. Valve will now be in the same position as when the solenoid is energized. To disengage manual operator, turn stem/lever counterclockwise until it hits a stop.

**▲ CAUTION:** For valve to operate electrically, manual operator stem/lever must be fully rotated counterclockwise.

**Flow Metering Devices**

Valves with suffix "M" in catalog number are provided with a metering device for flow control. Turn stem to right to reduce flow; left to increase flow.

**INSTALLATION**

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

Note: Inlet port will either be marked "I" or "IN". Outlet port will be marked "2" or "OUT".

**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**

For maximum valve ambient and fluid temperatures, refer to charts below. Check catalog number, coil prefix, and watt rating on nameplate to determine the maximum temperatures.

Wattage	Catalog Number Coil Prefix	Coil Class	Max. Ambient Temp. °F	Max. Fluid Temp. °F
6, 10.5, 12.4	none, DA or S	A	77	180
6, 10.5 12.4	DF, FT or SF	F	125	180
6, 10.5, 12.4	HT	H	140	180
9, 10.7	none, DP or SP	F	77	180
9.7	none, FT or HT	A, F or H	77	120
11.2	none, FT or HT	A, F or H	77	150
16.7	none, DP or SP	F	77	200
17.1	none, KP SP or SD	F	125	180
17.1	HB, KB SS or SV	H	140	180

Catalog Nos. 8262B200 and 8262 C200 AC construction only and Catalog Nos. 8262B214 and 8262 D200 AC and DC construction are limited to 140°F fluid temperature.

Valves with Suffix V or W that are designed for AC service and normally closed operation are for use with No. 2 and 4 fuel oil service. These valves have the same maximum temperatures per the above table except Suffix W valves are limited to a maximum fluid temperature of 140°F.

Listed below are valves with Suffix V in the catalog number that are acceptable for higher temperatures.

Catalog Number Coil Prefix	Max. Ambient Temp. °F	Max. Fluid Temp. °F
FT8262, HB8262 FT8263, HB8263 8262G, 8263G	125	250*
HT or HB 8262G HT or HB 8263G	140	250

\*The only exception is the 8262G and 8263G series (Class F coil) at 50 Hertz, rated 11.1 and 17.1 watts are limited to 210°F fluid temperature.

**Positioning**

This valve 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.

Valves with suffix "P" in the catalog number must be mounted with the solenoid vertical and upright.

#### Mounting

Refer to Figure 2 for mounting dimensions.

#### Piping

Connect piping or tubing to valve according to markings on valve body. Inlet port will either be marked "I" or "IN". Outlet port will be marked "2" or "OUT". Wipe the pipe threads clean of cutting oils. 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.

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

#### MAINTENANCE

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

NOTE: It is not necessary to remove the valve from the pipeline for repairs.

#### 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 open or close. Clean strainer or filter when cleaning the valve.

#### Preventive Maintenance

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- While in service, the 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. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

#### Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve (see Maintenance) and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

#### Valve Disassembly

1. Disassemble valve using exploded views for identification of parts.
2. Remove solenoid, see separate instructions.
3. Unscrew solenoid base sub-assembly or valve bonnet with special wrench adapter supplied in ASCO Rebuild Kit. For wrench adapter only, order No. K218948. Remove core assembly, core spring, and solenoid base gasket from valve body. For normal maintenance on Series 8263 valves it is not necessary to remove valve seat. See Figure 1 for metering or manual operator constructions.
4. For normally open construction (Figure 3) remove end cap, or manual operator, (not shown) end cap gasket, disc holder spring, and disc holder assembly.
5. All parts are now accessible to clean or replace. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

#### Valve Reassembly

1. Use exploded views for identification, orientation and placement of parts.
2. Lubricate all gaskets with DOW CORNING® 111 Compound lubricant or an equivalent high-grade silicone grease.
3. For normally open construction (Figure 3), install disc holder assembly, disc holder spring, end cap gasket and end cap or manual operator. For valves with 1/8" NPT, torque end cap or manual operator to  $90 \pm 10$  in-lbs [ $10.2 \pm 1.1$  Nm]. For all other valves torque end cap or manual operator to  $175 \pm 25$  in-lbs [ $19.8 \pm 2.8$  Nm].
4. For Series 8263 apply a small amount of LOCTITE® PST® pipe sealant to threads of valve seat (if removed). Follow manufacturers instructions for application of pipe sealant. Then install valve seat and torque to  $75 \pm 10$  in-lbs [ $8.5 \pm 1.1$  Nm].
5. Replace solenoid base gasket, core assembly with core spring and solenoid base sub-assembly or plugnut/core tube sub-assembly and valve bonnet. Note: For core assemblies with internal type core springs, install wide end of core spring in core assembly first, closed end of core spring protrudes from top of core assembly.
6. For 1/8" NPT valve constructions, Torque valve bonnet to  $90 \pm 10$  in-lbs [ $10.2 \pm 1.1$  Nm]. Torque solenoid base sub-assembly to  $175 \pm 25$  in-lbs [ $19.8 \pm 2.8$  Nm].
7. Install solenoid, see separate solenoid instructions. Then make electrical hookup to solenoid.

**▲ WARNING:** To prevent the possibility of personal injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.

8. Restore line pressure and electrical power supply to valve.
9. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic *click* signifies the solenoid is operating.

#### ORDERING INFORMATION FOR ASCO REBUILD KITS

Parts marked with an asterisk (\*) in the exploded view are supplied in Rebuild Kits. When Ordering Rebuild Kits for ASCO valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit 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.

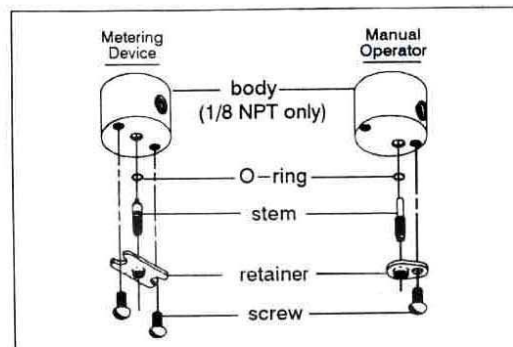


Figure 1. Metering and manual operator constructions.

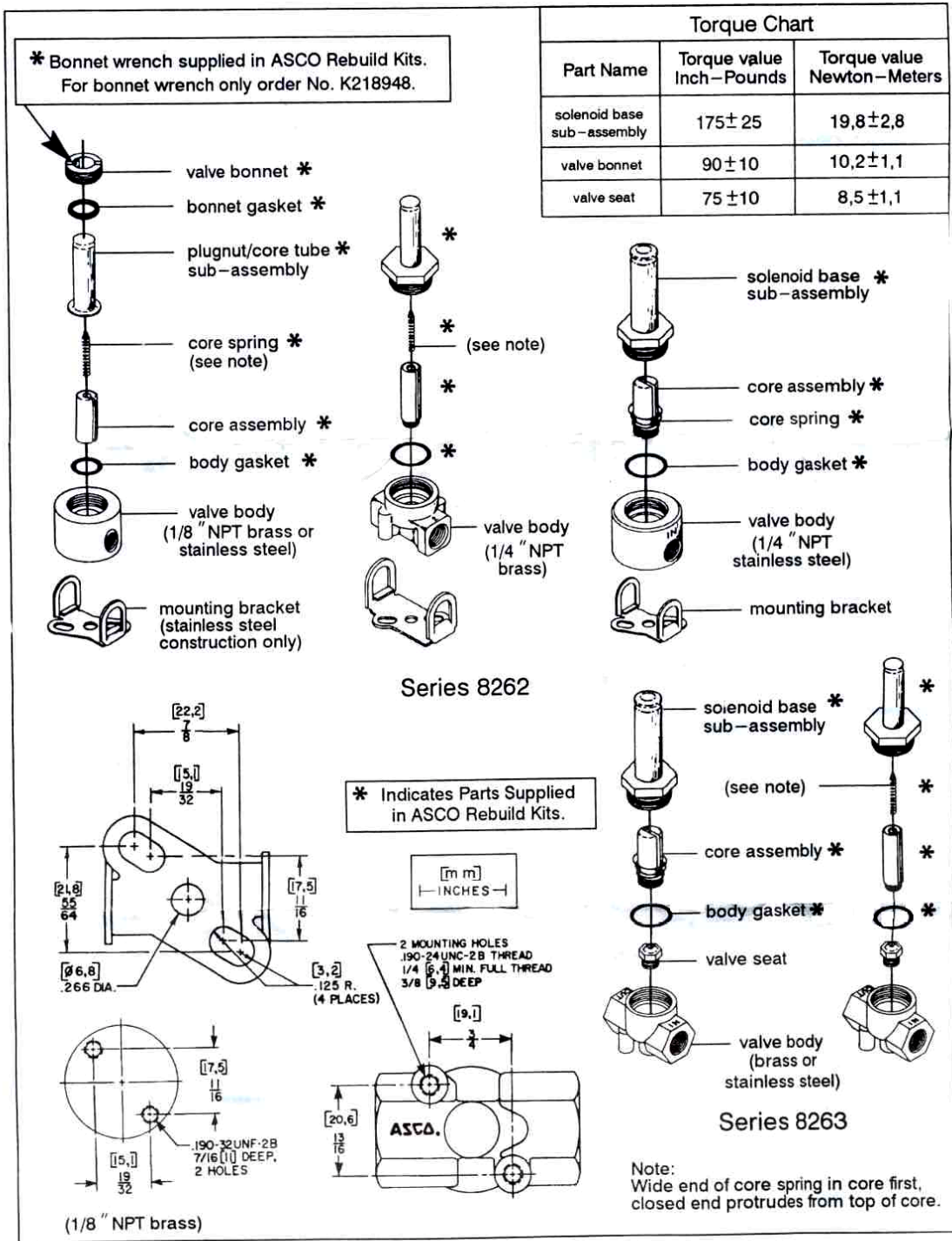


Figure 2. Series 8262 and 8263, normally closed construction.

**Disassembly and Reassembly of Stem /Lever Type Manual Operator (Refer to Figure 3)**

NOTE: There are two stem/lever manual operator constructions. They are identified by the location of the core spring as *internal* or *external* spring construction.

1. Unscrew solenoid base sub-assembly from manual operator body.
2. Unscrew manual operator body from valve body. Then remove body gasket and stem retainer.
3. Slip stem/spacer sub-assembly with stem gasket from manual operator body. Remove core assembly with core spring from center of manual operator body.
4. All parts are now accessible for cleaning or replacement. Lubricate gaskets per *Valve Reassembly* step 2.

5. Position core assembly with core spring into base of manual operator body. Then install stem/spacer sub-assembly into manual operator body to engage with core assembly.
6. Reinstall stem retainer on body and stem/spacer sub-assembly.

**IMPORTANT:** The spacer on the stem/spacer sub-assembly must be *inside* of the stem retainer for *internal* spring construction and *outside* the stem retainer for *external* spring construction.

7. Replace body gasket and install manual operator assembly in valve body. Torque manual operator body to  $175 \pm 25$  in-lbs [ $19,8 \pm 2,8$  Nm].
8. Replace solenoid base gasket and solenoid base sub-assembly. Torque solenoid base sub-assembly to  $175 \pm 25$  in-lbs [ $19,8 \pm 2,8$  Nm].
9. Check manual operator for proper operation. Turn stem clockwise and counterclockwise; stem should turn freely without binding.

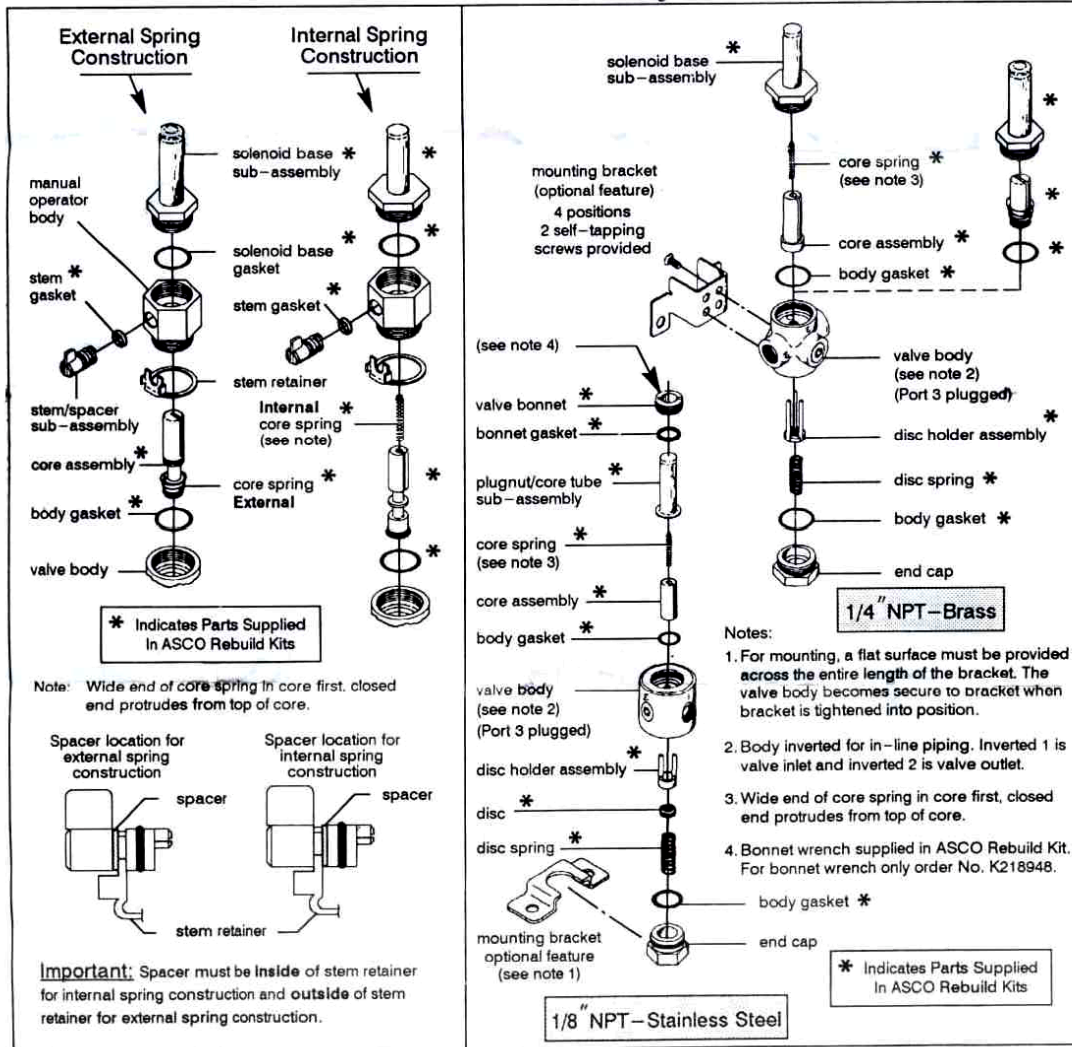


Figure 3. Stem/lever type manual operators

Figure 4. Series 8262, normally open construction.

# Installation & Maintenance Instructions

## OPEN-FRAME SOLENOIDS

**SERIES  
U8003  
US8003**

Form No.V6918

**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 U8003 are open-frame, pull type solenoid operators. When installed just as a solenoid and not attached to an ASCO valve, the core has a 0.250-28 UNF-2B tapped hole with 0.38 minimum full thread for DC construction and 0.62 for AC construction.

Series US8003 open-frame solenoid operators are the same as Series U8003 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 1 pound 5 ounces and 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

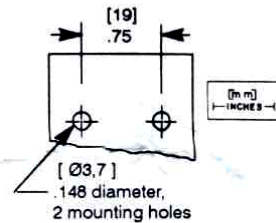
This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

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

### Mounting

Refer to Figure 1 (below) for mounting.



**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 seat in circular groove around side wall of solenoid base sub-assembly. Tighten retaining clip securely so that the retaining clip ends meet.

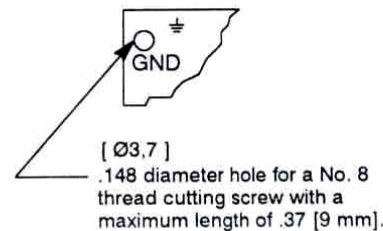


Figure 2. Hole for grounding screw (partial view).

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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 U80031, U80032, US80031 and US80032 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 and can not be touched by hand only for an instant. 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 personal 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 Circuit:** 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 solenoid, broken lead wires or splice connections.

- **Burned-Out Coil:** Check for open-circuited 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 from top of solenoid.

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

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

Note: For panel mount hi-shock construction (Figure 5) remove additional parts as required.

6. For additional disassembly, unscrew solenoid base sub-assembly.
7. Refer to basic valve instructions for further disassembly.

#### Coil Replacement/Solenoid Reassembly

1. Install solenoid base sub-assembly and torque to 175 ± 25 in-lbs [19,8 ± 2,8 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.

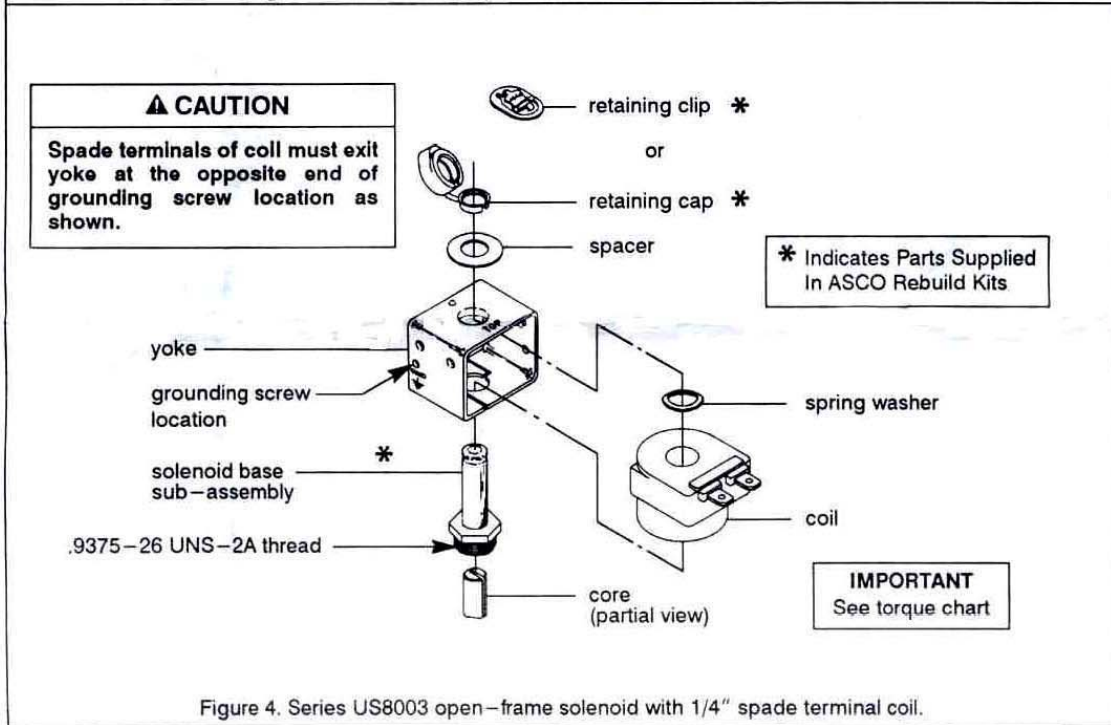
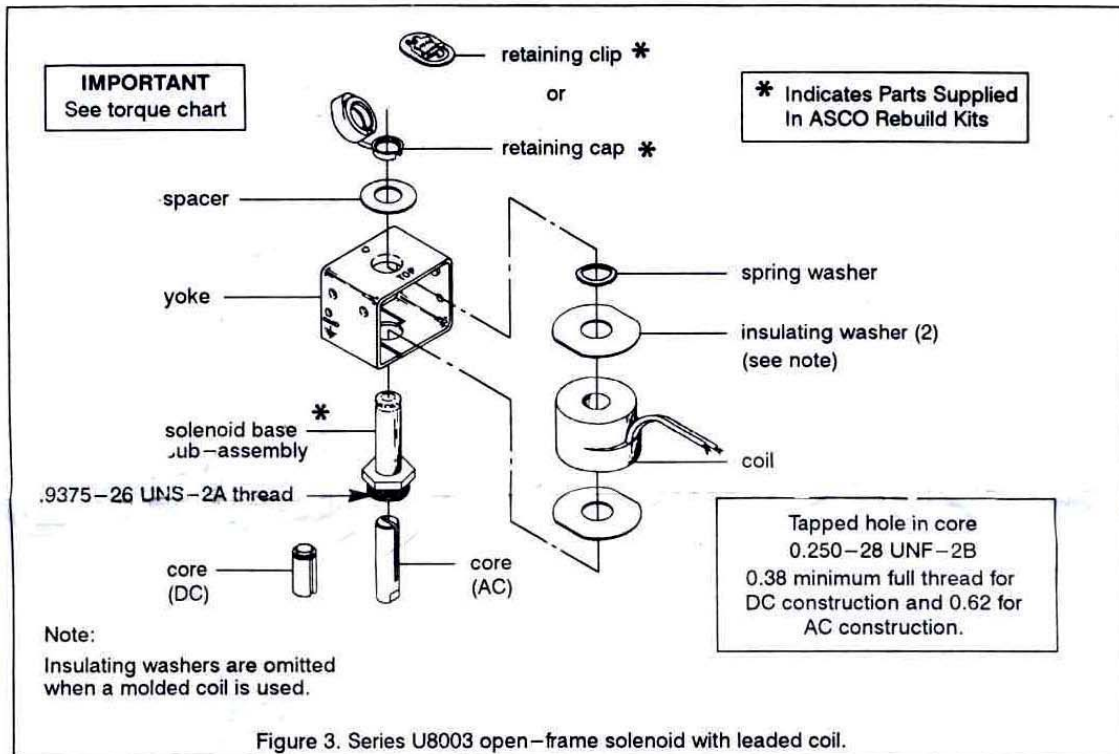
**▲ CAUTION: Solenoid must be fully reassembled because the yoke and internal parts complete the magnetic circuit. Be sure to replace insulating washer at each end of non-molded coil.**

### 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).





**Torque Chart**

Part Name	Torque Value Inch-Pounds	Torque Value Newton-Meters
Solenoid base sub-assembly	175 ± 25	19,8 ± 2,8

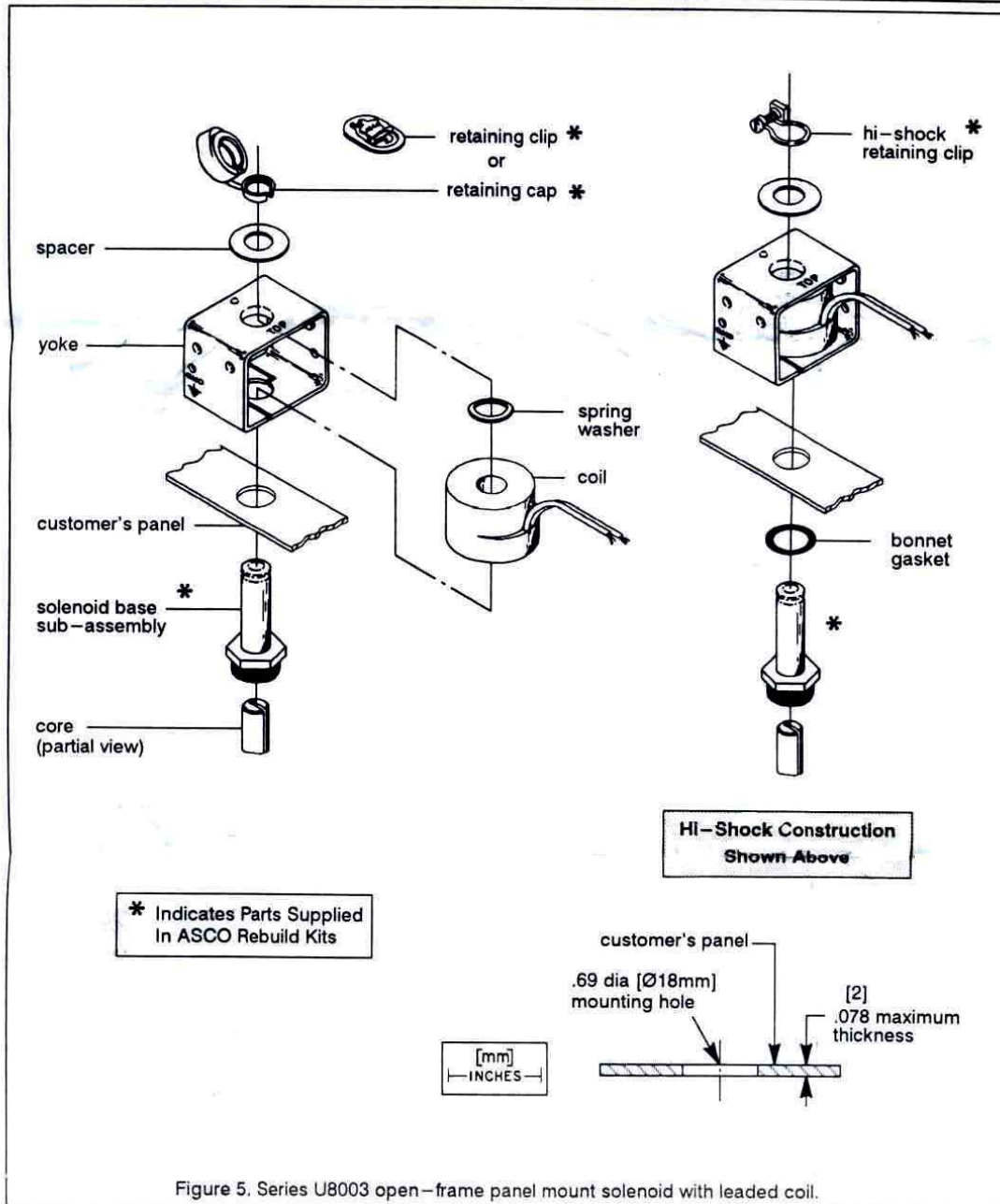


Figure 5. Series U8003 open-frame panel mount solenoid with leaded coil.

# INSTALLATION AND MAINTENANCE INSTRUCTIONS

## 2-WAY INTERNAL PILOT OPERATED SOLENOID VALVES HUNG DIAPHRAGM – 3/8, 1/2 AND 3/4 N.P.T. NORMALLY CLOSED OPERATION

BULLETINS

8210  
8211



Form No. V-5825

### DESCRIPTION

Bulletin 8210's are 2-way, normally closed, internal pilot operated solenoid valves. Valve body and bonnet are of brass construction. Standard valves have a General Purpose, NEMA Type 1 Solenoid Enclosure.

Bulletin 8211's are the same as Bulletin 8210's except the solenoids are equipped with an enclosure which is designed to meet NEMA Type 4 Watertight, NEMA Type 7 (C or D) Hazardous Locations - Class I, Group C or D, and NEMA Type 9 (E, F or G) Hazardous Locations - Class II, Group E, F or G. The explosion-proof/watertight solenoid enclosure is shown on a separate sheet of Installation and Maintenance Instructions, Form No. V-5380.

Bulletin 8210 and 8211 valves with suffix 'HW' in the catalog number are specifically designed for hot water service.

### OPERATION

Normally Closed: Valve is closed when solenoid is de-energized and opens when solenoid is energized.

### MANUAL OPERATOR (Optional)

Valves with suffix 'MO' in catalog number are provided with a manual operator which allows manual operation when desired or during an interruption of electrical power. To operate valve manually, push in knurled cap and rotate clockwise 180°. Disengage manual operator by rotating knurled cap counterclockwise 180° before operating electrically.

### MANUAL OPERATOR LOCATION (Refer to Figure 3)

Manual operator (when shipped from factory) will be located over the valve outlet. Manual operator may be relocated at 90° increments by rotating valve bonnet. Remove bonnet screws (4) and rotate valve bonnet with solenoid to desired position. Replace bonnet screws (4) and torque in a crisscross manner to 110 ± 10 inch pounds.

If valve is installed in system and is operational, proceed in the following manner:

**WARNING: Depressurize valve and turn off electrical power supply.**

1. Remove retaining cap or clip and clip the entire solenoid enclosure off the solenoid base sub-assembly. CAUTION: When metal retaining clip disengages, it will spring upwards.
2. Remove bonnet screws (4) and rotate valve bonnet to desired position.
3. Replace bonnet screws (4) and torque in a crisscross manner to 110 ± 10 inch pounds.
4. Replace solenoid enclosure and retaining clip or cap.

### INSTALLATION

Check nameplate for correct catalog number, pressure, voltage and service.

### TEMPERATURE LIMITATIONS

For maximum valve ambient and fluid temperatures refer to chart. The temperature limitations listed are for UL applications. For non UL applications, higher ambient and fluid temperature limitations are available. Consult factory. Check catalog number on nameplate to determine maximum temperatures.

Construction	Coil Class	Catalog Number Prefix	Maximum Ambient Temp. °F.	Maximum Fluid Temp. °F.
A-C Construction (Alternating Current)	A	None or DA	77	180
	F	DF or FT	122	180
	H	HT	140	180
D-C Construction (Direct Current)	A, F or H	None, FT or HT	77	150
Catalog Numbers Suffix 'HW'	A	None or DA	77	210
	F	DF or FT	77	210
	H	HT	122	210

### POSITIONING/MOUNTING

Valve may be mounted in any position. For mounting bracket (optional feature) dimensions, refer to Figure 1.

### PIPING

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only; if applied to valve threads, it may enter the valve and cause operational difficulty. Pipe strain should be avoided by proper support and alignment of piping. When tightening the pipe do not use valve as a lever. Wrenches applied to valve body or piping are to be located as close as possible to connection point. **IMPORTANT: Valves with suffix 'HW' in the catalog number have a special diaphragm material which is specifically compounded for hot water service. This material can be attacked by oil and grease. Wipe the pipe threads clean of cutting oils and use teflon tape to seal pipe joints.**

**IMPORTANT: For the protection of the solenoid valve, 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 the service conditions. See Bulletins 8600, 8601 and 8602 for strainers.**

### WIRING

Wiring must comply with Local and National Electrical Codes. Housings for all solenoids are provided with connections for 1/2 inch conduit. The general purpose solenoid enclosure may be rotated to facilitate wiring by removing the retaining cap or clip. CAUTION: When metal retaining clip disengages it will spring upwards. Rotate to desired position. Replace retaining cap or clip before operating.

**NOTE: Alternating Current (A-C) and Direct Current (D-C) Solenoids are built differently. To convert from one to the other, it is necessary to change the complete solenoid including the solenoid base sub-assembly and core assembly.**

### SOLENOID TEMPERATURE

Standard catalog valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched with the hand for only an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

### MAINTENANCE

**WARNING: Turn off electrical power and depressurize valve before making repairs. It is not necessary to remove valve from pipe line for repairs.**

Form No. V-5825

1975

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**CLEANING**

A periodic cleaning of all solenoid valves is desirable. The time between cleanings will vary, depending on media and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive leakage or noise will indicate that cleaning is required.

**PREVENTIVE MAINTENANCE**

1. Keep the medium flowing through the valve as free from dirt and foreign material as possible.
2. While in service, operate valve at least once a month to insure proper opening and closing.
3. Periodic inspection (depending on media and service conditions) of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any parts that are worn or damaged.

**IMPROPER OPERATION**

1. **Faulty Control Circuit:** Check electrical system by energizing solenoid. A metallic click signifies the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown-out fuses, open circuited or grounded coil, broken lead wires or splice connections.
2. **Burned-Out Coil:** Check for open circuited coil. Replace coil if necessary.
3. **Low Voltage:** Check voltage across coil leads. Voltage must be at least 85% of nameplate rating.
4. **Incorrect Pressure:** Check valve pressure. Pressure to the valve must be within range specified on nameplate.
5. **Excessive Leakage:** Disassemble valve and clean all parts. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

**COIL REPLACEMENT** (Refer to Figure 2)

Turn off electrical power supply and disconnect coil leads. Proceed in the following manner:

1. Remove retaining cap or clip, nameplate and cover. CAUTION: When metal retaining clip disengages, it will spring upwards.
2. Remove spring washer, insulating washer and coil. Insulating washers are omitted when a molded coil is used.
3. Reassemble in reverse order of disassembly paying careful attention to exploded view provided for identification and placement of parts.

**CAUTION:** Solenoid must be fully reassembled as the housing and internal parts are part of and complete the magnetic circuit. Place insulating washer at each end of coil if required.

**VALVE DISASSEMBLY** (Refer to Figures 2 and 3)

Depressurize valve and turn off electrical power supply. Proceed in the following manner:

1. Remove retaining cap or clip and slip the entire solenoid enclosure off the solenoid base sub-assembly. CAUTION: When metal retaining clip disengages, it will spring upwards.
2. Unscrew solenoid base sub-assembly and remove bonnet gasket.
3. Remove valve bonnet screws (4) and valve bonnet.
4. For normal maintenance, it is not necessary to disassemble the manual operator (optional feature) unless external leakage is evident. To disassemble remove stem pin, manual operator stem, stem spring and stem gasket.
5. Remove core spring, core/diaphragm sub-assembly and body gasket. CAUTION: Do not damage or distort hanger spring between core/diaphragm sub-assembly.
6. All parts are now accessible for cleaning or replacement. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

**VALVE REASSEMBLY**

1. Reassemble in reverse order of disassembly paying careful attention to exploded views provided for identification and placement of parts.
2. Replace body gasket and core/diaphragm sub-assembly. Locate the bleed hole in core/diaphragm sub-assembly approximately 45° from the valve outlet.
3. Replace core spring with wide end in core first; closed end protrudes from top of core.
4. If removed, replace manual operator stem, stem spring, stem gasket and stem pin.
5. Replace valve bonnet and bonnet screws (4). Torque bonnet screws (4) in a crisscross manner to  $110 \pm 10$  inch pounds.
6. Replace bonnet gasket and solenoid base sub-assembly. Put solenoid base sub-assembly to  $175 \pm 25$  inch pounds.
7. Replace solenoid enclosure and retaining cap or clip.
8. After maintenance, operate the valve a few times to be sure of proper opening and closing.

**SPARE PARTS KITS**

Spare Parts Kits and Coils are available for ASCO valves. Parts marked with an asterisk (\*) are supplied in Spare Parts Kits.

**ORDERING INFORMATION FOR SPARE PARTS KITS**

When Ordering Spare Parts Kits or Coils Specify Valve Catalog Number, Serial Number and Voltage.

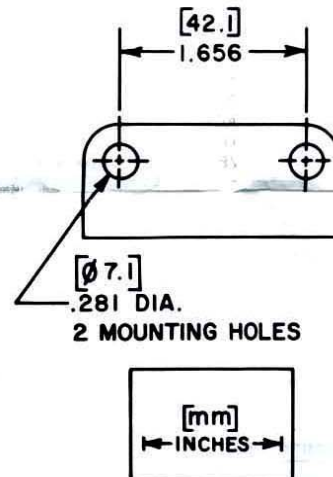
**PARTIAL VIEW OF MOUNTING BRACKET (OPTIONAL)**

Figure 1. Dimensions For Mounting Bracket (Optional Feature)

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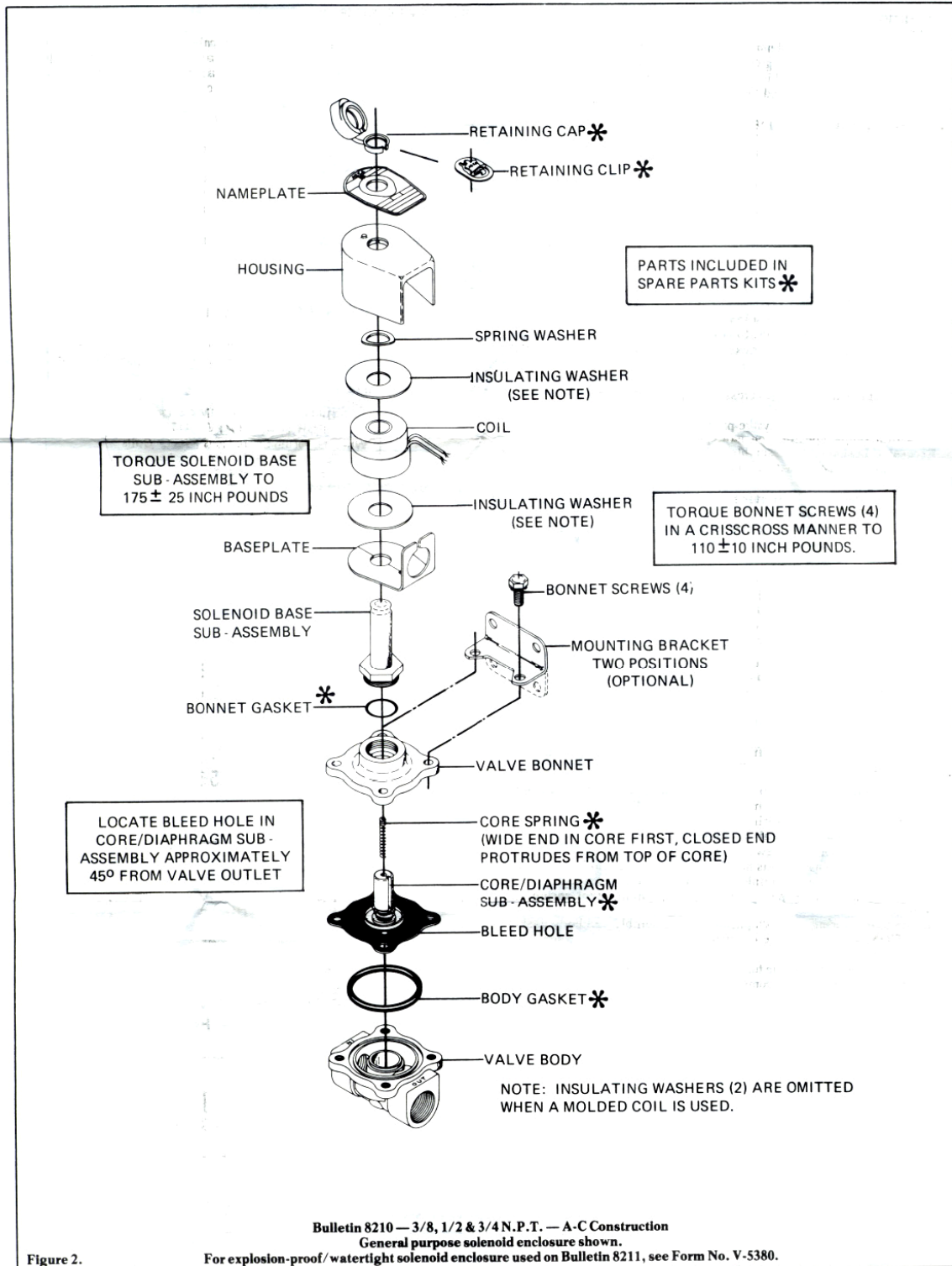


Figure 2.

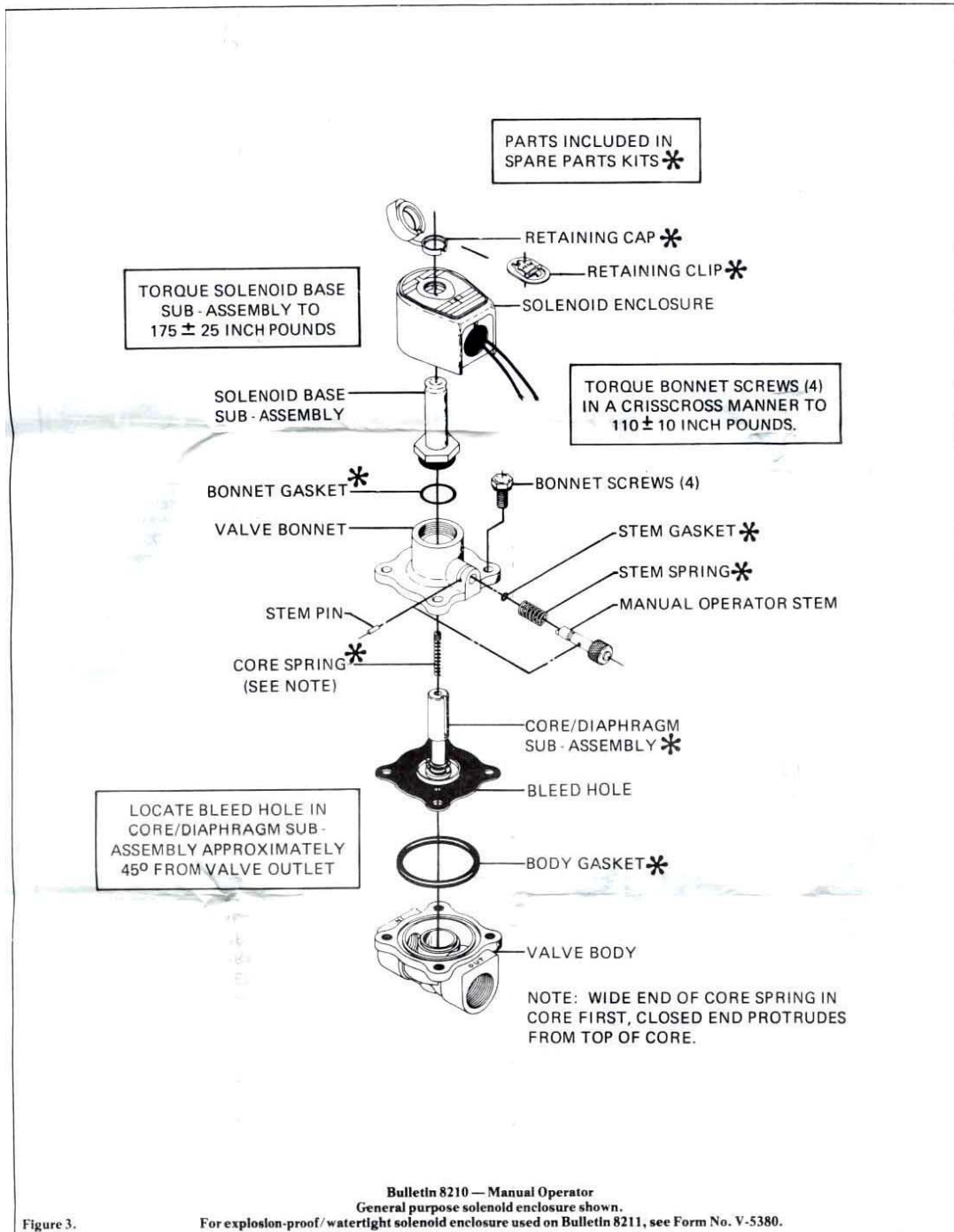


Figure 3.

<h1 style="margin: 0;">Installation &amp; Maintenance Instructions</h1> <p style="margin: 0;">2-WAY INTERNAL PILOTED-OPERATED SOLENOID VALVES BRASS AND STAINLESS STEEL CONSTRUCTION NORMALLY CLOSED OPERATION — 1", 1 1/4", &amp; 1 1/2" NPT</p>	<p style="margin: 0;"><b>SERIES</b> <b>8210</b> <b>8211</b></p> <p style="margin: 0;">Form No.V5455R4</p>
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**NOTICE:** See separate solenoid installation and maintenance instructions for information on: **Wiring, Solenoid Temperature, Cause of Improper Operation, Coil or Solenoid Replacement.**

**DESCRIPTION**

Series 8210 valves are 2-way normally closed internal pilot-operated solenoid valves designed for general service. Valves are made of rugged forged brass or stainless steel. Series 8210 valves are provided with a general purpose solenoid enclosure. Series EF8210 and 8211 are the same as Series 8210 except they are provided with an explosionproof or explosionproof/watertight solenoid enclosure.

**OPERATION**

**Normally Closed:** Valve is closed when solenoid is de-energized; open when energized.

**NOTE:** No minimum operating pressure differential required.

**Manual Operator (optional feature)**

Manual operator allows manual operation when desired or during an electrical power outage. To engage manual operator (open the valve), remove operator cap and gasket base of valve. Turn manual operator stem clockwise as far as possible. Do not force operator stem. Valve will then be in the same position as when the solenoid is energized. To disengage manual operator, turn stem counterclockwise as far as possible.

**▲ CAUTION:** Stem must be fully retracted counterclockwise before operating valve electrically.

Replace manual operator cap gasket and cap.

**INSTALLATION**

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

**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**

For maximum valve ambient and fluid temperatures, refer to chart below. Check catalog number prefix and watt rating on nameplate.

Watt Rating AC/DC	Catalog Number Prefix	Coil Class	Maximum Ambient Temp.	Maximum Fluid Temp.
15.1 & 16.1 AC	None, KF, SF or SC	F	125°F (51.7°C)	180°F (82°C)
	HT, KH, ST or SU	H	140°F (60°C)	180°F (82°C)
30.6 DC	HT	H	104°F (40°C)	77°F (25°C)

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**Positioning**

**AC Construction (Alternating Current):** Valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertical and upright so as to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

**DC Construction (Direct Current):** Valve must be mounted with solenoid vertical and upright.

**Piping**

Connect piping to valve according to markings on valve body. 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 protect the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601 and 8602 for strainers.

**MAINTENANCE**

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

**NOTE:** It is not necessary to remove the valve from the pipeline for repairs.

**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 open or close. Clean strainer or filter when cleaning the valve.

**Preventive Maintenance**

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- While in service, the 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. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

**Causes of Improper Operation**

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

**Valve Disassembly**

1. Disassemble valve in an orderly fashion using exploded views for identification and placement of parts. Refer to Figure 2 for AC construction; Figure 3 for DC construction.
2. Remove solenoid enclosure. See separate instructions.
3. Unscrew solenoid base sub-assembly. For DC construction, a special wrench is supplied in ASCO Rebuild Kit. For wrench only, Order ASCO Wrench Kit No. K168146-001.
4. Remove bonnet screws, valve bonnet, bonnet gasket, spring retainer (AC construction only) core spring, core/diaphragm sub-assembly and body gasket.
5. For valves equipped with a manual operator, remove cap, cap gasket, bonnet and bonnet gasket. Remove stem assembly with stem gasket from bonnet.
6. All parts are now accessible for cleaning or replacement. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

**Valve Reassembly**

1. Lubricate all gaskets and the disc at the base of the core/diaphragm sub-assembly with DOW CORNING 111® Compound lubricant or an equivalent high-grade silicone grease.
2. Replace body gasket and core/diaphragm sub-assembly. Locate bleed hole in core/diaphragm sub-assembly directly over valve outlet. For 1 1/2" NPT construction, locate bleed hole in core/diaphragm sub-assembly approximately 30° from valve outlet.
3. Replace core spring and spring retainer (AC construction only). Install small end of core spring in core first, wide end protruding from top of core. For DC construction, install core spring, small end down toward valve body.
4. Replace valve bonnet and bonnet screws. Hand tighten bonnet screws as far as possible.

**IMPORTANT:** Press firmly down on core/diaphragm sub-assembly to seat diaphragm assembly against valve seat. While holding this position, torque bonnet screws in a crisscross manner to 144 ± 15 in-lbs [16,3 ± 1,7 Nm].

5. Replace bonnet gasket and solenoid base sub-assembly. Torque solenoid base sub-assembly to 175 ± 25 in-lbs [19,8 ± 2,8 Nm]. For DC construction, the solenoid base sub-assembly must be placed inside the housing before assembling into the valve body. Before doing this, read separate lubrication instructions in *Solenoid Installation & Maintenance Instructions*.
6. For valves provided with a manual operator, replace stem assembly and bonnet (with gaskets). Torque bonnet to 75 ± 10 in-lbs [8,5 ± 1,1 Nm]. Replace cap gasket and cap.
7. Install solenoid. See separate instructions.

**⚠ WARNING:** To prevent the possibility of personal injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.

8. Restore line pressure and electrical power supply to valve.
9. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic *click* signifies the solenoid is operating.

**ORDERING INFORMATION****FOR ASCO REBUILD KITS**

Parts marked with an asterisk (\*) in the exploded view are supplied in Rebuild Kits. When Ordering Rebuild Kits for ASCO valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit 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.

**Torque Chart**

Part Name	Torque Value Inch-Pounds	Torque Value Newton-Meters
Manual operator bonnet	75 ± 10	8,5 ± 1,1

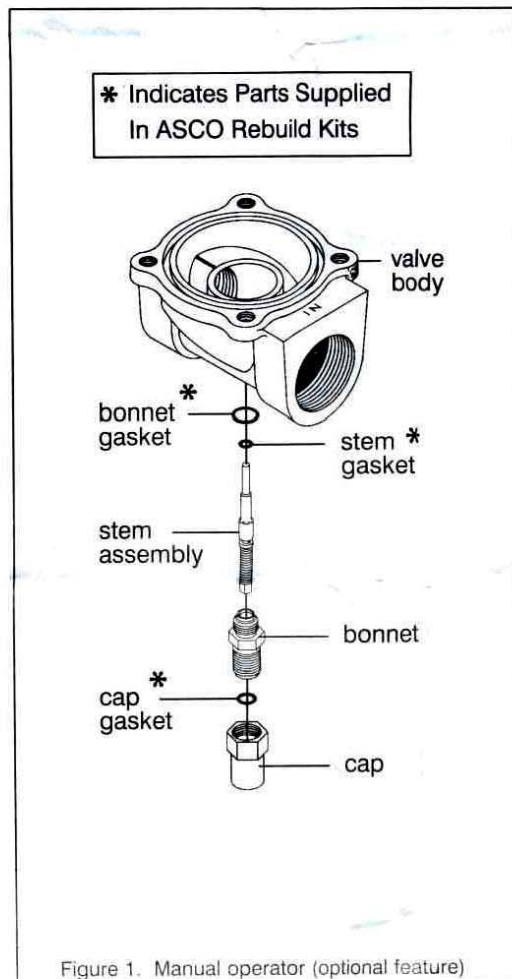
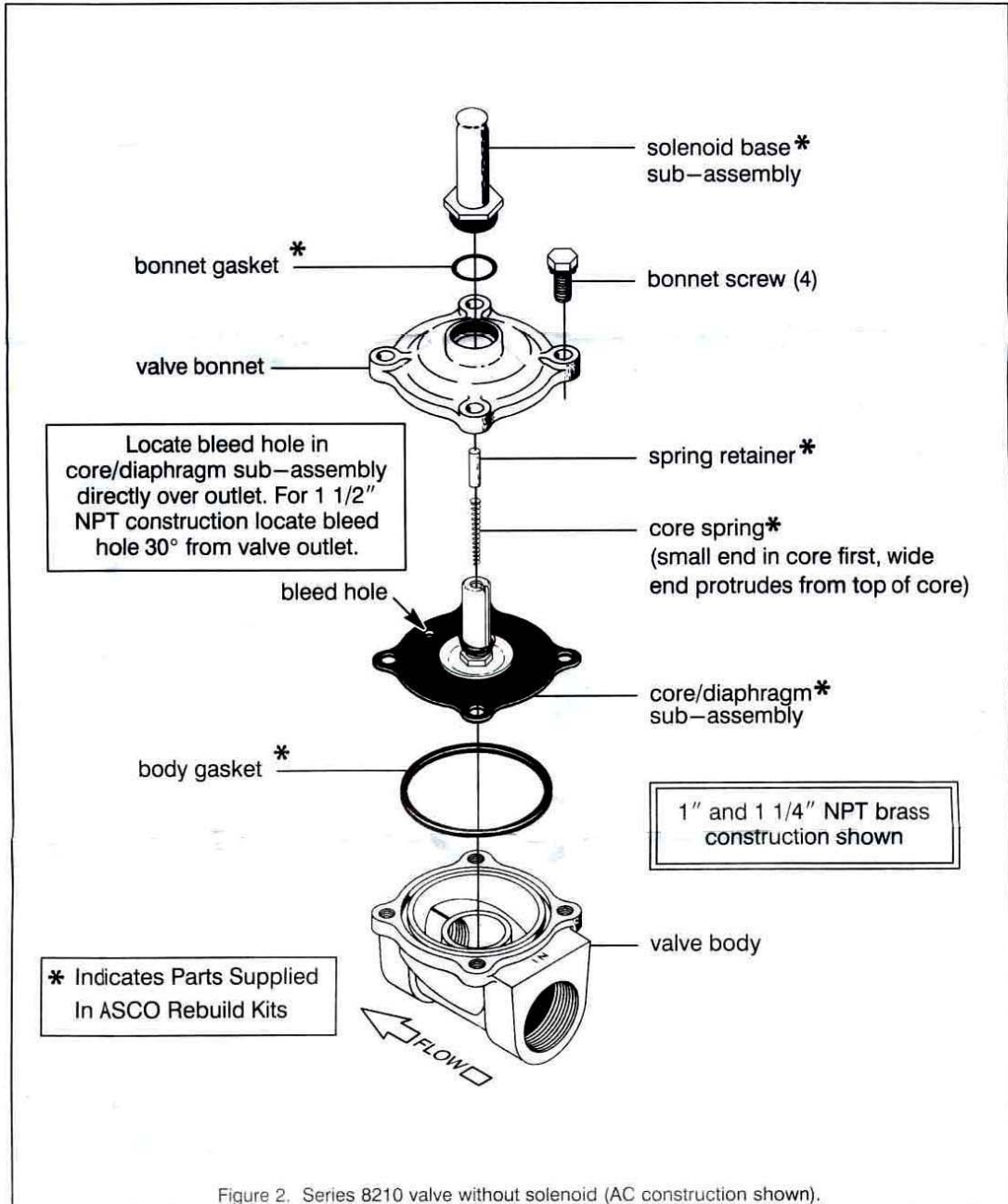


Figure 1. Manual operator (optional feature)



Torque Chart

Part Name	Torque Value Inch-Pounds	Torque Value Newton-Meters
Solenoid base sub-assembly	175 ± 25	19,8 ± 2,8
Bonnet screw	144 ± 15	16,3 ± 1,7



Torque Chart

Part Name	Torque Value Inch-Pounds	Torque Value Newton-Meters
Solenoid base sub-assembly	175 ± 25	19,8 ± 2,8
Bonnet screw	144 ± 15	16,3 ± 1,7

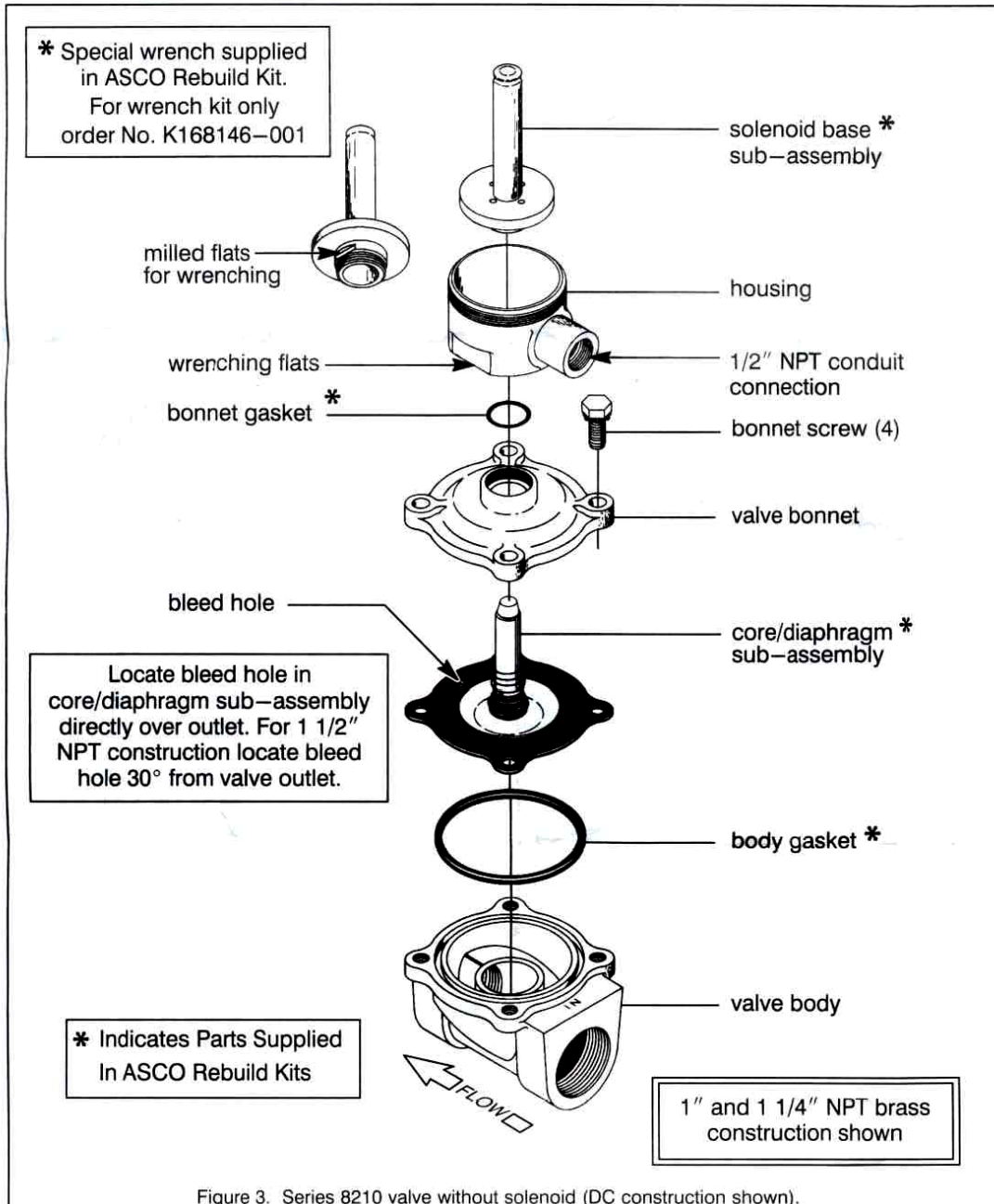


Figure 3. Series 8210 valve without solenoid (DC construction shown).

# Installation & Maintenance Instructions



OPEN-FRAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSIONPROOF SOLENOIDS

SERIES

8017G

8014G

Form No.V7221R1

**NOTICE:** See separate valve installation and maintenance instructions for information on: Operation, Positioning, Mounting, Cleaning, Preventive Maintenance, Causes of Improper Operation, Disassembly and Reassembly of basic valve.

## DESCRIPTION

Series 8017G and 8014G are epoxy encapsulated solenoids. The green solenoid with lead wires and 1/2" conduit connection is designed to meet Enclosure Type 1—General Purpose, Type 2—Dripproof, Types 3 and 3S—Raintight, and Types 4 and 4X—Watertight. The black solenoid on catalog numbers prefixed "EF" is designed to meet Enclosure Types 3 and 3S—Raintight, Types 4 and 4X—Watertight, Types 6 and 6P—Submersible, Type 7 (A, B, C & D) Explosionproof Class I, Division 1 Groups A, B, C, & D and Type 9 (E & F)—Dust—Ignitionproof Class II, Division 1 Groups E & F. See **Temperature Limitations** section for solenoid identification and nameplate/retainer for service. When Series 8017G is installed just as a solenoid and not attached to an ASCO valve, the core has a 0.250–28 UNF–2B tapped hole, 0.38 minimum full thread.

Catalog Nos. 8017G1 and 8017G2 are pull type direct-acting solenoids, while Catalog Nos. 8014G1 and 8014G2 are push type reverse-acting solenoids.

General purpose solenoids (green) are available in open-frame construction. This construction may be supplied with 1/4" spade, screw or DIN terminals (Refer to Figure 2).

## Optional Features For Type 1 – General Purpose Construction Only

- **Junction Box:** This junction box construction meets Enclosure Types 2, 3, 3S, 4, and 4X. Only solenoids with 1/4" spade or screw terminals may have a junction box. The junction box provides a 1/2" conduit connection, grounding and spade or screw terminal connections within the junction box (See Figure 3).
- **DIN Plug Connector Kit No. K236034:** Use this kit only for solenoids with DIN terminals. The DIN plug connector kit provides a two pole with grounding contact DIN Type 43650 construction (See Figure 4).

## OPERATION

Series 8017G – 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 is 1 pound, 12 ounces.

Series 8014G – When the solenoid is energized, the disc holder assembly seats against the orifice. **IMPORTANT:** Initial return force for the disc or disc holder assembly, whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force is 1 pound, 12 ounces. When the solenoid is de-energized, the disc holder assembly returns.

## INSTALLATION

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

**⚠ WARNING:** Electrical hazard from the accessibility of live parts. To prevent the possibility of death, serious injury or property damage, install the open-frame solenoid in an enclosure.

## FOR BLACK ENCLOSURE TYPES 7 AND 9 ONLY

**⚠ CAUTION:** To prevent fire or explosion, do not install solenoid and/or valve where ignition temperature of hazardous atmosphere is less than 180° C.

**NOTE:** These solenoids have an internal non-resettable thermal fuse to limit solenoid temperature in the event that extraordinary conditions occur which could cause excessive temperatures. These conditions include high input voltage, a jammed core, excessive ambient temperature or a shorted solenoid, etc. This unique feature is a standard feature only in solenoids with black explosionproof/dust-ignitionproof enclosures (Types 7 & 9).

**⚠ 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.

## Temperature Limitations

For maximum valve ambient temperatures, refer to chart. The temperature limitations listed, only indicate maximum application temperatures for field wiring rated at 90°C. Check catalog number prefix and watt rating on nameplate to determine maximum ambient temperature. See valve installation and maintenance instructions for maximum fluid temperature. **NOTE:** For steam service, refer to **Wiring** section, **Junction Box** for temperature rating of supply wires.

Temperature Limitations For Series 8017G or 8014G Solenoids for use on Valves Rated at 16.1 or 20.1 Watts

Watt Rating	Catalog Number Coil Prefix	Class of Insulation	Maximum Ambient Temp.
16.1	None, KF, KP, SD, SF, & SP	F	125°F (54°C)
20.1	FB, KF, KP, SD, SF, & SP	F	104°F (40°C)
16.1	None, KB, KH, SS, ST & SU	H	140°F (60°C)
20.1	HB, KH, SS, ST, SU & SV	H	140°F (60°C)

† Minimum ambient temperature –40° F (–40° C).

## 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.

## Wiring

Wiring must comply with local codes and the National Electrical Code. All solenoids supplied with lead wires are provided with a grounding wire which is green or green with yellow stripes and a 1/2" conduit connection. To facilitate wiring, the solenoid may be rotated 360°. For the watertight and explosionproof solenoid, electrical fittings must be approved for use in the approved hazardous locations.

**⚠ CAUTION:** Cryogenic Applications – Solenoid lead wire insulation should not be subjected to cryogenic temperatures. Adequate lead wire protection and routing must be provided.

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Page 1 of 4

ASCO Valves

Automatic Switch Co.

50–60 Hanover Road, Florham Park, New Jersey 07932

**Additional Wiring Instructions For Optional Features:**

- **Open – Frame solenoid with 1/4" spade terminals.**

For solenoids supplied with screw terminal connections use #12–18 AWG stranded copper wire rated at 90°C or greater. Torque terminal block screws to 10 ± 2 in–lbs [1,0 ± 1,2 Nm]. A tapped hole is provided in the solenoid for grounding, use a #10–32 machine screw. Torque grounding screw to 15 – 20 in–lbs [1,7 – 2,3 Nm]. On solenoids with screw terminals, the socket head screw holding the terminal block to the solenoid is the grounding screw. Torque the screw to 15 – 20 in–lbs [1,7 – 2,3 Nm] with a 5/32" hex key wrench.

- **Junction Box**

The junction box is used with spade or screw terminal solenoids only and is provided with a grounding screw and a 1/2" conduit connection. Connect #12–18 AWG standard copper wire only to the screw terminals. Within the junction box use field wire that is rated 90°C or greater for connections. For steam service use 105°C rated wire up to 50 psi or use 125°C rated wire above 50 psi. After electrical hookup, replace cover gasket, cover, and screws. Tighten screws evenly in a crisscross manner.

- **DIN Plug Connector Kit No.K236034**

1. The open–frame solenoid is provided with DIN terminals to accommodate the plug connector kit.
2. Remove center screw from plug connector. Using a small screwdriver, pry terminal block from connector cover.
3. Use #12–18 AWG stranded copper wire rated at 90°C or greater for connections. Strip wire leads back approximately 1/4" for installation in socket terminals. The use of wire –end sleeves is also recommended for these socket terminals. Maximum length of wire –end sleeves to be approximately 1/4". Tinning of the ends of the lead wires is not recommended.
4. Thread wire through gland nut, gland gasket, washer and connector cover.

NOTE: Connector housing may be rotated in 90° increments from position shown for alternate positioning of cable entry.

5. Check DIN connector terminal block for electrical markings. Then make electrical hookup to terminal block according to markings on it. Snap terminal block into connector cover and install center screw.
6. Position connector gasket on solenoid and install plug connector. Torque center screw to 5 ± 1 in–lbs [0,6 ± 1,1 Nm].

**Installation of Solenoid**

Solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid.

**Solenoid Temperature**

Standard solenoids are designed for continuous duty service. When the solenoid is energized for a long period, the solenoid becomes hot and can be touched by hand only for an instant. This is a safe operating temperature.

**MAINTENANCE**

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

**Cleaning**

All solenoid operators and valves should be cleaned periodically. The time between cleaning will vary depending on medium and service conditions. In general, if the voltage to the solenoid is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. Clean strainer or filter when cleaning the 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 Circuit:** 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 solenoid, broken lead wires or splice connections.
- **Burned–Out Solenoid:** Check for open–circuited solenoid. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate/retainer and marked on the solenoid. Check ambient temperature and check that the core is not jammed.
- **Low Voltage:** Check voltage across the solenoid leads. Voltage must be at least 85% of rated voltage.

**Solenoid Replacement (Refer to Figure 1)**

1. Disconnect conduit, coil leads, and grounding wire.

NOTE: Any optional parts attached to the old solenoid must be reinstalled on the new solenoid. For removal or assembly of optional parts, see Figure 2, 3 or 4.

2. Snap off red cap from top of solenoid base sub–assembly.
3. Push down on solenoid. Then using a suitable screwdriver, insert blade between solenoid spacer and nameplate/retainer. Pry up slightly and push to remove.
4. Remove solenoid spacer and solenoid from solenoid base sub–assembly.
5. Reassemble in reverse order of disassembly. Use exploded views for identification and placement of parts.

**Disassembly and Reassembly of Solenoids**

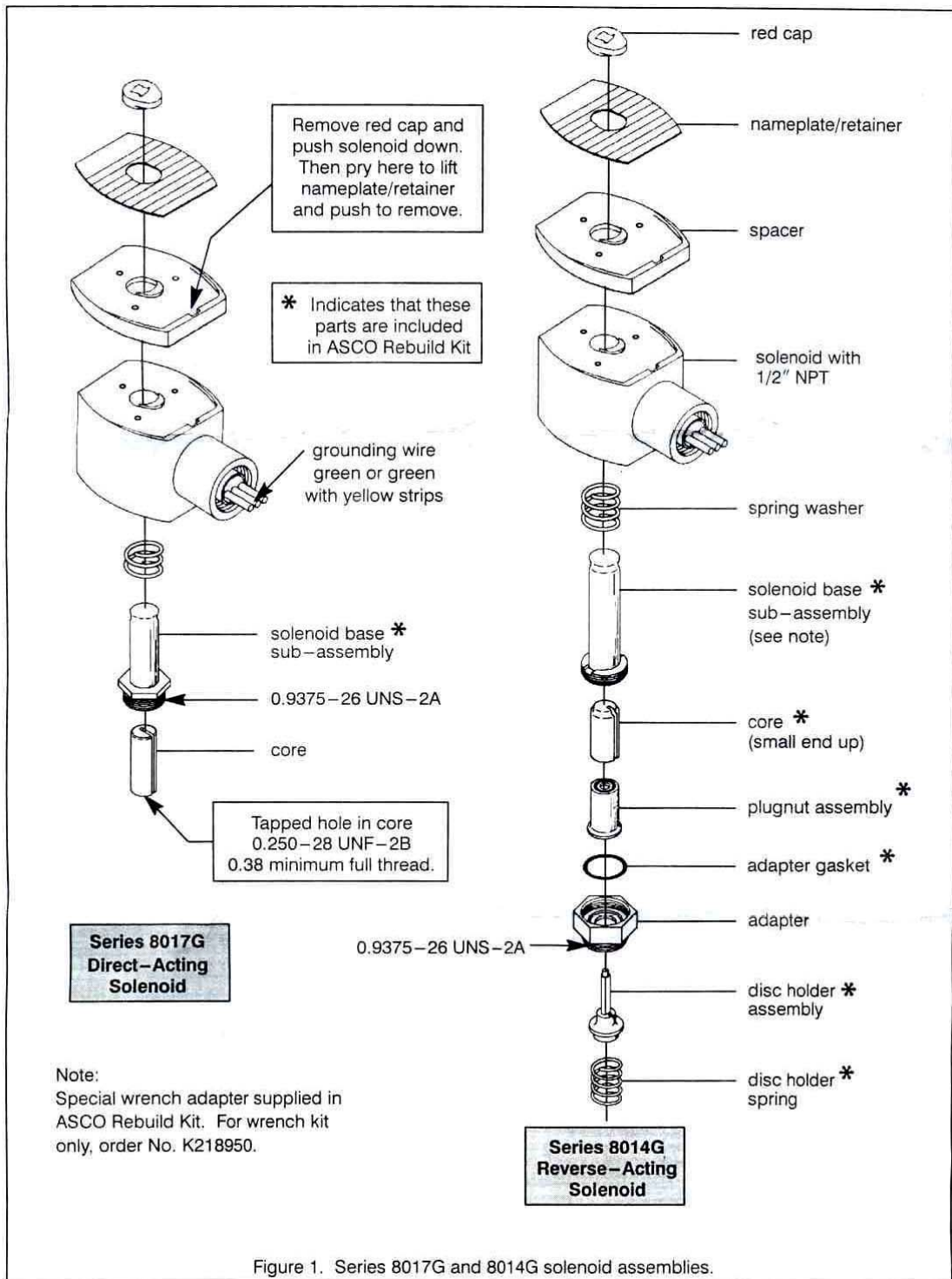
1. Remove solenoid, see *Solenoid Replacement*.
2. Remove spring washer from solenoid base sub–assembly.
3. Unscrew solenoid base sub–assembly from valve body. For Series 8014G solenoids a special wrench adapter for the solenoid base sub–assembly is supplied in the ASCO Rebuild Kit. For wrench adapter only, order Wrench Kit No. K218950.
4. Remove internal solenoid parts for cleaning or replacement. Use exploded views for identification and placement of parts.
5. If the solenoid is part of a valve, refer to basic valve installation and maintenance instructions for further disassembly.
6. Reassemble in reverse order of disassembly. Use exploded views for identification and placement of parts.
7. Torque solenoid base sub–assembly and adapter to 175 ± 25 in–lbs [19,8 ± 2,8 Nm].

**ORDERING INFORMATION FOR ASCO SOLENOIDS**

When Ordering Solenoids for ASCO Solenoid Operators or Valves, order the number stamped on the solenoid. Also specify voltage and frequency.

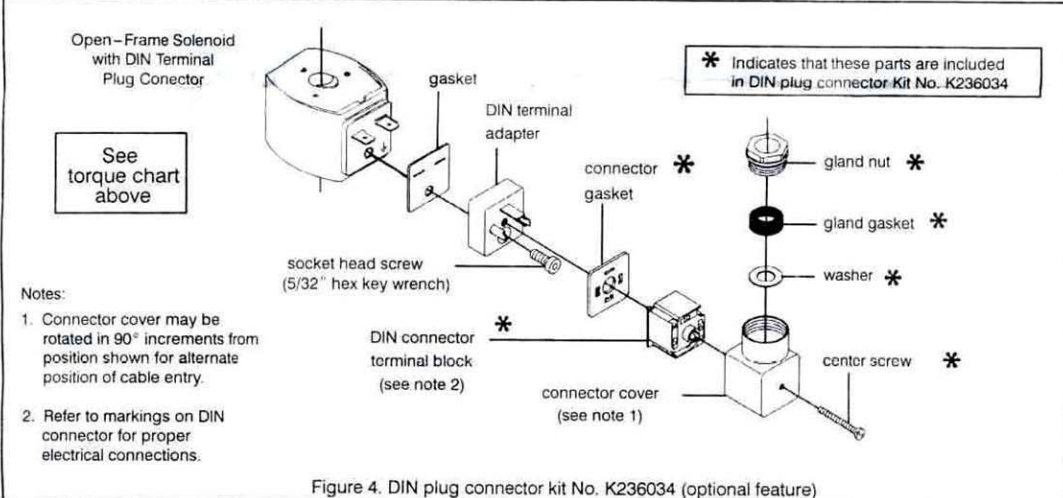
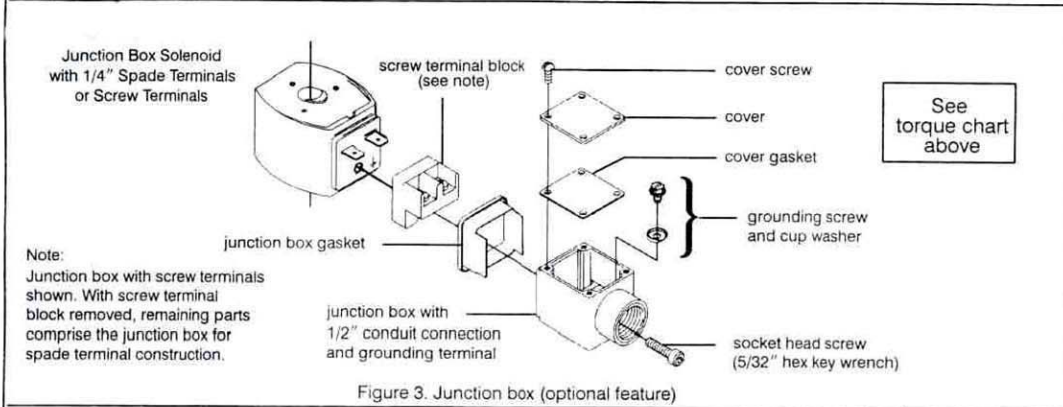
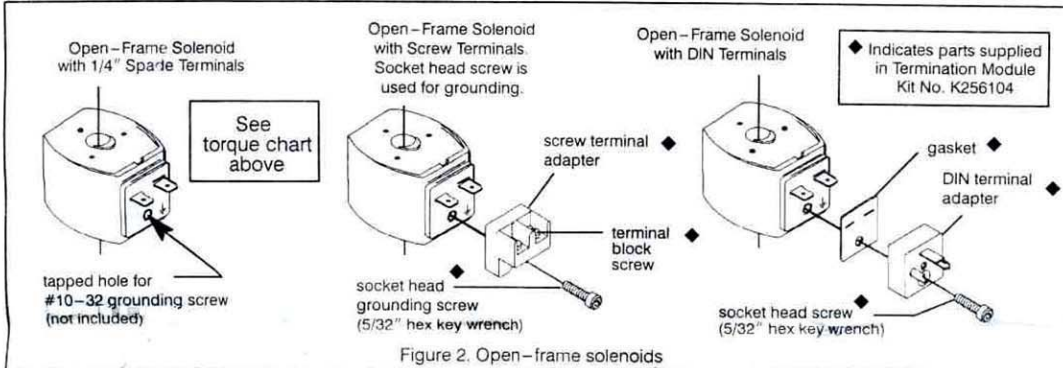
**Torque Chart**

Part Name	Torque Value In–lbs	Torque Value Nm
Solenoid base sub–assembly & adapter	175 ± 25	19,8 ± 2,8



**Torque Chart**

Part Name	Torque Value in Inch-Pounds	Torque Value in Newton-Meters
terminal block screws	10 ± 2	1,1 ± 0,2
socket head screw	15 – 20	1,7 – 2,3
center screw	5 ± 1	0,6 ± 0,1



# Installation & Maintenance Instructions

2-WAY AUXILIARY-OPERATED PILOT-CONTROLLED PISTON VALVES  
 NORMALLY CLOSED OR NORMALLY OPEN OPERATION  
 1/2, 3/4, 1, 1 1/4, 1 1/2, 2 OR 2 1/2 NPT  
 BRONZE OR STAINLESS STEEL CONSTRUCTION

SERIES  
**8290**  
 Form No. V6941R2

**NOTICE:** See separate Installation and Maintenance Instructions for information on *Solenoid Pilot Valve* used in conjunction with Series 8290 valves.

### DESCRIPTION

Series 8290 valves are 2-way auxiliary-operated, pilot-controlled piston valves designed for air, water, high oil or steam service. Valves are normally closed or normally open construction as required. Valve bodies are made of bronze or type 316L stainless steel; elastomers are made of PTFE. Series 8290 valves are supplied with a piston type operator having a diameter of 50, 63, 90 or 125 mm depending upon customer requirements. Valves have an integral position indicator, providing visual indication of *Open* and *Closed* positions; with the exception of the 50 operator.

### OPERATION

Refer to operating instructions (to follow) and the graphs *Auxiliary Pilot Pressure vs Main Line Pressure*. Use these graphs to determine the minimum auxiliary pressure (filtered air or water) required for a given main line pressure.

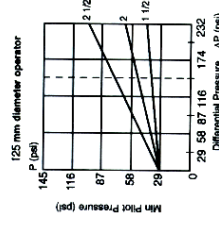
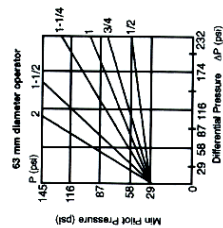
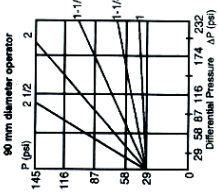
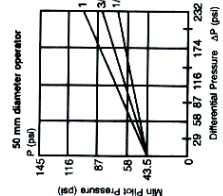
**Normally Closed Operation:** With auxiliary pressure removed valve is closed. With auxiliary pressure applied valve is open.

**Normally Open Operation:** With auxiliary pressure removed valve is open. With auxiliary pressure applied valve is closed.

**IMPORTANT:** Pressure is at Port 2 (entry under disc) for all liquids and gases. For rapid cycling steam valve pressure is at Port 1 (entry above disc).

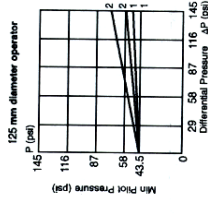
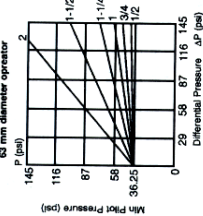
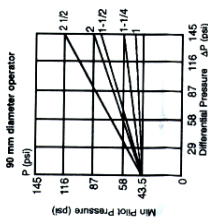
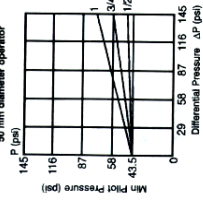
**NOTICE:** See corresponding product leaflets (on valves and pilot valves) for ambient and maximum pilot pressure, operating pressure, differential and fluid temperature.

### Normally Open Valves (entry under disc)



Normally closed – (entry under disc) Minimum pilot pressure is 58 psi; maximum 145 psi.

### Normally Closed Valves – Steam Service (entry above disc)



### INSTALLATION

Check nameplate for correct catalog number, pressure (main and auxiliary), temperature and service. Never apply incompatible fluids or excessive torque to the pipe. Installation and valve maintenance to be performed by qualified personnel.

**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 – Main Valve

- Ambient Temperature Range:
  - 12°F (-10°C) to 140°F (60°C)
  - Fluid Temperature Range:
    - 12°F (-10°C) to 356°F (180°C)

### Positioning

This valve is designed to perform properly when mounted in any position.

### Pilot Valve Installation (General)

For ease of access to solenoid pilot valve and auxiliary piping alignment, the piston operator with the pilot port connection may be rotated 360°. Remove the plastic protective plug from the pilot port. See separate instructions and drawings covering normally closed and normally open operation.

open operation. Then follow the connection procedures for the appropriate version:

- to the 1/8" NPT port (for 50 or 63 mm operator), see separate instructions for pilot valves.
- to the 1/4" NPT port (for 90 or 125 mm operator), see separate instructions for pilot valves.

### CAUTION: The exhaust port plug mounted by the manufacturer must never be removed.

Protect piping to valve according to markings on valve body. Pressure (main and auxiliary) must be maintained in all liquids and gases. For rapid cycling steam valves (entry above disc), the valve must be closed before applying pipe compound sparingly to make tight. The compound 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 piston operator head as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

**CAUTION: To protect the piston operated valve, install a strainer or filter suitable for the service involved (where practical) in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601 and 8602 for strainers.**

**MAINTENANCE**

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

NOTE: It is not necessary to remove the main valve from the pipeline for repairs. However, the piping or tubing and electrical connections must be disconnected from the solenoid pilot valve. See separate instructions.

**Cleaning**

All valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, 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 open or close. Clean strainer or filter when cleaning the valve.

**Preventive Maintenance**

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- While in service, the valve should be operated at least once a month to insure proper opening and closing.
- Depending on the medium and service conditions, periodic cleaning of the valve may be necessary. Damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

**Causes of Improper Operation**

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

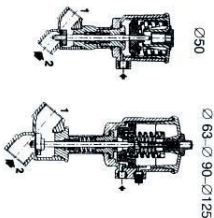
**Valve Disassembly and Reassembly**

1. Disassemble valve in an orderly fashion using exploded view for identification and placement of parts.
  2. Disconnect piping and wiring from solenoid pilot valve. See separate instructions.
  3. Remove the piston operator and stuffing box packing with a wrench (a).
  4. Unscrew the disc nut with a wrench (b).
  5. Clean all accessible parts.
  6. Replace parts numbers 1, 2, 3 and 4 with the corresponding parts from the ASCO Rebuild Kit.
  7. Reassemble the parts and observe the indicated tightening torques.
  8. Reinstall piping and make electrical connection to solenoid pilot valve. See separate instructions.
- ▲ WARNING:** To prevent the possibility of death, serious injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.
9. Restore pressure (main and auxiliary) and electrical power supply to solenoid pilot valve.
  10. After maintenance is completed, operate the valve a few times to be sure of proper operation.

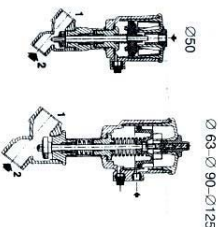
**ORDERING INFORMATION FOR ASCO REBUILD KITS**

When Ordering Rebuild Kits for ASCO Valves, order the Rebuild Kit number that corresponds to the size of the valve. The size is not visible, order by indicating the number of the Catalog Number and Serial Number of the valve(s) for which they are intended.

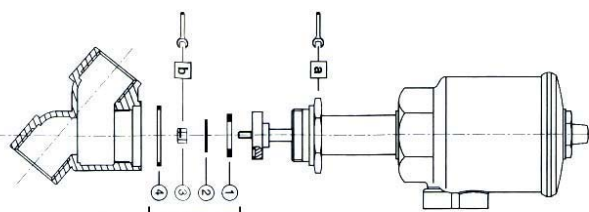
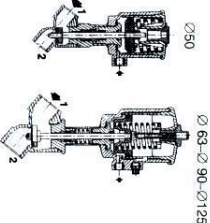
**Normally Closed Pilot (entry under disc)**



**Normally Open Pilot (entry under disc)**



**Normally Closed Pilot (entry above disc)**



• Valves: bronze, st.st, AISI 316L

TORQUES					
Ø (mm)	N.m	In.Lb	Ø (mm)	N.m	In.Lb
1/2	15	100	5	880	44
3/4	20	100	5	880	44
1	25	120	5	1060	44
1 1/4	32	120	5	1060	44
1 1/2	40	150	5	1320	44
2	50	150	5	1320	44
2 1/2	65	200	5	1770	44

\* Ø 50 bronze : a = 30

• Valves: bronze, st.st, AISI 316L

CATALOGUE NUMBER - CODES					
Ø (mm)	Disc seal (1) + washer (2) + disc nut (3) + seal (4)	Ø (mm)	Disc seal (1) + washer (2) + disc nut (3) + seal (4)	Ø (mm)	Disc seal (1) + washer (2) + disc nut (3) + seal (4)
1/2	15	5	880	1/2	15
3/4	20	5	880	3/4	20
1	25	5	1060	1	25
1 1/4	32	5	1060	1 1/4	32
1 1/2	40	5	1320	1 1/2	40
2	50	5	1320	2	50
2 1/2	65	5	1770	2 1/2	65



Serie - Series  
**189 banjo**

Messa in servizio - Instalacion - Installatie  
**ELETTROVALVOLA DI COMANDO A MONTAGGIO DIRETTO**  
 corpo filettato G1/8 e raccordo istantaneo tubo Ø 4mm est  
**ELECTROVALVULA DE MANDO CON IMPLANTACION DIRECTA**  
 cuerpo roscado G1/8 y enchufe rapido para tubo Ø 4mm  
**DIRECT MONTEERBAAR MAGNEETVENTIEL**  
 G1/8 poort aansluiting, insteekkoppeling Ø 4 mm ext.

**3/2**

<b>IT</b>	<b>ES</b>	<b>NL</b>
<b>IMBALLAGGIO</b> In sacchetto di plastica: a - Bobina b - Connettore c - Corpo elettrovalvola d - Clip e - Riduttore di scarico non montato (accessorio)	<b>SUMINISTRO</b> En bolsa de plástico: a - Bobina b - Conector c - Cuerpo de la electroválvula d - Clip e - Reductor de escape sin montar (accesorio)	<b>VERPAKKING</b> In een plastic verpakking: a - Spool b - Stecker c - Magnetventielbehuizing d - Clip e - Niet-gemonteerd smoothventiel (accessoire)

**APPLICAZIONI**  
APPLICATIONS

**MONTAGGIO - MONTAJE - MONTAGE**

**DE**

**ANWENDUNG**

Kompaktes Steuerventil zur direkten Montage auf einem pneumatischen Antrieb (ein-lachwirkender Zylinder, Ventil usw.). Einfache Montage, da das Ventilgehäuse, der Versorgungsanschluß (1), der Magnet und die Geräteboxe um 360° drehbar sind.

Zum Einsatz mit Luft oder neutralen Gasen.

**GB**

**APPLICATIONS**

Solenoid valve of compact design for direct installation on an actuator (single-acting cylinder, valve etc.). Mounting facilitated by 360° rotation capability of valve body, supply port (1), coil and connector.

For use with neutral gases and air.

**FR**

**APPLICATIONS**

Electrovanne compacte prévue pour l'installation directe sur un actionneur (vérin simple effet, vannes etc.). Grande flexibilité d'adaptation grâce aux possibilités d'orientation sur 360° du corps de l'électrovanne, de l'orifice d'alimentation (1), de la bobine et du connecteur.

Utilisation sur air ou gaz neutres

**DE**

**MONTAGE**

- I - Schrauben Sie den Magnet ein und befestigen Sie den Clip.
- II - Schrauben Sie das Magnetventil mit dem Verbrauchersanschluss (2) mit Hilfe eines Gabelschlüssels, Schlüsselweite 14, oder eines Schraubendrehers in das Anschlußgewinde des pneum. Antriebes.
- III - Positionieren Sie das Ventil und schließen Sie den Druckanschluß (1) mit einem 8mm Schlüsselschlüssel an.
- IV - Drehen Sie die Sicherungsmutter des beweglichen Auslaßdrossels oder des als Zubehör separat gelieferte Auslaßdrossels (Bestell-Code 346 00 380) in den Auslaß (3).
- V - Drehen Sie die Schraube (e1) der Auslaßdrossel bis zum Anschlag in das Gewinde (3) (Ø M5) ein und lösen Sie sie anschließend wieder mit nicht mehr als 3 Umdrehungen, um den Entlüftungsrundlauf zu erhöhen.
- VI - Der max. Durchfluß wird bereits nach 1 Umdrehung erreicht.
- VII - Befestigen Sie die Sicherungsmutter (e2) mit einem Gabelschlüssel, SW 8 mm.
- VIII - Überprüfen Sie die Feineinstellung durch, um den gewünschten Durchfluß zu erhalten.
- Die Auslaßdrossel darf nur im drucklosen Zustand eingestellt werden.

**GB**

**INSTALLATION**

- I - Fit coil and retaining clip.
- II - Screw the magnet valve into the 14mm open end wrench or screwdriver.
- III - Orientate valve and connect 4mm O.D. pressure supply hose to port (1).
- IV - Fit exhaust reducer supplied with valve or separately (code 346 00 380).
- V - Screw fitting (e1) into port 3 (M5) or the reducer until it bottoms, then unscrew it by not more than three turns to increase the exhaust flow (maximum flow obtained after 1 turn).
- VI - Tighten locknut (e2) with an 8mm open end wrench.
- VII - Pressurize then test.
- VIII - Adjust to obtain the required flow rate.
- Adjustment should be made with the reducer. The reducer must only be adjusted when unpressurised.

**FR**

**INSTALLATION**

- I - Montage de la bobine et du clip de verrouillage.
- II - Visser l'électrovanne par l'orifice d'alimentation (2) à l'aide d'une clé plate de 14 ou par tournevis.
- III - Choix de l'orientation et raccordement de l'arrivée de pression sur orifice (1) par tube souple Ø4mm ext.
- IV - Montage du réducteur d'échappement livré avec l'électrovanne ou fourni séparément en accessoire code 346 00 380.
- V - Visser dans l'orifice 3 (Ø 5) ou dans le réducteur jusqu'à ce qu'il bute, puis dévisser pour augmenter le débit d'échappement sans jamais dépasser 3 tours (débit maximal obtenu à partir d'1 tour).
- VI - Bloquer le contre-écrou (e2) avec une clé plate de 8 mm.
- VII - Mise sous pression, puis essai.
- VIII - Ajuster le réglage en fonction du débit d'échappement souhaité.
- Le réglage de l'électrovanne doit obligatoirement s'effectuer hors pression.

**DE**

**ELEKTRISCHER ANSCHLUSS**

Um 360° drehbarer Magnet  
 Elektrischer Anschluß über 3-poliges Gehäuse (Bestellcode 346 00 380) (Pg 9P) (Ø M8).  
 Geräteboxe mit Leuchtdiode und Schutzbeschaltung oder Kabel 2m lang (auf Anfrage).

Das Ventil ist für Dauerversorgung bei der angegebene maximal zulässige Umgebungstemperatur ausgelegt (60°C).  
 Wechselstrom 50/60 Hz oder Gleichstrom.  
 Überprüfen Sie bitte vor der Inbetriebnahme die Spannung und Versorgungsstromquelle, um Überlastungen zu vermeiden.  
 Ersatzspule lieferbar.  
 Das Magnetventil ist mit einer selbsthaltenden Handbetätigung mit Schlitzschache versehen.

**GB**

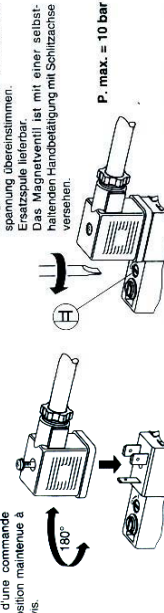
**ELECTRICAL CONNECTION**

Coil rotatable through 360°.  
 Electrical connection by standard 3-pin spade plug (two power terminals + earth) with CMB (Pg 9P).  
 Connector rotatable through 180°.  
 Connector supplied with integral display and protection system, or 2m lead on request (consult us).  
 Valve designed for continuous duty at up to ambient temperature limit (60°C).  
 Operates on DC or 50Hz or 60Hz AC.  
 Before energizing, check that line voltage matches coil voltage rating.  
 Coil available as a spare part.  
 Valve features a screwdriver-type locking manual operator.

**FR**

**RACCORDEMENT ELECTRIQUE**

Bobine orientable sur 360°.  
 Le raccordement électrique s'effectue par connecteur débrochable normalisé 3 broches (2 + masse) avec CMB (Pg 9P).  
 Connecteur orientable à 180°.  
 Connecteur livré avec affichage et protection câbles enregistrés long 2m, sur demande, nous consulter.  
 Electrovanne prévue pour une mise sous tension permanente dans les limites de température ambiante maximale (60°C).  
 Courant alternatif 50 Hz ou 60 Hz ou courant continu.  
 Avant mise sous tension, vérifier la condition de la tension.  
 Vérifier la compatibilité entre bobine et réseau d'alimentation.  
 Bobine proposée en pièces de rechange.  
 Electrovanne équipée d'une commande manuelle auxiliaire à position maintenue à commande par tournevis.





# MATERIAL SAFETY DATA SHEET

## I. PRODUCT IDENTIFICATION

Trade name (as labeled) DURABLA BLACK (Compressed Gasket Material)

MANUFACTURER'S NAME DURABLA MANUFACTURING COMPANY

Address (complete mailing address): 140 Sheree Blvd., P. O. Box 700, Lionville, PA 19341

Phone number for additional information: 610-363-8900

Date prepared or revised 9/15/94 (REV) Name of preparer\*

## II. HAZARDOUS INGREDIENTS

Chemical Names	CAS Numbers	Percent*	Exposure Limits in Air (give units)		
			ACGIH TLV	OSHA PEL	Other (specify)
Chrysotile Asbestos	1332-21-4	Approx. 80%	0.2 f/cc	0.2 f/cc	

## III. PHYSICAL PROPERTIES

Vapor density (air=1) N/A Melting point or range, °F N/A

Specific gravity 1.9 Boiling point or range °F N/A

Solubility in water Insoluble Evaporation rate (butyl acetate = 1) N/A

Vapor pressure, mmHg at 20 °C N/A

Appearance and odor: Asbestos is white and odorless, but is contained in a Styrene-butadiene or Nitrile (NBR) rubber binder which may be black or slate gray.

HOW TO DETECT THIS SUBSTANCE\* (warning properties of substance as a gas, vapor, dust or mist)

\*Not a required category

Note: All required categories should be addressed. If any item is not applicable, or no information is available, the space must be marked to indicate that.

The information contained herein is based on data provided from suppliers of the materials used and not on the mixture itself, and is believed to be correct. However, no warranty is expressed or implied regarding the accuracy of the data. Since the information contained herein may be applied under conditions beyond our control, the persons receiving it shall make their own determination of the suitability of the product for their particular purposes.

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#### IV. FIRE AND EXPLOSION

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Flash Point, °F (give method) N/A  
 Auto ignition temperature, °F N/A  
 Flammable limits in air, volume %: N/A lower (LEL) N/A upper (UEL) N/A  
 Fire extinguishing materials:  
 water spray  carbon dioxide \_\_\_\_\_ other:  
 foam  dry chemical  
 Special firefighting procedures: Non-combustible material. Type of fire will determine extinguishing material to be used.

Unusual fire and explosion hazards: Direct flame may ignite. Material contains rubber, which will burn slowly, emitting thick smoke. Self-contained breathing apparatus should be worn.

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#### V. HEALTH HAZARD INFORMATION

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SYMPTOMS OF OVEREXPOSURE for each potential route of exposure

Inhaled: Early symptom of asbestos overexposure may be reduced breathing capacity.  
 Contact with skin or eyes: Not probable route of overexposure.  
 Absorbed through skin: Not probable route of overexposure.  
 Swallowed: Not probable route of overexposure.

HEALTH EFFECTS OR RISKS FROM EXPOSURE. Explain in lay terms. Attach extra page if more space is needed.

Acute: None  
 Chronic: Exposure to high concentrations of asbestos dust increases risk of developing lung disease. Smokers are at greater risk.

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#### FIRST AID: EMERGENCY PROCEDURES

Eye Contact: N/A  
 Skin Contact: N/A  
 Inhaled: N/A  
 Swallowed: N/A

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#### SUSPECTED CANCER AGENT?

\_\_\_\_ NO: This product's ingredients are not found in the lists below.

YES:  Federal OSHA  NTP  IARC

California employers using Cal/OSHA - regulated carcinogens must register with Cal/OSHA. The Cal/OSHA and Federal OSHA carcinogen lists are similar.

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#### MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Asbestos may aggravate some medical conditions. For example, workers with emphysema can be affected.

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## VI. REACTIVITY DATA

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Stability:             Stable                             Unstable

Conditions to avoid:

Incompatibility (materials to avoid):    No known substances that reaction to would constitute a health hazard. Refer to product literature for application related limitations.

Hazardous decomposition products (including combustion products):    None

Hazardous polymerization:                             May occur                             Will not occur

Conditions to avoid:    None

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## VII. SPILL, LEAK AND DISPOSAL PROCEDURES

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Spill response procedures (include employee protection measures):

During removal, the used gasket should be wetted and its residue placed in impermeable bags for disposal. Small particles should be vacuumed with an approved system.

Preparing wastes for disposal (container types, neutralization, etc.):

Regular methods

NOTE: Dispose of all wastes in accordance with federal, state and local regulations.

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## VIII. SPECIAL HANDLING INFORMATION

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Ventilation and engineering controls: Provide adequate ventilation if PEL/TLV is exceeded.

Respiratory protection (type):    Unnecessary under normal use. However, approved (non-disposable) respirators are necessary if permissible exposure levels (PEL/TLV) are exceeded. Refer to 29 CFR 1910.1001 for respirator selection.

Eye protection (type):            Unnecessary under normal use.

Gloves (specify material):        Normally not required.

Other clothing and equipment:    Unnecessary under normal conditions.

Work practices, hygienic practices: The storage, handling or cutting of Durabla Black gasket material with a sharp blade or die, or the installation of a cut gasket, will not emit asbestos fibers in excess of the current OSHA action level limit. In removing a used gasket, we recommend using a gasket removal agent. If the user has reason to believe that asbestos fibers have been released, clean-up should be accomplished by using a vacuum cleaner equipped with a HEPA filter. No smoking, eating or drinking in work areas. Processes using drilling, grinding or sawing must be avoided.

Other handling and storage requirements: Store material in dry, ventilated areas.

Protective measures during maintenance of contaminated equipment:

**Do not drill, saw, grind, sand or subject material to any dust-producing process without adequate dust extraction or wetting down. Approved respirators should be worn during operations which will release asbestos fibers in excess of PEL/TLV limits.**

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