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## Introduction

This manual contains calibration and installation information for Moore Industries' Solenoid Valve (SVX). Along with a description of the SVX, this manual contains information regarding calibration, installation and theory of operation. Maintenance information is also included. Related tables and illustrations are provided for reference purposes.

This manual contains notes and cautions that must be observed to prevent equipment damage or minor inconveniences during calibration or installation of the SVX. The following definitions describe these captions:

A **NOTE** shall contain technical or literary information of a helpful nature. This information is intended to aid the reader's understanding of the subject being discussed and/or minimize inconveniences while performing technical tasks.

A **CAUTION** shall contain technical information of a serious nature that if ignored may cause equipment damage.

## Description

The SVX is a compact solenoid valve, which is available with bottom or rear pneumatic connections and four power input ranges (ac and dc) to accommodate many design applications. Two valve configurations are also offered: a 2-way, which does not vent to the outside; and a 3-way that vents to the atmosphere. The unit requires less than 1 watt of ac or dc power (12 Vdc, 24 Vdc, 117 Vac, or 240 Vac) to operate, and provides a flow coefficient (Cv) of 0.15 over a wide 10-100 psig range.

In its compact aluminum DIN-style housing, with mounting block, the SVX snaps onto standard mounting rails or optionally onto headers. Units without a pneumatic mounting block can be fitted onto a 19-inch rack-mounted header (RIR) or a surface-mounted header (SIR). Both mounting blocks and supply headers contain self-sealing valves. These valves allow the SVX to be removed and replaced without disturbing the pneumatic connections or causing accidental venting of supply or output air. RIR and SIR headers provide a 3/4-inch NPT common air supply connection (two connections on SIR).

Table 1 contains the SVX equipment specifications, including power inputs, pneumatic pressure range, and performance characteristics. See figure 4 for location of front panel features.

**Model Number.** The SVX model number describes the equipment type, functional characteristics, operating parameters, any options ordered, and housing. If all other documentation is missing, this number is used to identify equipment characteristics. The model number for the SVX is located on a label on the side of the unit.

**Serial Number.** Moore Industries maintains a complete history on every unit it sells and services. This information is keyed to the serial number. When service information is required on the SVX, it is necessary to provide the factory with this number. The serial number is located on the same label as the model number.

**Table 1. SVX Equipment Specifications**

Characteristic	Specification
<b>Power Input</b>	12 VDC, 24 VDC, 117 VAC or 240 VAC (+10%, -15%; 100% momentary)
<b>Pneumatic Pressure Range</b>	10-100 psig (0.7 - 7.0 bars)
<b>Configuration</b>	<p><b>* Output Venting:</b> 2-way, non-venting; 3-way, vented to atmosphere</p> <p><b>Output Mode:</b> Fixed as normally open (-NO) or normally closed (-NC) unless ordered with selectable output mode valve (-SO)</p>
<b>Performance</b>	<p><b>RFI Effect:</b> Not affected up to 50 V/M</p> <p><b>Flow Coefficient (Cv):</b> 0.15, minimum</p> <p><b>Power Consumption:</b> 1 watt, maximum</p>
<b>Connections</b>	<p><b>Pneumatic Supply:</b> 1/8" NPT female, bottom or rear location on units supplied with pneumatic mounting block</p> <p><b>Power Input:</b> Screw-clamp type, 22-14 AWG</p> <p><b>Pneumatic Output:</b> 1/8" NPT female, bottom or rear location on units supplied with pneumatic mounting block</p>
<b>Front Panel Features</b>	<p><b>Lamp:</b> Red LED on dc-powered units or neon bulb on ac-powered units, displays presence of power input (energized state)</p> <p><b>Output Mode Select Switch:</b> Optional manual 3-position slide valve selects normally open (NO) or normally closed (NC) output with a center OFF override position (no output)</p> <p><b>Output Pressure Indicator:</b> Optional output pressure indicator turns red with output pressure (<i>not recommended with less than 20 psig air supply</i>)</p>
<b>Operating Temperature</b>	<p><b>Range:</b> 32 to 140°F (0 to 60°C)</p> <p><b>Effect:</b> Less than 0.055%/°F (0.1%/°C)</p>
<b>Weight</b>	18 oz. (0.51 kg)
<p>* Units with 2-way configuration still vent a small amount of input air from the pilot valve cylinder, which is not connected to the output.</p>	

**Note:** See Installation Section for physical dimensions.

## Operation

This section contains information necessary to verify that the SVX is operating properly. Each unit is checked at the factory prior to shipment. Before installation, every SVX should be checked by the user for proper operation.

### NOTE

*The presence of appropriate power input (12 VDC, 24 VDC, 117 VAC or 240 VAC) to the SVX is indicated when the input lamp lights.*

## Equipment

Table 2 lists the equipment required to check the SVX. This equipment is not supplied with the unit and must be provided by the user.

## Setup

Figure 1 illustrates a typical bench check setup. To check the operation of the SVX, connect the unit as shown in this illustration.

## Checkout Procedures

Provide input power to the SVX and monitor the output pressure. Two functions must be verified:

- solenoid valve operation
- output pressure indicator

## Solenoid Valve Operation

Apply regulated air to the supply nozzle of the SVX. A minimum of 20 psig and a maximum of 100 psig is required to operate the unit. Switch the power on and off, and verify that the output reverses status (normally open [-NO] option becomes closed). See figure 2 for 2-way, non-venting units and figure 3 for 3-way. Both figures show the SVX with selectable output (-SO) option. For SVXs with the -NO or -NC option, simply pick the NO or NC column.

## Output Pressure Indicator Option

Switch the power on and off to change the output status. Observe the operation of the output pressure indicator. With output pressure, the window should appear red. When there is no pressure, the indicator should retract and the window should appear black.

### NOTE

*The output pressure indicator may not perform properly with less than 20 psig air pressure.*

**Table 2. Equipment Required**

Equipment	Description
Adjustable Voltage Source	12 VDC, 24 VDC, 117 VAC or 240 VAC
AC/DC Voltmeter	Accurate to within $\pm 0.05\%$
Instrument Air Supply	10-100 psig, filtered
Air Pressure Gauge	Accuracy not critical

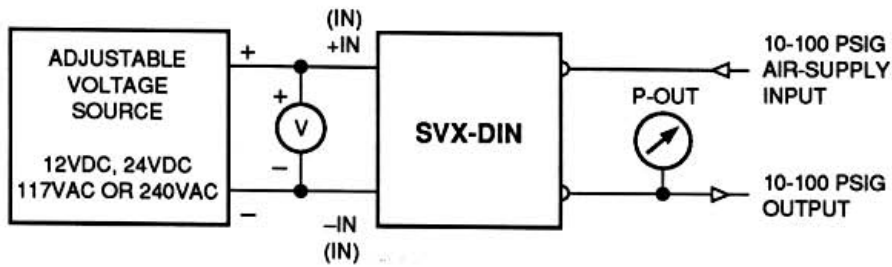


Figure 1. SVX Bench Check Setup

## 2-WAY VALVE FLOW PATTERN OPERATING MODE

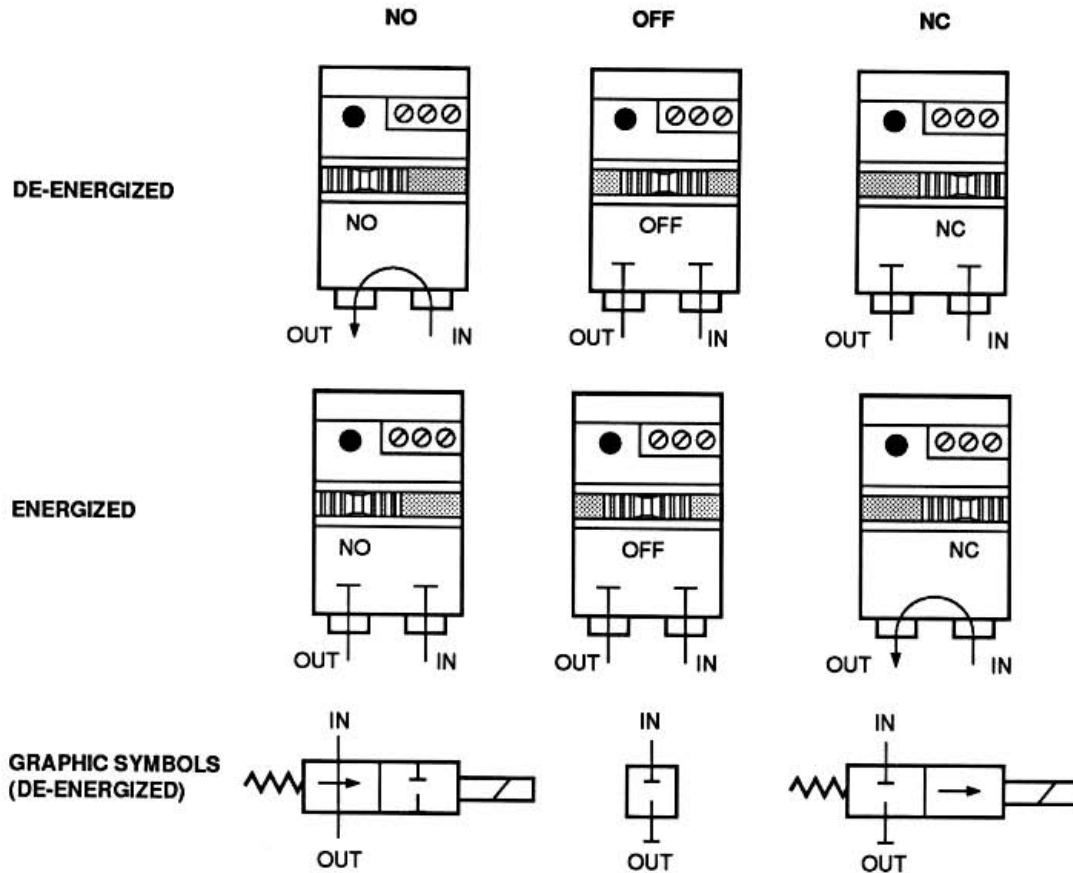
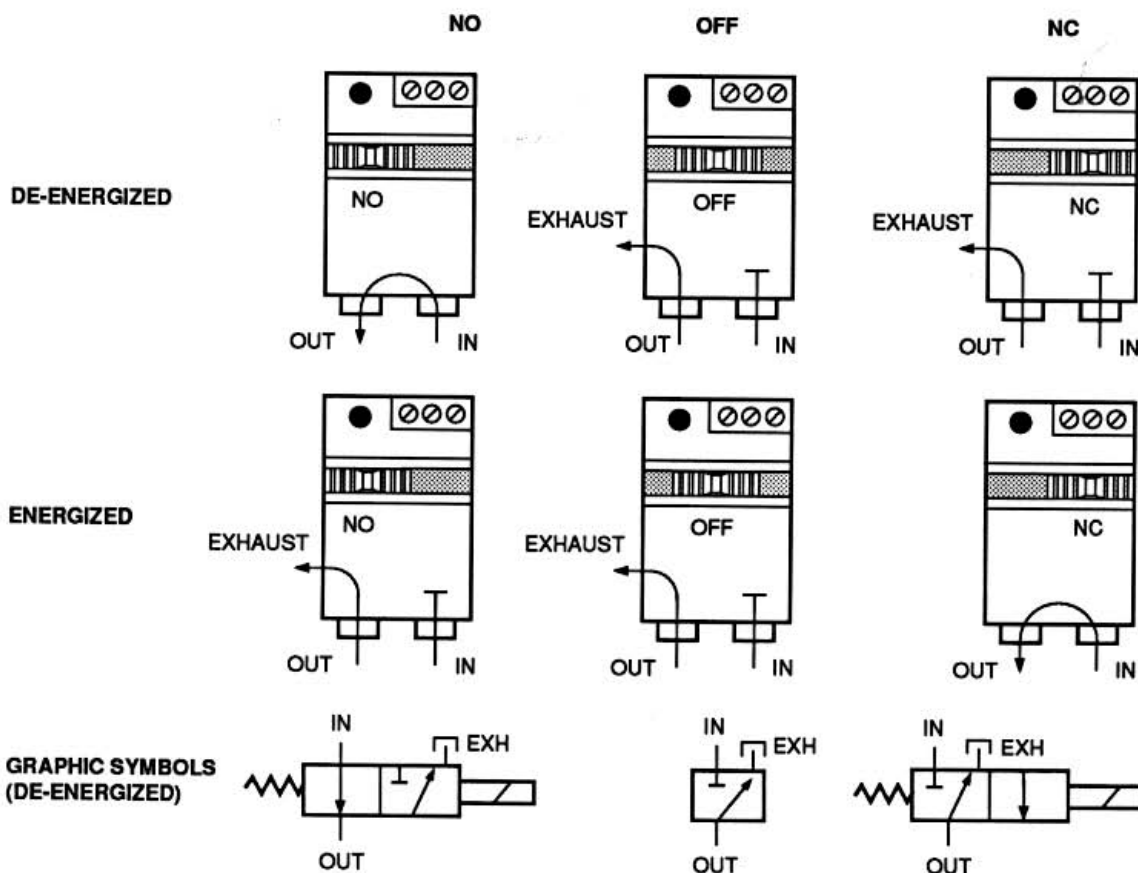


Figure 2. Valve Flow Pattern, 2-way

### 3-WAY VALVE FLOW PATTERN OPERATING MODE



**Figure 3. Valve Flow Pattern, 3-way**

# SVX

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## Installation

Installation of the SVX is divided into three phases: mounting, electrical connections, and pneumatic connections. In most cases, it is easier to mount the SVX before completing the electrical and pneumatic connections.

## Mounting

Individual SVXs consist of two parts: the solenoid valve and the mounting block. Units without a mounting block snap onto a header. SVXs with a mounting block are rail mounted. When mounting the SVX, ensure that the unit is mounted in an area free of dust, moisture, and corrosive elements. Figure 4 shows the mounting dimensions for both mounting styles.

### **CAUTION**

*It is recommended that mounting blocks and headers be purged of any debris prior to mounting the SVX. Insert a small diameter, blunt tip probe into the fitting and unseat the ball-check valves for a few minutes with the filtered instrument air supply in operation.*

Rack- or surface-mounted SVXs should be ordered with a Moore Industries' rack-mounted header (RIR) or a surface-mounted header (SIR). This eliminates the need for an interlocking mounting block and rail. Five, ten or fifteen units can be snapped onto one header, allowing multiple units to receive supply air

from one supply pipe. To mount an SVX onto a header, push the unit into place until the retaining lever snaps up flush beneath the handle. To remove an SVX, press down on the retaining lever and lift the unit out by the handle.

### **NOTE**

*Check valves in the headers prevent the loss of supply or output air during mounting or removal of SVXs.*

Rail-mounted SVXs must use a pneumatic mounting block. Pneumatic mounting blocks are 1.39 inches wide. Using a 0.17 inch wide gage between blocks provides a uniform spacing in a minimum rail length. For units with pneumatic mounting blocks, install the DIN rail with the wide side down (refer to figure 1). The G-style rail is per DIN specification 50035-G32, Moore P/N 800-124-24. To install pneumatic mounting blocks, locate the rail spring-clip against the rail with the mounting block bottom angled outwards. Push the block until it snaps into place. To remove, push upwards until bottom can be rotated free.

### **CAUTION**

*Do not apply force to retaining lever when installing mounting block. If retaining lever becomes bent, re-bend and straighten until lever bends slightly upward to ensure catching on case.*

### **NOTE**

*Installation of units onto mounting blocks or headers when input is pressurized may be difficult and require releasing pressure. First apply silicone grease to valve o-rings, since this may be sufficient.*



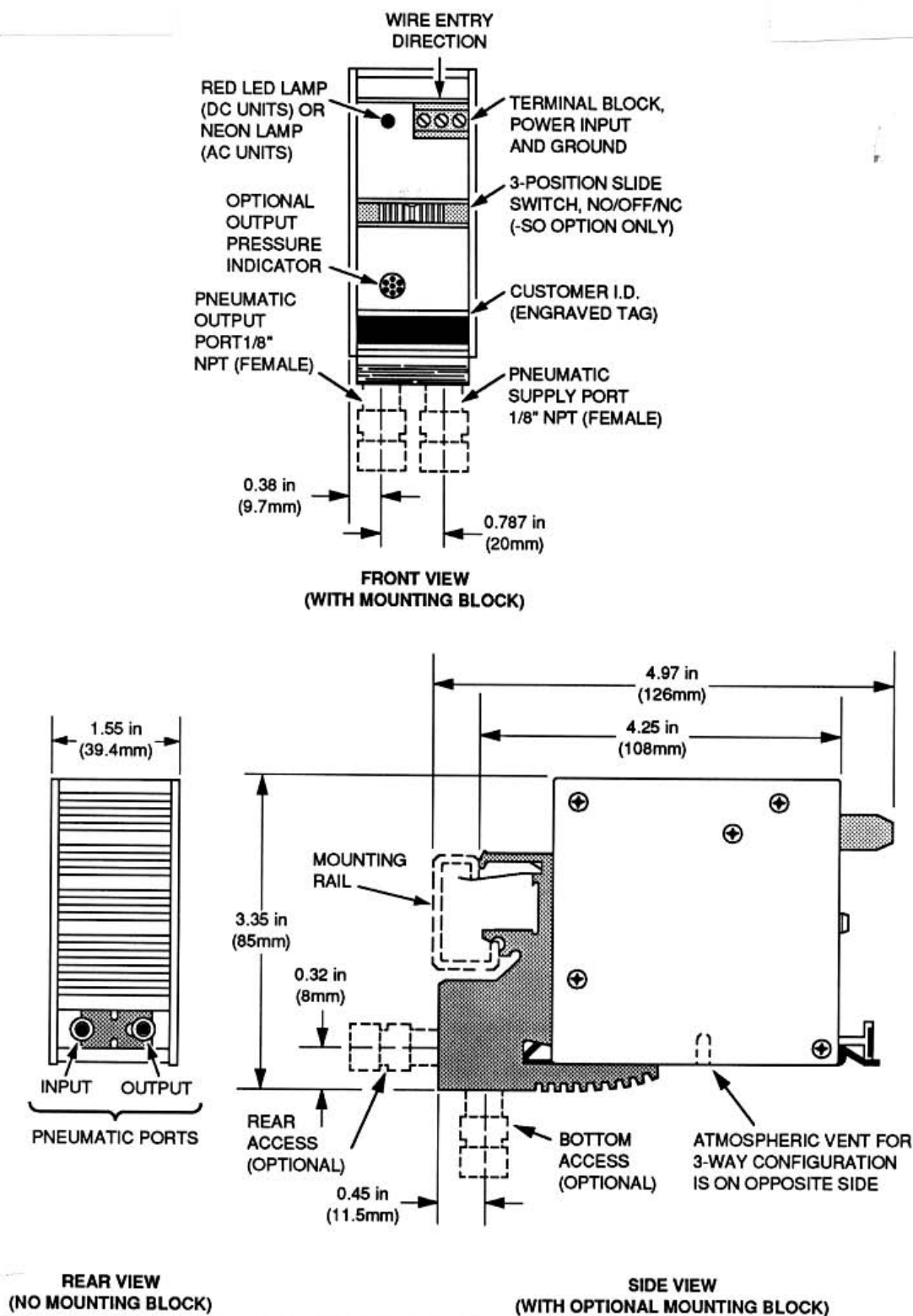


Figure 4. Mounting Dimensions

# SVX

## Electrical Connections

There are three terminals on the SVX for connecting input power and ground. The unit requires 12 VDC, 24 VDC, 117 VAC or 240 VAC power and a ground wire attached to the GND terminal. Table 2 lists the input power connections for the four voltage groups and corresponding wiring designations.

The electrical terminals are compression screw sockets that accept 22 to 14 AWG hookup wire. To complete these connections, use a slotted screwdriver with a head approximately 0.125 inch (3mm) in width to secure the wire leads to the SVX. The screws tighten down, which provides electrical contact between the wire and the terminal. Loosen each screw prior to inserting the wire being terminated. Strip the end of each wire. Then, while holding the uninsulated end of the wire in place, tighten the screw of the corresponding terminal.

## Pneumatic Connections

It is recommended that 1/4-inch diameter tubing be used for all outputs and supplies on pneumatic mounting blocks. Larger tubing may be necessary on longer runs, but smaller tubing may be used if an increased response time is allowable. SIR and RIR headers have an integral 0.92-inch (23 mm) diameter common supply with 3/4-inch NPT connections. The number of SVXs that run from a common supply determines the size of the tubing.

### NOTE

*Simultaneous operation of SVXs from a common supply may increase response time and pressure drop in the outputs of those units with outputs already under full pressure. Use over-sized lines to reduce pressure drop and response time.*

The SVX requires clean, water-free air. Although a stainless steel screen is provided on the supply port for gross particles, it is recommended that filters be installed to remove particles larger than 5 micron. This minimizes wear and provides for a long, trouble-free service life.

### CAUTION

*In most applications the output air is vented back through the SVX. For this reason, be sure to purge all output lines to prevent this contamination from damaging internal parts.*

## Unit Operation

Once adjusted and installed, the SVX operates unattended, except for occasional cleaning of the air supply filters.

If a malfunction is isolated to the SVX, refer to the Maintenance Section for recommendations. A unit may become warm during operation, especially where the ambient temperature is elevated. This is normal and should not be a cause for alarm unless a malfunction is also observed.

**Table 2. Input Power Connections**

Power	Ground (GND)	+IN (DC) IN (AC)	-IN (DCC) IN (ACC)
12 VDC	Green ground wire	Red positive wire	Black negative wire
24 VDC	Green ground wire	Red positive wire	Black negative wire
117 VAC	Green ground wire	Black positive wire	White negative wire
240 VAC	Green ground wire	Black positive wire	White negative wire

## Theory of Operation

This section describes briefly how the SVX operates. A simplified block diagram of the unit is included to help understand the circuit description. See figure 5.

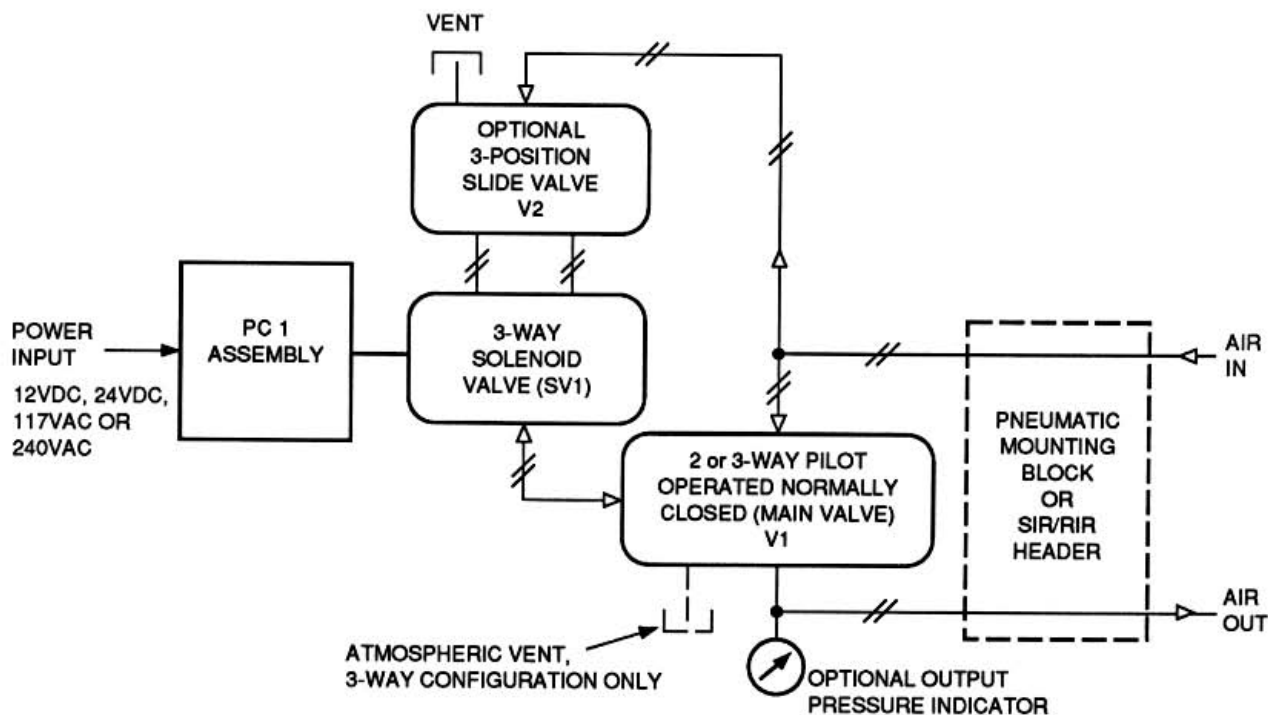
The main loop of the system flows from the supply nozzle through the main valve (V1) and out the output nozzle. The optional manual slide valve (V2) and the 3-way solenoid valve (SV1), function together as a control circuit for the SVX.

The optional slide valve is manually operated. It has three valve positions: normally closed (NC), normally opened (NO) and off. The SVX does not operate if the valve is placed in the off position, even with the

presence of input power and/or supply pressure. Placing the slide valve in the NO position, with pneumatic pressure at the supply nozzle and no power input, opens the 3-way main valve, allowing air out. Refer back to figures 2 and 3, which illustrate how the power input and the 3-position valve affect the output.

The 3-way solenoid valve (SV1) is a single winding, electrically sensitive valve, actuated with input power. When the solenoid is energized, controlled flow passages change condition. When the solenoid is de-energized, the controlled flow passages return to the original condition by spring return.

SVXs without the optional 3-position valve act in the same manner as described, but as if the valve was fixed in either the NO or NC condition.



**NOTE:** PILOT VALVE PORTION OF V1 VENTS INPUT AIR BACK THROUGH SV1 WITH -NO AND -NC OPTIONS OR THROUGH V2 WITH -SO OPTION. OUTPUT AIR VENTS BACK THROUGH V1 DIRECTLY TO ATMOSPHERE WITH 3-WAY CONFIGURATION AND NOT AT ALL WITH 2-WAY.

Figure 5. SVX Simplified Block Diagram

## Maintenance

Many components of the SVX have been thermally aged, tested, and selected using a computer-aided design program. This usually makes field repair unnecessary. It is therefore recommended that any unit found to be performing below specifications be returned to the factory in accordance with the instructions found on the back cover of this manual.

If a problem is suspected with the SVX, make sure that all connections are clean and tight. Verify that bench instruments used to take measurements have the proper range and accuracy and are currently certified.

During unit operation, instrument air flows continuously through the SVX and therefore the passageways must be kept clean. Depending on the purity of the air supply, the input and output ports must be periodically cleared of all contamination to maintain performance. Intermittent action or degraded response time may be caused by contamination in the air passage or input screen. The supply nozzle may be removed by pushing the nozzle retainer free with a screwdriver. Inspect the screen and remove contaminants.

Maintenance kits are available from the factory. For additional technical assistance or to obtain product drawings, contact Moore Industries' Customer Service Department at 1-800-999-2900.

## RETURN PROCEDURES

### To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

#### Warranty Repair –

If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

#### Non-Warranty Repair –

If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
  - a) A note listing the symptoms that indicate the unit needs repair
  - b) Complete shipping information for return of the equipment after repair
  - c) The name and phone number of the person to contact if questions arise at the factory
3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.
4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

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THE COMPANY MAKES NO EXPRESS, IMPLIED OR STATUTORY WARRANTIES (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY GOODS OR SERVICES SOLD BY THE COMPANY. THE COMPANY DISCLAIMS ALL WARRANTIES ARISING FROM ANY COURSE OF DEALING OR TRADE USAGE, AND ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY ACKNOWLEDGES THAT THERE ARE NO WARRANTIES IMPLIED BY CUSTOM OR USAGE IN THE TRADE OF THE BUYER AND OF THE COMPANY, AND THAT ANY PRIOR DEALINGS OF THE BUYER WITH THE COMPANY DO NOT IMPLY THAT THE COMPANY WARRANTS THE GOODS OR SERVICES IN ANY WAY.

ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY AGREES WITH THE COMPANY THAT THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY CONCERNING THE GOODS OR SERVICES SHALL BE FOR THE COMPANY, AT ITS OPTION, TO REPAIR OR REPLACE THE GOODS OR SERVICES OR REFUND THE PURCHASE PRICE. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES EVEN IF THE COMPANY FAILS IN ANY ATTEMPT TO REMEDY DEFECTS IN THE GOODS OR SERVICES. BUT IN SUCH CASE THE BUYER SHALL BE ENTITLED TO NO MORE THAN A REFUND OF ALL MONIES PAID TO THE COMPANY BY THE BUYER FOR PURCHASE OF THE GOODS OR SERVICES.

ANY CAUSE OF ACTION FOR BREACH OF ANY WARRANTY BY THE COMPANY SHALL BE BARRED UNLESS THE COMPANY RECEIVES FROM THE BUYER A WRITTEN NOTICE OF THE ALLEGED DEFECT OR BREACH WITHIN TEN DAYS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH, AND NO ACTION FOR THE BREACH OF ANY WARRANTY SHALL BE COMMENCED BY THE BUYER ANY LATER THAN TWELVE MONTHS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH.

#### RETURN POLICY

For a period of thirty-six (36) months from the date of shipment, and under normal conditions of use and service, Moore Industries ("The Company") will at its option replace, repair or refund the purchase price for any of its manufactured products found, upon return to the Company (transportation charges prepaid and otherwise in accordance with the return procedures established by The Company), to be defective in material or workmanship. This policy extends to the original Buyer only and not to Buyer's customers or the users of Buyer's products, unless Buyer is an engineering contractor in which case the policy shall extend to Buyer's immediate customer only. This policy shall not apply if the product has been subject to alteration, misuse, accident, neglect or improper application, installation, or operation. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.



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