



Tabletop Piston Filler Operation Manual

V1.2

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1.1 SAFETY

1.2 GENERAL SAFETY

Apex Filling Systems, LLC (APEX) manufactures and designs all of its products so they can be operated safely. However, the primary responsibility for safety rests with those who use and maintain these products. The following safety precautions are offered as a guide that if conscientiously followed, will minimize the possibility of accidents throughout the useful life of this equipment. The safety of personnel, equipment and plant facilities should be considered during equipment operation and with each changeover of product, or any machine modifications.

Only those who have been trained and delegated to do so and have read and understood this operator's manual should operate the equipment. Failure to follow the instructions, procedures and safety precautions in this manual can result in accidents and injuries.

DO NOT modify the equipment except with written factory approval. Unauthorized equipment modifications will void the warranty.

Each day walk around the equipment and inspect for leaks, loose parts, missing or damaged components, and parts out of adjustment. Perform all recommended maintenance noted in this manual.

EQUIPMENT SHOULD ALWAYS BE DE-ENERGIZED (POWER AND AIR) BEFORE MAKING MECHANICAL ADJUSTMENTS.

1.3 ELECTRICAL SHOCK

MOST PISTON FILLERS DO NOT REQUIRE ELECTRICITY, BUT IF SO EQUIPPED:

- To avoid electrical shock hazard, make sure this equipment is properly grounded.
- Dangerous voltages are present within the electrical enclosures. DO NOT operate this equipment with electrical covers open or removed.
- Keep all parts of the body, hand held tools, or other conductive objects away from exposed live-parts of the electrical system. Maintain dry footing and stand on insulating surfaces. DO NOT contact any portion of the equipment when adjusting or making repair to exposed live parts of electrical system.
- Attempt repairs only in a clean, dry, well-lighted, and ventilated area.

1.4 CONTACT MATERIALS COMPATIBILITY

APEX endeavors to make all contact parts compatible with buyer's products, if known. Because of the wide variety of possible products, Apex Filling Systems, LLC cannot be responsible or liable for ensuring compatibility of contact material with the products. Evaluate material compatibility prior to machine use. Failure to follow this procedure can result in machine damage, fire, operator injury or death.

1.5 SAFETY COMPLIANCE LIABILITY

APEX endeavors to make machinery as safe to operate as possible. National, state and local laws related to safety in the workplace apply primarily to the responsibilities of the employer, and not the equipment manufacturer. The seller agrees to cooperate with the buyer in finding feasible answers to compliance problems. However, because APEX has little control of the many factors which may significantly affect the environment in which this equipment is installed, the seller does not warrant this equipment to be in compliance with OSHA or any like state or local laws or regulations. It is the buyer's responsibility to provide the modifications necessary to assure compliance with the laws and regulations at the point of installation. **A complete inspection of product is necessary until the machinery is proven to produce acceptable results. This should also be performed after every changeover.**

1.6 CONVENTIONS

To ensure the safety of personnel which will install, adjust, maintain and operate this equipment, it is imperative that they understand the dangers, warnings and caution notices. It is important to understand the **signal words** that may be used throughout this manual.

	Alerts to immediate hazard, which will result in death or severe personal injury, if not avoided
	Alerts to a hazard which will result in serious injury, or death in some cases, if not avoided.
	Alerts to a potential hazard that may result in a serious personal injury, if not avoided. It also alerts against an unsafe practice that will permanently damage equipment or property.
IMPORTANT	Indicates a suggestion as to how to use or adjust the equipment for best product results.
NOTE	Points out a proper use that will avoid damage to the equipment, or will extend the life of the parts.

2.1 MACHINE FEATURES & SPECIFICATIONS

2.2 INTRODUCTION:

APEX Tabletop Piston Fillers are ideal for low to medium viscosity products such as food items, daily use chemicals, pesticides, medicines, creams and pastes. Standard tabletop models require no electricity, operating on compressed air only. Simple breakdown design provides easy cleaning and maintenance. The fillers can fill a wide variety of products into different containers with minimal downtime. PT Series fillers are designed for thin liquids, while PV Series fillers can handle thicker products, such as pastes and creams.

2.3 FEATURES & BENEFITS

- ✦ **Easy Changeover**
Simple mechanical adjustment for different bottle sizes. Quick to changeover, simple to use and easy to clean
- ✦ **Robust**
Stainless steel shells, frames, legs and housings maximize the working life of your machine, and minimize maintenance costs and downtime
- ✦ **Customizable**
Whatever the production need, APEX has a design to meet
- ✦ **Flexible**
Versatility and Simplicity are intrinsic to the design. Many container sizes and shapes, and many products can be run on one machine

2.4 PERFORMANCE SPECIFICATIONS

Dispensing Speed: up to 30 cpm (varies per application)

Dispensing Volume: .2-169oz (5-5000ml) depending upon piston and cylinder combination

Operating Temperature: 32 to 122 Degrees F (0 to 50 Degrees C) / 10% to 95% RH (non condensing)

2.5 MECHANICAL DIMENSIONS

Standard Dimensions (ref): SPV 125 - 36" x 32" x 12" (914mm x 812mm x 305mm)
SPT 125 – 30" x 16" x 16" (762mm x 406mm x 406mm)
Approximate Shipping Weight: SPV Series: 52 lbs (24kg) - SPT Series: 35 lbs (16 kg)
Weight varies considerably with options.

2.6 ELECTRICAL SPECIFICATIONS & REQUIREMENTS

No electricity required for standalone tabletop filler. Automation package requirements will vary per application.

2.7 AIR SPECIFICATIONS & REQUIREMENTS

Compressed Air Consumption: 3 CFM (5.1m³/h) @ 70 PSI (5 kg/cm², .5MPa) clean, dry compressed air (not-oiled)

3.1 INSTALLATION & START-UP

3.2 INSTALLATION PROCEDURES

Uncrate and carefully remove the packing from the unit. Place unit on a sturdy, level workbench, ideally at a comfortable height for the operator. For the SPT series piston fillers (thin product), attach the 3-way Slide Valve using a Sanitary Clamp with the appropriate gasket, and attach the inlet tube and fill nozzle tube using band clamps, as shown in Figure 3-1 and Figure 3-2.

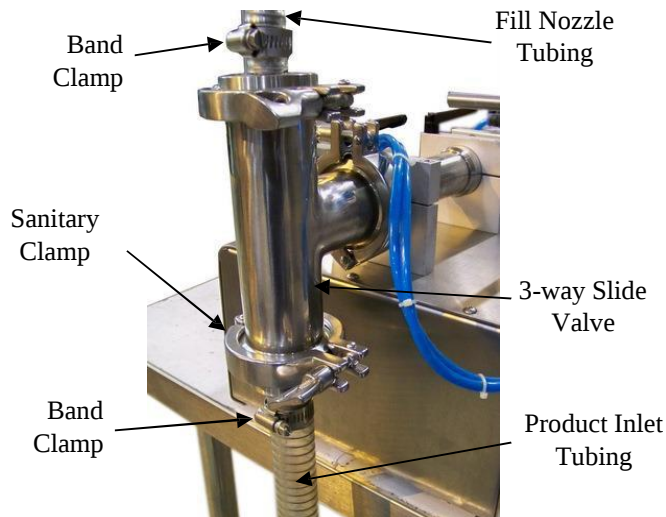


Figure 3-1
3-way Slide Valve Inlet

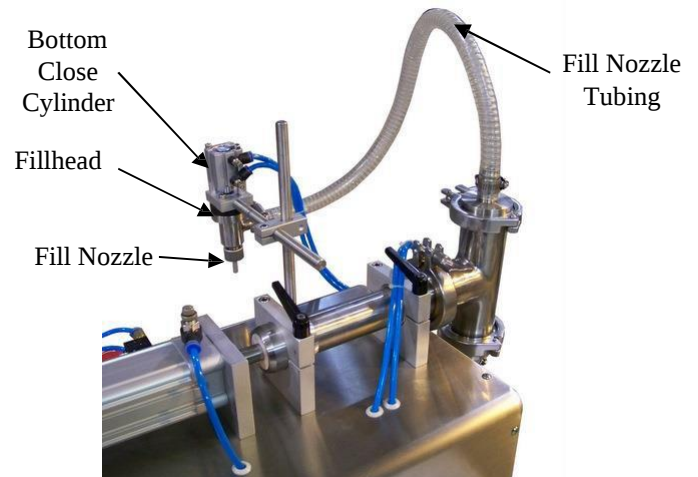


Figure 3-2
SPT Series Fillhead

For the SPV series piston fillers (thick product) there is a 3-way Actuated Valve in place of the 3-way Slide Valve, and instead of an inlet tube, there is an overhead cone tank, as shown in Figure 3-3.



Figure 3-3
3-way Valve SPV Series

Next, for the SPT series, place the inlet tube into the product tank. For the SPV series, put product in the overhead tank.

IMPORTANT Make sure all gaskets are properly seated and that all clamps are securely tight. SPT series fillers will likely fail to pull product if any air is allowed through the clamp fittings.

3.3 START-UP & COMMISSIONING

This manual should be read completely before powering-up the Machine. Commissioning of the Machine should be preformed by a trained technician only after complete understanding of the Machine, and with products that match samples indicated to Apex Filling Systems, LLC if supplied.

- 🔧 Check the machine to see that guards are in place.
- 🔧 Check the mechanical system for loose or missing parts.

Ensure the E-STOP button is depressed, and that the Foot/Auto Toggle Switch is set to Foot, as shown in Figure 3-4, and then connect the compressed air to the air inlet, shown in Figure 3-5.

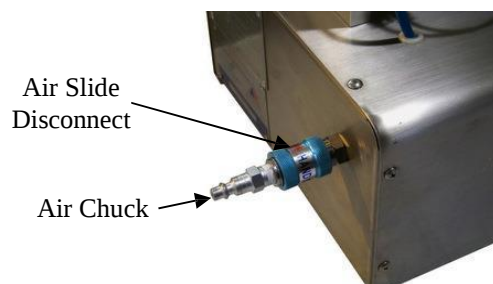


Figure 3-5
Air Inlet



Figure 3-4
E-STOP and Foot/Auto
Toggle Switch



The Slide Disconnect is not intended to be a safety device, and is not lock-out/tag-out compliant. Always disconnect air supply completely, or use lock-out/tag-out valve upstream before performing maintenance.

In Figure 3-5, the Slide Disconnect Valve is in the ‘off’ position, slid out toward the Air Chuck. After air has been connected, slide the valve to the ‘on’ position, toward the filler base.

The air pressure is adjusted with the regulator knob such as shown in Figure 3-6.



Figure 3-7
Air Gauge

Monitor the inlet pressure using the air gauge shown in Figure 3-7. Typically, the pressure should be set to 5kg/cm² (approx 70 PSI)



Figure 3-6
Air Regulator

After verifying that the air pressure is set to 5kg/cm² (approx 70 PSI), and the “Auto/Foot” switch is set to “Foot” (Figure 3-4), then rotate the E-Stop switch clockwise until it extends (pops out)

The piston filler is now ready to be primed and calibrated to fill product.

4.1 OPERATION

4.2 THEORY OF OPERATION

APEX Piston fillers are versatile and easy to use, able to fill a wide range of product and designed with quick and simple changeover and cleaning in mind. The piston is driven by an air cylinder which has magnetic air valves to determine the stroke length. When the piston is pulled back, product is drawn into the piston cylinder. With the SPT series, thin product is pulled through the three-way slide valve (a spring loaded one-way check valve). With the SPV series, thicker product is pulled through an actuated three-way rotary valve. When the piston is pushed forward, the bottom close nozzle is opened, and product is pushed out into a container. When the piston cylinder reaches the adjustable front limit switch, the bottom close nozzle closes, the air cylinder retracts, drawing product into the piston cylinder for the next cycle.

There are five primary sections to note regarding its function:

- Priming the Piston Filler
- Calibrating the Fill Parameters
- Calibrating the Bottom Close Nozzle
- Foot Pedal Operation
- Auto Cycle Run

4.3 PRIMING THE PISTON FILLER

Make sure the forward switch is set to the max fill level. Pressing the Foot Switch starts a fill cycle. When starting a new fill, it is necessary to cycle the filler at minimum 10 times to flood the inlet tubing, product cylinder and fill head tubing. Place a large container under the fillhead, and cycle the filler until all are flooded, and there appear to be no air pockets remaining in the tubing, cylinder or valves.



Figure 4-1
Pneumatic Foot Switch

4.4 CALIBRATING THE FILL PARAMETERS

The total fill volume is adjusted by loosening the set screw on the Cylinder Forward Switch and moving the sensor into the desired position. The Cylinder Home Switch should not be moved.

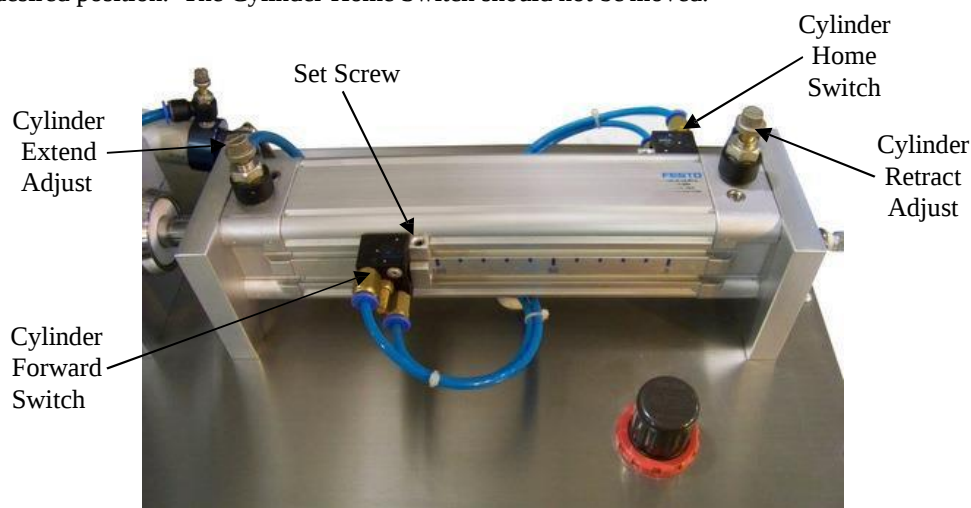


Figure 4-2
Air Cylinder

NOTE

When the switch senses the cylinder's position, a small blue indicator button will protrude from the switch.

Tabletop piston fillers equipped with automation packages will utilize an electronic reed switch instead of the pneumatic switch pictured.



Figure 4-3
Switch Indicator

To adjust the air cylinder speed, adjust the corresponding exhaust flow control valve. For instance, if the product being filled is a foamy cleaner, a slower fill will decrease the foam. Slowly adjust the Cylinder Extend Adjust flow control knob clockwise and note the filling will slow. Adjust as necessary to achieve the proper fill.

Similarly, to adjust the drawing, or loading of the cylinder, the Cylinder Retract Adjust flow control knob can be turned clockwise to slow, or counter-clockwise to quicken. This can be helpful for thicker products which may have air introduced if the draw is too quick.

4.5 CALIBRATING THE BOTTOM CLOSE NOZZLE

If the bottom close nozzle cylinder closes shut too quickly, the product may 'spit' as the nozzle closes. This can be adjusted with the Cylinder Down Adjust flow control valve. Similar to the other flow control valves, turning the knob clockwise will decrease the nozzle closing speed, counter-clockwise will increase the nozzle closing speed.

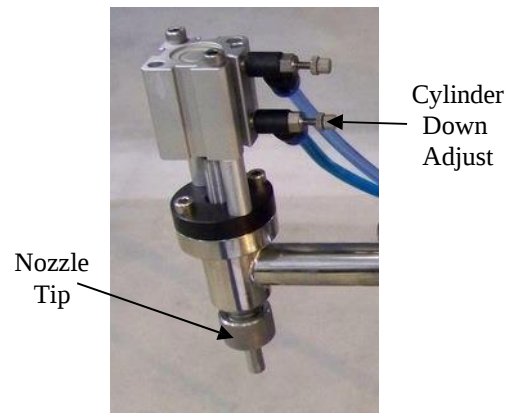


Figure 4-4
Bottom Close Nozzle

4.6 FOOT PEDAL OPERATION

When the machine is set to 'FOOT' as shown in Figure 3-4, each cycle requires the foot pedal to be pressed to initiate product flow.

4.7 AUTO CYCLE RUN

When the machine is set to 'AUTO' (switch in Figure 3-4), the machine will automatically cycle repeatedly, until the switch is set back to 'FOOT' or the E-STOP is pressed. To run auto, the operator should have empty containers ready, as the machine will operate quickly. This is not recommended for small volume fills unless the fill and retract (product draw) cycles are slowed down so there is adequate time to present empty containers for filling.

5.1 MACHINE CHANGEOVER

5.2 CLEANING PROCEDURE

It is important that the machine is kept clean of dirt, broken glass, sand, etc. as these will reduce the wear life of the piston, O-Rings, etc. The machine should be cleaned with water or soap at regular intervals. Stronger detergents are often used in the food industry and can be corrosive on the machine components. Therefore, the machine should be washed down thoroughly immediately after cleaning with any harsh detergents.



WARNING: When using a high-pressure pistol with cold and hot water, as well as steam for cleaning, do not spray near any electrical enclosures.

5.3 SPV SERIES DISASSEMBLY

First, loosen the sanitary clamp and remove the product hopper mounted on top of the 3-way valve. Place sanitary gasket and clamp aside.



Figure 5-1
Hopper Tank Removal

Next, remove the linkage bolt which connects the linkage to the 3-way valve mechanism



Figure 5-2
Linkage

IMPORTANT

DO NOT REMOVE the mount bracket from the valve rod. If the bracket is removed it will be necessary to re-calibrate the valve to the linkage

Remove the sanitary clamp between the product cylinder and the 3-way valve.

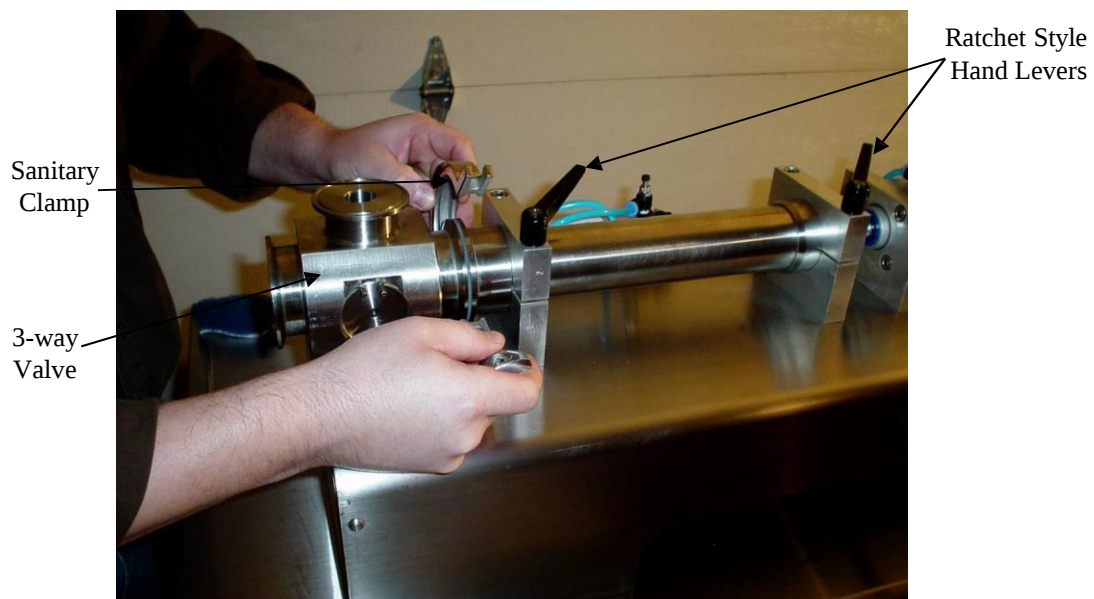


Figure 5-3
Valve Disassembly

Loosen the two black “ratchet style” hand levers.

Remove the product cylinder by twisting and pulling the cylinder forward.

NOTE: New machines will have tight fits due to the high tolerances required in manufacturing.

Figure 5-4 shows a 5000ml piston filler with the 3-way valve removed. For this model, in order to remove the cylinder, it is necessary to first remove the Valve Base. Loosen the two bolts on the underside of the base, as shown in Figure 5-5 to remove the base, and allow access to the piston cylinder.



Figure 5-4
Valve Base

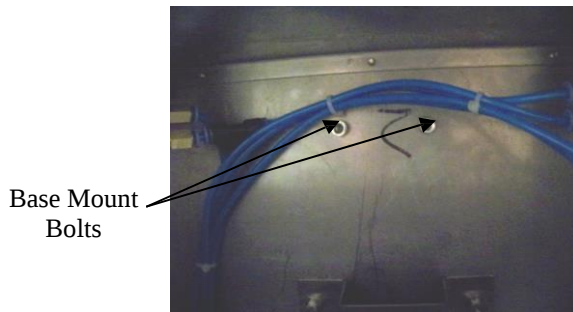


Figure 5-5
Base Mount

The piston itself can be removed if required, by removing the center bolt and tapping the piston off of the shaft with a small rubber mallet. Again, a new machine will have a tight fit, so be careful to tap on the piston lightly as to not damage the Teflon piston. Also, take care not to cause any damage to the cylinder rod any time the product cylinder is removed for cleaning.

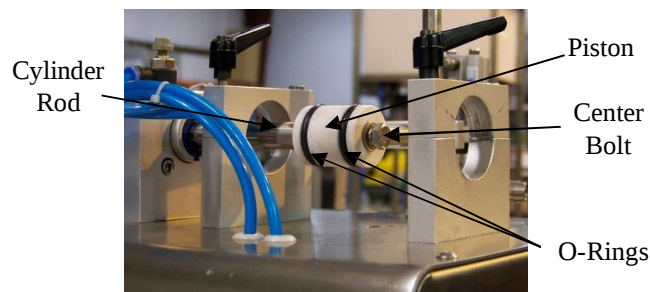


Figure 5-6
Piston

Clean all components and lubricate Silicone and Viton O-Rings and seals with a small amount of sanitary Petrol-Gel, U.S.P. mineral oil or equivalent.



If the filler is equipped with EPDM O-Rings and seals, DO NOT USE Petrol-Gel, as it is not chemically compatible. Instead, lubricate with Glycerin or Petroleum Jelly.

5.4 THREE-WAY ACTUATED VALVE DISASSEMBLY

First, remove retaining rings from both sides of the 3-way valve as shown in Figure 5-7

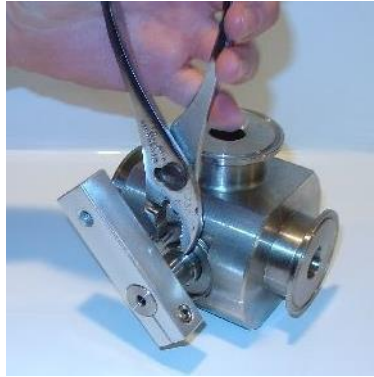


Figure 5-7
Retaining Rings



Figure 5-8
End Cap

After the retaining rings have been removed, pull off the end cap (shown in Figure 5-8). There is an end cap on both sides of the valve, but it is only necessary to remove the end cap on the opposite side of the linkage.

Now the center rotating assembly can be removed. Note that a new piston filler's inner rotating assembly may fit tightly inside the 3-way valve. No specialized tools are necessary to remove the inner assembly. With a common deep-well socket which has a similar diameter as the inner face of the bearing, tap the socket lightly to push the inner assembly out of the valve, as shown in Figure 5-10. Note: Newer models now include a plastic ram rod that can be used for this purpose as well.



Figure 5-9
Socket Sizing



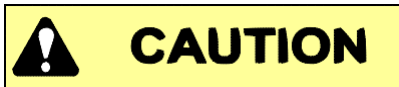
Figure 5-10
Removing Inner Assembly

After the machine has been in normal operation for a period of time, the valve's inner assembly can typically be removed by hand.



Figure 5-11
3-Way Disassembled

After the valve and assemblies have been cleaned, it is necessary to lubricate the Silicone or Viton O-Ring seals with Petrol-Gel U.S.P. mineral oil, or equivalent.



If the filler is equipped with EPDM O-Rings and seals, DO NOT USE Petrol-Gel, as it is not chemically compatible. Instead, lubricate with Glycerin or Petroleum Jelly.

5.5 SPT SERIES DISASSEMBLY



Figure 5-12
Fill Check Valve

Remove the sanitary clamp attached to the fill nozzle tube and remove the fill check valve (Figure 5-12) from the top of the T valve.

Next, remove the sanitary clamp attached to the product inlet tube, and remove the inlet check valve (Figure 5-13) from the bottom of the T valve.



Figure 5-13
Inlet Check Valve

IMPORTANT

Ensure the check valves are installed in the proper side of the T valve when re-assembling. If they are reversed, the piston filler will fill in reverse.

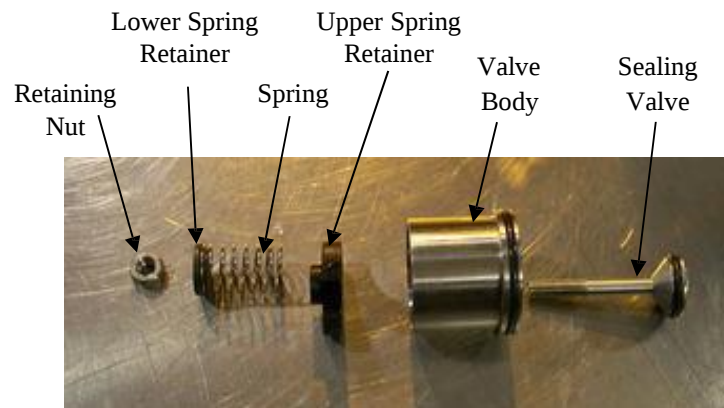


Figure 5-14
Fill Check Valve
Disassembled

When disassembling either the fill check valve or the inlet check valve, first remove the valve body from the hose barb endcap. Unscrew the Retaining Nut, then unscrew the Lower Spring Retainer.

NOTE: The Lower Spring Retainer is threaded onto the Sealing Valve threads.

The product cylinder is removed in the same manner as the SPV Series cylinder: Loosen the two black “ratchet style” hand levers (shown in Figure 5-3) Remove the product cylinder by twisting and pulling the cylinder forward.

NOTE: New machines will have tight fits due to the high tolerances required in manufacturing.

5.6 FILLHEAD DISASSEMBLY

The bottom close nozzle is quickly disassembled by loosening the two lower mounting screws as shown in Figure 5-16.

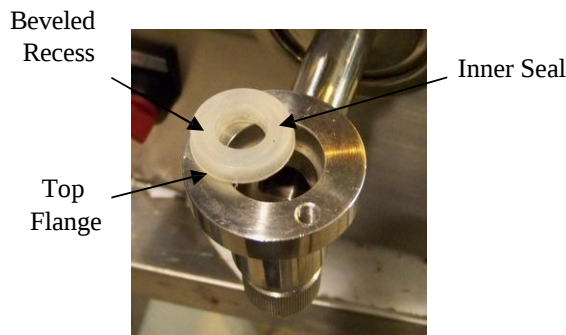


Figure 5-15
Inner Seal

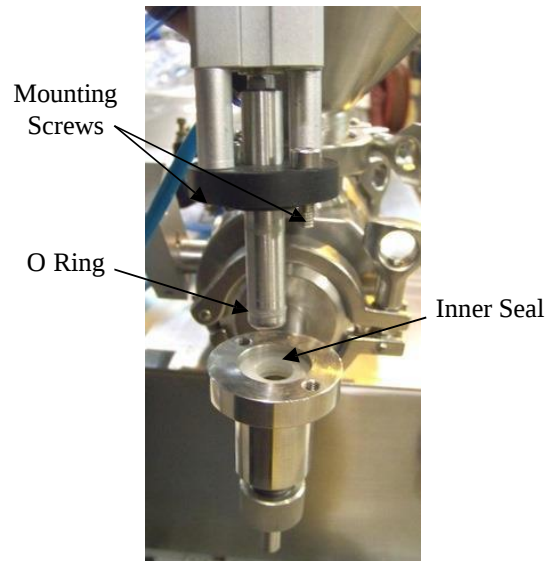


Figure 5-16
Bottom Close Nozzle
Cylinder

Note the orientation of the Inner Seal (shown upside-down in Figure 5-15), as it needs to be re-installed in the same direction (as shown in Figure 5-16), with the flange on the top, and the beveled recess on the bottom, otherwise it will leak.

After cleaning, apply a small amount of grease (Petrol-Gel or similar, as appropriate) to the Silicone or Viton O-Ring and Inner Seal. If the seals are EPDM, then lubricate with Glycerin or Petroleum Jelly.

5.7 ADDITIONAL MACHINE ADJUSTMENTS & PROCEDURES

The fillhead on the SPT Series filler is easily adjusted for different height containers. Simply loosen a lock screw and slide the mount bracket up or down, in or out. The fillhead can also be removed and mounted on a remote bracket for convenience.

The nozzle tip is threaded for ease of removal for cleaning or to change with a different sized orifice. Typically, the largest nozzle tip used produces the most efficient fill.

See sections 4.3 and 4.4 for detailed information about calibrating the fill cycle parameters and fill head bottom close action.

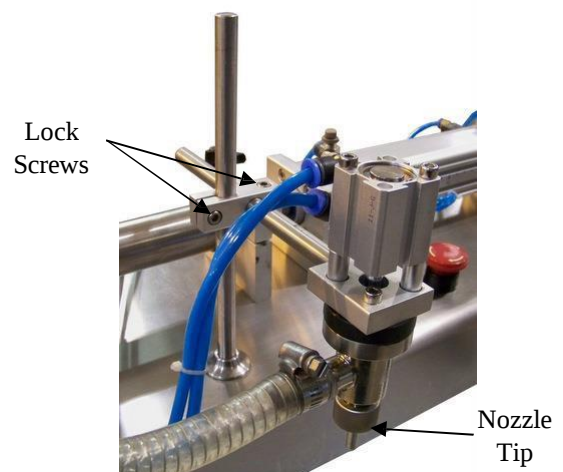


Figure 5-17
SPT Series Fillhead

6.1 SERVICING

6.2 RECOMMENDED MAINTENANCE & SCHEDULES

Itemized below are simple guidelines for maintenance. Several parts of the equipment should be inspected regularly to ensure the longest wear life possible. The following points should be controlled at the inspection:

COMPONENTS	DAILY	WEEKLY
Clean hopper, tubing, valves after each use	X	
Wipe down base and housing		X

6.3 MAINTENANCE LOG

COMPONENT	REPAIR DETAILS	REPLACEMENT DETAILS	DATE

6.4 SPARE PARTS LIST(S)

PART DESCRIPTION	PART NUMBER
Proximity Switch	10101-00031
Foot Pedal	10204-00008
E-Stop Button	10101-00012
Air Cylinder for Bottom Close Nozzle (Contact Support to gather correct part number)	
Appropriate Seal Kit (Contact Support to gather correct part number)	

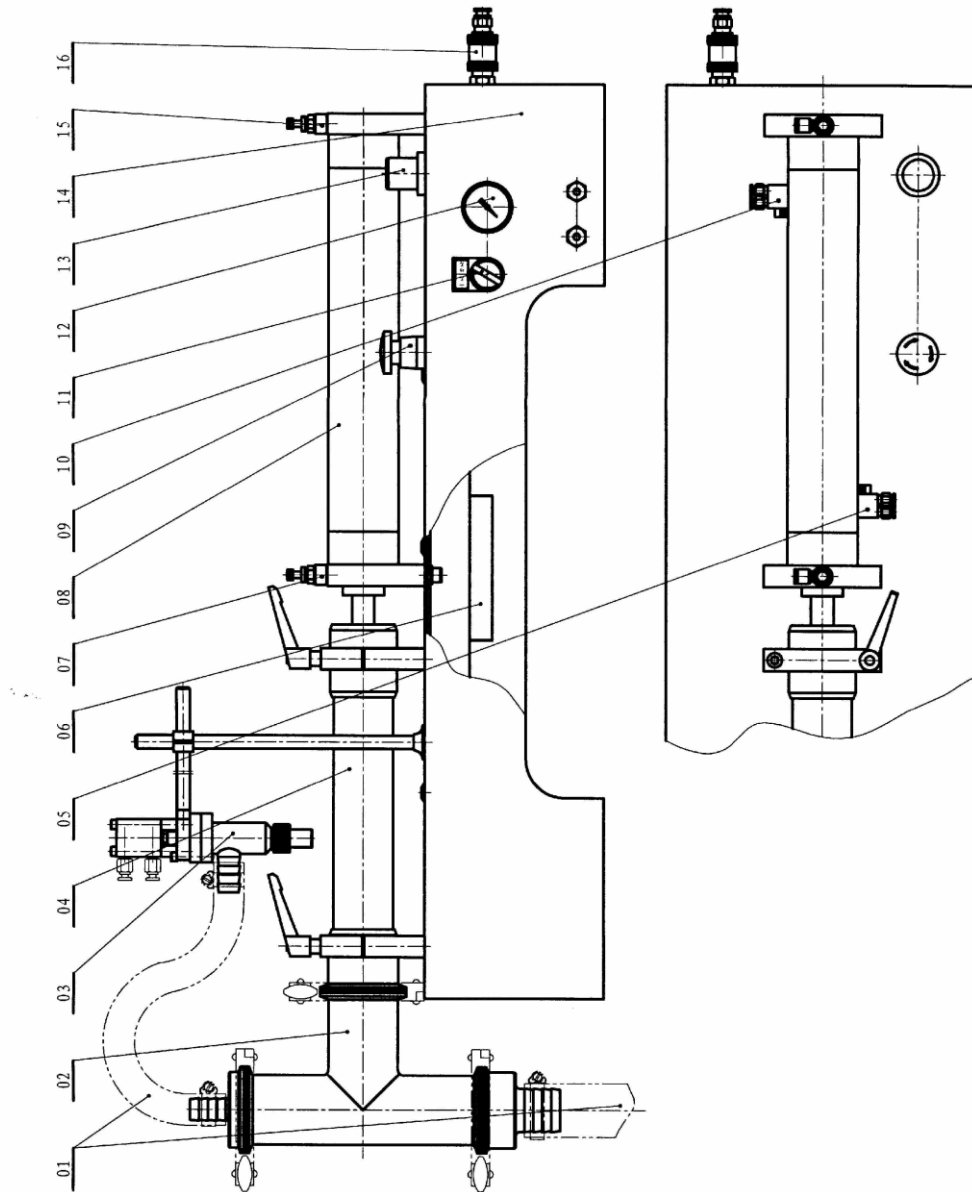
6.5 FACTORY TECHNICAL SUPPORT

Apex Filling Systems, LLC
1001 Eastwood Rd
Michigan City, Indiana 46360 USA
(219) 575-7493 www.apexfilling.com

Spare Parts
Direct: (219) 575-7493
Fax: (219) 575-7586

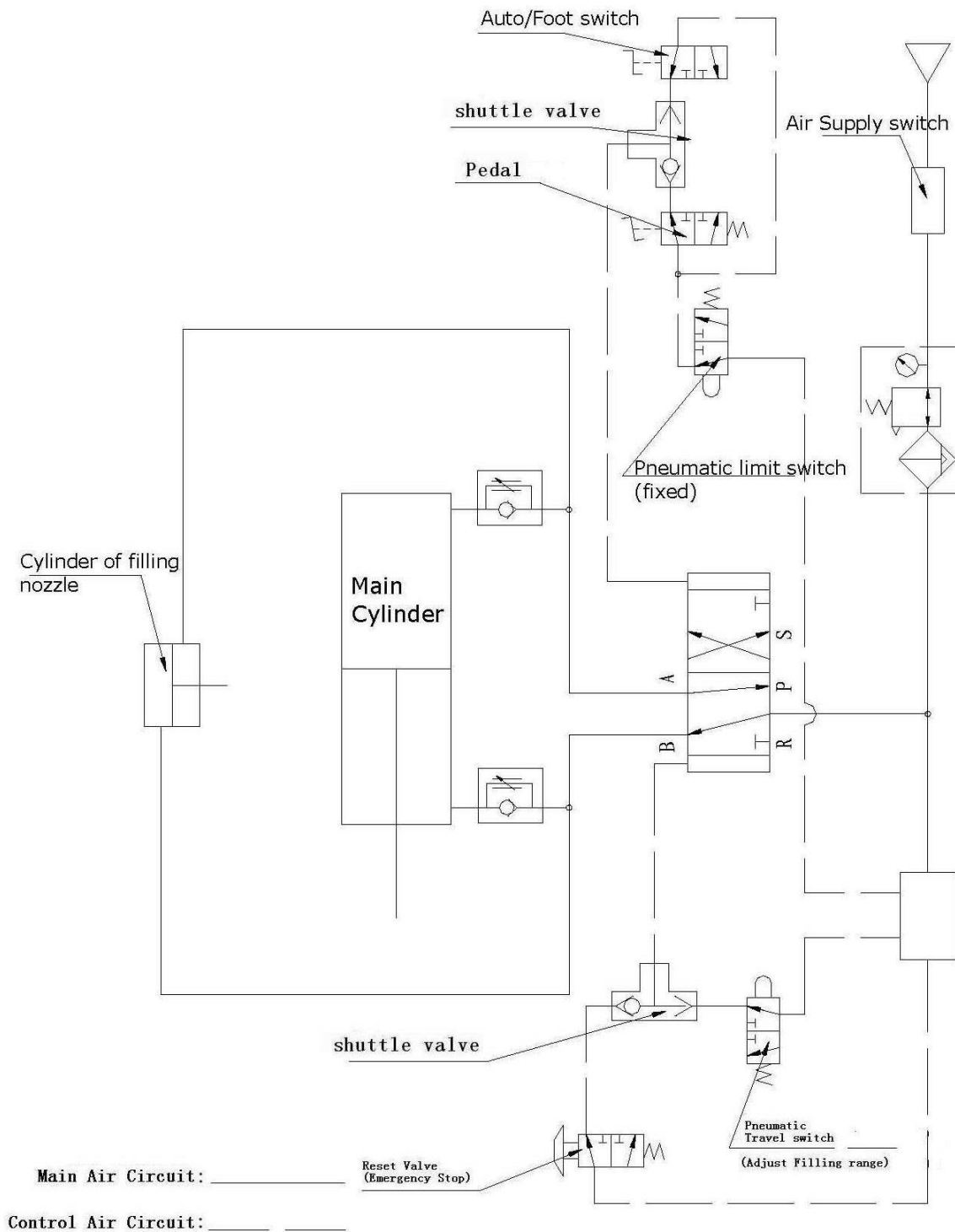
7.1 TROUBLESHOOTING

7.2 SPT FILLER DIAGRAM



01	Transparent steel wire fill tubing	09	Reset button(E-Stop)
02	3-way valve	10	Proximity switch
03	Filling nozzle	11	Switch for Foot pedal or automatic operation
04	Product Cylinder	12	Air pressure meter
05	Proximity switch (to adjust fill volume)	13	Equipment for filtering and regulating air pressure
06	5/2 way air solenoid valve (air controlled)	14	Filler Body
07	Filling speed control valve	15	Drawing (Loading) speed control valve
08	Air Cylinder, Piston drive	16	Slide Valve air cutoff switch

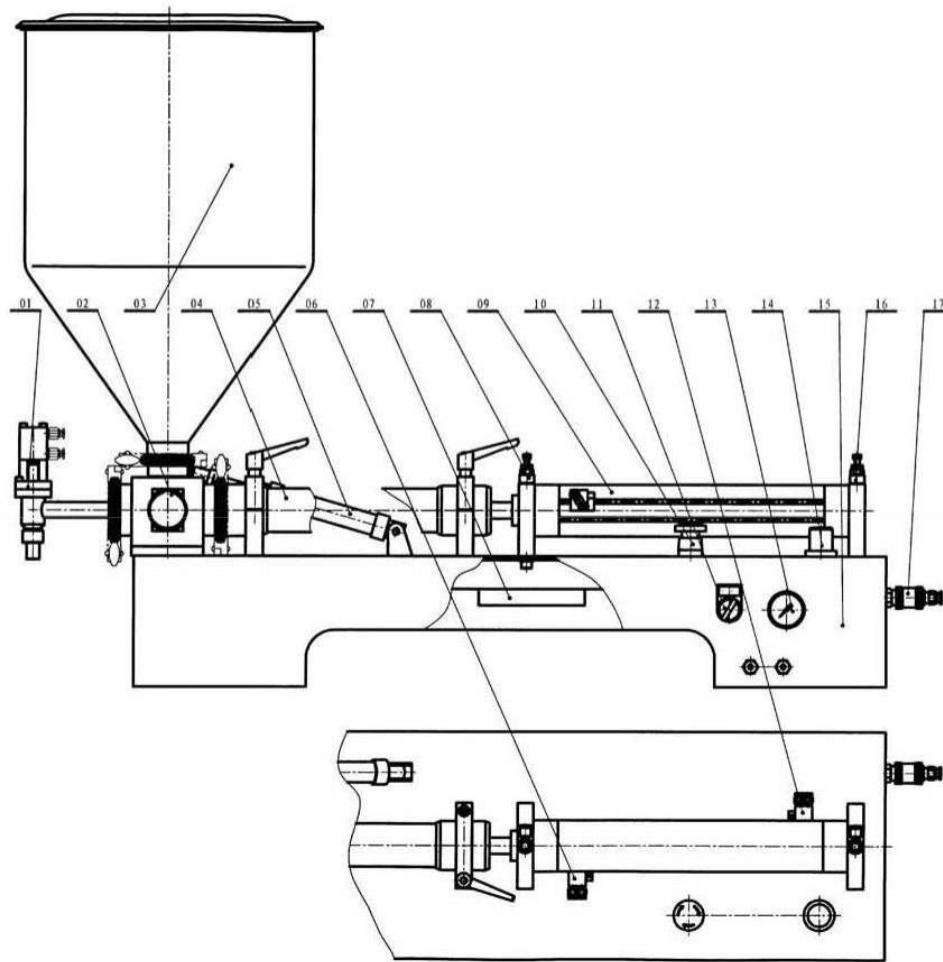
7.3 SPT PNEUMATIC SCHEMATIC



7.4 TROUBLESHOOTING SPT FILLER

Problem	Solution
Neither Cylinder nor piston function	1. Check compressed air source
	2. Check whether the pneumatic switch (16) is open or not
	3. Check whether the proximity switch (05) is out of the maximum range
	4. Ensure air pressure meter (12) reads at least 4 kg/cm ²
	5. Check piston to determine if it has seized
	6. Confirm the viscosity of the product
	7. Verify that the E-Stop reset button (09) is not depressed
Piston in the cylinder is pushed to the end, but it will not return	1. Press the E-Stop reset button (09), adjust the position of proximity switch (06)
Filling volume is inaccurate or material can't be dispensed	1. Check whether the proximity switch (05) is loose, and tighten as needed.
	2. Reduce drawing speed (15) (primarily applies to high viscosity products)
	3. Check the one way check valves for jams
	4. Ensure there is adequate product in the hopper
	5. Check all clamps are sealed and tight
Material leaks from the end of the cylinder	1. Check O-ring on the Piston for damage
	2. Check that piston is firmly attached to piston rod

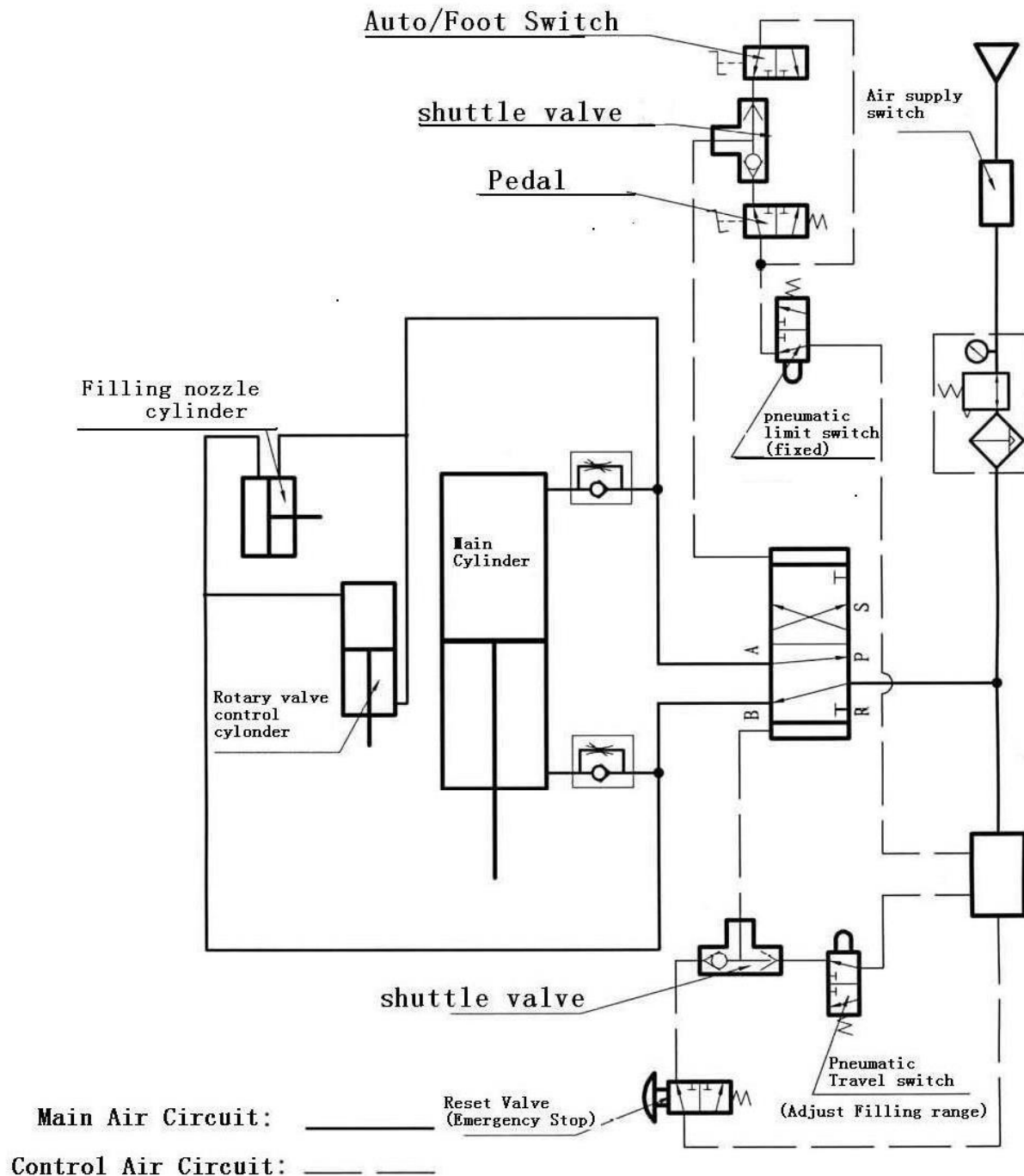
7.5 SPV FILLER DIAGRAM



SPV FILLER DRAWING

01	Filling Nozzle (Air Cylinder)	10	Reset button (E-Stop)
02	3-way valve	11	Switch for Foot pedal or automatic operation
03	Hopper	12	Proximity switch (fixed)
04	Product Cylinder	13	Air pressure meter
05	Air Cylinder	14	Equipment for filtering and regulating air pressure
06	Proximity switch (adjust filling volume)	15	Filler Body
07	5/2 way air solenoid valve (air controlled)	16	Drawing (Loading) speed control valve
08	Filling speed control valve	17	Slide Valve air cutoff switch
09	Air Cylinder, piston drive		

7.6 SPV PNEUMATIC SCHEMATIC



7.7 TROUBLESHOOTING SPV FILLER

Problem	Solution
Neither Cylinder nor piston function	1. Check compressed air source
	2. Check whether the pneumatic switch (17) is open or not
	3. Check whether the proximity switch (06) is out of the maximum range
	4. Ensure air pressure meter (13) reads at least 4 kg/cm ²
	5. Check piston to determine if it has seized
	6. Confirm the viscosity of the product
	7. Verify that the E-Stop reset button (10) is not depressed
Piston in the cylinder is pushed to the end, but it will not return	1. Press the E-Stop reset button (10), adjust the position of proximity switch (06)
Filling volume is inaccurate or material can't be dispensed	1. Check proximity switch (06) if loose, tighten as needed.
	2. Reduce drawing speed (16) (primarily applies to high viscosity products)
	3. Check the one way check valves for jams
	4. Ensure there is adequate product in the hopper
	5. Check all clamps are sealed and tight
	6. Check if 3-way valve (02) is seized
Material leaks from the end of the cylinder	1. Check O-ring on the Piston for damage
	2. Check that piston is firmly attached to piston rod

7.8 TROUBLESHOOTING RECORD

To better assist you in troubleshooting, please record the following information with the model number from the frame, the problem that is occurring, speed of application, product characteristics (i.e. Foamy Product, High Viscosity, or Special Variation).

Company Name: _____

Your Name: _____

Phone Number: _____

FAX Number: _____

Date: _____

CONTAINER	COLOR	SIZE	PROBLEM
<i>EXAMPLE: Glass</i>	<i>Blue</i>	<i>16oz.</i>	<i>Product overflowing.</i>

NOTES