

**Fluid Handling
System w/ 3-Valve
Boardrunner
(Bobst)**

**Manual Number: MY037
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SECTION 1 - INTRODUCTION

Description

Valco Cincinnati has prepared this manual as an aid for installing, operating, and servicing the Fluid Handling System. It also contains a list of part numbers for replacement parts. If you need more information, please contact your Valco Cincinnati representative.

The Fluid Handling system is an electronically controlled gluing system. Using an enclosed extrusion glue system, the Flexoseal® equipment applies precise glue patterns to either inside or outside laps at speeds of up to 2000 feet (610 meters) per minute. High-quality sealing at all parent machine speeds is possible. The system produces good mechanical seals due to the adhesive penetration caused by the direct application of the glue. The bond is excellent due to the uniform pattern application. The system is modular in design. Quick-disconnect fittings are used for the applicator assemblies. The glue pattern is programmed by using flexible soft buttons on the front panel of the control.

The Fluid Handling system applies glue only when a box is present, and only when the machine is running faster than the minimum speed. The line shaft of the parent machine drives the shaft encoder. The encoder supplies machine speed information to the control system. The control system adjusts the glue pressure and pattern dimension for precise glue application. The gluing cycle starts when a box is detected by the scanner. The control system begins measuring the box. The measuring phase ends as the leading edge of the box (front flap) reaches the glue applicator.

Components

The Fluid Handling system consists of three main subsystems:

- **Glue delivery system** – EPP9 pump, air filter/regulator, glue filter, and glue-pressure gauge/protector regulator
- **Glue application system** – glue station, glue valves, applicator head
- **VC-X or MCP-4 control system** – boards, encoder

Options include:

- Beacon with audible alert
- Jam prevention feature
- Glue inspection system

**Flexoseal® Gluing
System Kits for 3-
Valve Boardrunner**

Different kits are available for the Flexoseal® gluing system with the 3-Valve Boardrunner:

- 739xx227 - VC-X Control
- 739xx228 - Tri-Valve FFS OS/DS
- 739xx316 - Bobst BoxChek 7 Kit

The following kits go with 739xx316:

- 739xx235 - Bobst kit 253
- 739xx234 - Bobst kit 255



For drawings and/or part lists, see
Section 8 - Parts List.

SECTION 2 - SAFETY AND USE

Read Thoroughly Before Handling Equipment

Symbols

Warning!



Read and follow all safety precautions, warnings, cautions, and other recommendations in this manual. OTHERWISE, DEATH, PERSONAL INJURY OR EQUIPMENT DAMAGE COULD OCCUR.

Read this entire section before handling the equipment.

The following symbols may be used on the equipment and/or in this manual.



This symbol represents a **Caution** or a **Warning**. *Cautions* draw special attention to anything that could damage equipment or cause the loss of data. *Warnings* draw special attention to anything that could injure or kill the reader. Both Cautions and Warnings are placed before the step they apply to.



This symbol represents a **Hot Surface**.



This symbol represents a **Puncture Risk**. It is usually used in regard to nozzle cleaning appliances and other sharp instruments that can cause puncture wounds and risk exposure to bloodborne pathogens and other debris.



This symbol means that **Working Gloves** are required.



This symbol means that **Goggles** are required.



This symbol indicates a **Shock Hazard**. There is a presence of non-insulated dangerous voltage within the product's enclosure. This voltage may cause electrical shock or fire.

Continued next page

Symbols - Continued



This symbol indicates the need to **Unplug/Disconnect All Power Sources** and to let them de-energize before attempting any type of work or maintenance. Remember that there can still be energy in equipment, cords, and wires even when unplugged/disconnected.



This symbol indicates the need to **Lock Out All Power Sources** and to let them de-energize before attempting any type of work or maintenance. If power is not locked out, the person working on the equipment may be injured or killed if someone unknowingly switches on the power to the equipment.



This symbol indicates a **Note**. Notes point out something of special interest or importance to the reader. They give tips, hints, and information in addition to what is necessary for the step preceding it.

Owner Responsibilities

The owner of the equipment is under obligation to manage all safety information. Some examples include:

- Examine all safety materials and documents as well as jurisdictional laws and make certain all laws, recommendations, and other safety/hazard laws, certification requirements, training, and instructions are followed and kept current.
- Maintain all safety materials including tags, labels, documents, and MSDS information. Make certain they are distinct and can be read/understood. Replace any that are dirty, worn, or unreadable.
- Make sure all personnel who will handle, install, maintain, operate, fix, and work around the equipment have ready access to the safety information, training, and equipment according to jurisdictional authorities.

The owner of the equipment is under obligation to make certain that all instructions, requirements, and jurisdictional laws are met. Some examples include:

- Make sure there are regular inspections of equipment and safety devices.
- Have regular safety drills and inspections supervised by the proper authorities.
- Provide all required safety items, first aid equipment, and training.

The owner of the equipment is under obligation to make certain that all personnel who will handle, install, maintain, operate, fix, and work around the equipment are qualified, trained, and up-to-date with all information regarding the equipment. Some examples include:

- Make sure all personnel have the proper safety training, equipment, education, and abilities necessary for the job function according to safety instructions and all jurisdictional laws and regulations.
- It is strongly advised that personnel receive first-responder medical care training in case of burns, medical emergencies, or other injuries. Training should be kept up to date.
- Make sure all personnel understand and can follow safety policies and procedures for the organization as well as for the specific equipment.
- Make sure that all personnel are consistently trained, evaluated, free of alcohol and medications that may impair judgment and reflexes, and are tested for banned substances according to jurisdictional authorities.

Limitations of Use

Read this document and all information regarding the equipment before handling the equipment. The intended use of the equipment is stated in Section 1 of this manual.

Do not use this equipment for anything other than its intended use. Do not modify, change, or alter the equipment in any way. If you are unsure of the intended use and the limitations of use for the equipment, contact your Valco Melton Representative before handling the equipment.

Installation/Startup/Use Safety Information

Valco Melton hot melt units, cold glue units, controllers, inspection systems and all related accessories have the following universal safety precautions (this is not intended to be an exhaustive list; follow all instructions and safety precautions for the specific type of equipment involved):

Warning!



Only qualified personnel should install the equipment. Valco Melton strongly recommends that a Valco Melton Technician install all equipment. OTHERWISE, DEATH, PERSONAL INJURY, OR DAMAGE TO EQUIPMENT COULD OCCUR.

Warning!



The equipment should be installed so that it can be turned off at a location **away** from the equipment in case of injury, electrical problems, or malfunction. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Properly route all electrical wires. Never tamper with equipment. Only use approved and correct voltage, type of current, fuses, and other power supplies. Replace worn cords, hoses, etc. immediately. FAILURE TO OBSERVE WARNING MAY RESULT IN DEATH, PERSONAL INJURY, AND/OR EQUIPMENT DAMAGE.

Warning!



Poor ventilation, smoking, and open flames can cause overheated hot melt to ignite. Adequate ventilation must be provided. Smoking should be prohibited in the immediate vicinity of the molten adhesive. Open flames must be kept away from the area around molten adhesive. OTHERWISE, DEATH, PERSONAL INJURY, OR DAMAGE TO EQUIPMENT COULD OCCUR.

Warning!



Never use any Valco Melton equipment in an explosive environment. Explosive environments include, but are not limited to, solvent-based cleaners or adhesives, explosive materials, radioactive materials, etc. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Equipment will start automatically when remotely controlled by triggering devices. Be sure to disable all triggering devices, carefully release hydraulic pressure, and disconnect air pressure before servicing or working near guns, valves, and other triggered devices. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Shut Down Safety Information

Valco Melton hot melt units, cold glue units, controllers, inspection systems and all related accessories have the following universal safety precautions (this is not intended to be an exhaustive list; follow all instructions and safety precautions for the specific type of equipment involved):

Warning!



Purge the fluid pressure and the air pressure from the system before disconnecting/disabling any part of the system. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Disconnect and lock out all power before maintenance or other need to open the equipment. Only qualified personnel should open and service the control. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Equipment may still be energized even if unplugged! When making adjustments or performing checkout procedures, stay clear of any moving mechanical parts and do not touch exposed electrical equipment or electrical connectors. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Disconnect/disable all mechanical and/or electrical devices that send activation signals to the gun(s), valve(s), melter pump(s), etc. This includes pattern controls, timers, input/output signals, etc. Only qualified personnel should open and service the control. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Disable all triggering devices, relieve all residual pressure (hydraulic and air) and allow adhesive to cool before attempting to disconnect guns, hoses, valves, etc. Only qualified personnel should open and service the control. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Never point an adhesive dispensing gun, valve, hose, air hose, or anything else at yourself or another person. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Hot Melt Specific General Safety Information

Valco Melton hot melt units have the following universal safety precautions **in addition to all other universal precautions previously mentioned** (this is not intended to be an exhaustive list; follow all instructions and safety precautions for the specific type of equipment involved):

Warning!



Never process any polyurethane reactive (PUR) hot melt or solvent-based material in a Valco Melton unit unless you are certain that the unit is compatible and is marked "PUR"! Read all instructions and MSDS sheets carefully, following manufacturer's instructions, especially regarding heat levels. If you have any question as to the compatibility of a Valco Melton unit for PUR hot melt, call your Valco Melton Representative before attempting to use the unit for PUR or solvent-based materials. OTHERWISE, HAZARDOUS FUMES, EXPLOSION, DEATH, OR PERSONAL INJURY COULD OCCUR.

Warning!



Keep pump cover and electrical enclosures closed except during setup, service, and checkout procedures. OTHERWISE, DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



People with respiratory problems (e.g., asthma, bronchitis, etc.) should not work in the vicinity of molten adhesive. RESPIRATORY PROBLEMS MAY BE AGGRAVATED BY THE FUMES. Do not wear a face mask when working around molten adhesive. THE MASK MAY TRAP THE FUMES AND DEATH OR PERSONAL INJURY COULD OCCUR.

Warning!



Keep hot melt hoses away from walkways and the moving parts of hot melt systems. OTHERWISE, PERSONAL INJURY OR EQUIPMENT DAMAGE COULD OCCUR.

Warning!



Hot surfaces! Do not touch! Use extreme caution when refilling the unit by hand. OTHERWISE, PERSONAL INJURY COULD OCCUR.

Warning!



Wear protective gloves and goggles at all times around all machinery, especially hot melt. OTHERWISE, SERIOUS PERSONAL INJURY COULD OCCUR.

Warning!



Never use an open flame to heat hot melt components or adhesive. OTHERWISE, DEATH, PERSONAL INJURY, OR DAMAGE TO EQUIPMENT COULD OCCUR.

***What to Do if Contact
with Hot Adhesive
Occurs***

If hot adhesive comes in contact with the skin, do the following:

Warning!

Do not attempt to remove heated hot melt adhesive from the skin. OTHERWISE, SEVERE PERSONAL INJURY AND DEATH COULD OCCUR.

1. Immediately immerse the contacted area in clean, cold water.



It is strongly recommended that a source of clean, cold water be provided near the hot melt work area.

2. Cover the affected area with a clean, wet compress and call the emergency medical response system (such as 911) immediately.
3. Watch for and treat the subject for signs of shock while waiting for professional help to arrive.

***What to Do if
Inhalation of
Adhesive Fumes
Occurs***

If adhesive fumes are inhaled, immediately follow these steps:

1. Take the victim away from the immediate work area.
2. Provide victim with fresh air.
3. Call the emergency medical response system (such as 911) immediately.

**What to Do if
Adhesive-Related
Fire or Explosion
Occurs**

During the heating and melting process, the surface of the adhesive will be exposed to air. The mixture of polymer fumes and air can catch fire if the hot melt is overheated.

Warning!



Poor ventilation, smoking, and open flames can cause overheated hot melt to ignite. Adequate ventilation must be provided. Smoking should be prohibited in the immediate vicinity of the molten adhesive. Open flames must be kept away from the area around molten adhesive. OTHERWISE, DEATH, PERSONAL INJURY, OR DAMAGE TO EQUIPMENT COULD OCCUR.

Warning!



Exposed arcing may ignite the fume/air mixture. Shield all electrical equipment from melt fumes to avoid exposed arcing. OTHERWISE, PERSONAL INJURY OR EQUIPMENT DAMAGE COULD OCCUR.

Warning!



Do not use a water extinguisher to extinguish the fire! OTHERWISE, PERSONAL INJURY OR EQUIPMENT DAMAGE COULD OCCUR.

If the hot melt adhesive ignites, promptly perform the following steps:

1. Sound a fire alarm.
2. Evacuate the immediate area.
3. Turn off all local electrical equipment at the source.
4. Leave the area immediately if conditions are unsafe.

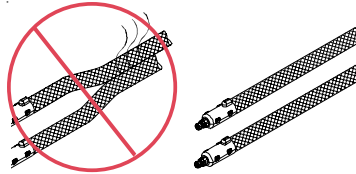
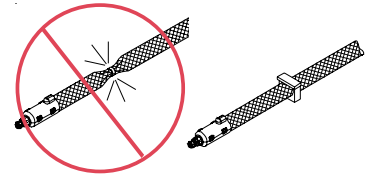
If you feel you can fight the fire **safely**, do **one** of the following:

- Smother the fire with a fire blanket.
- Aim a CO₂ fire extinguisher at the base of the flames.
- Aim a dry-powder fire extinguisher at the base of the flames.

Hose Safety Information

Do not use bindings, wire ties, or unapproved fasteners around the hoses.

Do use approved wrapping (P/N KAP0434), making sure the wrapping is slightly snug but not tight.

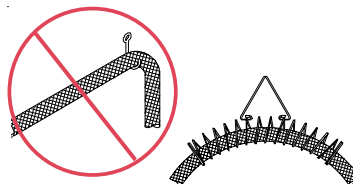
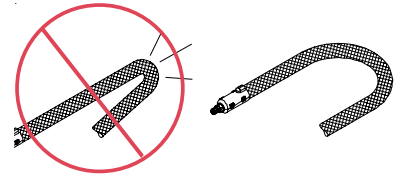


Do not place hoses close together.

Do allow at least 2 inches (5.1 cm) between hoses for proper ventilation.

Do not bend hoses sharply. **Do not** allow kinks or indentations in the hoses.

Do use a minimum bend radius of 10 inches for a 20-inch diameter coil hose.

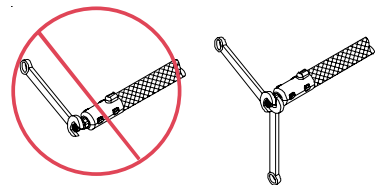


Do not use unapproved hooks to hang hoses. **Do not** wrap hoses over or around objects.

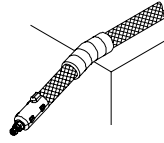
Do use a hose hanging kit (P/N 781xx827).

Do not use the “one handed/one wrench” technique to attach or remove hoses. **Do not** wrench on any surface other than the large hexagon swivel nuts.

Do use two hands and two wrenches to tighten or loosen connections on hoses. **Do** wrench only on large hexagon swivel nuts.



Hose Safety Information -
Continued

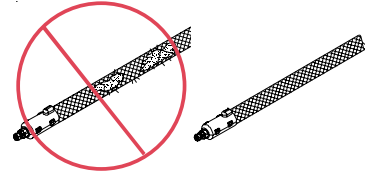


Do not allow hoses to rub against objects or to come into contact with sharp edges or points.

Do wrap the hoses in approved padding (P/N 795xx549) if the hoses must be installed where they will come into contact with objects.

Do not use worn, damaged, or bent hoses.

Do inspect all hoses regularly for damage and/or wear and replace damaged or worn hoses immediately.



SECTION 3 - WIRING GUIDELINES

Routing Low-Voltage Leads

Warning!



Failure to observe could result in personal injury, death, or damage to equipment.

When routing low-voltage leads, follow these guidelines:

- Do not route low-voltage leads in the same conduit as wires carrying a high-current load.
- Do not route low-voltage leads adjacent to, or across wires carrying a high-current load. If low-voltage leads must cross or run parallel to wires carrying high current, keep the leads at least 6" (152 mm) from high-current wires.
- Do not splice or solder leads.
- Trim leads to the required length. Leads should be only as long as necessary for installation.
- All wiring should be in conduits or wireways.

Connecting the Electrical Power

Warning!



Electrical connections should be made only by experienced service personnel! Failure to observe could result in personal injury, death, or damage to equipment.

When connecting the supply of electrical power, follow these guidelines:

- Connect the control to a “clean” supply of electrical power. Use a dedicated circuit if possible.



If a dedicated circuit is not available, do not connect the control to a circuit that supplies high-amperage equipment—use another circuit such as a lighting circuit. Otherwise, equipment may not function properly.

SECTION 4 - SETUP

System Setup

The Fluid System consists of three systems:

- Glue-delivery system
- Glue-application system
- VC-X or MCP-4 control system

Air Pressure Settings

Table 4-1. Air Pressure Settings

Component	Contact Extrusion
EPP9 pump	6.5 bar/80 psi*
Marker-valve tank	1.5 bar/20 psi min.
To EPC	6.5 bar/100 psi
Force Reduction Air Pressure	30 psi max.
Air Manifold Air Pressure	60 psi min.
*Pump range between 20 / 80 psi (1.5 / 6.5 bar)	

Air Pressure to the Manifold

WARNING! Always set the manifold Auto/Manual switch to “Manual” before performing any Boardrunner-based adjustments.



The recommended air pressure settings to the Manifold are as follows:

Tipsealer Air: 60 psi min.

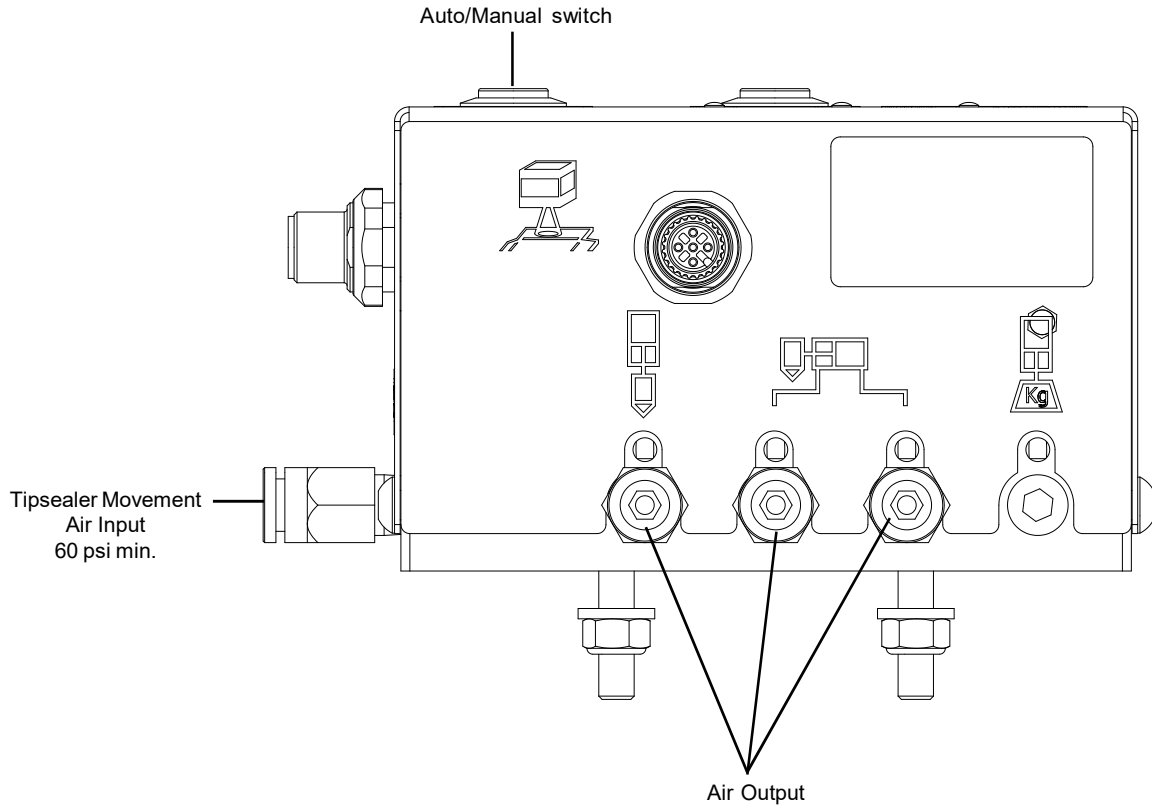
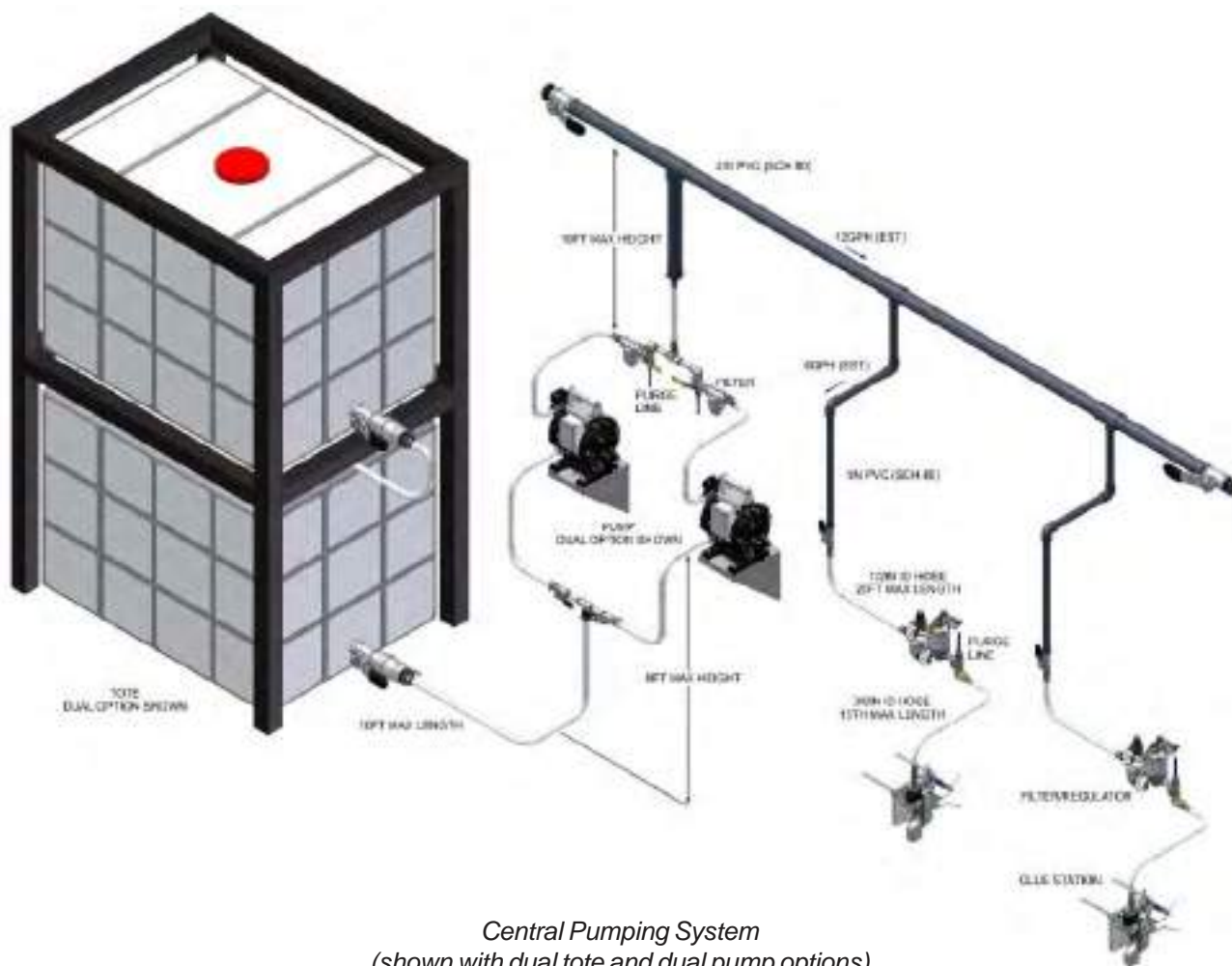


Figure 4-7. Manifold Air Inputs and Outputs (bottom view)

Central Pumping System

Illustration shows dual tote supply option. The upper tote supplies the lower tote and is replaced when empty. The pump draws from the lower tote (should be replaced once a year).

- Prevents air from entering system when changing totes
- Eliminate contamination and debris



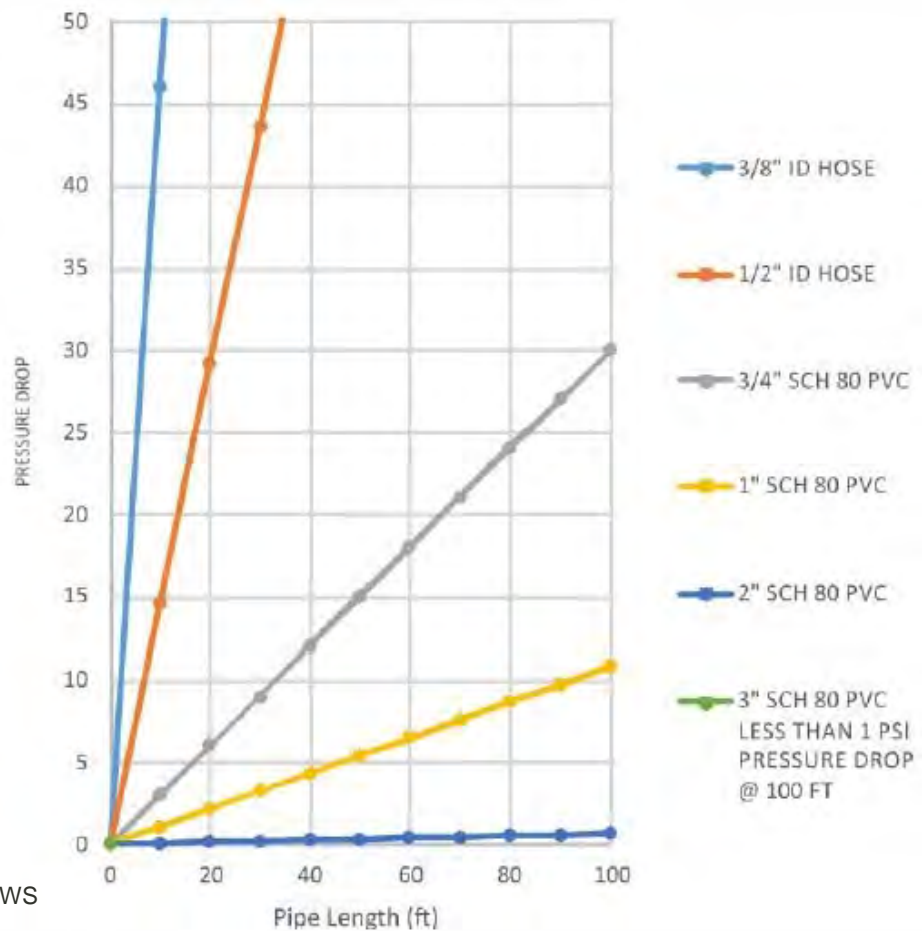
Central Pumping System
(shown with dual tote and dual pump options)

Central Pumping System Installation Guidelines

- Use schedule 80 PVC. Schedule 40 may be acceptable for low-pressure/low-viscosity installations (DD-1 pumps). Consult adhesive supplier for materials other than PVC.
- Do not use galvanized or black iron pipe.
- On long runs to multiple machines, it is best to centrally locate the pump at an equal distance from each machine.
- Install purge valves on output side of fluid filter. These will enable the user to quickly purge trapped air after servicing the filter.
- Use tee fittings instead of elbow fittings to eliminate trapped air and facilitate system purge.
- Drop lines should exit bottom side of lateral supply, not side or top

Pressure Drop/Pipe Diameter

2000 cps @ 10 gph



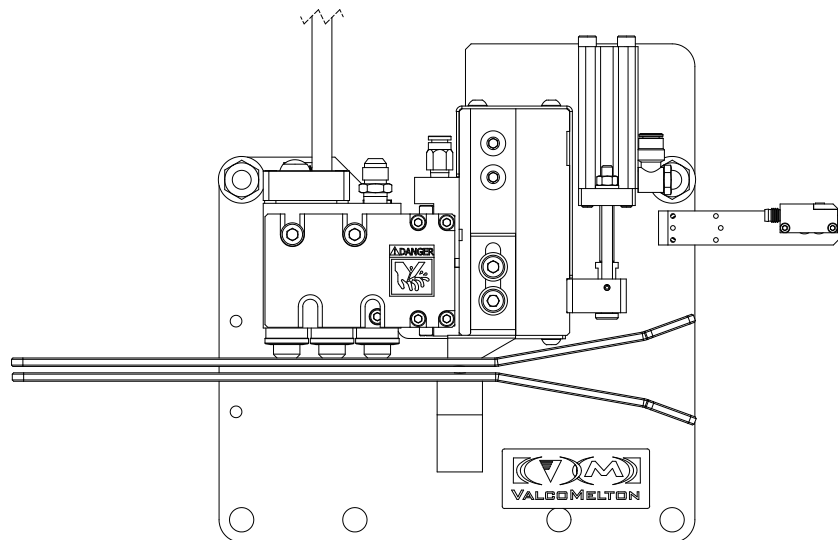
PRESSURE DROP PER 10 ELBOWS
 3/8" ID HOSE (.375" ID)
 1/2" ID HOSE (.500" ID)
 3/4" SCH 80 PVC (.742" ID) 13.20
 1" SCH 80 PVC (.957" ID) 5.60
 2" SCH 80 PVC (1.939" ID) 0.55
 3" SCH 80 PVC (2.900" ID) 0.14

3-Valve BOARD-RUNNER™ Glue Station (583xx590; 583xx585)

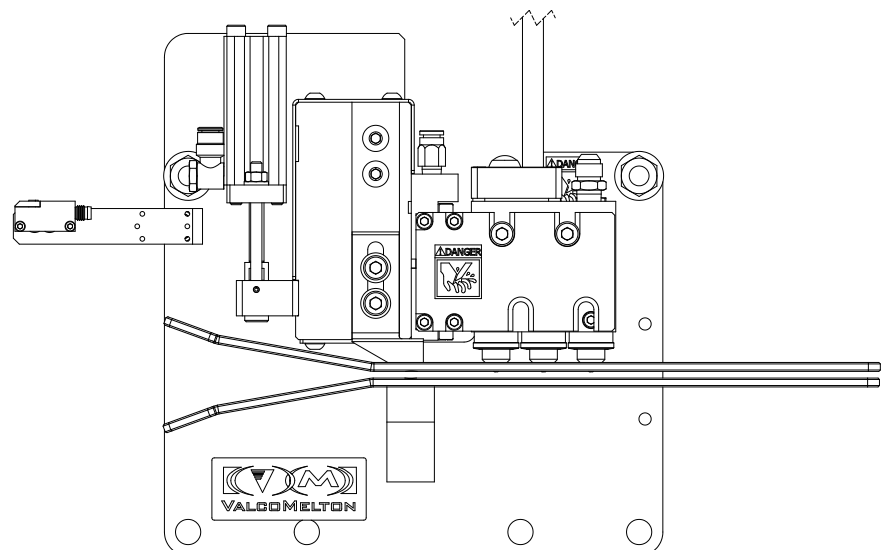
The 3-Valve BOARDRUNNER glue station uses individual valves to dispense glue without contacting the box. The all-electric Series 524 works with a variety of non-contact adhesives.

BOARDRUNNER uses a laser beam to detect product, so a precise glue pattern is applied even if the board flutters during the gluing process.

The 3-Valve Boardrunner parks the Valve Tips on a sealing pad (Tipsealer) when the Feeder is stopped, keeping the tips from drying out. When boxes are fed again, the glue station returns to the operating position.



BOARDRUNNER - Drive Side / 4th Panel Side



BOARDRUNNER - Operator Side / Tab Side

Figure 4-2. Boardrunner Glue Station

**Initial Setup of Glue Application System
(3-Valve BOARDRUNNER - 524 valves)**

When the BOARDRUNNER is shipped, it is ready for a 4th panel (drive side) or tab (operator side) installation. The scanner is initially mounted to view the product in line with the center glue valve (see Figure 4-3). The gap adjustment is set so that a single-walled product (approximately 5 mm thick) can pass through the glue station.

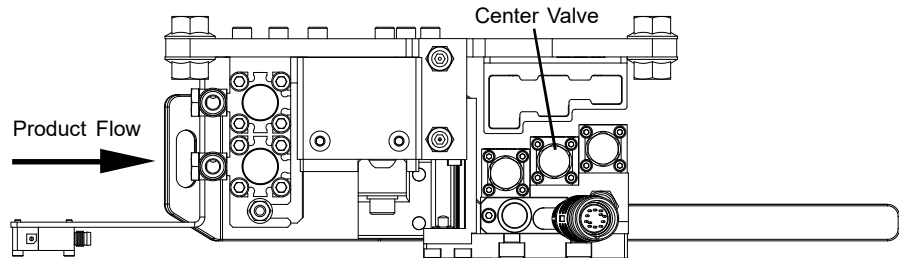


Figure 4-3. Valves (top view)

Minimal adjustments, if any, should be made during the setup process.

The Setup Process consists of the following steps:

1. Mount the BOARDRUNNER to the mounting rods.
2. Connect the single-valve cable to the MCP-4 or VCX control.
3. Connect the air lines and cables to the Tipsealer Box.
4. Purge all air from the glue line, then connect it to the valve.
5. Place the Tipsealer Box in Manual Mode.
6. Purge the valve by activating the push button switch on the manifold (Figure 4-4).

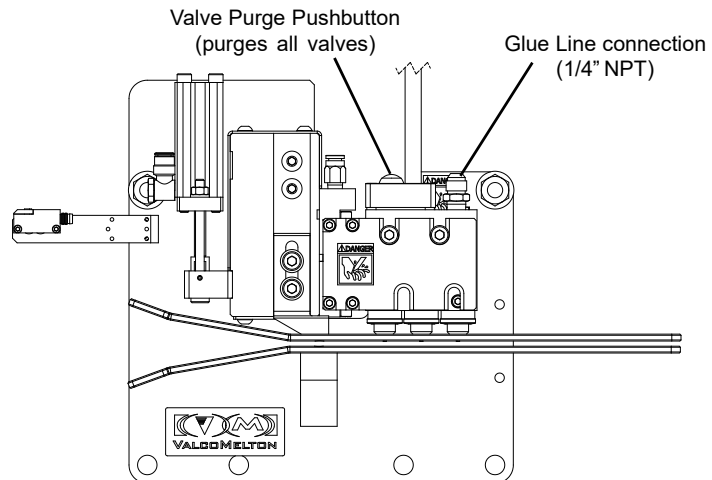


Figure 4-4. Glue Line connection and Valve Purge Pushbutton

Initial Setup of Glue Application
System (3-Valve BOARDRUNNER
- 524 valves) - Continued

7. Purge adhesive through the valves until no air is present in the glue line and no air bubbles are coming from the valve. (The valves should produce an even glue flow.)
8. Run the parent machine. Stop the machine when a product reaches the glue station.
9. Adjust the glue station vertically to ensure the product is level. The product should not be forced up or down when traveling through the glue station (see *Boardrunner Adjustment*, below).

CAUTION! Do not remove the valves from the manifold, as the connecting wires are short and might break.



10. If the box body must be detected, the scanner must slide on its arm toward the inside of the machine.



Longer brackets are available. It is also possible to mount the scanner remotely to the folding rail.

Make sure the scanner is always facing down (red on bottom and yellow indicator light on top).

11. The upper inlet guide height can be adjusted to optimize the gap for the box, and to guide the board under the nozzles properly.

Boardrunner Adjustment

CAUTION! The system must be set to 'Manual' mode when adjusting the Boardrunner.



The Bottom Guide is fixed, and should be installed level with the product line. The machine inflow guides should end just before the Boardrunner Guides.

1. Set the Nozzles 3/16" (5mm) above the lower edge of the Top Guide by adjusting the manifold as follows:
 - A. Use a 6mm hex wrench to loosen the top guide screws shown in Figure 4-5. Adjust the top guide to move it closer to, or away from, the valves.

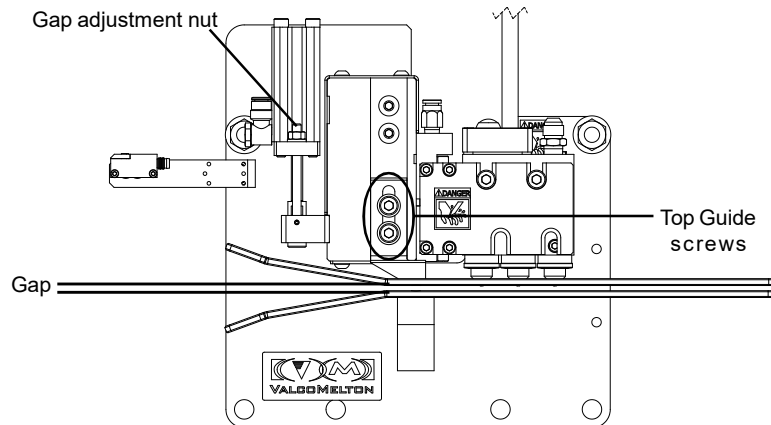


Figure 4-5. Manifold Adjustment

2. Modify the 'gap adjust' between the guides, using a 10mm wrench to adjust the hex nut, increasing or decreasing the gap between the upper and lower guides. Adjust the gap to slightly greater than the thickness of the thickest product.



The box should run freely between the guides, with neither bounce nor drag.

Adjustment for Tipsealer

WARNING! Always set the Tipsealer Auto/Manual switch to “Manual” before performing any Boardrunner-based adjustments. See Figure 4-6. If in Auto, the Laser Scanner will cause the unit to move.

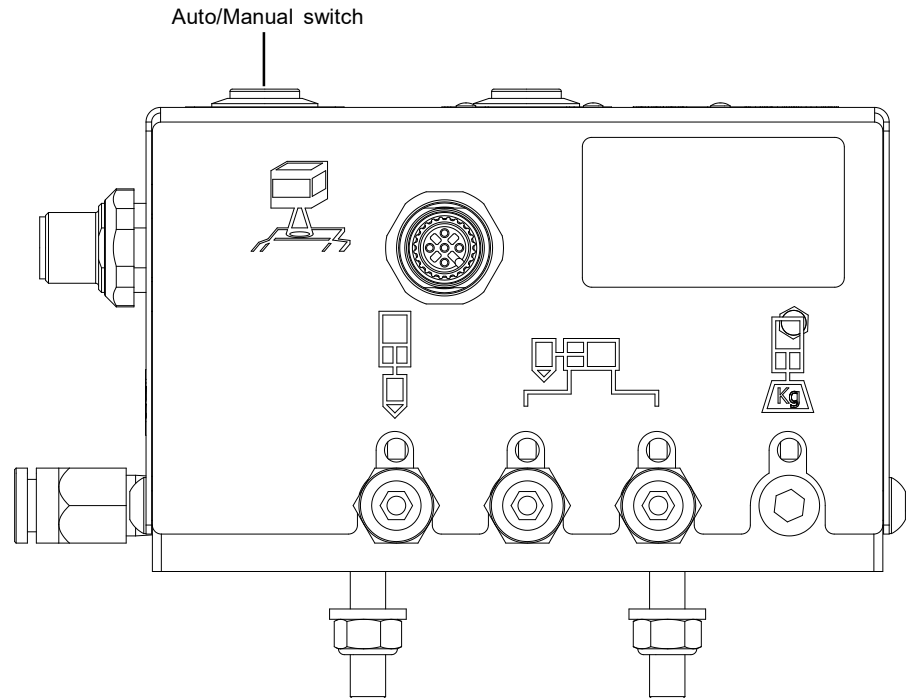


Figure 4-6. Tipsealer Auto/Manual Switch on Manifold (bottom view of unit)

When products stop running/flowing, the manifold assembly will move up, back and down, placing all three nozzles contacting the Tipsealer (Figure 4-7).

If the nozzles are not all contacting the Tipsealer pad, adjust as follows:

1. Set the system to MANUAL.
2. Use a 6mm hex wrench to loosen the manifold mounting screws (refer to Figure 4-7).
3. Adjust the manifold so the nozzles will be in contact with the Tipsealer pad.
4. Retighten the manifold screws.
5. Reset the system to AUTO. When the valves move to the Tipsealer pad, check to see if the nozzles are contacting the pad.
6. If the nozzles still do not contact the Tipsealer, repeat the above steps until the position is correct.

Adjustment for Tipsealer -
Continued

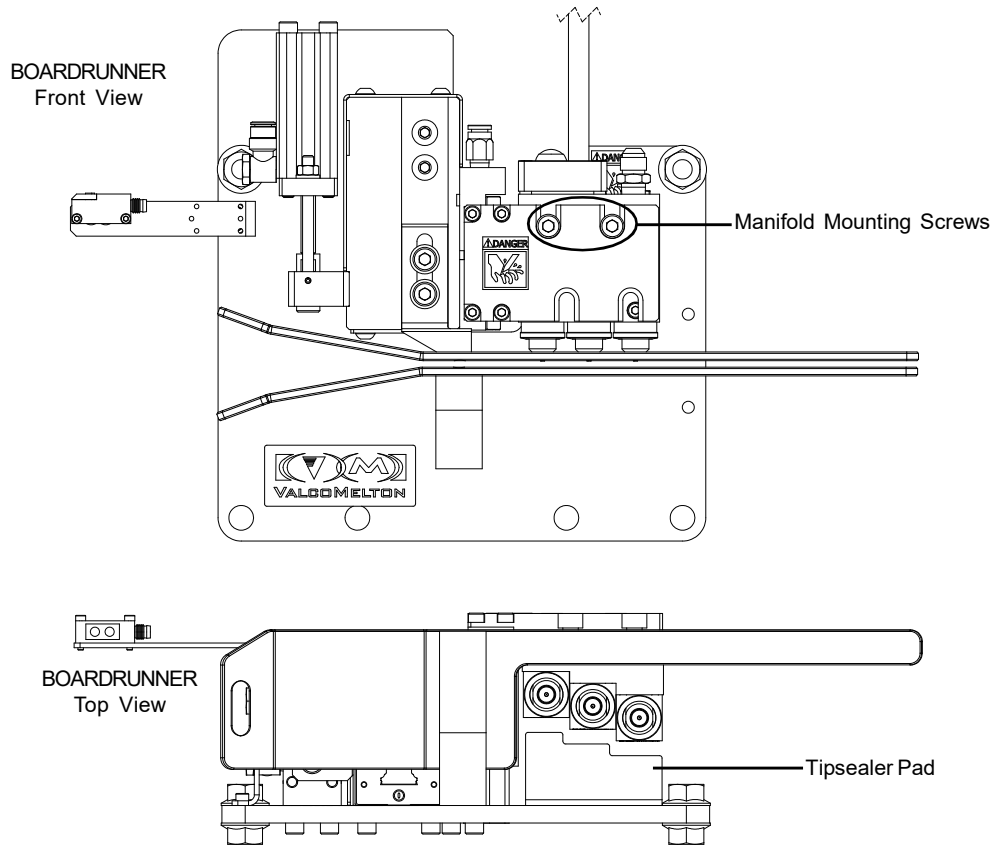



Figure 4-7. Tipsealer

SECTION 5 - OPERATION

Operating the Balancing Regulator

The balancing regulator (Figure 5-1) is pneumatically controlled and consists of a glue regulator and a pressure gauge. The glue regulator operates in conjunction with the EPC, and can be put into manual mode using the switch. When in Manual mode, the Air Regulator on the Glue Regulator controls air pressure. The air line from the EPC allows the glue regulator to increase glue pressure up to the maximum glue source pressure. The gauge normally requires no maintenance. If required, the regulator can be rebuilt with a repair kit.

 See control documentation to set EPC pressure curve that relates glue pressure to machine speed.

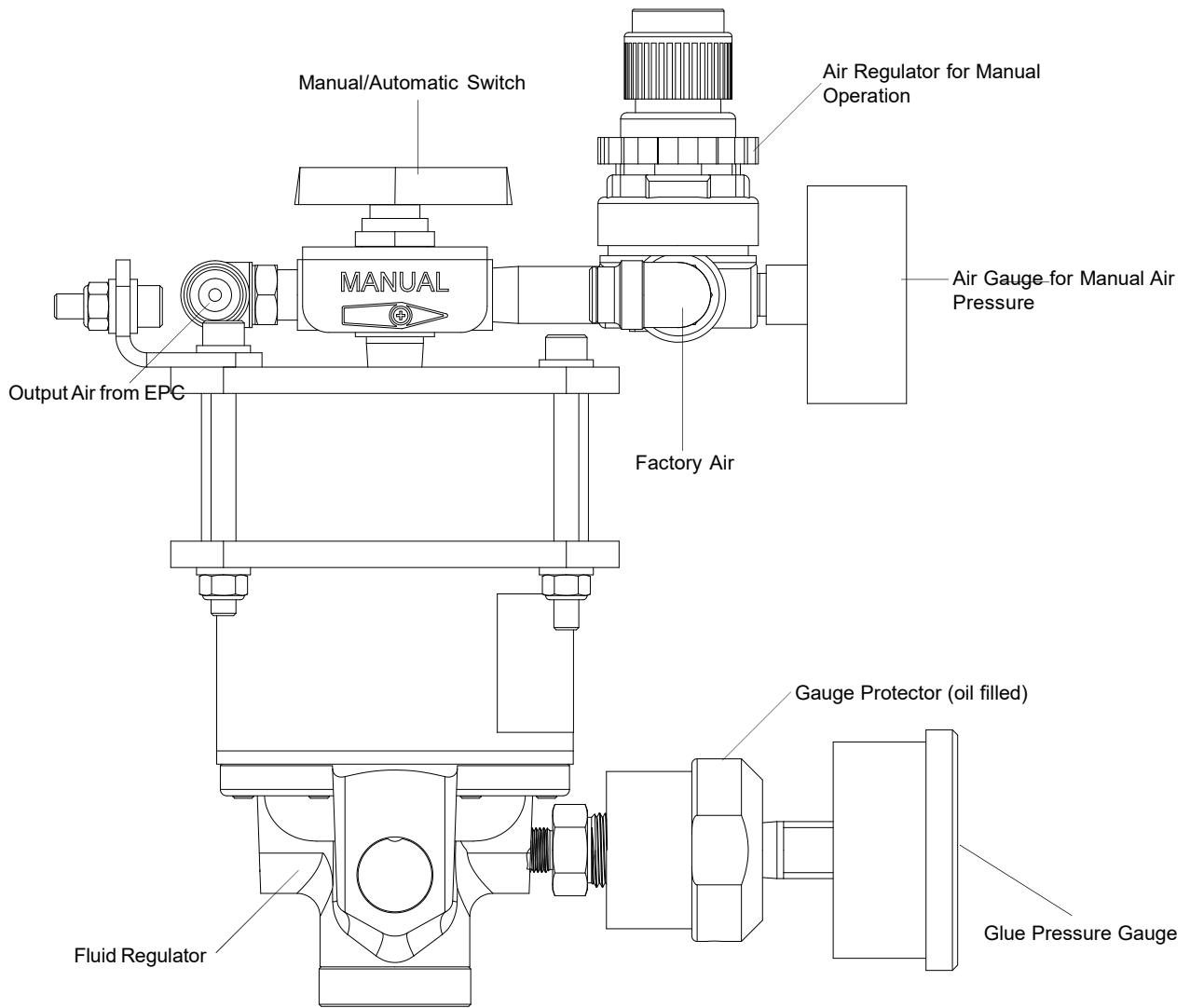


Figure 5-1A. Balancing Regulator - Side View

Operating the Balancing Regulator
- Continued

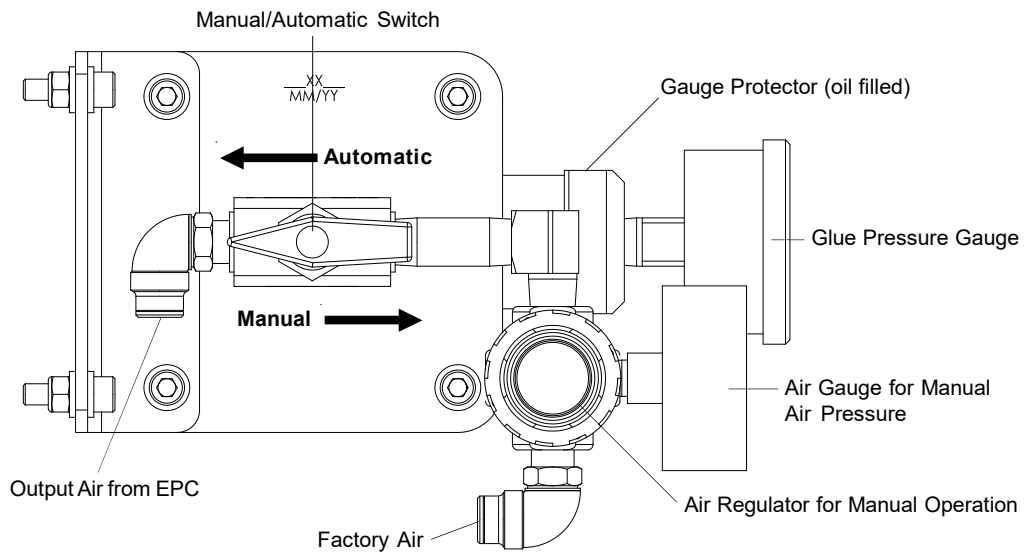


Figure 5-1B. Balancing Regulator - Top View

Operating the EPP-9 Piston Pump

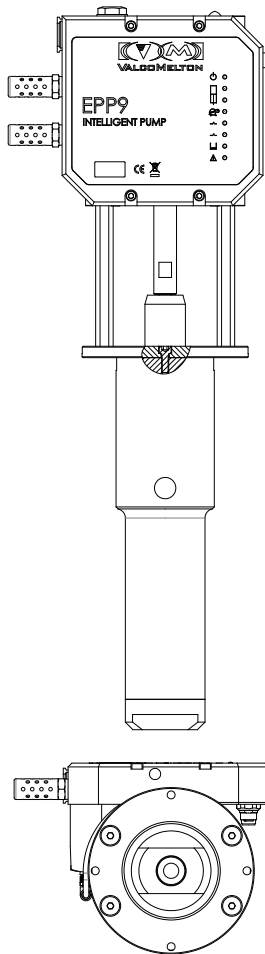
CAUTION!



Do not use filled adhesives! Fillers are usually clay, which will damage the pump shaft and seals severely.

To operate the Valco EPP9 Piston Pump, follow these steps:

1. Ensure that the air regulator pressure setting is zero (0) psi.
2. Connect the electrical power.
3. Turn on the air supply and power to the pump.
4. Adjust the air regulator to slowly increase the air pressure to the desired flow rate (see *Slow Mode*, below).



For efficient operation, air pressure should be adjusted to the lowest cycling rate that does not decrease flow rate. This may be the maximum flow rate for your particular conditions.

During pump operation, you may notice that one solenoid becomes warm. This is a normal condition.

If the pump speeds up noticeably without a proportionate increase in flow as air pressure is increased, the pump may be starting to cavitate. This can be caused by excessive restriction in suction lines, or the suction line diameter may need to be increased. If suction line checks out for size and tightness, cavitation can be stopped by adjusting the air regulator to reduce air pressure.

Figure 5-2 EPP-9 Pump

SECTION 6 - MAINTENANCE

A regular maintenance program helps ensure longer life and efficient operation of the system. A few minutes spent on maintenance greatly reduces downtime.

Checking the Settings

At the beginning of each shift, follow these steps:

1. Check all air pressure settings.
2. Check all glue pressure settings.

Purging the Adhesive

The system should be purged of air at every start-up or shift change. To purge the system, follow these steps:

1. Place the system in manual mode.
2. Press the purge button on the screen or on the manifold.
3. Purge adhesive until no air is present and the glue flows evenly.



The glue valves can be purged manually by means of an activator located on the valve itself, a solenoid-operated air valve or they can be purged from the front panel of the control.

When using any valve in the top-down position for the first time, it might be necessary to remove the valve and hold it so that the nozzles are at the top. The fluid pressure should then be set to 4 bar, and the solenoid should be fired until all the air is out and a flow of glue is present.

Performing Downtime Maintenance

During long periods of downtime (30 days or longer, such as order changeover, follow these steps:

1. Apply lithium grease to the valve nozzles.
2. Flush the entire glue supply system (including the pump or tank) with clean water (see Flushing the Adhesive System in this section).

Flushing the Adhesive System

A mild vinegar-and-water solution (1 part vinegar, 10 parts water) should be used to flush the system. Water alone can be used when you are simply changing adhesives or preparing the system for an extended period of downtime.

The entire system must be flushed when the following conditions apply:

- A new adhesive formula is not compatible with the present formula. (Always consult your adhesive supplier regarding compatibility between adhesive formulas.)
- System shutdown exceeds 30 days.
- Glue-line buildup causes an excessive pressure drop.
- Excessive filter screen maintenance is required due to contaminated adhesive.

Lubricating the System

To lubricate the system, follow these steps:

- Use lithium grease on all machined threads and fittings when servicing the system.

524 Valve Maintenance

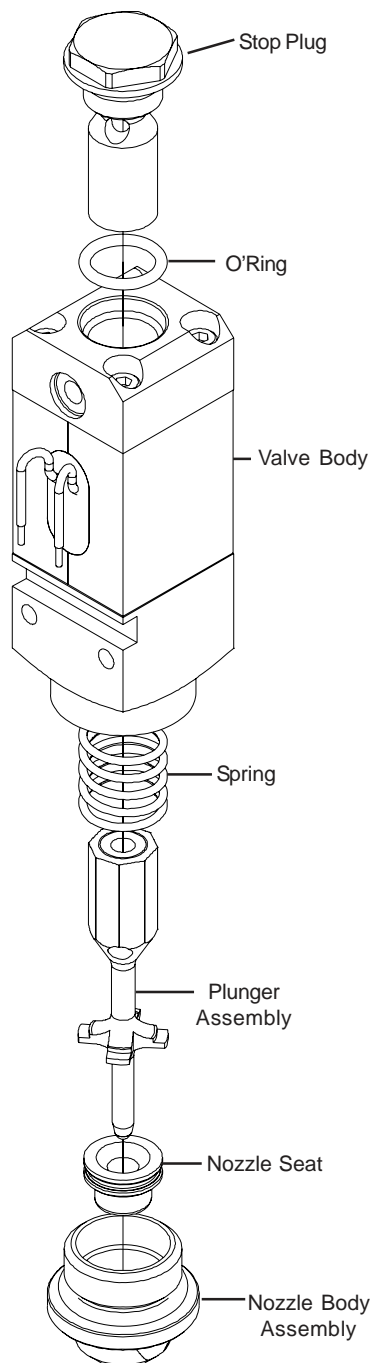
Disassembly

1. Use a 15mm wrench to loosen the Nozzle Body Assembly from the Valve Body.
2. Remove the Nozzle Body Assembly (w/Nozzle Seat), Plunger Assembly and Spring from the Valve Body



If the Nozzle Seat needs to be replaced, press it out from the lower end of the Nozzle Body. If a tool is required, take care not to damage the parts.

3. Remove the Spring from the large diameter end of the Plunger Assembly.
4. Use a 15mm wrench to loosen the Stop Plug into the Valve Body.
5. Unscrew and remove the Stop Plug from the Valve Body.
6. Slide the O'Ring off of the Stop Plug.

524 Valve Maintenance -
Continued**Reassembly**

1. Before reassembling, make sure all parts are clean and free of burrs or other debris that can cause improper operation and valve damage.
2. Slide the O'Ring over the Stop Plug.
3. Thread the Stop Plug into the Valve Body.
 - A. Use a 15mm to tighten it completely.



If the Nozzle Seat has been removed from the Nozzle Body Assembly for replacement, insert the new Nozzle Seat into the Nozzle Body Assembly, allowing the Nozzle Seat insert to slide into the bottom of the Nozzle Body, and then use the ball end of the Plunger Assembly to gently press the Nozzle Seat into place.

4. Place the Spring over the large diameter end of the Plunger Assembly.
5. Insert the Plunger Assembly and Spring into the Valve Body.
6. Place the Nozzle Body Assembly over the ball end of the Plunger Assembly, and then thread it into the Valve Body.
 - A. Use a small, adjustable wrench to tighten it completely.

CAUTION!

Do not attempt to remove the valves from the manifold.
Do not soak the valve in water; use a damp cloth only.

**Cleaning the Exterior
of the Valve**

CAUTION!

Never hose or steam-clean the unit. If the surrounding area is cleaned in this manner, protect the unit by covering it with plastic or other waterproof material. OTHERWISE, EQUIPMENT DAMAGE COULD OCCUR.

CAUTION!

Before cleaning the valve with any type of liquid, remove the solenoid. LIQUID CAN CAUSE DAMAGE TO THE SOLENOID.

The exterior of the 524 valve needs to be kept clean. To clean the exterior of the valve, follow these steps:

1. Disconnect valve from system.
2. Using a damp cloth, clean the exterior of the valve with a mild soap-and-water solution.

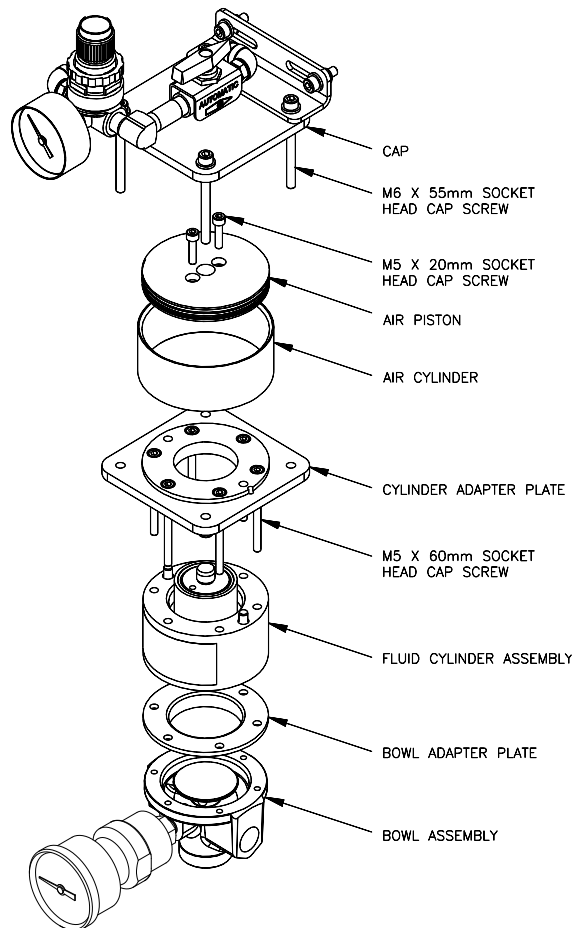
Balancing Regulator Maintenance (593xx521)

Recommended Tools and Materials

The balancing regulator may need to be disassembled periodically to replace the ball seat, diaphragm, or worn parts. You will need the following tools:

- Allen wrench
- Adjustable wrench
- 24-mm socket
- Bench-mounted vise
- Repair kits as necessary for your repair:
 - Repair Kit - 3:1 regulator - Viton Seals (593xx523)
 - Repair Kit - 3:1 regulator - EP Seals (593xx528)

Disassembly



1. Relieve pressure from the air and glue lines.
2. Remove the (4) M6 x 55mm hex-head cap screws.
3. Remove the cap from the regulator assembly.
4. Remove the (2) M5 x 20mm socket-head cap screws.

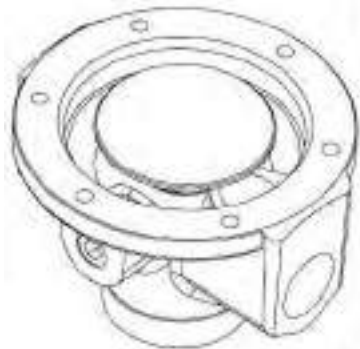
Disassembly - Continued

5. Remove the air cylinder assembly.
6. Remove the (6) M5 x 60mm socket-head cap screws.
7. Remove the cylinder adapter plate.
8. Remove the fluid cylinder assembly and bowl adapter plate.

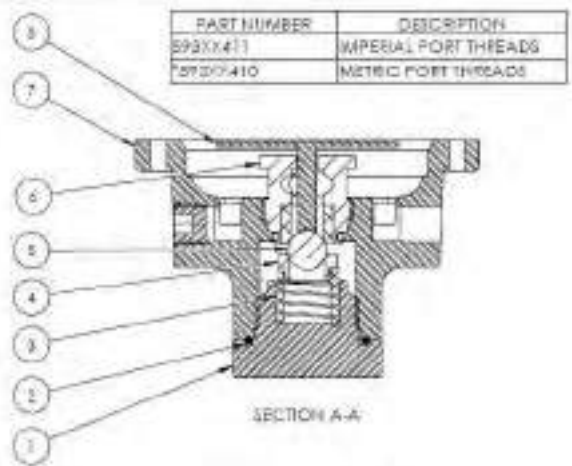
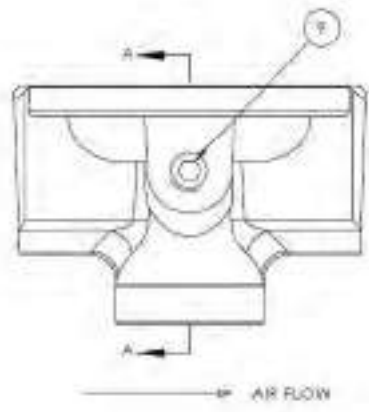
**Repair Kit
(EP - 593XX528;
Viton - 593XX523)**

ITEM	DESCRIPTION	PART NUMBER	EP	VITON	QTY
1	DIAPHRAGM, ROLLING	746XX155			1
2	TAPE, ADHESIVE TRANSFER	781XX821			1
3	RING QUAD 3.237" NITRILE	746XX285			2
4	O-RING	745XX307			1
5	O-RING	746XX163	x		1
		745XX080		x	1
6	SPRING	593XX055			1
7	BALL SUPPORT	593XX054			1
8	BALL 3/8	593XX053			1
9	BALL SEAT MODIFICATION	593XX526	x		1
		593XX130		x	1
10	MALE QUICK DISCONNECT	752XX004			1
11	BUSHING REDUCER 1/2 X 1/4	797XX049			1
12	HEX HEAD PIPE PLUG 1/2	797XX040			1
13	O-RING	745XX142			1
14	O-RING	746XX162	x		1
		745XX398		x	1
15	ACTIVATOR PIN; REGULATOR	593XX262			1
16	INSTRUCTION SHEET 1:1 PROP REG	IS0291			1
17	FIXTURE - PISTON ALIGNMENT	593XX524			1

**Bowl Assembly
Repair**

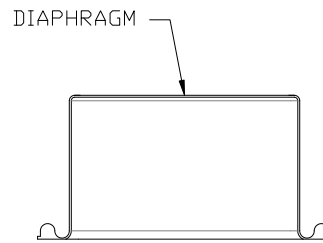


ITEM	PART NUMBER	QTY.	DESCRIPTION
1	593XX027	1	BOTTOM PLUG - FINISHED
2	745XX080	1	O-RING
3	593XX055	1	SPRING
4	593XX054	1	BALL SUPPORT
5	593XX053	1	5/8" CERAMIC BALL
6	593XX030	1	BALL SEAT ASSEMBLY
7	593XX350	1	REGULATOR HOUSING, NPT
77	593XX051	1	REGULATOR HOUSING, METRIC
8	593XX262	1	ACTIVATOR PIN
9	799XX029	1	PIPE PLUG; 1/8" NPT
99	799XX040	1	PLUG; 1/8" BSP

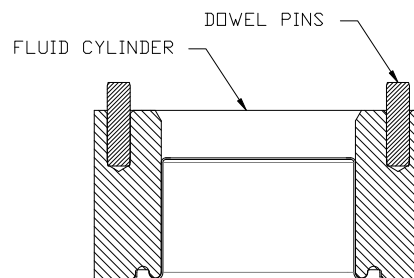


Diaphragm Repair

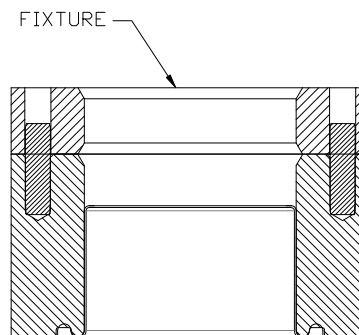
1. Place the diaphragm (Item #1) face down on a smooth, clean surface.



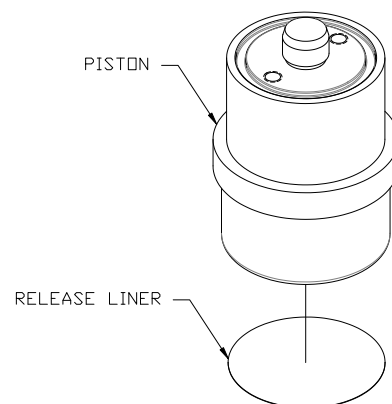
2. Place the fluid cylinder with the dowel pins over the diaphragm, so that the diaphragm sits in the fluid cylinder groove.



3. Place the alignment fixture (Item #17) over the dowel pins.

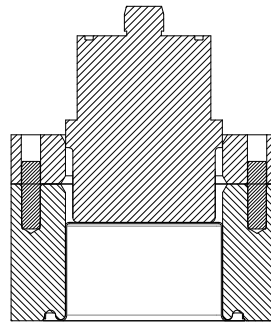


4. Place a piece of transfer tape on the bottom of the piston.

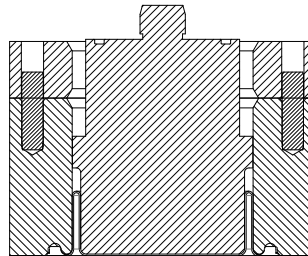


Diaphragm Repair - Continued

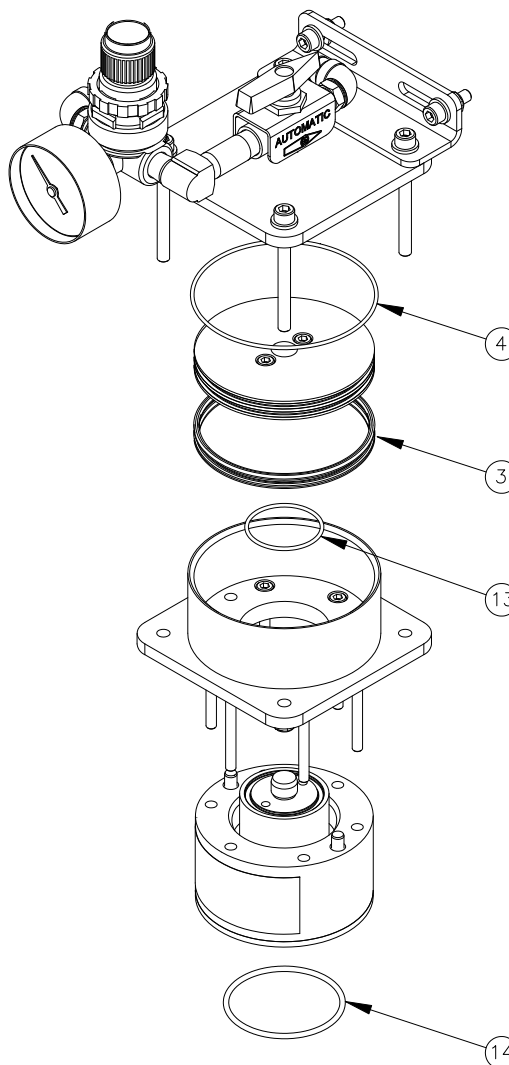
5. Cut away the excess.
6. Remove the release liner from the transfer tape.
7. Place the piston, adhesive side down, into the fluid cylinder, so the adhesive contacts the diaphragm.



8. Push the piston down. The diaphragm will surround the piston.

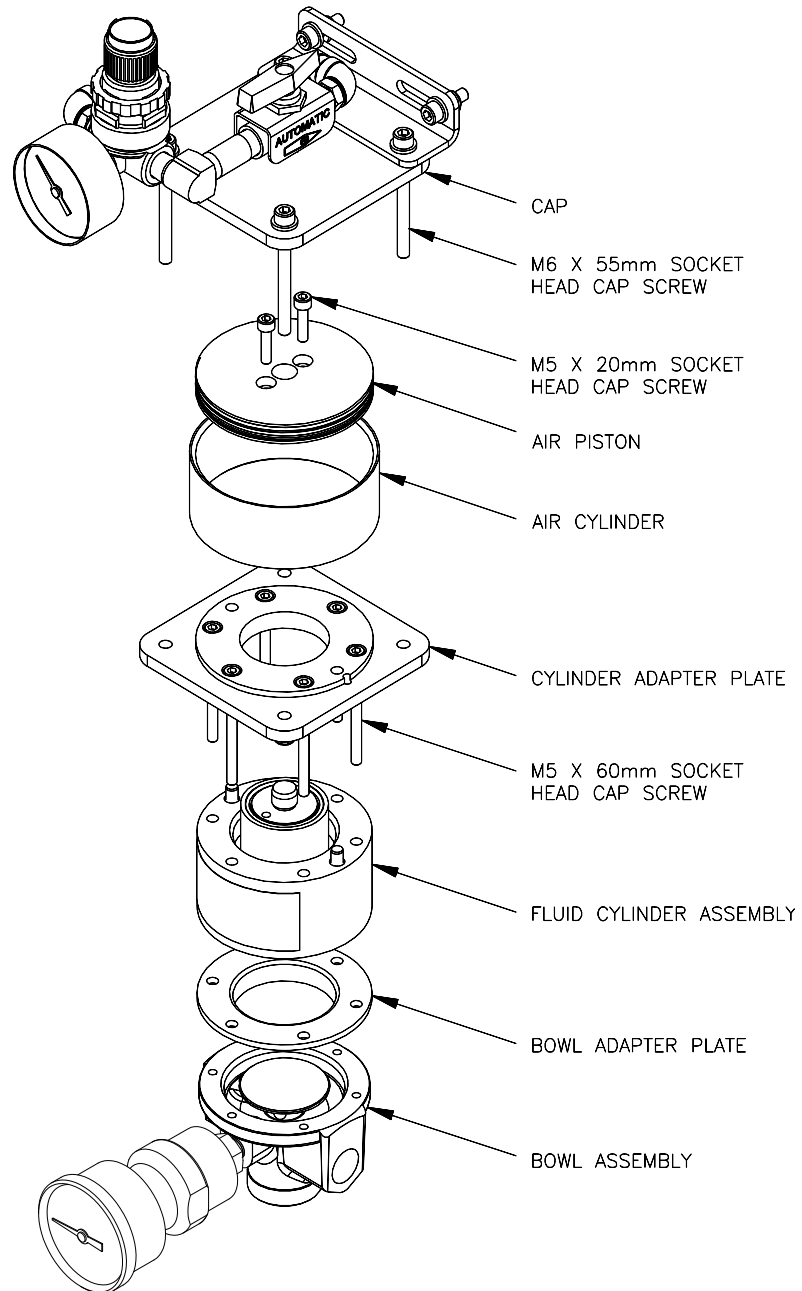


Seal Replacement



ITEM	DESCRIPTION	PART NUMBER	EP	VITON	QTY
1	DIAPHRAGM, ROLLING	746XX155			1
2	TAPE, ADHESIVE TRANSFER	781XX821			1
3	RING QUAD 3.237" NITRILE	746XX285			2
4	O-RING	745XX307			1
5	O-RING	746XX163	x		1
		745XX080		x	1
9	BALL SEAT ASSEMBLY	593XX539	x		1
		593XX538		x	1
10	MALE QUICK DISCONNECT	752XX004			1
11	BUSHING REDUCER 1/2 X 1/4	797XX049			1
12	HEX HEAD PIPE PLUG 1/2	797XX040			1
13	O-RING	745XX142			1
14	O-RING	746XX162	x		1
		745XX398		x	1
15	ACTIVATOR PIN; REGULATOR	593XX262			1
16	INSTRUCTION SHEET 1:1 PROP REG	IS0291			1
17	FIXTURE - PISTON ALIGNMENT	593XX524			1

**Reassembly
Procedure**



1. Place the bowl adapter plate into the bowl assembly.
2. Place the fluid cylinder assembly on top of bowl adapter plate.

CAUTION! Make sure the screw holes are aligned.



3. Place the cylinder adapter plate on top of the fluid cylinder assembly.

 Reassembly Procedure -
 Continued

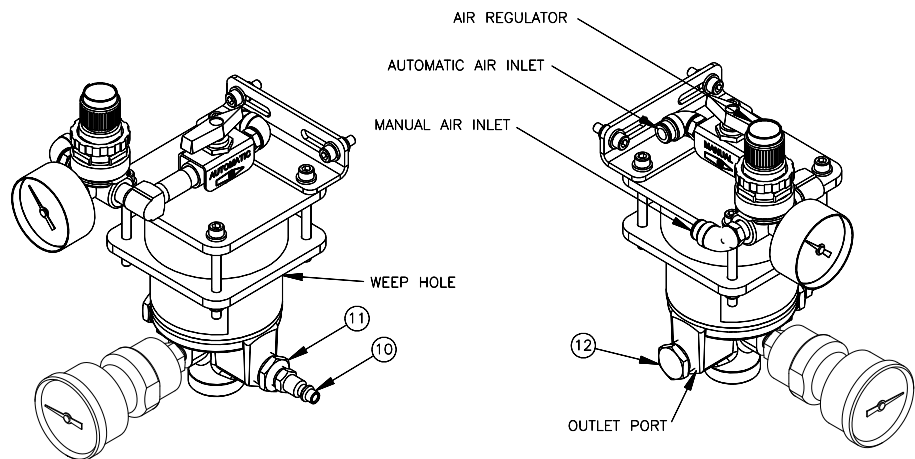
4. Install the (6) M5 x 60mm socket-head cap screws.
5. Apply Super Lube, food grade lubricant (782XX557) to the inside of the air cylinder.
6. Place the air cylinder onto the cylinder adapter plate.
7. Insert the air piston into the air cylinder.
8. Use a flat-head screwdriver to prevent the piston from rotating.
9. Insert the (2) M5 x 20mm socket-head cap screws.
10. Tighten the screws to 30 in-lbs.

CAUTION! Do not allow piston to rotate.



11. Place the cap onto the air cylinder.
12. Tighten the (4) M6 x 55mm hex-head cap screws.

Test Procedure



1. Attach the test fittings (items #10, #11, and #12) to the bowl regulator, as shown above.
2. Attach shop air to item #10, and to the manual air-inlet fitting.
3. Use the air regulator to adjust the pressure to 60 psi.
4. Turn the ball valve from manual to automatic several times, to help seat the diaphragm.
 - a. Leave the valve in the manual position.

Test Procedure - Continued

5. Check for leaks around the diaphragm.
6. If there are no leaks, regulate the air back to 0 psi, and remove item #12 (plug).
7. Check for air leaks around the outlet port, to test for ball check seal leaks.
8. If all tests pass, reattach to the machine.

Fluid-Filter Maintenance

Inspecting the In-Line Fluid-Filter Screens

On new installations, the fluid-filter screens should be inspected once a week during the first month to determine maintenance requirements. After the first month, filter screens should be inspected and cleaned regularly. Service intervals should not exceed 14 days.

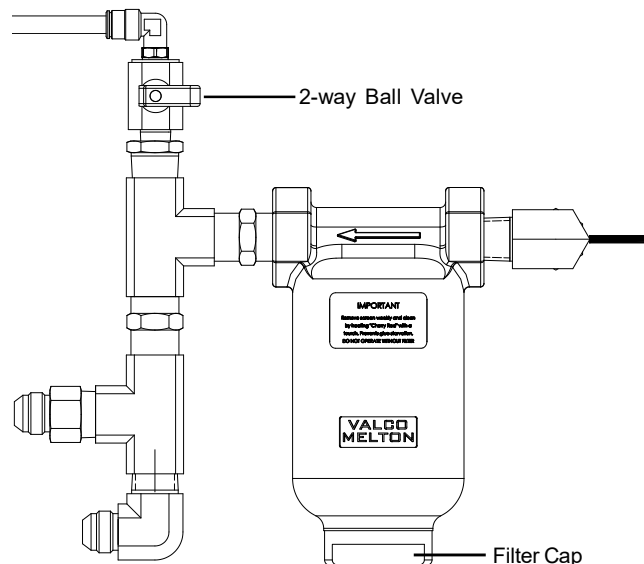
To remove the filter screen, follow these steps:

1. Turn the Pump off.
2. Twist off filter cap.
3. Remove filter screen.



Frequent clogging of the filter screens may indicate adhesive issues, or that the entire glue system requires cleaning.

4. Clean the filter screen.
5. Re-install the screen.
6. Rotate the 2-way valve to purge air from the filter assembly.
7. When all air has been purged from the system, rotate the valve back to the operating position.



Fluid-Filter Assembly

Maintaining the EPP-9 Piston Pump

Cleaning the Exterior of the Pump

CAUTION!

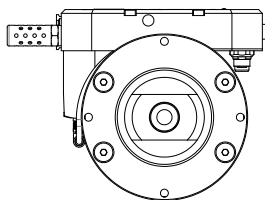
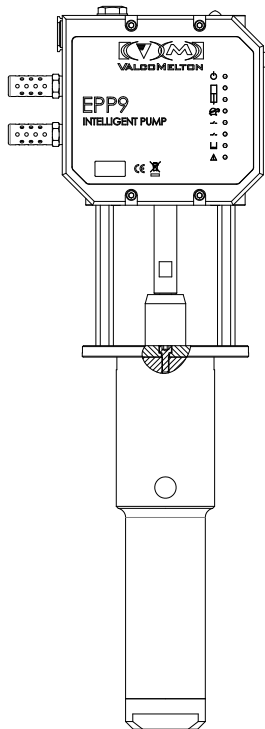


Never hose or steam-clean the unit. If the surrounding area is cleaned in this manner, protect the unit by covering it with plastic or other waterproof material. OTHERWISE, EQUIPMENT DAMAGE COULD OCCUR. When cleaning the pump, keep the electrical control box enclosure closed. OTHERWISE, EQUIPMENT DAMAGE COULD OCCUR.

To clean the exterior of the Valco EPP9 Piston Pump, follow these steps:

1. Turn off the main power.
 2. Use a damp cloth and clean the pump and air motor with a mild soap-and-water solution.
-
1. Never allow the pump to run dry. A dry pump will quickly accelerate to a high speed and possibly damage itself. If the pump accelerates quickly or is running too fast, stop it immediately and check the fluid supply. If the supply container is empty and air has been pumped into the lines, refill the container and prime the pump and lines with fluid. Be sure to eliminate all air from the fluid system.
 2. For an overnight shutdown, turn off the power and relieve the pressure.
 3. During startup, the shaft seal may leak a small amount of glue. This glue will dry and ball up around the shaft. When this happens, turn off the power to the pump, lift the clear shaft guard, and remove the dried glue. If the leak does not stop and a significant amount of wet glue leaks past the seal without drying up, it is time to replace the shaft seal.

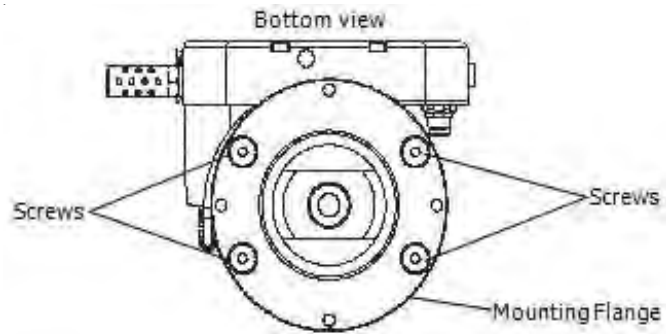
Maintenance Tips



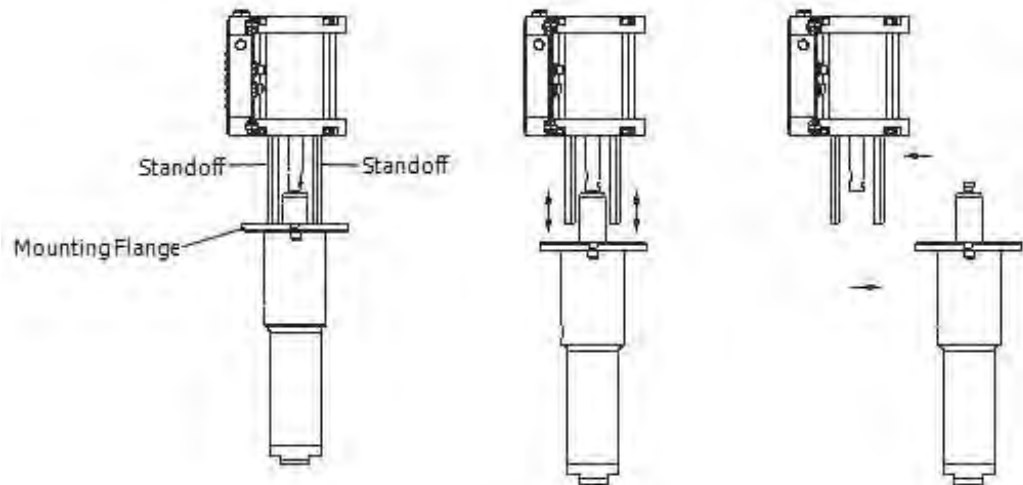
EPP-9 Pump

Separating the Air Motor and the Pump

1. Remove the screws securing the air motor standoffs to the mounting flange.



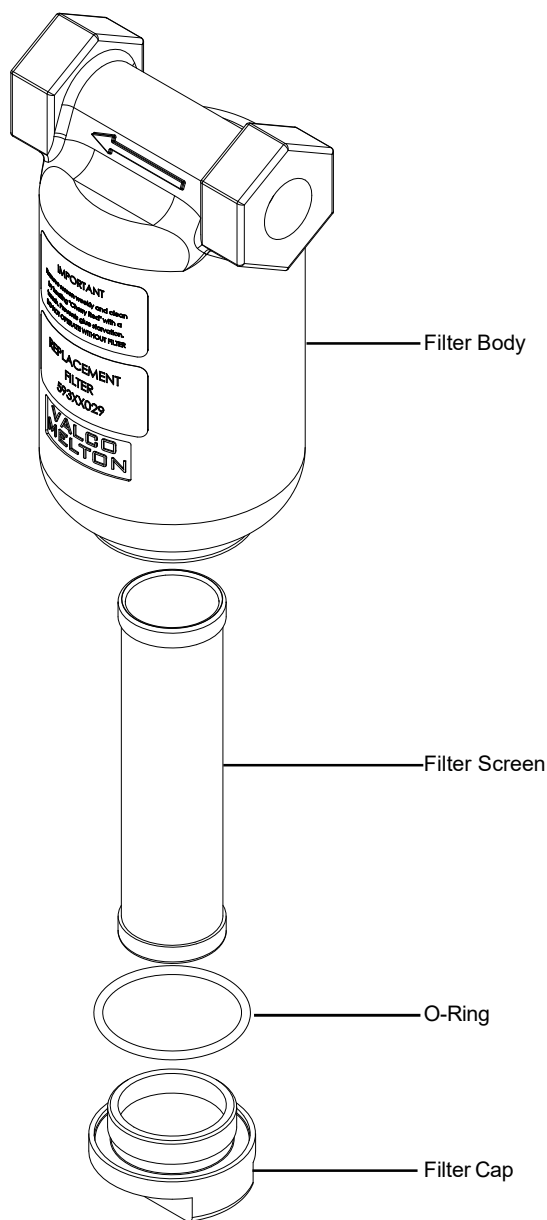
2. Slide the pump down, and then sideways, to disengage it from the air motor.



Cleaning the EPP-9 Fluid Filter

The fluid filter should be cleaned regularly. To clean the filter, follow these steps:

1. Remove the filter cap.
2. Remove the filter screen.
3. Clean the filter screen with either a mild vinegar-and-water solution or a propane torch.



593xx535.dwg

Maintaining Air Filter Regulators

All Valco Cincinnati gluing systems require clean, dry air to operate efficiently. All Valco air filter regulators are equipped with quick-disconnect fittings, making it easy to access the units for installation, removal and replacement.

To maintain proper air quality. Pressure from the plant air supply should also be monitored continually to ensure uninterrupted and proper pressure rates.

400 Marking Valve Maintenance

The 400 marking valve is solenoid-operated for precise marking patterns at high machine speeds. The valve features a purge/test switch and a carbide-tipped plunger assembly for long service life.

Recommended Tools and Materials

- 9/16" wrench
- Soft tube brush (included in maintenance kit)
- Nozzle-cleaning drills (included in maintenance kit)
- Lithium grease (included in maintenance kit)
- Soft cloth
- Warm soapy water
- Air hose and gun

General Recommendations

- Replace all worn or dirty O-rings.
- Ensure that electrical connections are kept clean.
- Clean the valve only when it is not operating properly.
- When valve is not in operation, use Lithium grease on nozzle tip to keep nozzle from clogging .
- Use only fresh, clean fluids in the valve.
- Keep quick-disconnect and valve-body fluid source inlet clean.
- Ensure that fluid-source outlet is clean before inserting it into the quick-disconnect.

Cleaning the Exterior of the Valve

CAUTION!



Never hose or steam-clean the unit. If the surrounding area is cleaned in this manner, protect the unit by covering it with plastic or other waterproof material. OTHERWISE, EQUIPMENT DAMAGE COULD OCCUR.

Before cleaning the valve with any type of liquid, remove the solenoid. LIQUID CAN CAUSE DAMAGE TO THE SOLENOID.

The exterior of the 400 marking valve needs to be kept clean. To clean the exterior of the valve, follow these steps:

1. Disconnect valve from system.
2. Using a damp cloth, clean the exterior of the valve with a mild soap-and-water solution.

Changing the Nozzle

To change the nozzle, follow these steps:

1. Using a 9/16" wrench, remove nozzle-body assembly (12).
2. Pull plunger assembly (8) and spring (7) from valve-body assembly.
3. Push nozzle-seat insert assembly (9) out of nozzle-body assembly (12).
4. Lubricate O-ring (10) on nozzle-seat insert assembly (9) with appropriate lubricant.
5. Insert nozzle-seat insert assembly (9) into nozzle-body assembly (12).
6. Using ball end of plunger assembly (8), gently press nozzle-seat insert assembly (9) into place.
7. Place spring (7) over the large diameter end of the plunger assembly (8).
8. Insert plunger and spring into valve body.
9. Ensure that spring is seated on spring seat.
10. Place nozzle assembly over ball end of plunger assembly (8).
11. Thread nozzle assembly into valve-body assembly (5).
12. Hand-tighten nozzle assembly.
13. Using the 9/16" wrench, make sure that shoulder of nozzle-body assembly (12) meets shoulder on valve-body assembly (12). *Do not overtighten.*

SECTION 7 - TROUBLESHOOTING

EPP-9 Pump

Problem	Possible Cause	Possible Solution
1. Pump will not start	<p>1a. Electrical:</p> <ul style="list-style-type: none"> -Power input LED out -No electrical service -Service cable faulty -Line fuses out -Faulty 4-way solenoid -Faulty Hall effects <p>1b. Pneumatic:</p> <ul style="list-style-type: none"> -Regulator pressure gauge at zero -Regulator pressure gauge not at zero; solenoid valves not operating <p>1c. Mechanical:</p> <ul style="list-style-type: none"> -Pumped solidified fluid 	<p>Check line fuse. Check plant power supply. Replace PC board/transformer assembly.</p> <p>Check plant power supply. Repair or replace service cable. Replace line fuses. Replace solenoid. Test switches with magnet.</p> <p>Check plant air supply. Open master air valve. Turn regulator adjusting knob clockwise.</p> <p>Check air lines to valves.</p> <p>Check strainers and filters. Service the suction and discharge lines. Service the check valves. Service the pump.</p>
2. Fluid flow is not steady.	<p>2a. Suction leakage</p> <p>2b. One or more check valves not seating correctly</p> <p>2c. Clogged valve nozzle</p>	<p>2a. Test and repair suction components.</p> <p>2b. Shut pump down and service the check valves.</p> <p>2c. Clean valve nozzle.</p>
3. Pump runs without flow.	<p>3a. Suction leakage</p> <p>3b. Blocked suction line</p> <p>3c. One or more check valves not seating properly. Down Stroke = Lower check Up Stroke = Piston check</p> <p>3d. Pump is sucking in air</p>	<p>3a. Test and repair suction components.</p> <p>3b. Check and clean suction strainer if used. Check installation.</p> <p>3c. Shut pump down and service the check valves.</p> <p>3d. Check all fittings. Use pipe sealant to seal fittings.</p>
4. Pump speeds up noticeably without a proportionate increase in flow as air pressure is increased.	<p>4a. The pump may be beginning to cavitate due to excessive restriction in suction lines or insufficient suction-line diameter.</p>	<p>4a. If suction line checks out for size and tightness, cavitation can be stopped by turning the regulator knob counterclockwise to reduce air pressure.</p>

SECTION 8 - PART NUMBER LIST

How to Order Parts

To order parts, please contact your closest Valco office by mail, phone, or Email:

USA:

Valco Cincinnati, Inc.
497 Circle Freeway Drive
Suite 490
Cincinnati, OH 45246
Tel: (513) 874-6550
Fax: (513) 874-3612
Email: sales@valcomelton.com
Web: <http://www.valcocincinnatiinc.com>

England:

Valco Cincinnati Limited
Hortonwood 32
Telford, TFI 7YN, England
Tel: (+44) 1952-677911
Fax: (+44) 1952-677945
Email: sales@valco.co.uk
Web: <http://www.valco.co.uk>

Germany:

Valco Cincinnati GmbH
Bonnerstrasse 349
40589 Dusseldorf-Benrath, Germany
Tel: +49 211 984 798-0
Fax: +49 211 984 798-20

Spain:

Melton S.L.U.
Pol. Industrial Agustinos
calle G, n. 34
31160 Orcoyen, Navarra, Spain
Tel: (34) 948-321-580
Fax: (34) 948-326-584

France:

Valco Melton France
Technoparc des Hautes Faventines
32 Rue Jean Bertin
26000 Valence
Tel: +33 (0)4 75 78 13 73
Fax: +33 (0)4 75 55 74 20

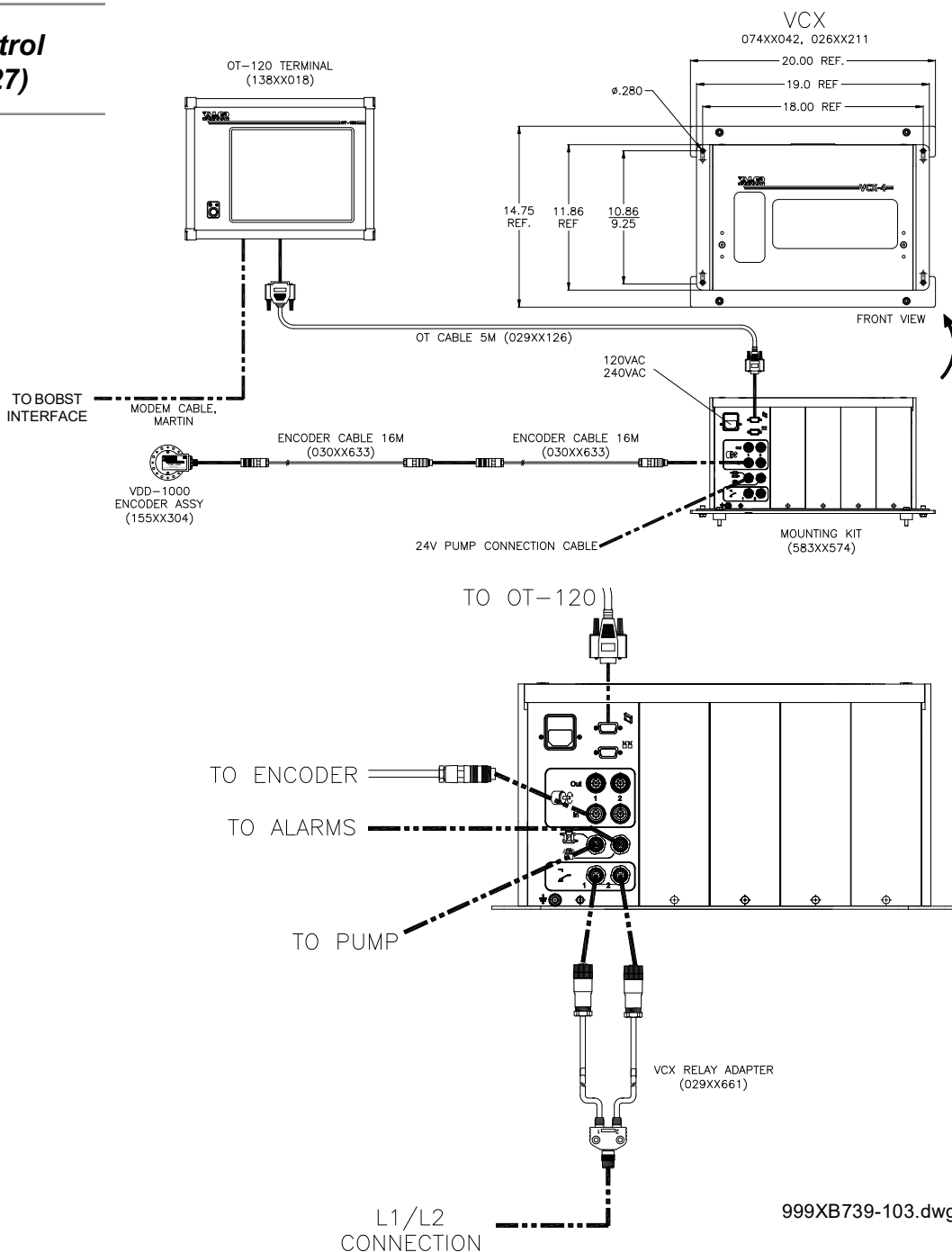
Kits for Flexoseal® Gluing System using 3-Valve Boardrunner

Different kits are available for the Flexoseal® gluing system using the 3-Valve Boardrunner:

- 739xx227 - VC-X Control*
- 739xx228 - Tri-Valve FFS OS/DS

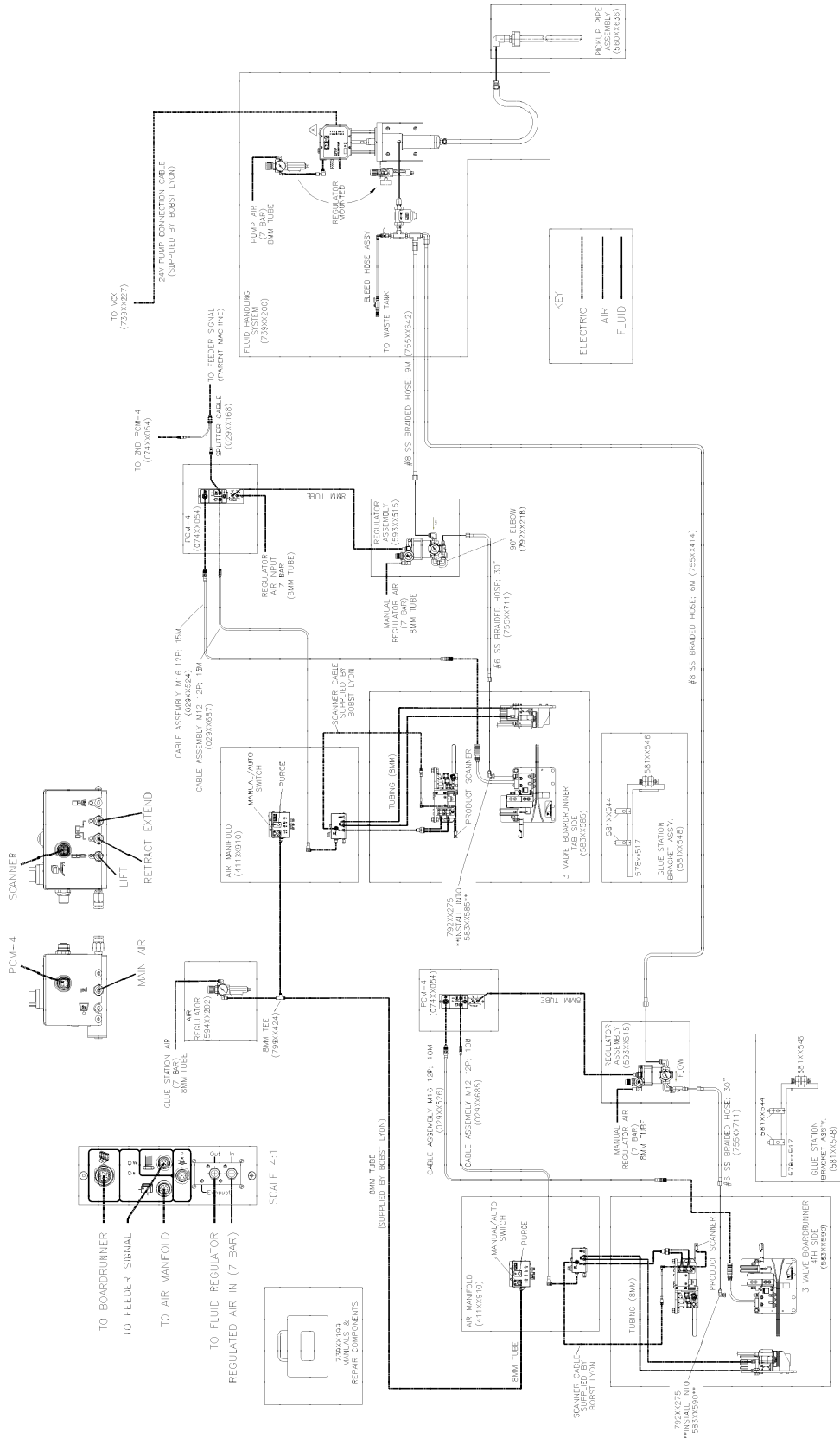
*For systems using the VC-X control.

**VC-X Control
(739xx227)**



739XX227			
ITEM	PART#	QTY.	DESCRIPTION
1	138XX018	1	OT-120 TERMINAL
2	074XX042	1	VCX CONTROL ASSY
3	026XX211	4	BLANKING PLATE
4	029XX126	1	OT-120 TO VCX CABLE, 5M
5	030XX633	2	ENCODER CABLE, 16M
6	155XX304	1	ENCODER ASSY
7	029XX661	1	VCX RELAY ADAPTER
8	315XX088	1	USB FLASH DRIVE
9	583XX574	1	MCP 12 TO VCX CONVERSION KIT
10	999XB739-103	1	ILLUSTRATION DRAWING
11	730XX055	1	BOX, PALLET
12	730XX068	1	SKID, PLAIN

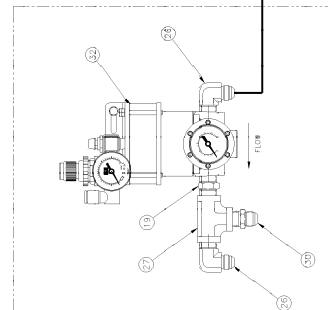
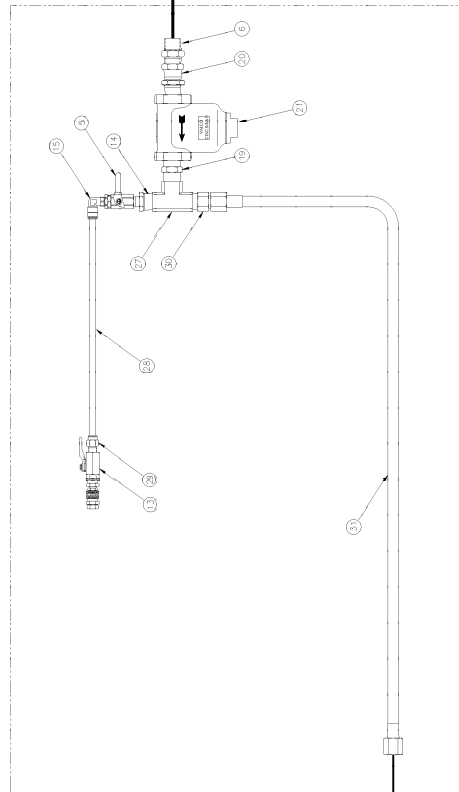
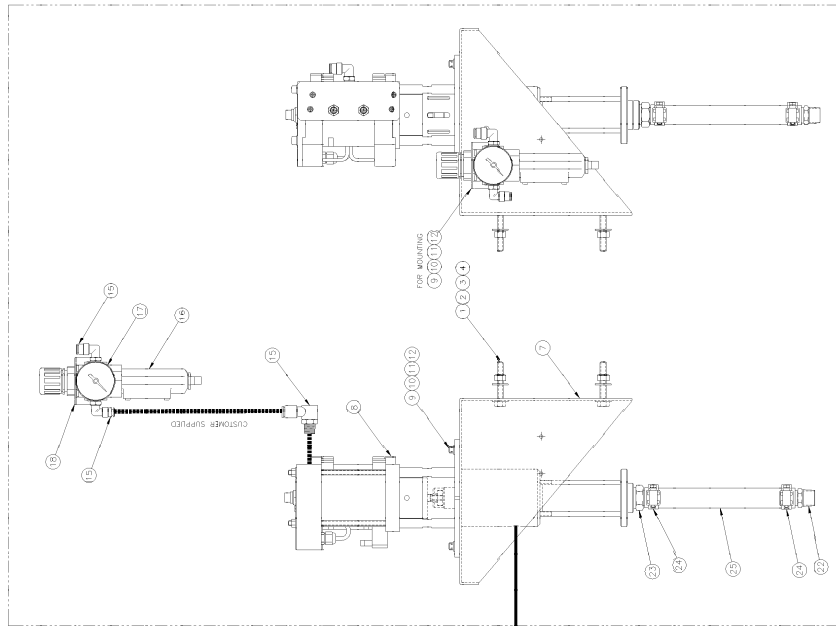
Tri-Valve FFS OS/DS (739xx228)



Tri-Valve FFS OS/DS (739xx228)
- Continued

Item	Part #	Description	QTY
1	3NC GLUE STATION TAB SIDE	583XX585	1
2	3NC GLUE STATION 4TH PANEL	583XX590	1
3	MTG. BRACKET ASSY.	581XX548	2
4	ELBOW 90 SWIVEL 3/8 JIC SS	792XX275	2
5	FLUID HANDLING SYSTEM	739XX200	1
6	SUCTION TUBE CONVERSION KIT	560XX636	1
7	MANUALS & REPAIR KIT BOBST	739XX199	1
8	REGULATOR ASSEMBLY 820 FFG	593XX515	2
9	TEE, 8MM PUSH-IN	799XX424	1
10	CABLE ASSY,SCAN"Y" ADAPT 2CT	029XX168	1
11	MODULE ASSY PCM-4 BR W/EPC	074XX054	2
12	ASSY AIR MANIFOLD CONTROL	411XX910	2
13	BOX, BOXCHEK 7	730XX055	1
14	SKID, PLAIN, 36 X 29	730XX068	1
15	CABLE ASSY, M16 12 PIN M-F 15	029XX524	1
16	CABLE ASSY M12 12P M/F R/A 15M	029XX687	1
17	CABLE ASSY, M16 12 PIN M-F 10	029XX526	1
18	CABLE ASSY M12 12P M/F R/A 10M	029XX685	1
19	HOSE BRAIDED 3/8 ID (#6) X 30"	755XX711	2
20	HOSE ASSY, 20FT. LG.	755XX414	1
21	HOSE BRAIDED 1/2ID 30'LG	755XX642	1
22	ELBOW, 1/2NPT, STREET, 90	792XX218	1
23	AIR REGULATOR/FILTER ASSY	594XX202	1
24	ILLUSTRATION DRAWING	999XD739-104	1

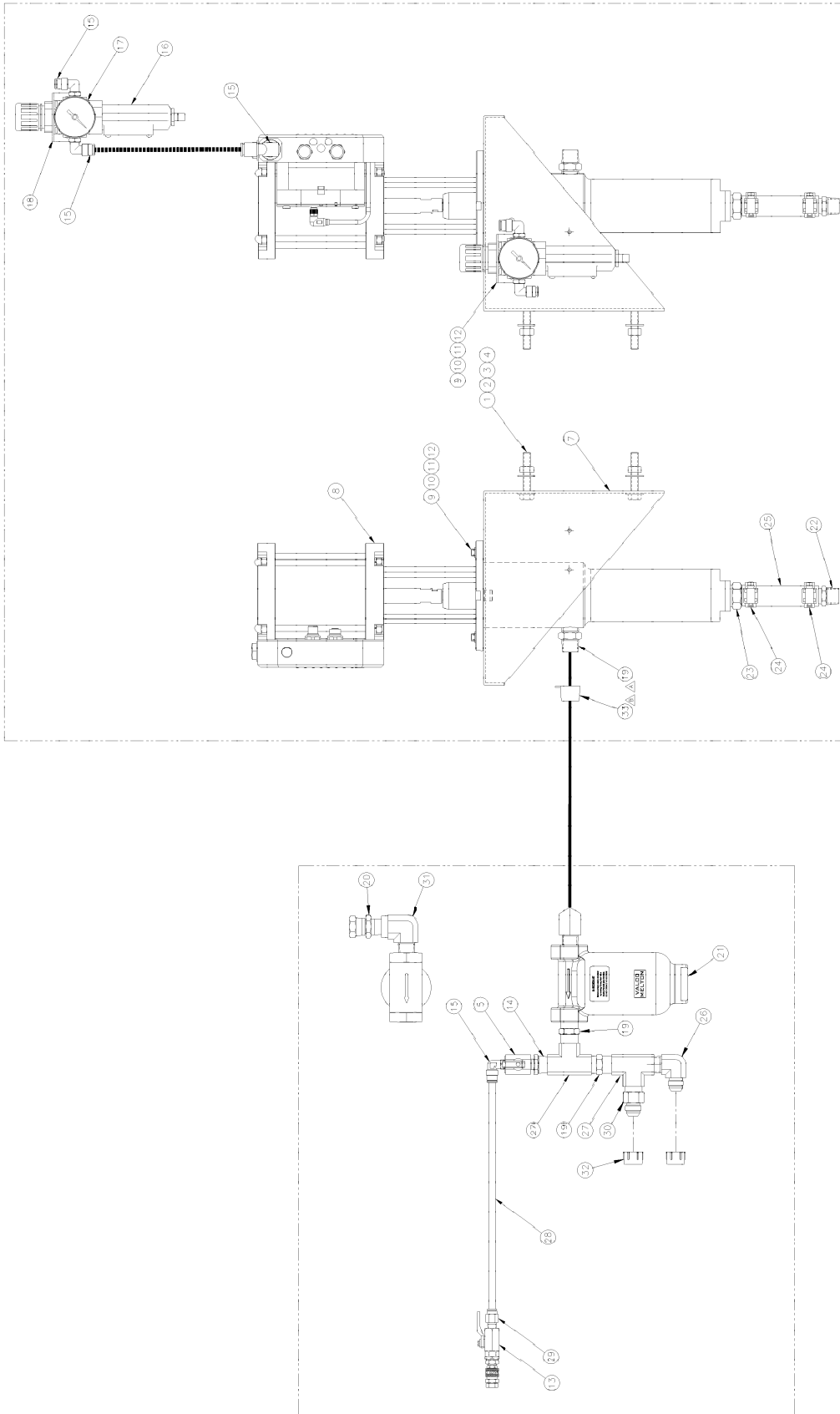
Fluid System, Single Regulator (BAW2877)



Fluid System, Single Regulator
(BAW2877) - Continued

Item	Part #	Description	QTY
1	SHCS M10 X 50 SS	784XX612	4
2	FLAT WASHER M10 SS	784XX443	4
3	SLW M10 SS	784XX569	4
4	HEX NUT M10 X 1,5 SS	784XX015	4
5	SHUT-OFF VALVE 1/4 SS	792XX370	1
6	NIPPLE; HEX	792XX348	1
7	WALL MOUNTING BRACKET	580XX410	1
8	EPP9 PUMP	561XX352	1
9	SHCS M6 X 20 SS	798XX158	8
10	FLAT WASHER M6 SS	784XX183	8
11	SLW M6 SS	784XX600	8
12	NUT, M6	793XX491	8
13	SHUT-OFF VALVE	703XX418	1
14	BUSHING REDUCER 1/2 X 1/4NPTSS	792XX035	1
15	MALE ELBOW, 5/16I X 1/4NPT	799XX821	4
16	AIR FILTER REGULATOR 150 PSI	594XX162	1
17	GAUGE 0-150 PSI 1/8 BACK MNT	786XX002	1
18	BRACKET-REGULATOR	582XX300	1
19	NIPPLE; HEX	792XX348	2
20	ADAPTER-PIPE; SWIVEL	792XX347	1
21	FLUID FILTER ASSY; 50 MESH	593XX299	1
22	FITTING,BARB,3/4 X 1/2,S.S.	792XX296	1
23	FITTING,BARB,3/4,S.S.	792XX295	1
24	CLAMP	795XX883	2
25	TUBING; PVC, .75"ID	755XX522	120
26	ELBOW 90 1/2 JIC X 1/2 NPT SS	799XX441	2
27	PIPE TEE,96718023	792XX006	2
28	TUBING,NYLON,8MM O.D.	755XX575	120
29	FITTING, MALE: 5/16I X 1/4NPT	797XX395	1
30	CONNECTOR 1/2 JIC X 1/2 NPT SS	792XX174	2
31	HOSE	755XX523	1
32	3:1 BALANCING REGULATOR	593XX521	1

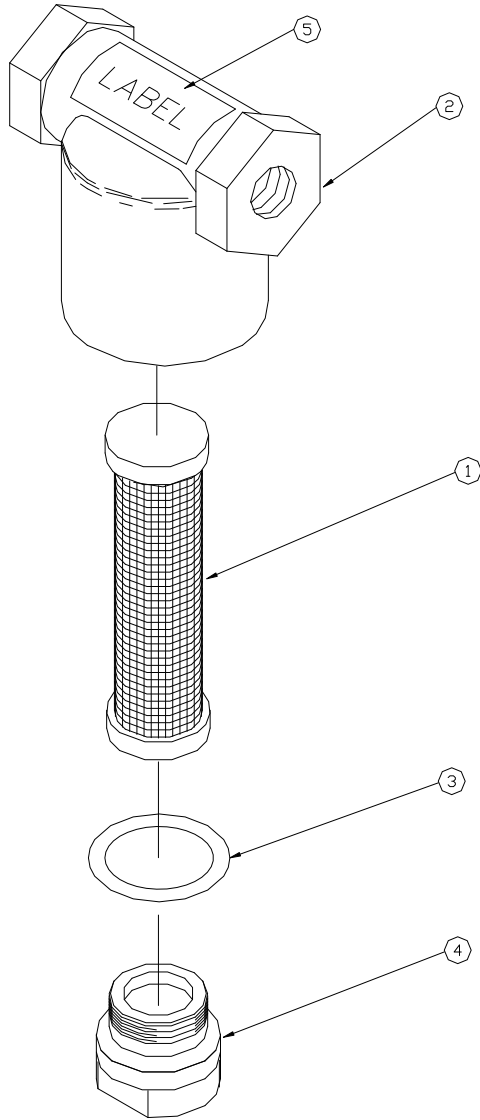
Fluid System, Dual Regulator (739xx200)



Fluid System, Dual Regulator
(739xx200) - Continued

Item	Part #	Description	QTY
1	SHCS M10 X 50 SS	784XX612	4
2	FLAT WASHER M10 SS	784XX443	4
3	SLW M10 SS	784XX569	4
4	HEX NUT M10 X 1,5 SS	784XX015	4
5	BALL VALVE 1/4 NPT	792XX473	1
7	WALL MOUNTING BRACKET	580XX410	1
8	EPP9 INTELLIGENT PISTON PUMP	561XX352	1
9	SHCS M6 X 20 SS	798XX158	8
10	FLAT WASHER M6 SS	784XX183	8
11	SLW M6 SS	784XX600	8
12	NUT, M6	793XX491	8
13	SHUT-OFF VALVE	703XX418	1
14	BUSHING REDUCER 1/2 X 1/4NPTSS	792XX035	1
15	MALE ELBOW, 5/16I X 1/4NPT	799XX821	4
16	AIR FILTER REGULATOR 150 PSI	594XX162	1
17	GAUGE 0-150 PSI 1/8 BACK MNT	786XX002	1
18	BRACKET-REGULATOR	582XX300	1
19	NIPPLE; HEX	792XX348	3
20	ADAPTER-PIPE; SWIVEL	792XX347	1
21	FLUID FILTER ASSY LRG 50 MESH	593XX535	1
22	FITTING, BARB, 3/4 X 1/2, S.S.	792XX296	1
23	FITTING, BARB, 3/4, S.S.	792XX295	1
24	CLAMP	795XX883	2
25	TUBING; PVC, .75"ID	755XX522	120
26	ELBOW 90 1/2 JIC X 1/2 NPT SS	799XX441	1
27	PIPE TEE, 96718023	792XX006	2
28	TUBING, NYLON, 8MM O.D.	755XX575	120
29	FITTING, MALE: 5/16I X 1/4NPT	797XX395	1
30	CONNECTOR 1/2 JIC X 1/2 NPT SS	792XX174	1
31	ELBOW, 1/2NPT, STREET, 90	792XX218	1
32	CAP PLASTIC 3/4-16	730XX094	2
33	CAP PLASTIC 1/2 NPT	730XX090	1

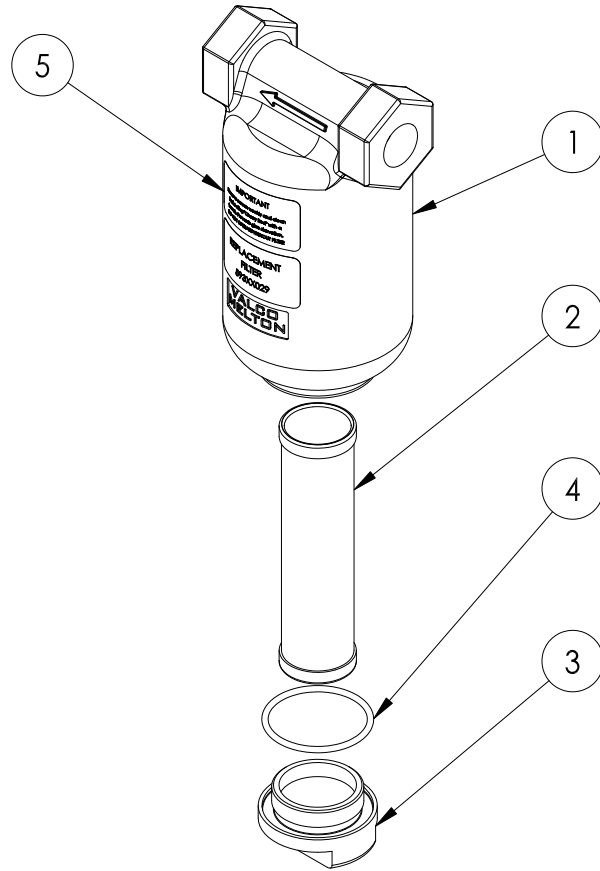
Fluid Filters



593xx299

Item	Description	Part #	QTY
1	Screen 50 mesh, SS	593XX029*	1
2	Body; Fluid Filter	593XX298	1
3	O-ring	745XX059	1
4	Cap	593XX081	1
5	Label; "Important"	781XX349	1

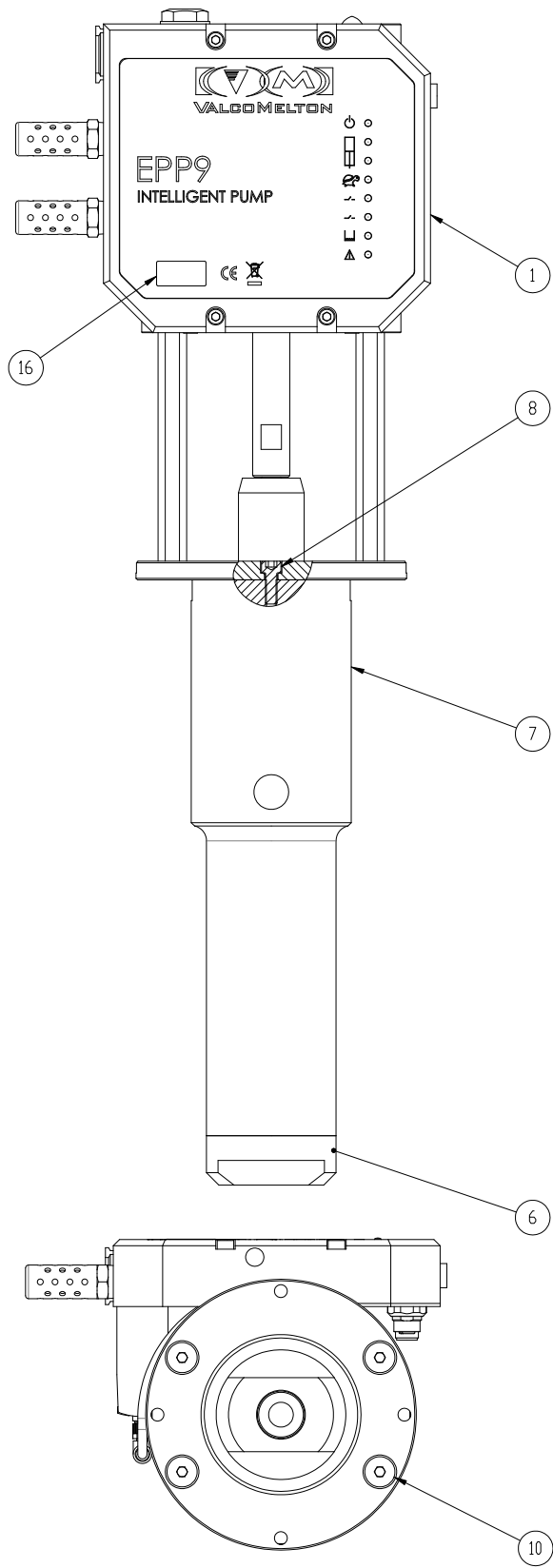
*Since 6/2020. Before 6/2020, part number was 593xx020.



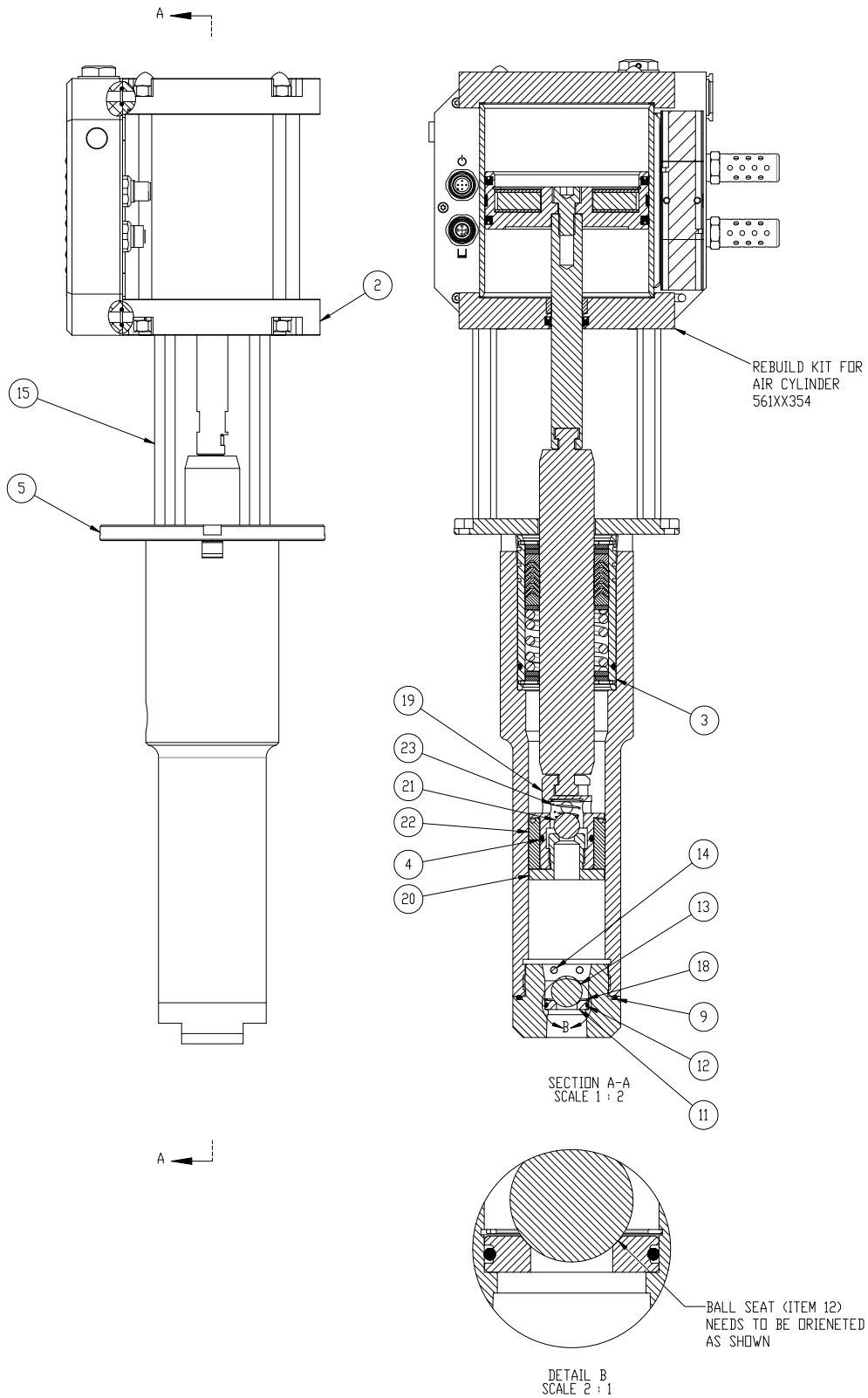
593xx535

Item	Description	Part #	QTY
1	Body; Fluid Filter, large	593XX532	1
2	Mesh Filter	593XX029	1
3	Filter Cap	593xx531	1
4	O-Ring	746xx099	1
5	Label	781xx349	1
6	Label – Replacement Filter	782xx789	1

EPP9 Piston Pump Assembly (561xx352)



EPP9 Piston Pump Assembly
(561xx352) - Continued



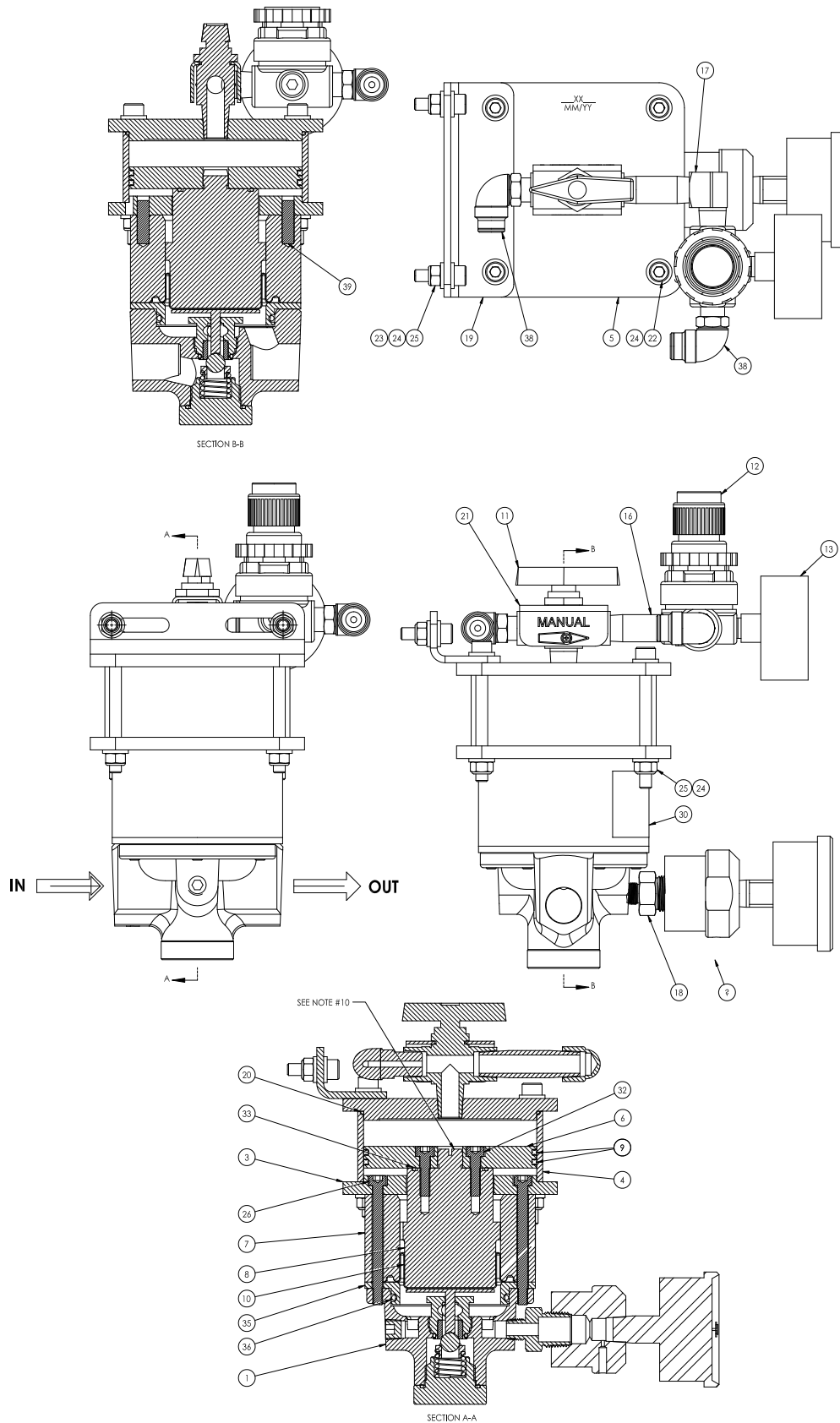
EPP9 Piston Pump Assembly
(561xx352) - Continued

Item	Description	Part Number	Quantity
1	MANIFOLD/PCB/SOLENOID SUB-ASSY	561XX351	1
2	CYLINDER, AIR	782XX653	1
3	ASSEMBLY, SEAL CARTRIDGE	561XX350	1
4	O-RING	745XX005	1
5	FLANGE, MOUNTING	561XX344	1
6	CHECK, LOWER	561XX336	1
7	BODY, EPP9	561XX342	1
8	SCREW	784XX091	6
9	O-RING	746XX159	1
10	SCREW	884XX339	4
11	SEAT-CHECK, DD-1 PUMP	561XX165	1
12	O-RING	746XX124	1
13	BALL, CERAMIC	561XX307	1
14	PIN, DOWEL	091XX757	2
15	STAND-OFF AIR MOTOR	561XX239	4
16	LABEL	782XX636	1
17	GREASE SILICONE W/PTFE	782XX557	0
18	RING, SNAP	783XX413	1
19	PISTON BODY, UPPER	561XX337	1
20	PISTON BODY, LOWER	561XX338	1
21	BALL, CERAMIC	561XX247	1
22	SEAL, PISTON	746XX271	1
23	SPRING	783XX385	1

EPP6 6:1 Piston Pump Assembly -
Continued

Item	Description	Part #	QTY
40	BODY-PISTON,EPP6	561XX135	1
41	O` RING	745XX023	1
42	CAP-PISTON	561XX136	1
43	SEAL & BEARING,PISTON	746XX101	1
44	TUBE-PUMP,EPP6	561XX137	1
45	CHECK-LOWER,EPP6	561XX138	1
46	RETAINER,BALL,EPP6	561XX139	1
47	SPRING	783XX116	1
48	BALL	560XX961	1
49	O'RING	745XX088	1
50	SCREW	784XX576	4
51	O'RING	745XX103	2
52	TUBING	094XX001	10
53	TUBING	094XX004	5
54	MANUAL-VALCO EPP6 PUMP ON CD	MS010CD	1
55	LABEL, CE MARK	781XX109	1
56	WASHER;BACKUP	561XX191	1
57	SPRING;WAVE,SS	783XX236	1
58	SET SCREW	884XX232	1

Balancing Regulator 3:1 (593xx521)



Balancing Regulator 3:1
(593xx521) - Continued

Item	Description	Part #	QTY
1	BOWL ASSY,1:1 IMP,BAL REG	593XX411	1
2	GAUGE AND PROTECTOR 0-300 PSI	786XX112	1
3	PLATE - ADAPTER FLANGE	593XX517	1
4	CYLINDER - UPPER AIR	593XX520	1
5	CAP - AIR CYLINDER	593XX518	1
6	PISTON - UPPER	593XX519	1
7	CYLINDER, LOWER FLUID BONNET	593XX510	1
8	PISTON LOWER	593XX514	1
9	RING QUAD 3.237" NITRILE	746XX285	2
10	DIAPHRAGM, ROLLING	746XX155	1
11	3-WAY BALL VALVE	704XX745	1
12	REGULATOR, AIR	594XX114	1
13	GAUGE 0-100 PSI 1/8 BACK MNT	786XX001	1
16	LONG NIPPLE 1/4 X 2 LG	797XX089	1
17	STREET ELBOW-90 F-M 1/4 X 1/4	797XX007	1
18	REDUCER, M-M 3/8 X 1/8, SS	792XX330	1
19	BRACKET,MOUNTING	593XX450	1
20	O-RING FKM/FPM BROWN	745XX307	1
21	LABEL,PROP BAL REG	781XX817	1
22	SHCS M6 X 65	884XX346	4
23	SHCS M6 X 20 SS	784XX426	2
24	FLAT WASHER M6 SS	784XX183	12
25	NUT LOCK M6	798XX416	6
26	SHCS M5 X 60	884XX545	6
27	TAPE,ADHESIVE TRANSFER	781XX818	2
28	TUBING	755XX528	6
30	LABEL, VALCO MELTON LOGO	794XX917	1
31	DS,PRESSURE-BAL GLUE REGLR	DS113	1
32	SHCS, M5 X 20MM, 20098A2	798XX047	2
33	O-RING FKM/FPM BROWN	745XX142	1
35	FLANGE ADAPTER	593XX475	1
36	O-RING FKM/FPM BROWN	745XX398	1
38	MALE ELBOW, 5/16I X 1/4NPT	799XX821	2
39	PIN,DOWEL-6MM X 20MM	784XX635	2
40	FITTING;PARALLEL UNION "Y"	799XX678	1
42	TUBE END EXP/RED, 1/4 TO 5/16	799XX478	2
50	FOAM SET, FOR REGULATOR ASSY	730XX067	1
51	BOX #5 TIMER	730XX040	1

Balancing Regulator Rebuild Kits

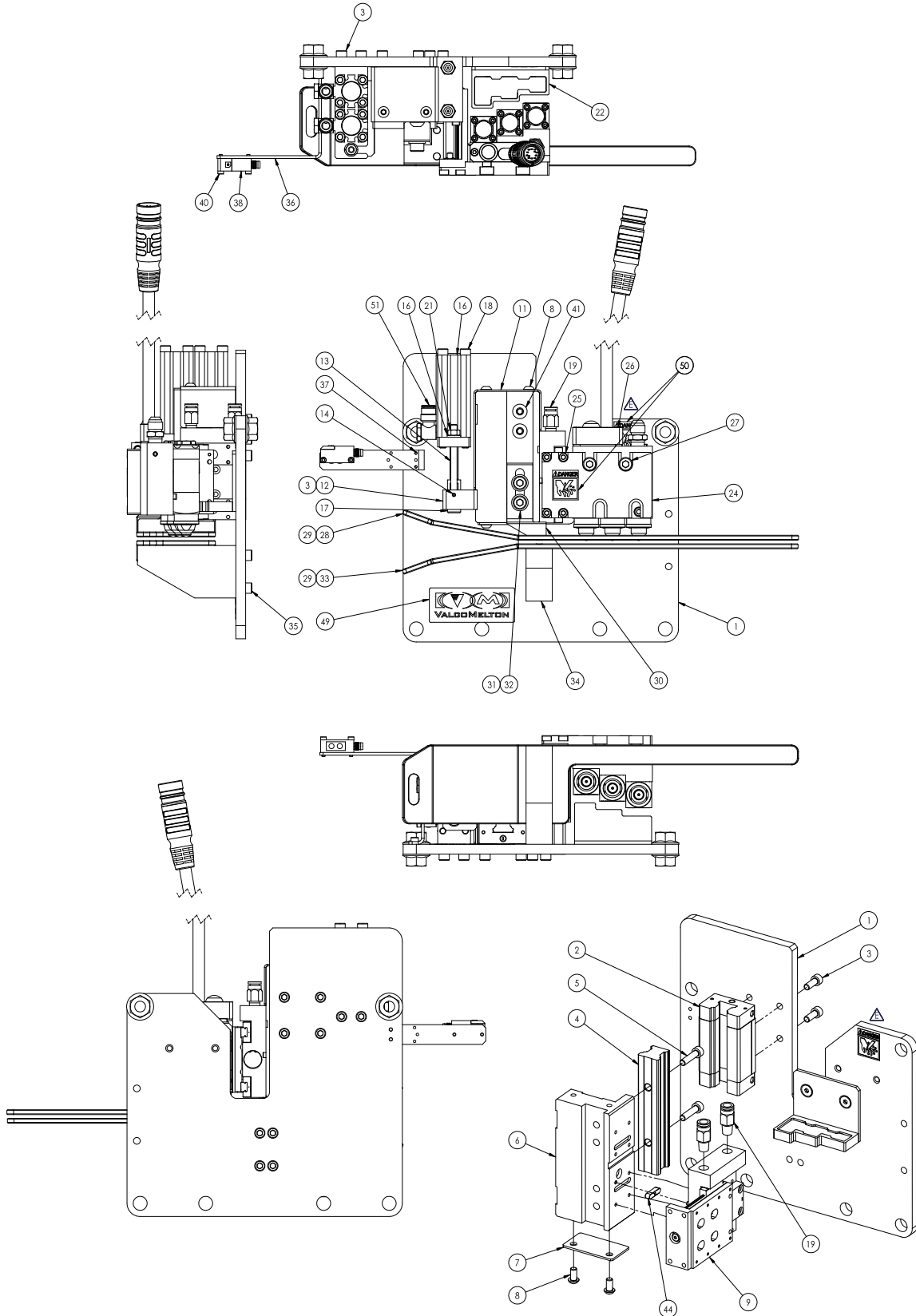
3:1 Kit - Viton Seals (593xx523)

Item	Description	Part #	QTY
1	DIAPHRAGM, ROLLING	746XX155	1
2	TAPE, ADHESIVE TRANSFER	781XX821	1
3	RING QUAD 3.237" NITRILE	746XX285	2
4	O-RING FKM/FPM BROWN	745XX307	1
5	O-RING FKM/FPM BROWN	745XX080	1
6	SPRING	593XX055	1
7	BALL SUPPORT	593XX054	1
8	BALL 3/8	593XX053	1
9	BALL SEAT MODIFICATION	593XX130	1
10	MALE QUICK DISCONNECT	752XX004	1
11	BUSHING REDUCER 1/2 X 1/4	797XX049	1
12	HEX HEAD PIPE PLUG 1/2	797XX040	1
13	O-RING FKM/FPM BROWN	745XX142	1
14	O-RING FKM/FPM BROWN	745XX398	1
15	ACTIVATOR PIN; REGULATOR	593XX262	1
16	INSTRUCTION SHEET 1:1 PROP REG	IS0291	1
17	FIXTURE - PISTON ALIGNMENT	593XX524	1

3:1 Kit - EP Seals (593xx528)

Item	Description	Part #	QTY
1	DIAPHRAGM, ROLLING	746XX155	1
2	TAPE,ADHESIVE TRANSFER	781XX821	1
3	RING QUAD 3.237" NITRILE	746XX285	2
4	O-RING FKM/FPM BROWN	745XX307	1
5	O-RING	746XX163	1
6	SPRING	593XX055	1
7	BALL SUPPORT	593XX054	1
8	BALL 3/8	593XX053	1
9	ASSY - BALL SEAT EPDM SEALS	593XX526	1
10	MALE QUICK DISCONNECT	752XX004	1
11	BUSHING REDUCER 1/2 X 1/4	797XX049	1
12	HEX HEAD PIPE PLUG 1/2	797XX040	1
13	O-RING FKM/FPM BROWN	745XX142	1
14	O-RING	746XX162	1
15	ACTIVATOR PIN; REGULATOR	593XX262	1
16	INSTRUCTION SHEET 1:1 PROP REG	IS0291	1
17	FIXTURE - PISTON ALIGNMENT	593XX524	1

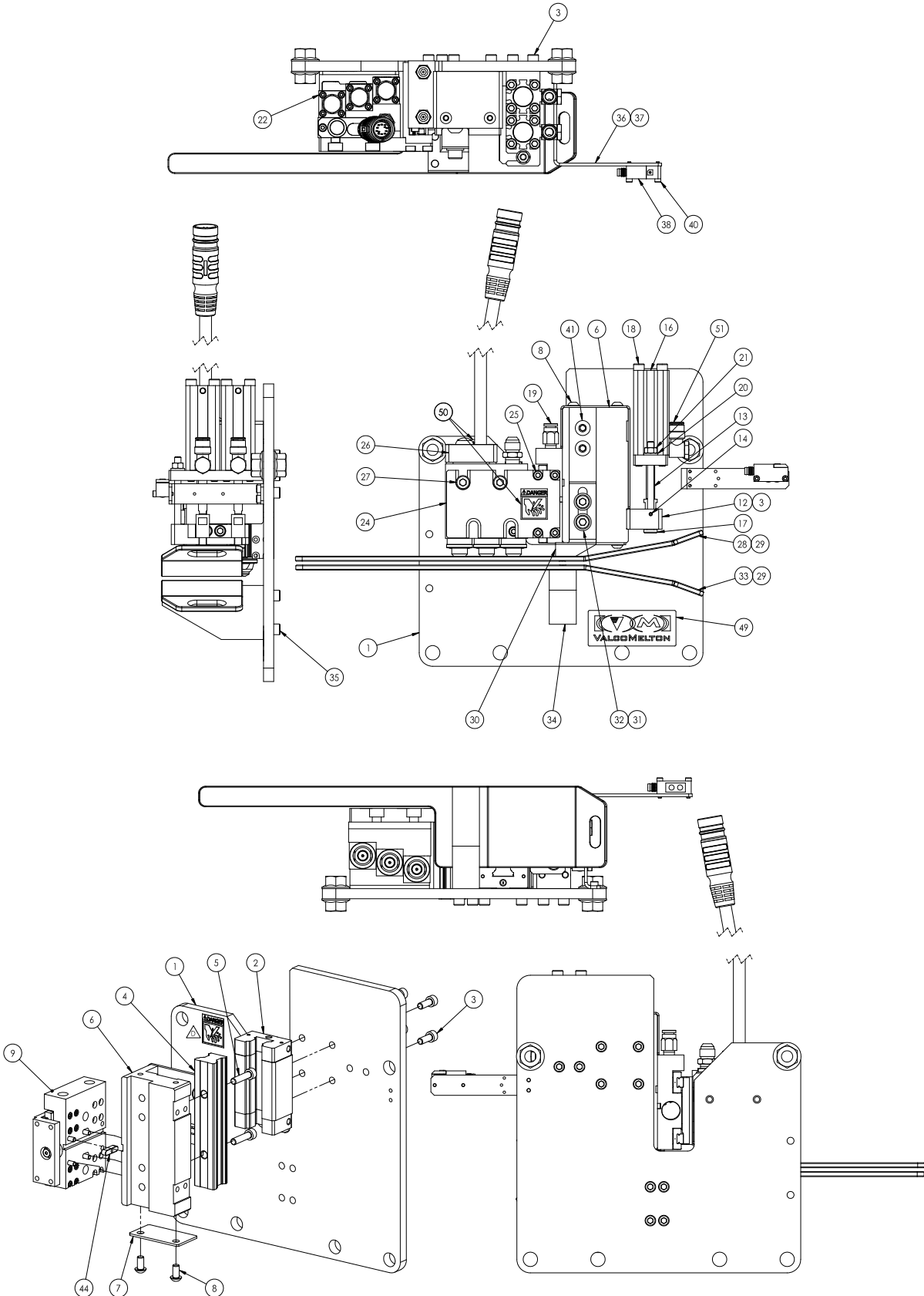
524 Boardrunner, Non-Contact; 3-Valve; Tab Side (583xx585)



524 Boardrunner, Non-Contact;
3-Valve; Tab Side
(583xx585) - Continued

Item	Description	Part #	QTY
1	PLATE BACK, 3 VA. BOARDRUNNER	579XX528	1
2	BLOCK RUNNER SIZE 25	579XX540	1
3	SHCS M6 X 16 SS	784XX091	8
4	RAIL GUIDE SIZE 25 X 125MM LG.	579XX527	1
5	SHCS - M6 X 25MM, S.S.	798XX192	2
6	BLOCK SLIDER	579XX529	1
7	COVER, BOTTOM	579XX538	1
8	BHCS M6 X 12 SS	884XX239	4
9	AIR CYLINDER ASSEMBLY	782XX382	1
11	COVER, TOP	579XX526	1
12	BLOCK, ADJUSTMENT	579XX524	1
13	ROD THREADED M6 X 3.0" LG	579XX539	1
14	ROLL PIN	091XX044	1
15	BRACKET CYLINDER MOUNT	579XX535	1
16	CYLINDER AIR 3/4 BORE X 1 1/2	782XX363	2
17	ADAPTER AIR CYLINDER	579XX533	2
18	SHCS M6 X 90 SS	884XX234	8
19	CONNECTOR,MALE: 8MM X 1/8 NPT	799XX582	2
20	FLAT WASHER M6 SS	784XX183	1
21	NUT LOCK M6	798XX416	1
22	TIP SEALER ASSEMBLY 3NC	583XX721	1
24	PLATE, MOUNTING	579XX530	1
25	SHCS M5 X 10 SS	798XX097	4
26	ASSEMBLY; 3 VALVE MANIFOLD	583XX296	1
27	SHCS M8 X 20 SS	784XX442	2
28	GUIDE - EXTENDED	579XX697	1
29	FHSS M8 X 16 SS	884XX236	4
30	BLOCK, GUIDE ADJUSTMENT	579XX525	1
31	SHCS M8 X 35 SS	784XX993	2
32	FLAT WASHER M8 SS	784XX097	2
33	GUIDE - EXTENDED	579XX696	1
34	BLOCK GUIDE MOUNTING	579XX537	1
35	SHCS M6 X 20 SS	784XX426	4
36	BRACKET - SCANNER	579XX695	1
37	SHCS M4 X 12 SS	784XX051	2
38	SENSOR ASSY,NPN LASER W/CBL	280XX290	1
40	SHCS M3 X 16 SS	798XX099	2
41	BHCS M8 X 10 STAINLESS	784XX501	2
42	NUT,FLANGE 1/2-13	798XX699	4
43	SLIDER BAR 760-8BT-8F	567XX032	2
44	KEY STOCK SQUARE 5MM X 20MM LG	763XX328	1
49	LABEL, VALCO MELTON LOGO	794XX917	1
50	LABEL; WARNING	781XX430	2
51	BOLT BANJO FITTING 8MM TUBE	799XX781	2
52	FITTING;PARALLEL UNION "Y"	799XX678	1
53	ILLUSTRATION DRAWING; TRI-VA.	999XC583-21	1
54	FLAT WASHER M3 SS	798XX753	2

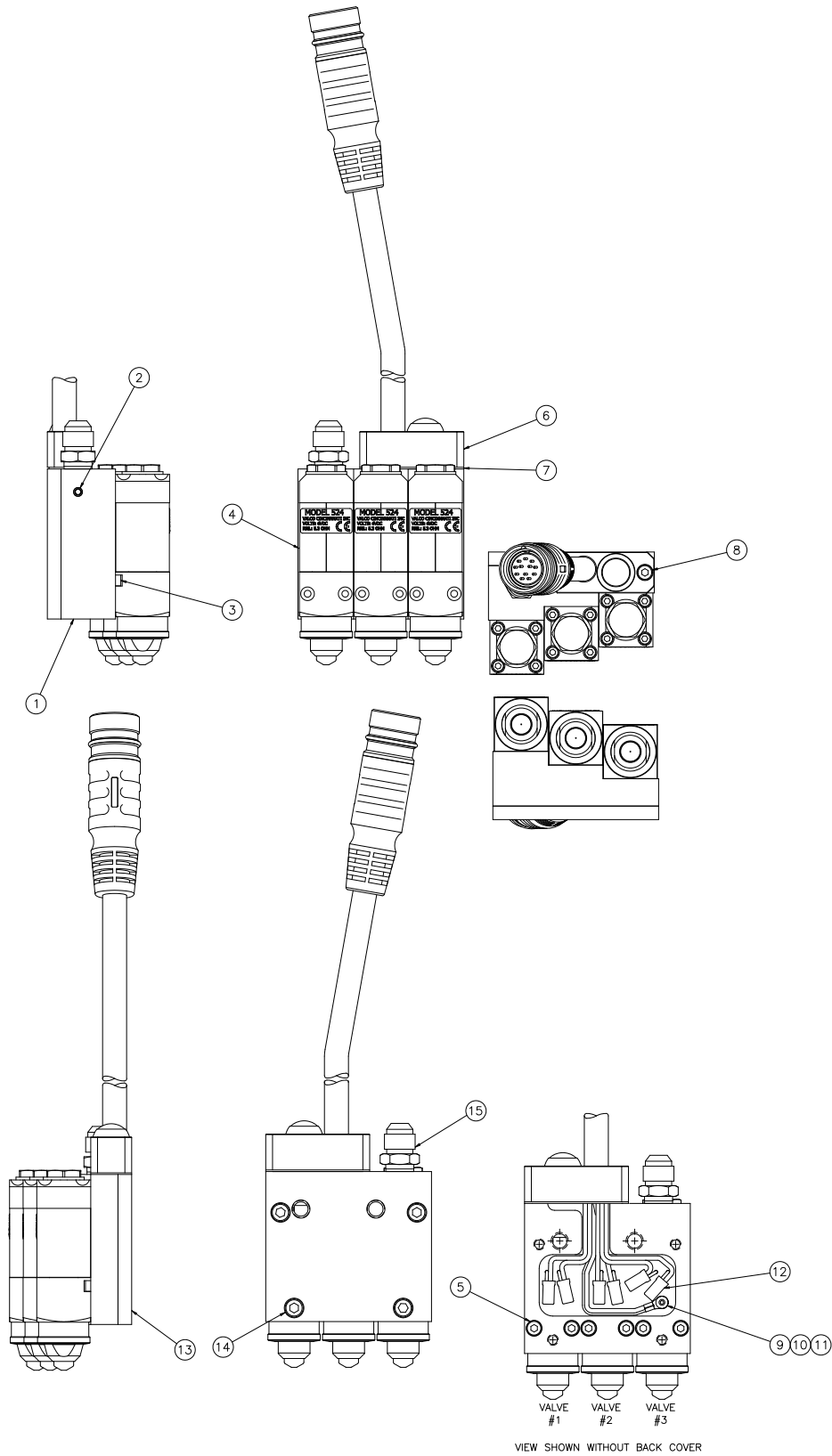
524 Boardrunner, Non-Contact; 3-Valve; 4th Panel (583xx590)



524 Boardrunner, Non-Contact;
3-Valve; 4th Panel
(583xx590) - Continued

Item	Description	Part #	QTY
1	PLATE BACK, 3 VA. BOARDRUNNER	579XX528	1
2	BLOCK RUNNER SIZE 25	579XX540	1
3	SHCS M6 X 16 SS	784XX091	8
4	RAIL GUIDE SIZE 25 X 125MM LG.	579XX527	1
5	SHCS - M6 X 25MM, S.S.	798XX192	2
6	BLOCK SLIDER	579XX529	1
7	COVER, BOTTOM	579XX538	1
8	BHCS M6 X 12 SS	884XX239	4
9	AIR CYLINDER ASSEMBLY	782XX383	1
11	COVER TOP, 4TH PANEL	579XX523	1
12	BLOCK, ADJUSTMENT, 4TH PANEL	579XX534	1
13	ROD THREADED M6 X 3.0" LG	579XX539	1
14	ROLL PIN	091XX044	1
15	BRACKET CYLINDER MOUNT	579XX535	1
16	CYLINDER AIR 3/4 BORE X 1 1/2	782XX363	2
17	ADAPTER AIR CYLINDER	579XX533	2
18	SHCS M6 X 90 SS	884XX234	8
19	CONNECTOR,MALE: 8MM X 1/8 NPT	799XX582	2
20	FLAT WASHER M6 SS	784XX183	1
21	NUT LOCK M6	798XX416	1
22	TIP SEALER ASSEMBLY 3NC	583XX721	1
24	PLATE, MOUNTING	579XX530	1
25	SHCS M5 X 10 SS	798XX097	4
26	ASSEMBLY; 3 VALVE MANIFOLD	583XX296	1
27	SHCS M8 X 20 SS	784XX442	2
28	GUIDE - EXTENDED	579XX696	1
29	FHSS M8 X 16 SS	884XX236	4
30	BLOCK GUIDE ADJUSTMENT TOP	579XX536	1
31	SHCS M8 X 35 SS	784XX993	2
32	FLAT WASHER M8 SS	784XX097	2
33	GUIDE - EXTENDED	579XX697	1
34	BLOCK GUIDE MOUNTING	579XX537	1
35	SHCS M6 X 20 SS	784XX426	4
36	BRACKET - SCANNER	579XX695	1
37	SHCS M4 X 12 SS	784XX051	2
38	SENSOR ASSY,NPN LASER W/CBL	280XX290	1
40	SHCS M3 X 16 SS	798XX099	2
41	BHCS M8 X 10 STAINLESS	784XX501	2
42	NUT,FLANGE 1/2-13	798XX699	4
43	SLIDER BAR 760-8BT-8F	567XX032	2
44	KEY STOCK SQUARE 5MM X 20MM LG	763XX328	1
49	LABEL, VALCO MELTON LOGO	794XX917	1
50	LABEL; WARNING	781XX430	2
51	BOLT BANJO FITTING 8MM TUBE	799XX781	2
52	FITTING;PARALLEL UNION "Y"	799XX678	1
53	ILLUSTRATION DRAWING; TRI-VA.	999XC583-21	1
54	FLAT WASHER M3 SS	798XX753	2

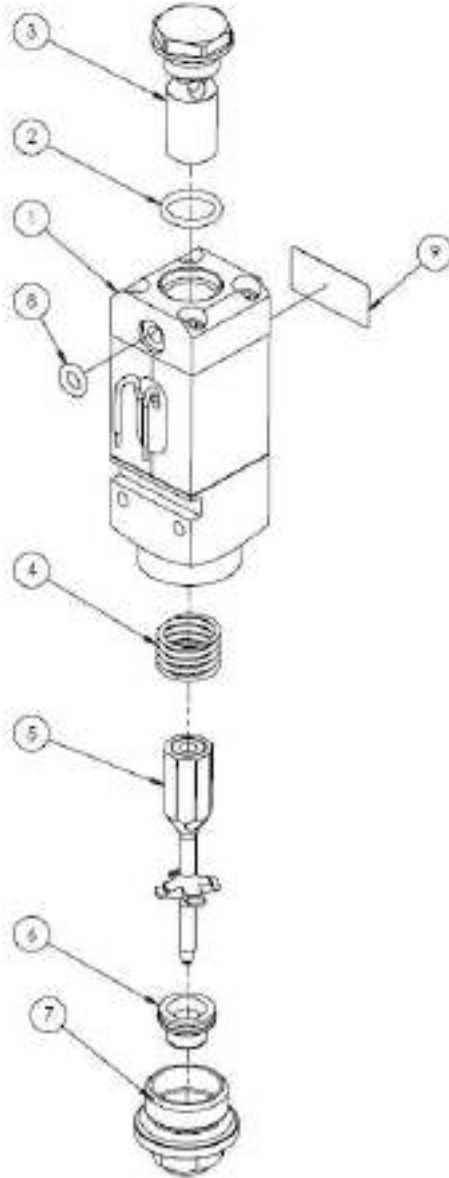
Valve Manifold Assembly w/3, 524 EZT Valves (583xx296)



Valve Manifold Assembly
w/3, 524 EZT Valves (583xx296)
- Continued

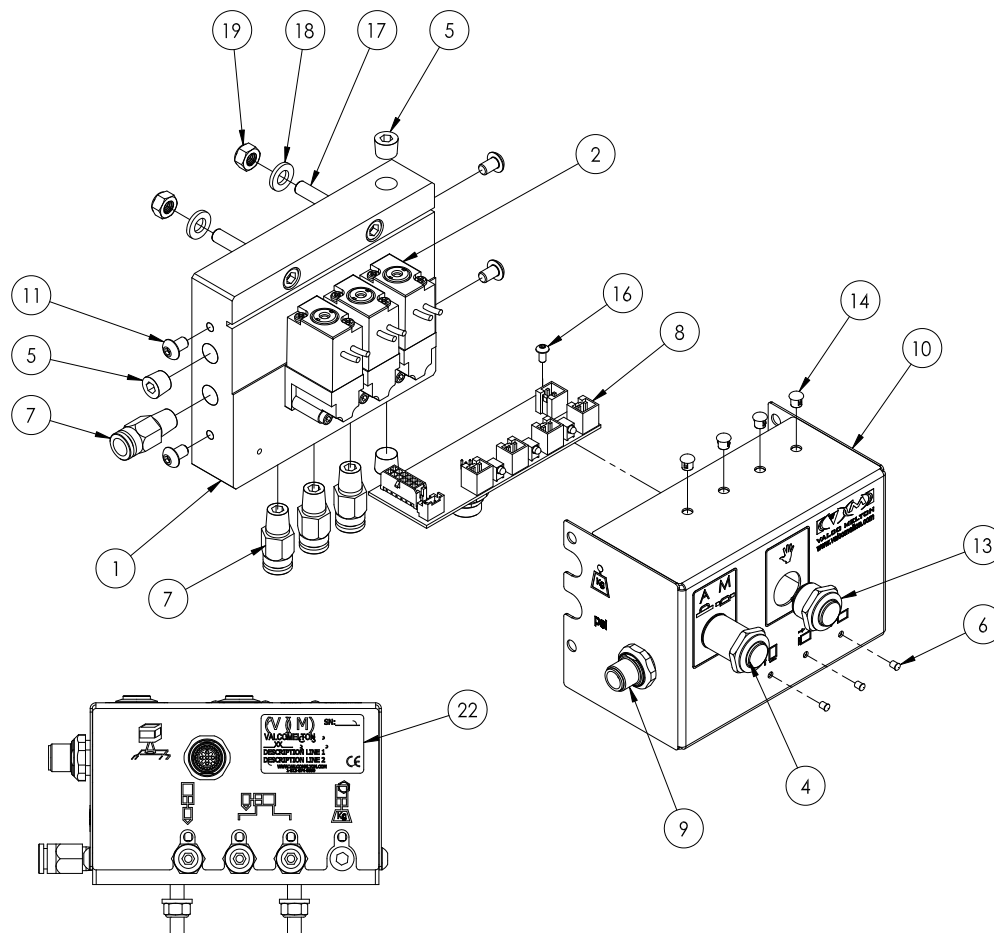
Item	Description	Part #	QTY
1	MANIFOLD, GLUE, 3 524 VALVE	583XX298	1
2	SET SCREW M5 X 8 SS	884XX235	1
3	KEY STOCK SQUARE 5MM X 20MM LG	763XX328	3
4	ASSEMBLY 524EZT MANIFOLD MOUNT	707XX625	3
5	SHCS M4 X 14 SS.	884XX100	6
6	ASSEMBLY PURGE CONNECTOR BLOCK	583XX300	1
7	GASKET, PURGE BLOCK	583XX301	1
8	SHCS M4 X 20MM LG S.S.	784XX910	2
9	WASHER LOCK M3 EXT-TOOTH	784XX315	1
10	WIRE TERMINAL; RING 213909	075XX060	1
11	BHCS M3 X 6 SS	784XX541	1
12	SPARE WIRE CAP; 16-14AWG	075XX311	8
13	PLATE BACK	583XX297	1
14	SHCS M5 X 12 SS	784XX125	4
15	CONNECTOR 3/8 JIC X 1/4 NPT SS	792XX081	1

524 EZT Valve; low restriction; manifold mount (707xx625)



Item	Description	Part #	QTY
1	ASSEMBLY COIL 524 VALVE	707XX626	1
2	O-RING FKM/FPM BROWN	745XX340	1
3	PLUG, STOP: 524 VA.	707XX609	1
4	SPRING; 900, A15-43	783XX042	1
5	PLUNGER ASSEMBLY; 524 VALVE	707XX529	1
6	NOZZLE SEAT;LR, .40MM	707XX524	1
7	NOZZLE BODY;ASSY 524EZ	707XX518	1
8	O-RING FKM/FPM BROWN	745XX026	1
9	LABEL, CE LOGO, 524 VA.	782XX211	1

Air Manifold (411xx910)



Item	Description	Part #	QTY
1	MANIFOLD, AIR	583XX302	1
2	ASSEMBLY, 3-WAY VALVE	411XX907	3
4	SWITCH ASSY SPDT YELLOW LED	481XX058	1
5	SOC.HD. PIPE PLUG N.P. 1/8NPT	799XX039	3
6	LIGHT PIPE;CLR,D3MM,L3.2MM	107XX072	3
7	CONNECTOR,MALE: 8MM X 1/8 NPT	799XX582	4
8	PCB SUBA MANIFOLD TIP-SEALER	152XX718	1
9	ASSEMBLY; CONNECTOR	068XX356	1
10	COVER - AIR MANIFOLD	583XX919	1
11	BHSCS M5 X 8 SS	784XX159	4
13	SWITCH ASSY SPST MOMENTARY	481XX059	1
14	PLUG HOLE 3/16"	782XX728	4
16	BHCS M3 X 6 SS	784XX541	1
17	SHCS M6 X 40 SS	798XX168	2
18	FLAT WASHER M6 SS	784XX183	2
19	NUT LOCK M6	798XX416	2
20	BOX-RETENTION PACKAGING	730XX017	1
21	INSERT, RETENTION PACK, MEDIUM	730XX018	1
22	LABEL STOCK, SILVER	781XX780	1

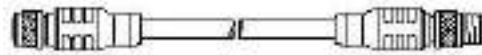
Connector Cables

Standard Scanner/Encoder/Valve/Manifold cables

(cable ends are yellow)

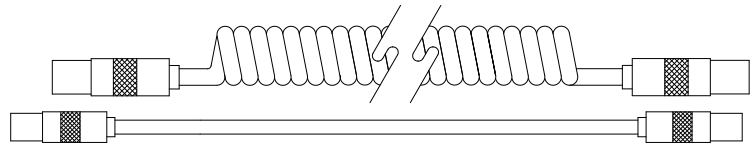
Scanner

030xx592	Scanner cable, 1m, standard key
030xx593	Scanner cable, 2m, standard key
030xx891	Scanner cable, 3m, standard key
030xx594	Scanner cable, 4m, standard key
030xx873	Scanner cable, 5m, standard key
030xx555	Scanner cable, 6m, standard key
030xx892	Scanner cable, 7m, standard key
030xx595	Scanner cable, 8m, standard key
030xx738	Scanner cable, 10m, standard key
030xx739	Scanner cable, 15m, standard key
030xx740	Scanner cable, 20m, standard key
030xx829	Scanner cable, R/A, 1m
030xx830	Scanner cable, R/A, 2m
030xx831	Scanner cable, R/A, 4m
030xx832	Scanner cable, R/A, 8m
030xx833	Scanner cable, R/A, 10m
030xx596	Cable, 10m, pump to flying leads



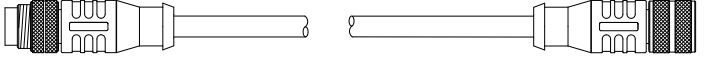
Encoder

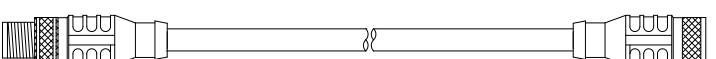
030xx630	Encoder cable, 2m
030xx827	Encoder cable, 3m
030xx631	Encoder cable, 4m
030xx632	Encoder cable, 8m
030xx633	Encoder cable, 16m
030xx634	Encoder cable, 32m
029xx014	Encoder cable, 40m




Connector Cables - Continued

Valve

029xx509	Valve cable, M16 12 pin M-F, 5m	
029xx526	Valve cable, M16 12 pin M-F, 10m	
029xx524	Valve cable, M16 12 pin M-F, 15m	
029xx525	Valve cable, M16 12 pin M-F, 30m	

030xx623	Valve cable, M12 valve 5 pin, 1m	
030xx624	Valve cable, M12 valve 5 pin, 2m	
030xx889	Valve cable, M12 valve 5 pin, 3m	
030xx625	Valve cable, M12 valve 5 pin, 4m	
030xx874	Valve cable, M12 valve 5 pin, 5m	
030xx877	Valve cable, M12 valve 5 pin, 6m	
030xx890	Valve cable, M12 valve 5 pin, 7m	
030xx626	Valve cable, M12 valve 5 pin, 8m	
030xx741	Valve cable, M12 valve 5 pin, 10m	
030xx742	Valve cable, M12 valve 5 pin, 15m	
030xx743	Valve cable, M12 valve 5 pin, 20m	

Manifold

029xx448	Manifold cable, 5m	
029xx486	Manifold cable, 10m	
029xx481	Manifold cable, 12m	
029xx488	Manifold cable, 15m	

SECTION 9 - WARRANTY

General Warranty Information

Valco Cincinnati, Inc. warrants its equipment worldwide against defects in material and workmanship as outlined in this section.

Liability of the company is limited to repair of the product, or replacement of any part shown to be defective, and does not extend to defects caused by accidents, misuse, abuse, neglect, tampering or deterioration by corrosion. This warranty does not cover those items determined by Valco Cincinnati, Inc. to be normal wear items such as seals, O-rings, diaphragms, springs, etc.

Reconditioned equipment, unless specified otherwise at the time of purchase, will be warranted as described above for a period of ninety (90) days from the date of shipment by Valco Cincinnati.

Components purchased by Valco Cincinnati, Inc. from others for inclusion in its products are warranted only to the extent of the original manufacturer's warranty. In no event shall Valco Cincinnati, Inc. be liable for indirect or consequential damages arising out of the use of Valco Cincinnati products.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to Valco Cincinnati, Inc. for examination and verification. If claimed defect is verified, repairs or replacements will be made F.O.B. Cincinnati, Ohio, U.S.A. or ex-works Telford, U.K. If the inspection of the equipment does **not** disclose any defect of workmanship or material, any necessary repairs will be made at a reasonable charge and return transportation will be charged.

This is the only authorized Valco Cincinnati, Inc. warranty and is in lieu of all other expressed or implied warranties, representations or any other obligations on the part of Valco Cincinnati, Inc.

Cold Glue Equipment and Electronic Controls

The warranty for cold glue equipment and electronic controls is for a period of one (1) year from the date of shipment by Valco Cincinnati.

Hot-Melt Units, Hoses, Valves, Guns, and Related Equipment

All hot-melt components except cast-in heating elements are warranted for a period of six (6) months from the date of shipment by Valco Cincinnati. Cast-in heaters carry an additional, pro-rated warranty not to exceed three (3) years from the date of shipment by Valco Cincinnati.

SECTION 10 - SERVICE

If you have problems with your system, please contact your Valco representative. If your need is urgent, we encourage you to contact our corporate office in Cincinnati, Ohio, U.S.A. at (513) 874-6550. If the problem cannot be resolved, Valco will promptly arrange to have a technical representative visit your facility. Any charges for a service call will be quoted at that time. Any part that fails during the warranty period shall be returned prepaid to Valco Cincinnati, Inc. by the customer for disposition.



Upon request, Valco personnel are available to repair or replace parts under warranty at the customer's facility. Charges for this service include travel time and expenses.

If an equipment problem is the result of customer abuse, improper installation or operation, all travel time, labor, parts, and expenses will be charged to the customer.

If the responsibility for a problem cannot be absolutely determined, the customer will be charged for travel time and expenses only. No charge will be made for parts and labor.