



# VD520-SS Diaphragm Valve Operating Manual

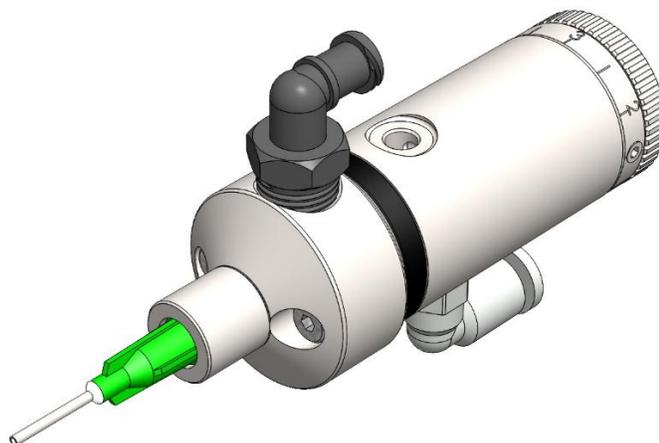
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## Table of Contents

Overview	3
Specifications	4
Accessories	4
Optional Accessories	5
Valve Operation	6
Dispense Setup	7
Dispense System Configurations	9
Repair Kit	13
Optional Tubing & Fittings	14
Maintenance	16
Dispense Tip Removal	20
Spare Parts List	21
Technical Drawing	22
Troubleshooting	23

## OVERVIEW



**Model VD520-SS Diaphragm Valve**

The VD520-SS diaphragm valve is designed for accurately controlling the dispensing of low to medium viscosity materials. Fluid flow rate is precisely controlled through the valve and fine-tuned using the stroke adjustment knob.

The inert diaphragm separates the wetted parts from the moving parts, thus making the valve ideal for dispensing reagents, paints, UV adhesives, and other volatile substances.

Stroke Adjustment for precise flow control

Separated wetted parts

Durable, compact size & lightweight design

Seal free design

Accurate & repeatable dispense volumes

Low maintenance, easy to clean design

Fast & clean positive shutoff eliminates dripping

Simple to set up, adjust, and operate

Unrestricted material flow path reduces turbulence and micro bubbles

## SPECIFICATION

Item	VD520-SS
Operating Air Pressure	70-100psi (4.8 – 6.9 Bar)
Cycle Rate	Up to 500 cycles / min
Max. Fluid Pressure	70 psi (4.8 Bar)
Fluid Viscosity Range	1 – 60,000 Cps
Max. Flow Rate	60 ml/sec (H2O @ 70psi)
Valve Body Material	SUS303
Diaphragm Material	UHMW-PE
Fluid Body Material	SUS303
Tip Retaining Nut Material	SUS303
Air Input Thread	M5 x 0.8
Fluid Inlet Thread	1/8" NPT
Mounting Hole	M5 x 0.8
Weight	207g (0.46lb)

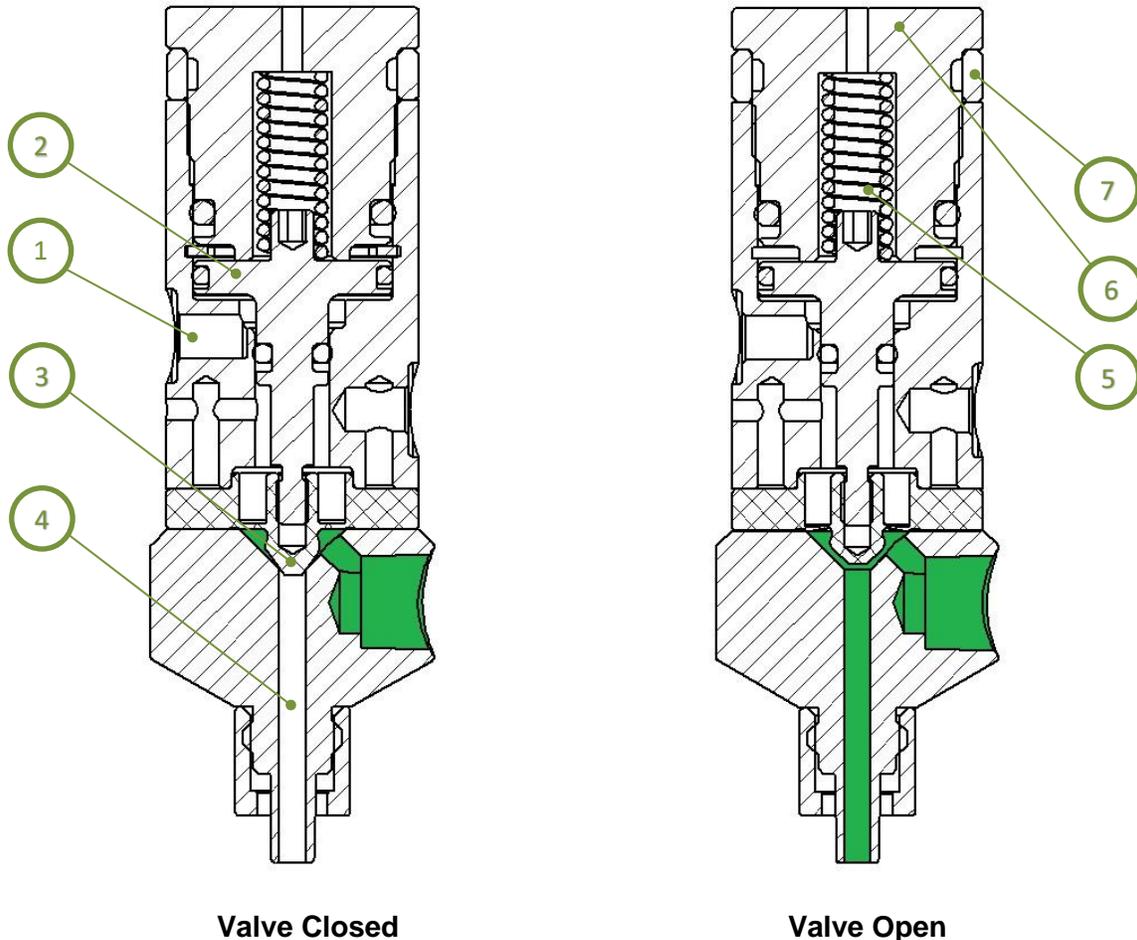
## ACCESSORIES

Item	Description	Quantity
562354	Air Inlet Hose Assembly – 6FT	1
562355	Air Inlet Fitting – Elbow 5/32" O.D. Tube x M5 Male	1
561821-BLACK	Fluid Inlet Fitting – Elbow Female Luer Lock x 1/8" NPT Male	1
560714-BLACK	Fluid Inlet Fitting – Elbow 1/4" O.D. Tube x 1/8" NPT Male	1
560715-BLACK	Fluid Inlet Fitting – Straight 1/4" O.D. Tube x 1/8" NPT Male	1
560743-10FT	PE Tubing 1/4" O.D. x 0.170" I.D. Tubing - Black	1
QK-NSK	Dispense Tip Sample Kit	1
QK-TRT	Tip Replacement Tool	1
562356	Hex Key – 2.5mm	1
562357	Hex Key – 1.5mm	1

## OPTIONAL ACCESSORIES

Item	Description
562043U	Valve Stand 
562151U	Robot Valve Mounting Bracket Assembly <i>(fasteners included)</i> 
0401-08-000491	Valve Mounting Bracket <i>(fasteners included)</i> 

## VALVE OPERATION



The VD520-SS is normally a closed diaphragm valve. When air pressure (70psi minimum) is applied into the air input (1), the piston (2) is forced upwards. This causes the sealing surface of the diaphragm (3) to lift upwards and allow fluid material to flow through and out of the fluid outlet of the valve (4).

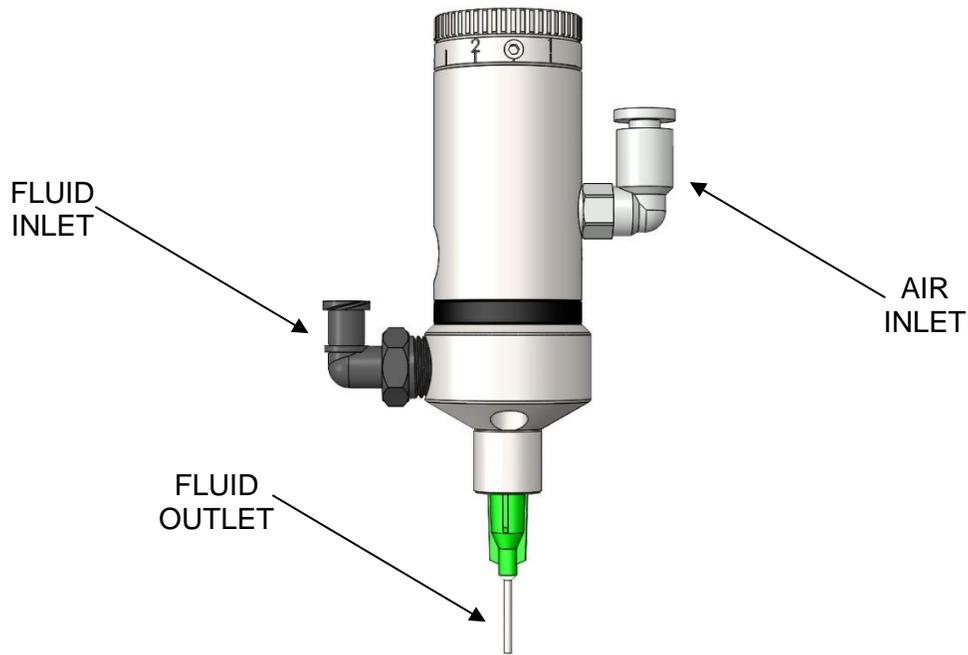
When the air pressure is removed from the air input (1), the piston (2) is forced downwards by the spring (5), which allows the sealing surface of the diaphragm to return quickly to its closed state for immediate shut-off of fluid material flow.

The amount of fluid material dispensed from the valve is based on the below attributes of the dispense system,

- Valve open time    - Fluid Viscosity    - Fluid Pressure    - Diaphragm Stroke    - Tip Size

The valve can be calibrated by rotating the stroke adjustment knob (6) clockwise to its fully closed position. Then loosen the setscrew on the reference ring (7) and align its "0" mark with the reference mark on the valve body. Tighten the setscrew back in place to complete the calibration process.

## DISPENSE SETUP

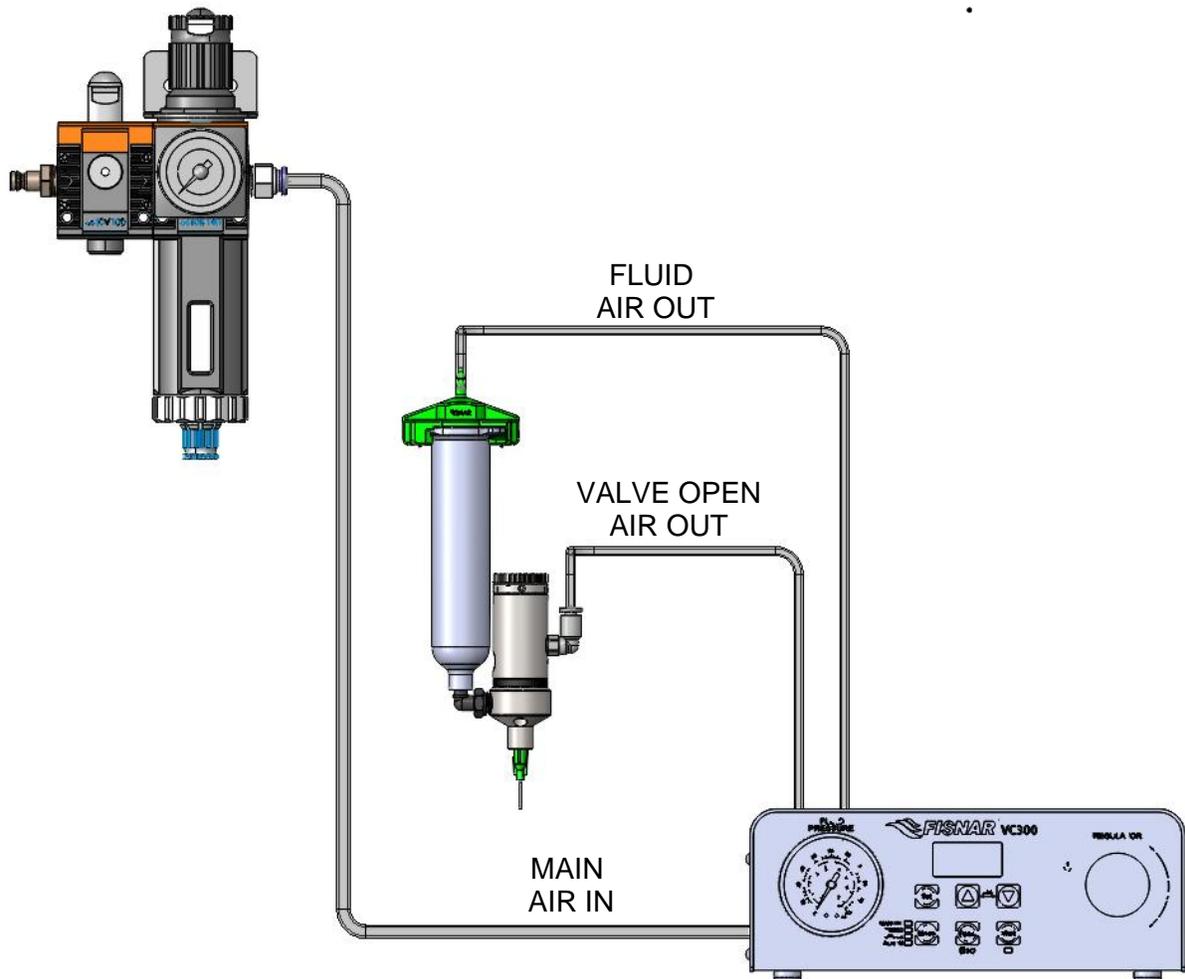


1.	When using a VC300 valve controller connect 5/32" OD air hose (#562354) between the operating air inlet fitting of the valve and the "Valve Open Air Out" port on the controller.
2.	Connect the 1/4" OD pneumatic tubing between the "Fluid Air Out" port on the back of the machine and the air inlet port of the connected fluid feed system to be pressurized.  If a Fisnar QuantX syringe barrel is being used as the fluid feed system to the valve, then a standard Fisnar syringe barrel adapter head assembly can be used as the pressurized air source between the syringe barrel and "Fluid Air Out" port on the back of the controller.
3.	Connect 1/4" OD polyethylene tubing (#560743-10FT) between the fluid outlet of the feed system and the fluid inlet fitting on the valve, using one of the provided compression fittings (#560714-BLACK or #560715-BLACK).  If a Fisnar QuantX syringe barrel is being used as the fluid feed system to the dispense valve, then an 1/8" luer lock elbow fitting (#561821-BLACK) can be used to connect the syringe barrel directly to the valve.
4.	Switch on the VC300 valve controller and set the machine in "MANUAL" mode.

5.	Gradually apply air pressure (80 psi) to the “Main Air In” port on the back of the controller.
6.	Slowly increase the fluid pressure by rotating the pressure regulator clockwise on the front of the VC300 valve controller. <b>(Do not exceed a max pressure of 70psi 4.8 Bar)</b>
7.	Rotate the stroke control knob clockwise until it can no longer be rotated any further. Then rotate the stroke control knob counterclockwise a 1/4 turn (90°). The fluid flow rate through the valve is controlled by the amount the stroke control knob is rotated counterclockwise from its fully closed position.
8.	<p>Press and hold the shot button on the front panel of the VC300 valve controller until fluid begins to dispense out of the fluid outlet of the valve. When fluid is consistently flowing out of the fluid outlet of the valve and no bubbles/air-pockets are observed, release the shot button.</p> <p>If no fluid is dispensing out of the valve after approx. 1 minute, release the shot button. The below steps can then be carried out, and the valve actuated again.</p> <ol style="list-style-type: none"> <li>a) Rotate the stroke control knob counterclockwise by ¼ of a turn (90°).</li> <li>b) Increase fluid pressure.</li> </ol> <p>If fluid is still not dispensing out of the valve, contact your local sales representative.</p>
9.	<p>Attach a suitable dispense tip to the dispense valve.</p> <p>Note:- A lower gauge number (larger I.D.) dispense tip will dispense a larger diameter dot or bead width. A higher gauge number (smaller I.D.) dispense tip will dispense a smaller diameter dot or bead width.</p>
10.	<p>Use the below parameters to achieve the necessary settings for the dispensing application.</p> <ol style="list-style-type: none"> <li>1.) Adjust the fluid pressure of the fluid feed system to achieve the required flow rate.</li> <li>2.) Adjust the stroke control knob on the valve to achieve the required flow rate.</li> <li>3.) Adjust the dispense time on the VC300 valve controller to set the desired time that fluid material will be dispensed, to achieve the required fluid volume.</li> <li>4.) Select the correct dispense tip size to optimize the dispense dot or bead size.</li> </ol>
	<p><b><i>Do not overtighten the stroke control knob beyond its closed position. Doing so may cause irreversible damage to the diaphragm, and cause fluid to drool from the dispense tip.</i></b></p> <p><b><i>Do not rotate the stroke control knob counterclockwise more than two turns from its closed position. Doing so may cause the diaphragm to open due to high fluid pressure and result in fluid dispensing continuously out of the valve.</i></b></p> <p><b><i>Please refer to the valve controller and fluid feed system operating manuals, to fully understand safety and operation guidelines of the complete dispense system.</i></b></p>

## Dispense System Configuration

### Example 1

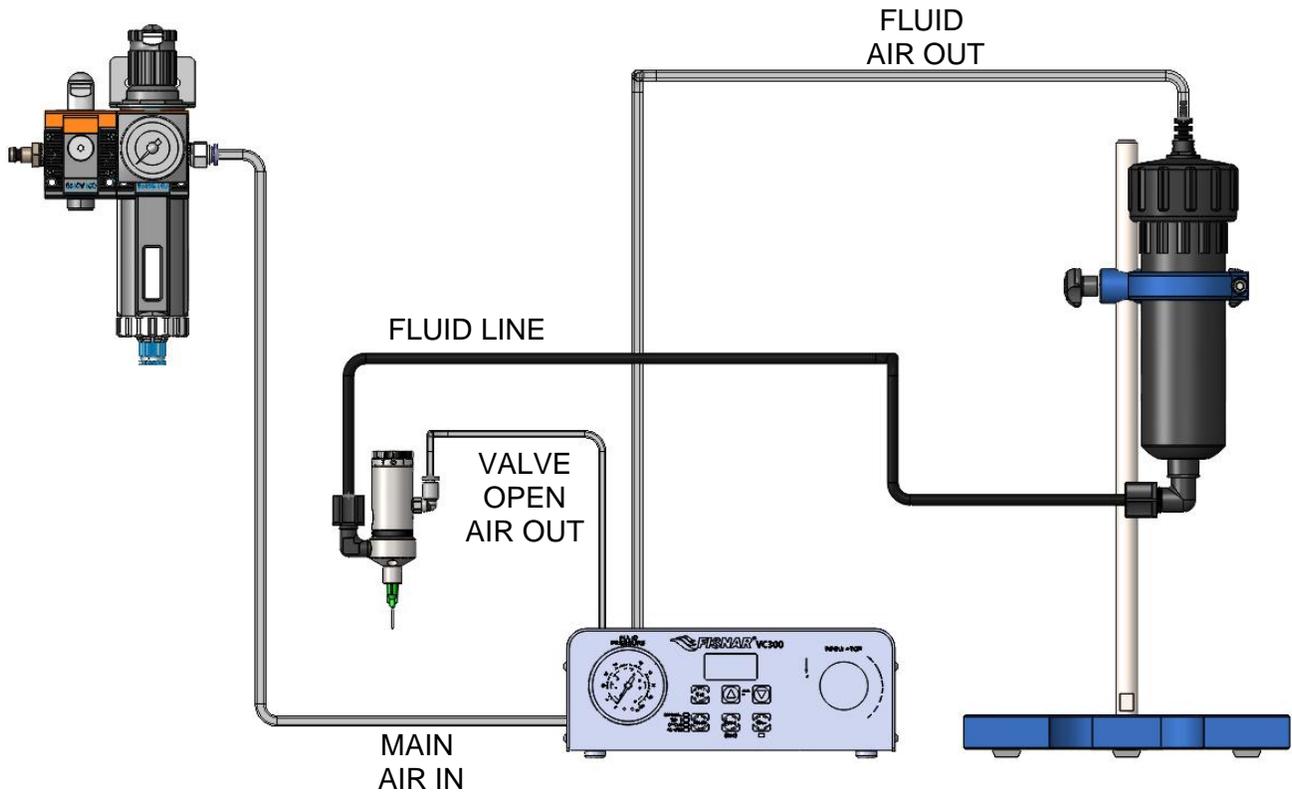


#### SYSTEM PARTS

Item	Description	Quantity
VD520-SS	Diaphragm Valve	1
VC300	Valve Controller	1
560567M	Air Filter Regulator	1
562354	Air Inlet Hose Assembly – 6FT	1
561821-BLACK	Fluid Inlet Fitting – Female Luer Lock x 1/8" NPT	1
8001004	QuantX 30cc Syringe Barrel - Clear	1
8001009	QuantX 30/55cc Piston - Green	1
8001021	QuantX 30/55cc Adapter Head Assy – 6ft (1.8m)	1

## Dispense System Configuration

### Example 2

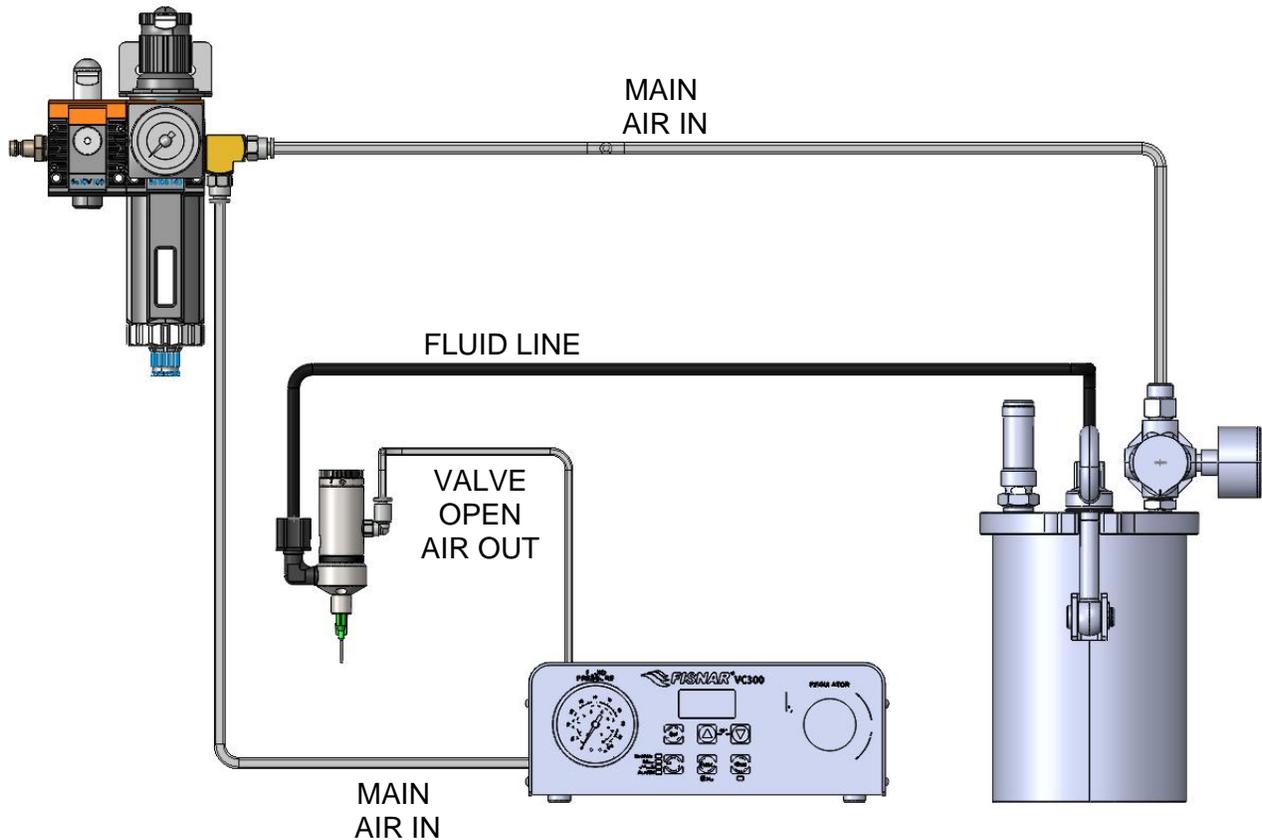


#### SYSTEM PARTS

Item	Description	Quantity
VD520-SS	Diaphragm Valve	1
VC300	Valve Controller	1
560567M	Air Filter Regulator	1
562354	Air Inlet Hose Assembly – 6FT	1
5801380-KIT	6oz Cartridge Retainer Assembly	1
560535-NU	Cartridge Retainer Stand	1
560743-10FT	1/4" OD PE Tubing Black – 10FT	1
560714-BLACK	Fitting – Elbow 1/4" O.D. Tube x 1/8" NPT Male	1
560748-BLACK	Fitting – Elbow 1/4" O.D. Tube x 1/4" NPT Male	1

## Dispense System Configuration

### Example 3

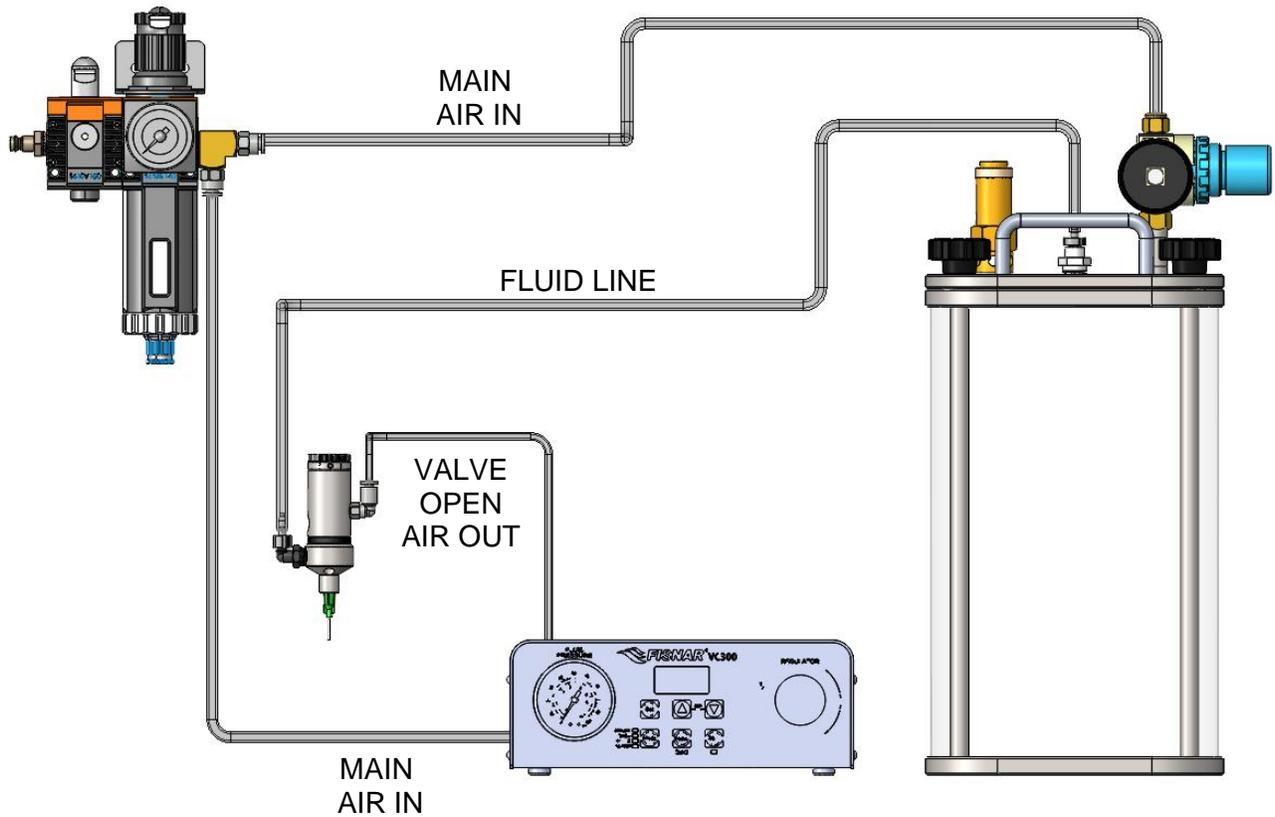


#### SYSTEM PARTS

Item	Description	Quantity
VD520-SS	Diaphragm Valve	1
VC300	Valve Controller	1
560567M	Air Filter Regulator	1
562354	Air Inlet Hose Assembly – 6FT	1
FPT800SS	8 Liter SS Fluid Reservoir – 0-100psi	1
560743-10FT	1/4" OD PE Tubing Black – 10FT	1
560714-BLACK	Fitting – Elbow 1/4" O.D. Tube x 1/8" NPT Male	1
560656-2601-BLACK	Fitting – Straight 1/4" O.D. Tube x 1/4" NPT Male	1

## Dispense System Configuration

### Example 4

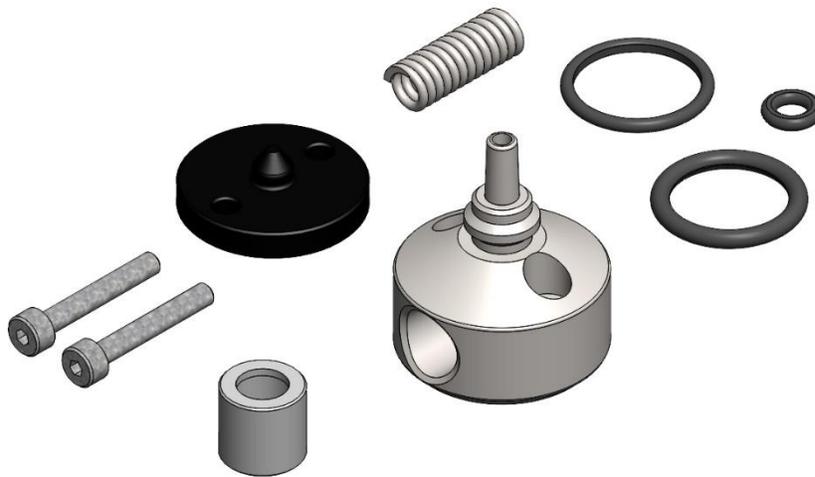


#### SYSTEM PARTS

Item	Description	Quantity
VD520-SS	Diaphragm Valve	1
VC300	Valve Controller	1
560567M	Air Filter Regulator	1
562354	Air Inlet Hose Assembly – 6FT	1
PP450-GL	4.5 Liter Clear View Fluid Reservoir – 0-60psi	1
561821-BLACK	Fluid Inlet Fitting – Female Luer Lock x 1/8" NPT	1
580047A-10-36	0.10" I.D. PE Fluid Line Clear – 36"	1

## REPAIR KIT

### VD520SS-RK



### INCLUDED PARTS

Item	Description	Quantity
VD520-1-SS	Fluid Body	1
VD520-4	Tip Retaining Nut	1
VD520-5-UHMWPE	Diaphragm	1
VD520-8	O-Ring	1
VD520-9	O-Ring	1
VD520-10	Spring	1
VD520-11	O-Ring	1
VD520-12	Socket Screw	2

## OPTIONAL TUBING & FITTINGS

### Hose

	Item Number	Description	Material / Color
	5801060-10FT	1/4" O.D. x 0.160" I.D. Tubing	Polyurethane / Clear
	561415-IJ-10FT	1/4" O.D. x 0.170" I.D. Tubing	Polyethylene / Natural
	560722-10FT	1/4" O.D. x 0.188" I.D. Tubing	PTFE / Natural
	561416-10FT	3/8" O.D. x 1/4" I.D. Tubing	Polyethylene / Natural
	560744-10FT	3/8" O.D. x 1/4" I.D. Tubing	Polyethylene / Black

### Fittings

	560714	1/4" O.D. Tube x 1/8" NPT Elbow Compression Fitting	Nylon / Natural
	560715	1/4" O.D. Tube x 1/8" NPT Straight Compression Fitting	Nylon / Natural
	561821	Female Luer Lock x 1/8" NPT Elbow Fitting	Polypropylene / Natural
	7610	3/8" O.D. Tube x 1/8" NPT Straight Compression Fitting	Nylon / Natural
	7610BP	3/8" O.D. Tube x 1/8" NPT Straight Compression Fitting	Polypropylene / Black
	561085	Female Luer Lock x 5/32" I.D. Straight Barb Fitting	Polypropylene / Natural
	561086	Male Luer Lock x 5/32" I.D. Straight Barb Fitting	Polypropylene / Natural
	561085N-BLACK	Female Luer Lock x 5/32" I.D. Straight Barb Fitting	Nylon / Black
	561086N-BLACK	Male Luer Lock x 5/32" I.D. Straight Barb Fitting	Nylon / Black

## OPTIONAL TUBING & FITTINGS

### Fluid Manifolds

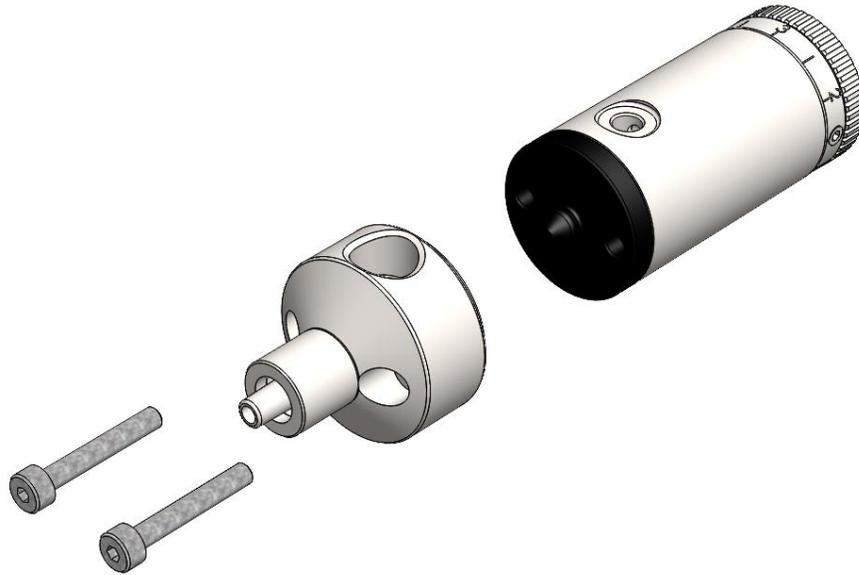
	Item Number	Description	Material / Color
	560542-1/4	4 Port Fluid Manifold 1/4" O.D. Tube	Acetal / Black
	560542-3/8	4 Port Fluid Manifold 3/8" O.D. Tube	Acetal / Black
	560542LL	4 Port Fluid Manifold Luer Lock	Acetal / Black

### Air Manifold

	560057	4 Port Air Manifold 1/4" O.D. Tube	Aluminum / Blue
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## MAINTENANCE

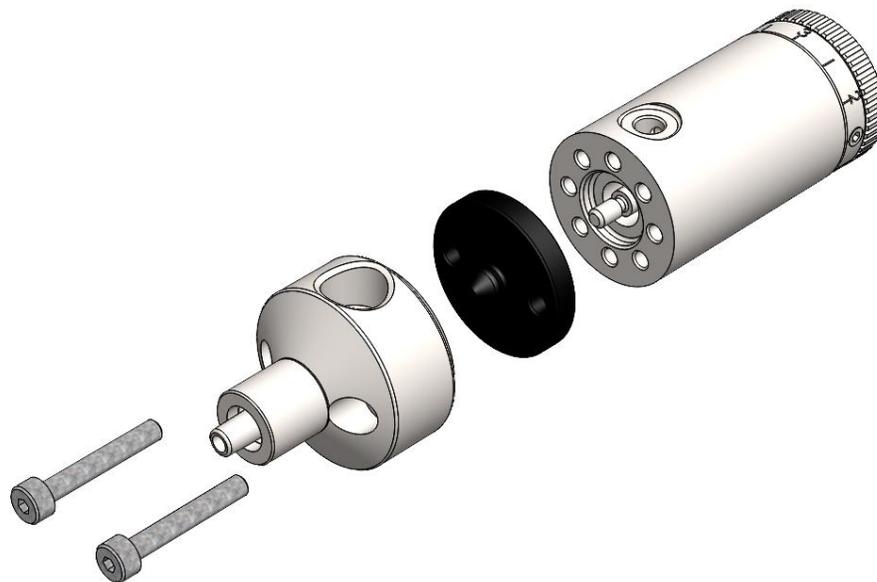
### Fluid Body Servicing



1. Use the 2.5mm hex key (#562356) to remove the two socket screws.
2. Attach and align the mounting holes of the new fluid body to the holes on the diaphragm and air cylinder body.
3. Re-insert the two socket screws and tighten to the below specification.  
VD520-SS (stainless steel fluid body / UHMW-PE Diaphragm) = 0.8 Nm / 0.59 ft-lb

## MAINTENANCE

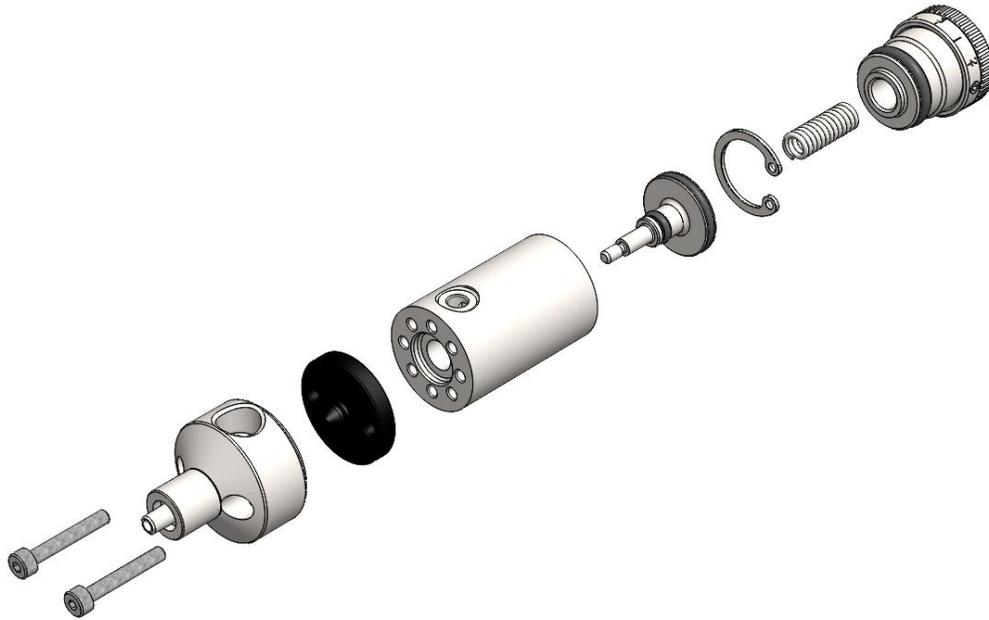
### Diaphragm Servicing



<b>1.</b>	Rotate the stroke control knob one full turn counterclockwise from its fully closed position.
<b>2.</b>	Use the 2.5mm hex key (#562356) to remove the two socket screws.
<b>3.</b>	Remove the diaphragm from the piston by rotating it counterclockwise by hand.
<b>4.</b>	Install the new diaphragm onto the piston by rotating it clockwise by hand, until the surface of the diaphragm is in full contact with the surface of the air cylinder body.
<b>5.</b>	Align the mounting holes of the fluid body, diaphragm, and air cylinder body.
<b>6.</b>	Re-insert the two socket screws and tighten to the below specification.  VD520-SS (stainless steel fluid body / UHMW-PE Diaphragm) = 0.82 N*m / 0.6 ft*lb
<b>7.</b>	Rotate the stroke control knob clockwise until the closed position is reached. Then rotate counterclockwise to set the desired stroke / flow rate.

## MAINTENANCE

### Piston O-Ring Servicing

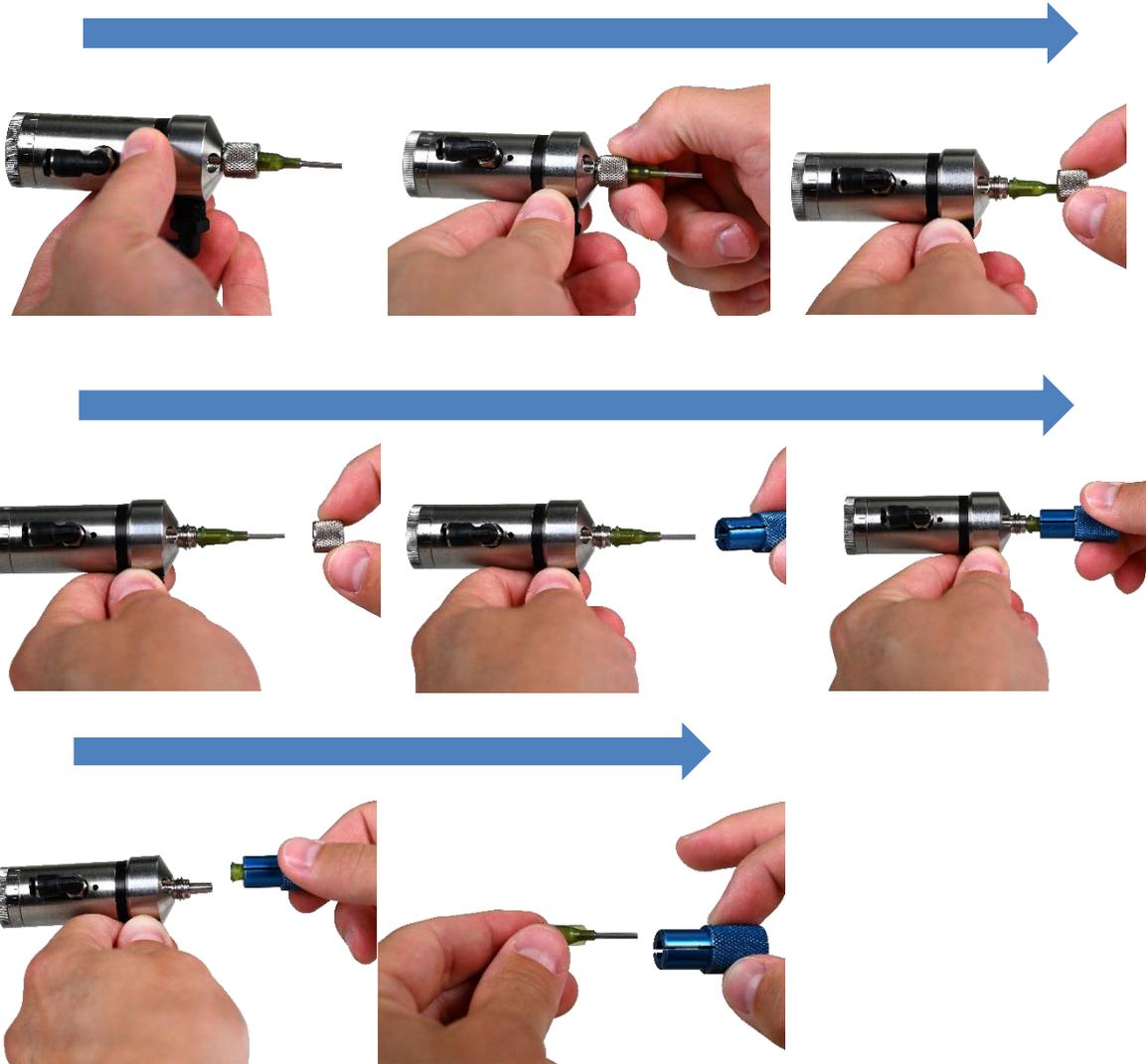


1.	Use the 2.5mm hex key (#562356) to remove the two socket screws.
2.	Remove the diaphragm from the piston by rotating it counterclockwise by hand.
3.	Remove the stroke control knob and spring from the air cylinder body by rotating it counterclockwise by hand.
4.	Use circlip pliers to remove the internal circlip from the air cylinder body.
5.	Use needle nose pliers to clamp onto the back of the piston and then pull the piston out of the air cylinder body.
6.	Remove the two O-Rings on the piston.
7.	Lubricate the new O-Rings with a mineral based oil and then assemble onto the piston.
8.	Re-insert the piston into the air cylinder body by hand, ensuring it is pushed to the very bottom.

9.	Use circlip pliers to install the internal circlip into the groove inside the air cylinder body.
10.	Insert the spring into the air cylinder body. The spring should be positioned so that the end of the piston sits inside the spring.
11.	Install the stroke control knob onto the air air cylinder body. Rotate the stroke control knob one full turn back from its fully closed position.
12.	Install the diaphragm onto the piston by rotating it clockwise by hand, until the surface of the diaphragm is in full contact with the surface of the air cylinder body.
13.	Align the mounting holes of the fluid body, diaphragm, and air cylinder body.
14.	<p>Re-insert the two socket screws and tighten to the below specification.</p> <p>VD520-SS (stainless steel fluid body / UHMW-PE Diaphragm) = 0.8 Nm / 0.59 ft-lb</p>
15.	Rotate the stroke control knob clockwise until the closed position is reached. Then rotate counterclockwise to set the desired stroke / flow rate.

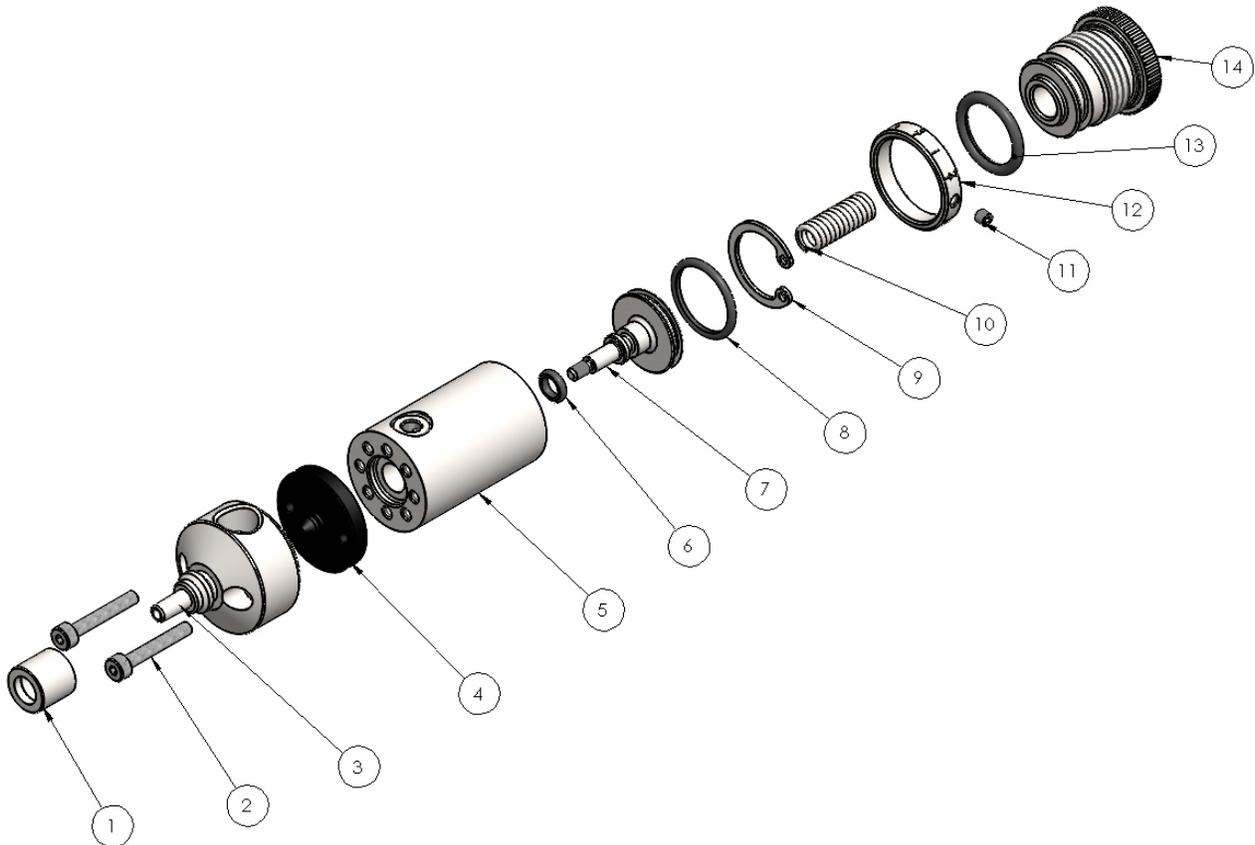
## Dispense Tip Removal

### QX-TRT



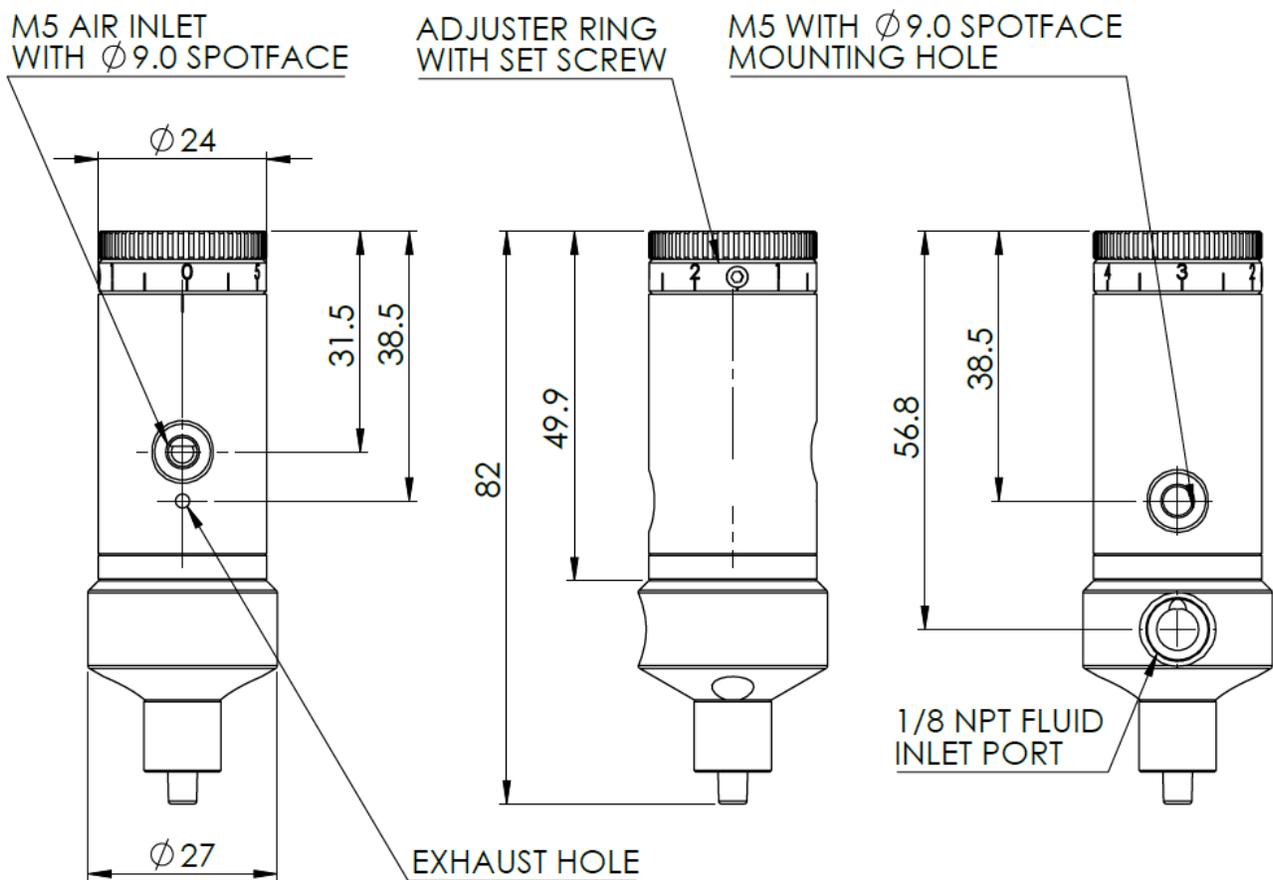
1. Remove the tip retaining nut (#VD520-4) from the valve.
2. Insert the tip removal tool over the dispense tip until it is fully engaged.
3. While twisting the tip removal tool in either direction, pull the tool backwards to remove the dispense tip from the valve fluid body.

## SPARE PARTS LIST – VD520-SS



Ref.	Item Number	Description
1	VD520-4 VD520-4MT	Tip Retaining Nut (SS 303) – Plastic Hub Tips Tip Retaining Nut (SS303) – Metal Hub Tips (Optional Part)
2	VD520-12	Socket Screw (SS)
3	VD520-1-SS	Fluid Body (SS 303)
4	VD520-5-UHMWPE	Diaphragm (UHMW-PE Black)
5	VD520-2	Air cylinder body (SS 303)
6	VD520-8	O-Ring (NBR)
7	VD520-6	Piston (SS 303)
8	VD520-9	O-Ring (NBR)
9	VD520-16	Internal Circlip (SS)
10	VD520-10	Spring (SS 303)
11	VD520-15	Set Screw (SS)
12	VD520-13	Stroke Reference Ring (SS 303)
13	VD520-11	O-Ring (Silicone)
14	VD520-3	Stroke Control Knob (SS 303)

## TECHNICAL DRAWING



## TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
No Fluid Flow	<ul style="list-style-type: none"> <li>- Fluid pressure too low</li> <li>- Actuating air input pressure too low</li> <li>- Dispense tip blocked</li> <li>- Fluid cured inside fluid body</li> <li>- Stroke adjustment knob closed too much</li> </ul>	<ul style="list-style-type: none"> <li>- Increase fluid pressure</li> <li>- Check actuating air pressure is greater than 70psi</li> <li>- Replace dispense tip</li> <li>- Clean/Replace fluid body</li> <li>- Rotate the stroke adjust knob counterclockwise</li> </ul>
Fluid Drools after valve closes but then stops	<ul style="list-style-type: none"> <li>- Air trapped inside dispense tip or fluid body</li> </ul>	<ul style="list-style-type: none"> <li>- Purge valve</li> </ul>
Fluid Drips Continuously	<ul style="list-style-type: none"> <li>- Fluid pressure is too high</li> <li>- Sealing edge of diaphragm or fluid body is worn/damaged</li> <li>- Stroke adjustment knob opened too much</li> <li>- Valve reassembled incorrectly.</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease fluid pressure to below 70psi</li> <li>- Replace diaphragm and/or fluid body</li> <li>- Check that the stroke adjustment knob is not opened by more than two turns from fully closed</li> <li>- Check and follow maintenance procedure correctly.</li> </ul>
Fluid Leaking between fluid body and diaphragm	<ul style="list-style-type: none"> <li>- Surface face of diaphragm or fluid body is damaged</li> </ul>	<ul style="list-style-type: none"> <li>- Replace diaphragm and/or fluid body</li> </ul>
Fluid leaking out of the exhaust hole	<ul style="list-style-type: none"> <li>- Diaphragm has split</li> </ul>	<ul style="list-style-type: none"> <li>- Replace diaphragm</li> </ul>
Valve actuates slowly	<ul style="list-style-type: none"> <li>- Actuating air input pressure too low</li> <li>- Piston O-Ring is worn</li> </ul>	<ul style="list-style-type: none"> <li>- Check actuating air input pressure is greater than 70psi and there are no restrictions/blockages in the pneumatic tubing.</li> <li>- Lubricate and/or replace piston O-ring</li> </ul>

## LIMITED WARRANTY

Manufacturer warrants this product to the original purchaser for a period of one (1) year from the date of purchase to be free from defects in material and workmanship, but not against damages caused by misuse, negligence, accident, faulty installation, abrasion, corrosion or by not operating in accordance with factory recommendations and instructions. Manufacturer will repair or replace (at factory's option), free of charge, any component of the equipment thus found to be defective, upon prepaid return of the equipment to the factory during the warranty period of the equipment. In no event shall any liability or obligation of Manufacturer arising from this warranty exceed the purchase price of the equipment. **This warranty is valid only when 5 micron filtered air is used.** The manufacturer's written liability, as stated herein, cannot be altered or enlarged except by a written statement signed by an officer of the company. In no event shall manufacturer be liable for consequential or incidental damages. A return authorization is required prior to shipping a defective machine to the factory.

Manufacturer reserves the right to make engineering or product modifications without notice.



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