BV-500

Spray Valve User Manual

BAN SEOK®
#656-253, Sungsu-1ka, Sungdong-ku, Seoul, Korea
TEL : 02-469-1229 / FAX: 02-497-1270 / E-MAIL : bansock@bansock.co.kr / WEB SITE: www.bansock.co.kr

Contents

1. Specifications

Size: 104 x ¢ 27

Weight:

Air cylinder body: SUS 303

Fluid chamber: SUS 303

Piston: SUS 303

Piston return spring: SUS 303

Needle and Nozzle: SUS 303

Air cap: SUS 303

Needle packings: Teflon

Packing spring: Stainless steel

Liquid inlet hole: 1/8 NPT female

Mounting: ¼ - 30 Thread UNC

Operating frequency: Exceeds 400 per minute

Air pressure required: 70 psi (4.8 bar)

Minimum mounting center distance: 1.067” (27.1 mm)

Standard nozzle diameter: 0.7mm

Optional nozzle sizes: 0.3mm

Spray patterns: Round

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2. How the Valve Operate

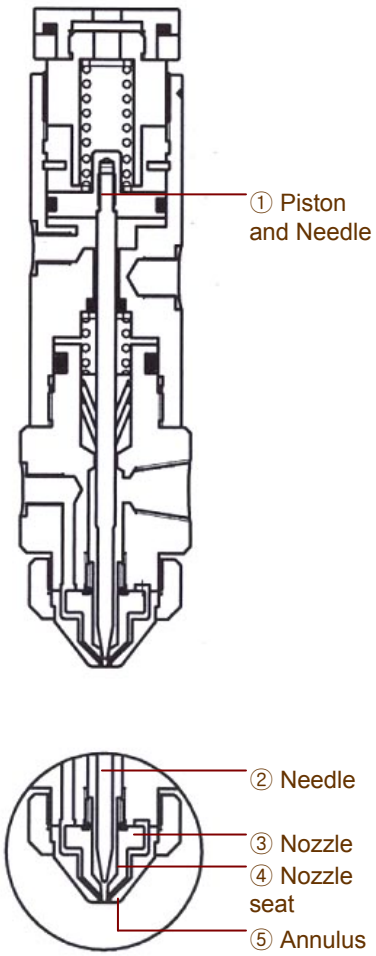
BV-500 is a normally closed, air actuated needle type spray valve that uses a Low Volume Low Pressure(LVLP) design for high transfer efficiency without overspray or airborne mist.

Air pressure from the TAD-400SR controller at 70 psi (4.8 bar) acts on a piston① that retracts the needle② from its nozzle seat③ and allows liquid to flow from the nozzle④. At the same time, nozzle air, also from the TAD-400SR, is turned on and flows from an annulus⑤ around the liquid nozzle.

This adjustable nozzle air creates a pressure drop around the nozzle, causing the liquid to atomize into fine droplets.

When the timed actuating air from the TAD-400SR shuts off, the piston spring moves the needle onto the nozzle seat, shutting off liquid flow. A preset nozzle air delay ensures that no liquid remains on the nozzle after the valve closes, eliminating after-deposit spatter.

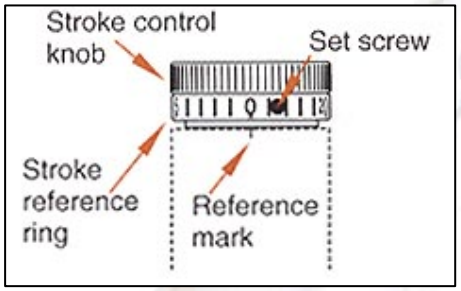
The amount sprayed is controlled by the valve open time, tank pressure and needle stroke. Area of coverage is determined by the nozzle size and the distance between the BV-500 nozzle and the work surface.



3. Setup

1) Close needle stroke control knob, fully(clockwise), then set at one turn open. This is a starting point only. Final setting will be determined by the desired flow rate.

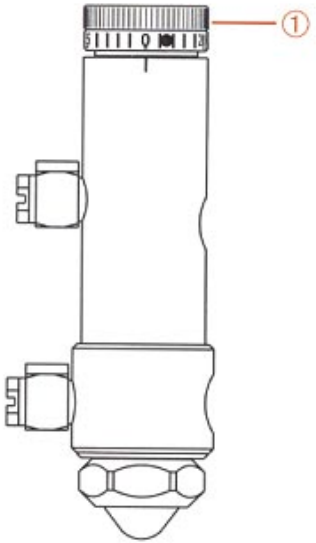
2) Check the nozzle air gauge. If not at zero, turn the regulator knob clockwise to turn off the nozzle air.



The Stroke Control Reference allows you to calibrate the stroke control setting or document the dispensing process.

To calibrate, close the stroke control knob all the way. Loosen the set screw and turn the reference ring so the zero on the ring aligns with one of the two reference marks on the valve body. When the set screw is tightened, the valve is calibrated.

4. Adjusting the Spray



Check to be sure steps under Setup have been completed, then proceed to adjust the spray.

1. Using the needle stroke control knob① on the BV-500 valve, set the fluid flow rate to one or two drops per second. Check flow rate by actuating the controller in the time override mode. Make valve stroke adjustment when the controller is off.

2. Set the nozzle air pressure on the TAD-400SR controller to 10 psi and actuate the controller. The valve will produce a fine spray.

To change fluid flow, use the needle stroke control knob①.

To change nozzle air, use the nozzle air pressure regulator. Higher pressures will provide finer spray.

5. Spray Patterns

Round Pattern Spray Area Coverage

Nozzle Distance from the Work Surface

Nozzles	1” 25.40 mm	2” 50.80 mm	3” 76.20 mm	6” 152.40 mm
#501-07 0.7 mm	0.200” 5.08 mm	0.400” 10.16 mm	0.600” 15.24 mm	1.200” 30.48 mm
#501-03 0.3 mm	0.170” 4.32 mm	0.340” 8.64 mm	0.500” 12.70 mm	1.000” 25.40 mm

6. Troubleshooting Guide

Valve Trouble	Possible cause and correction
No fluid flow.	▶ If valve operating pressure is too low, the valve will not open. Increase air pressure to 70 psi (4.8 bar) minimum. ▶ The reservoir air pressure may not be high enough. Increase pressure. ▶ The nozzle may be clogged. Clean the nozzle. ▶ The stroke adjustment control may be closed. If it is closed, open counterclockwise one turn. ▶ The control and the nozzle air lines may be reversed. Check for proper connection.
Valve does not provide clean shutoff, leaving a buildup on the nozzle.	▶ Nozzle air pressure may be too low. Increase air pressure. ▶ Nozzle air time delay is too short. Increase time.
Fluid continuously drips from the nozzle after the valve shuts off.	▶ A continuous drip can be caused by improper seating of the needle in the nozzle seat. Remove the nozzle, clean the needle and nozzle, replace worn or damaged parts. ▶ If the liquid chamber has not been fully turned onto the air cylinder body during reassembly, the needle will not seat in the nozzle. Check to be sure the liquid chamber is properly installed. ▶ Needle packings may be binding due to leakage, preventing the needle from fully closing. Disassemble the valve in accordance with the Maintenance Instructions. Replace the packings if there is evidence of leakage.
Fluid flows from the nozzle but will not spray.	▶ Nozzle air pressure may be too low. Increase air pressure. ▶ he air passageway between the nozzle and air cap may be obstructed. Remove the air cap, and clean the air cap and nozzle. ▶ If the fluid viscosity is too high, it will not atomize. Reduce viscosity.

7. Valve Maintenance

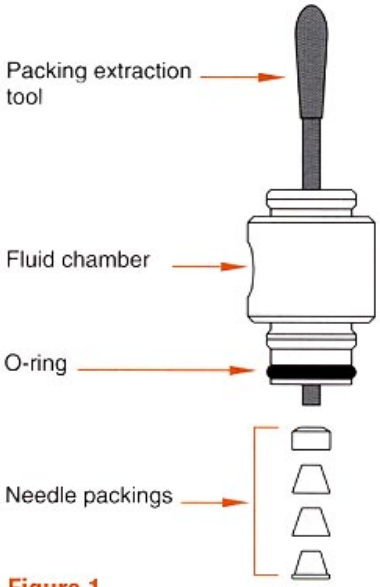


Figure 1
Pushing needle packings from the fluid chamber.

Normal cleaning is accomplished by purging with appropriate solvent. The air cap and nozzle can be removed, soaked in solvent and reinstalled without demounting the valve.

To thoroughly clean valve chamber and replace needle packing:

1. Remove the needle stroke control knob and spring to prevent damage to the needle and nozzle during reassembly.

2. Remove the air cap retainer, then the air cap, nozzle and fittings from the liquid chamber.

3. Remove the fluid chamber from the air cylinder body by turning counterclockwise until free. Then remove the O-ring from the fluid chamber.

4. Clean the fluid chamber, air cap and nozzle in appropriate solvent.

5. Remove the needle packings from the fluid chamber, using tool in the figure with the valve. Insert through nozzle end of the fluid chamber and gently push out the packings (see Figure 1).

Do not use sharp instruments to scrape or clean these components. Scratches may cause the valve to leak.

6. Remove any remaining packings and the spring from the needle.

7. Clean the needle with a cloth dampened in solvent.

8. Lubricate the needle with Grease and reinstall the needle packing spring and packings in accordance with Figure 2.

9. Install a new O-ring (#519) on the fluid chamber. Screw the air cylinder onto the fluid chamber. Hand tighten only. The chamber can be backed off ½ turn from the air cylinder body to orient fittings.

10. Reinstall the nozzle, air cap, retainer and fittings. Reinstall the needle stroke control and spring. Back to the desired setting.

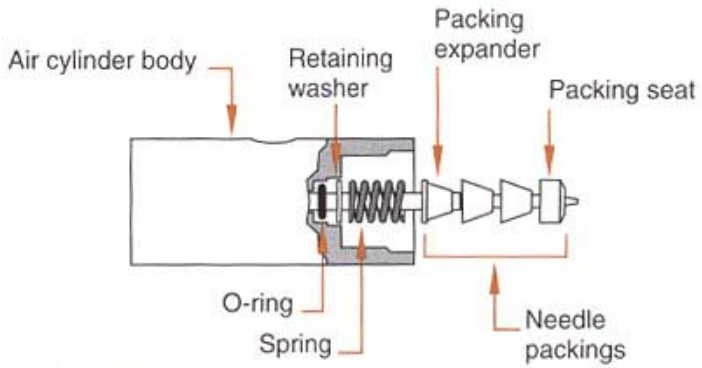


Figure 2
Proper assembly order for reinstalling needle packings.

7. Valve Maintenance

To replace the piston and needle assembly or the piston O-ring:

1. Remove the needle stroke control knob by turning counterclockwise until free.

2. Remove the piston return spring and thrust washers located on each end of the spring.

3. Remove the snap ring using snap ring pliers.

4. Pull the piston and needle assembly out of the air cylinder using small pliers on the spring pilot (at the top of the piston).

Note: The piston and needle assembly is replaced as a unit and cannot be disassembled.

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5. Clean the air cylinder body wall and apply lubricant.

6. Reinstall a new O-ring on the piston, apply lubricant to the needle and O-ring then reinstall in the air cylinder.

7. Reinstall the snap ring.

8. To reinstall the piston return spring, first put one thrust washer over the spring pilot, then the other thrust washer into the needle stroke control, followed by the spring.

9. Reinstall the needle stroke control knob by aligning the piston return spring with the spring pilot. Turn the needle stroke control clockwise until it stops and then back it out to the desired setting.

Note: After performing maintenance, the valve should be leak tested before it is returned to service.

To leak test the valve:

1. Set the needle stroke control knob at two turns open.

2. Shut off actuating air. Install an air hose in the valve's fluid inlet and connect it to a 100 psi (7 bar) air supply.

3. Submerge the nozzle in a container of water. If air bubbles appear, perform the following procedure to reseat the parts:

To reseat the needle and nozzle assembly:

1. Disconnect or shut off all air to the valve.

2. Check needle stroke control knob is two turns open.

3. Using an adjustable wrench, loosen the nozzle one full turn, then turn it back in and retighten. This causes any small irregularities on the needle and seat to conform with one another and become a matched set.

4. Restore actuating air and cycle the valve a few times, then perform the leak test again.

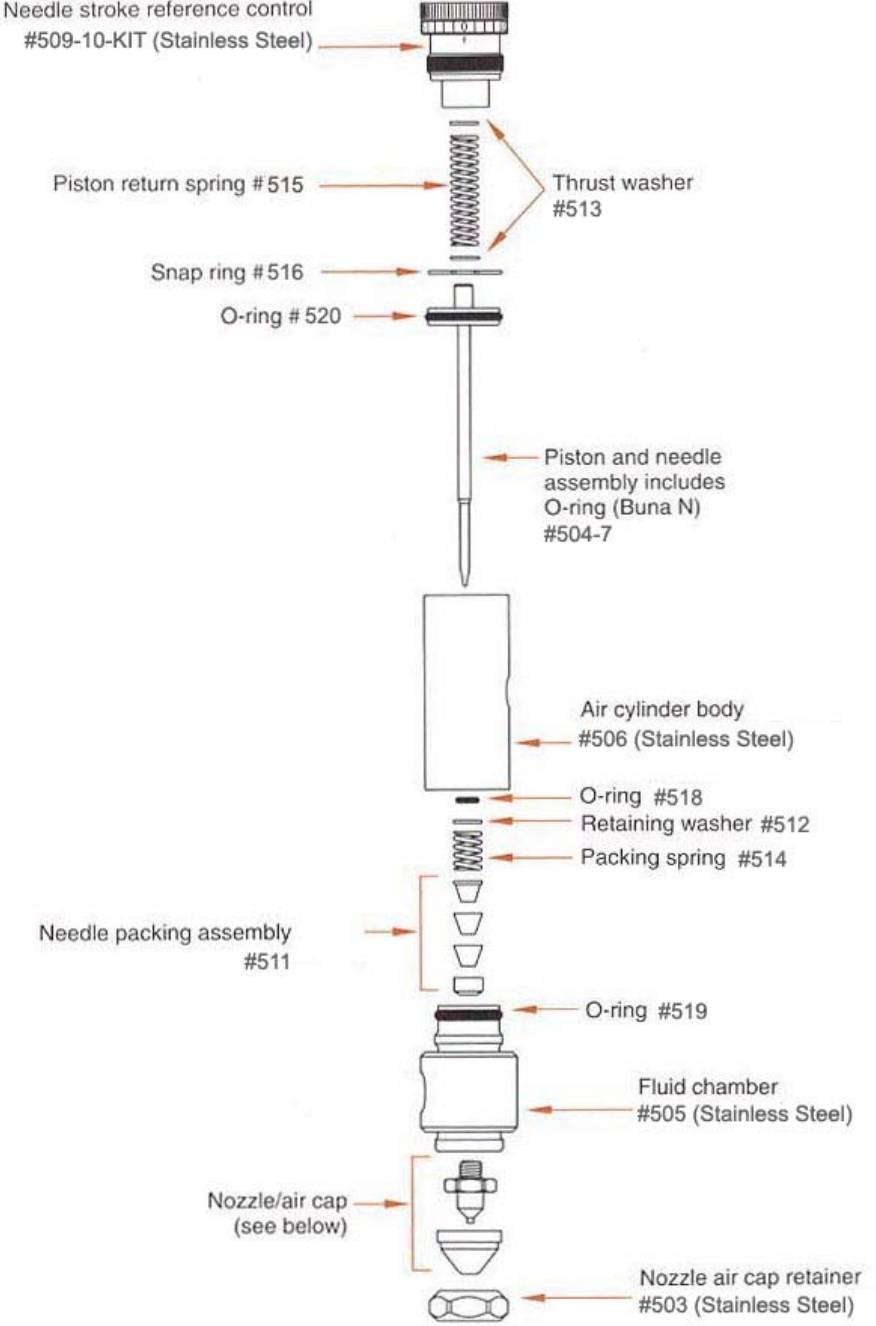
5. Steps 3 and 4 may be repeated up to three times to obtain satisfactory results.

6. If the valve continues to leak after three attempts to reseat the needle, replace the needle and nozzle.

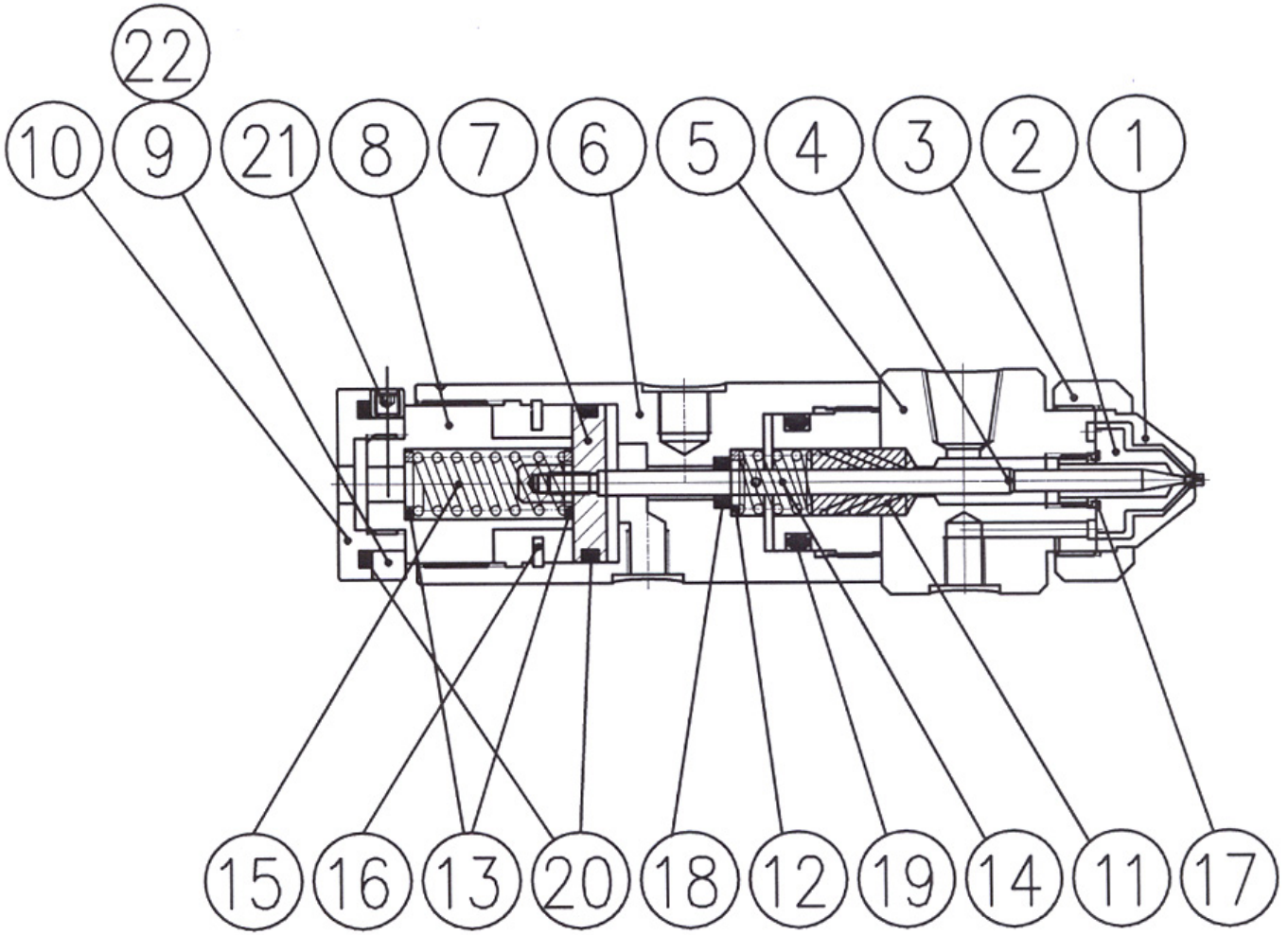
8. BV-500 Exploded View

Nozzle and Air Cap Assembly

Nozzle Size	Round pattern Stainless Steel	Round wide-angle Stainless Steel
0.7mm	#502-07	N/A
0.3mm	#502-03	N/A



9. Drawing



10. Part List

No.	Part No.	Description	Q'ty	Material	Spec.	Remark
1	501	Air Cap	1	SUS 303		
2	502	Nozzle	1	SUS 303	Φ0.7	
3	503	Nozzle Air Cap Retainer	1	SUS 303		
4	504	Needle	1	SUS 303		
5	505	Fluid Chamber	1	SUS 303		
6	506	Air Cylinder Body	1	SUS 303		
7	507	Piston	1	SUS 303		
8	508	Stroke Housing	1	SUS 303		
9	509	Stroke Control Reference	1	SUS 303		
10	510	Stroke Control Knob	1	SUS 303		
11	511	Needle Packings	1	TEFLON		
12	512	Retaining Washer	1	SUS 303		
13	513	Thrust Washer	2	NYLON		
14	514	Packing Spring	1	SUS 303	D:6.4 x d:1.2 x L:10	
15	515	Piston Return Spring	1	SUS 303	D:6.4 x d:1.2 x L:30	
16	516	Snap Ring	1	SUS 303		
17	517	O-Ring	1	VITON	S5	
18	518	O-Ring	1	VITON	P3	
19	519	O-Ring	1	VITON	P12.5	
20	520	O-Ring	2	VITON	AN016	
21	521	Set Screw	1		M3x3L	
22	522	Label	1		4x5	