

OPERATING AND MAINTENANCE MANUAL

Series 7100 "Flo-Lift" Piston Check Valve



Series 7100

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GENERAL DESCRIPTION

This instruction manual includes installation, operation and maintenance information for the Norriseal Series 2023 No-Freeze Valves.

All Norriseal valves come with spring-diaphragm pneumatic actuators that are either reverse-acting (fail-closed) or direct-acting (fail-open). Both are available in No. 9 (35 sq. in.) and No. 12 (70 sq. in.).

1.0 Installation

1. Before installing the valve, inspect it for shipping damage and any foreign material that may have collected during shipping. Remove the flange protectors and/or thread caps.
2. Flush out inlet piping to remove the pipe scale, chips, welding slag and other foreign materials.
3. The valve must be installed so that the flow is going the same way as the arrow tag attached to the side of the body. Also note the word “INLET” engraved in the flange O.D. at the inlet end of the body.
4. Install the valve using good piping practice. For flanged bodies, use a suitable gasket between the body and the pipeline flange.
5. If the pipeline must be in operation during maintenance and inspection, install a conventional bypass around the valve.
6. The bodies are rated at 150, 300, 600, 900, 1500 and 2500 ANSI class. Do not install the valve in a system where the operating pressures exceed those specified in the standards.

2.0 Normal Maintenance Schedule

CAUTION!

*Before starting any repair or maintenance, make sure that all pressure has been released from the valve body. Before unbolting the bonnet **SLOWLY LOOSEN** the pipe plug in the top center of the bonnet. While loosening the plug, listen for the sound of gas pressure escaping around the plug. Do not remove the bonnet until all trapped pressure, if any, has escaped.*

CAUTION!

Before disassembly or maintenance, all pressures in this device must be relieved. Failure to relieve pressures may result in personal injury or device damage. The resulting uncontrolled venting or spilling of line fluids may cause personal injury, loss of process control or environmental contamination.

2.1 Disassembly

NOTE: The numbers in parentheses refer to the items shown in figures 1 and 2 on page 2.

1. Remove the nuts (14A) from the bonnet studs (14B). The required wrench sizes are as follows:

CHART 1	
Stud Size	Wrench Size
0.62	1.06
0.75	1.25
0.88	1.44
1.00	1.62
1.12	1.81
1.25	2.00
1.38	2.19
1.50	2.38
2.00	3.12

2. Lift the bonnet (6) to remove it from the body (13).
3. Remove the load spring (5) by

lifting it straight up and out of the body.

4. The valve plug (1), cage (3) and guide (4) may be removed by lifting the attachment (1D) screwed into the top of the plug.
5. After they are removed from the body, the plug, cage and guide may be separated by lifting the guide (4), then cage (3) over the top of the plug.
6. Remove the plug seal (11) from the recess in the lower end of the guide.
7. Remove the seat (2) and seat gasket (9) by lifting them out of the recess in the body.

2.2 Inspection

Follow the valve disassembly as outlined above; carefully inspect the individual components as follows:

1. **Plug Seal:** Its construction consists of a stainless steel spring surrounded by a TFE jacket. Examine the spring to be sure it is not bent or permanently crimped. The TFE jacket should be carefully examined under good light. The jacket must be free of scratches, cuts and tears in order to function properly.
2. **Valve Plug:** The O.D. of the plug slides through a seal ring and therefore must be free of nicks and scratches that could damage the TFE jacket. Handle the plug carefully to avoid damage during maintenance. Examine the seating surface for scratches, nicks or gouges that could impair shut-off. If the plug has a non-metallic soft insert, this item should be closely examined, as it is particu-

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larly susceptible to damage. Construction may be solid (1-piece), or it may be an assembly of three or more basic components as described below.

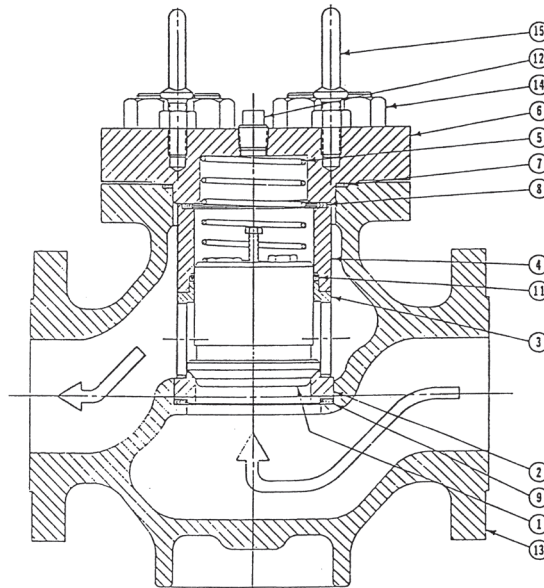
a. Metal to Metal Seating (Figure 2)

i. 1", 1.5", 2", 3" and 4" valve size: The plug is a solid 1-piece construction with an integral seating surface machined near the bottom of the plug.

ii. 6", 8", 10" and 12" valve size: The plug is a multi-piece device with replaceable seating insert secured to the plug butt with screws.

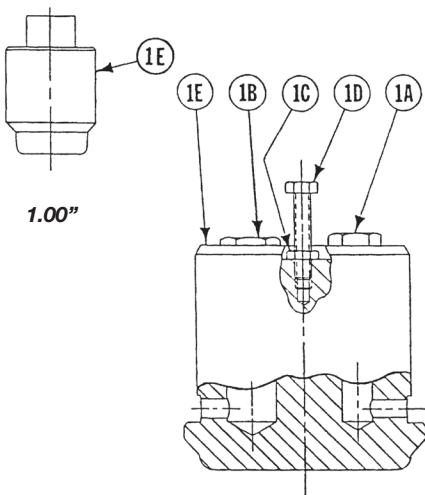
b. Composition (Non-Metallic)-to-Metal Seating (Figure 3):

VALVE SIZE	# OF COMPONENTS	ASSEMBLY
1"	5	A screw
1.5"	3	A castellated nut and cotter pin
2.0"	3	Two screws
3" & 4"	4	One screw
6" & 8"	4	Four screws
10"	4	Six screws
12"	4	Twelve screws

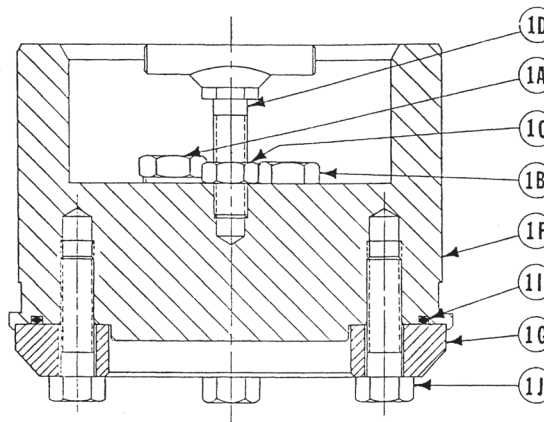


Item	Description
1	Piston Assembly
2	Seat Valve
3	Cage Piston
4	Guide Piston
5	Spring Piston
6	Bonnet Valve
7	Gasket Bonnet
8	Gasket Guide
9	Gasket Seat
11	Seal Piston
12	Plug Vent
13	Body
14	Stud Bonnet w/Nut
15	Eye Bolts

Figure 1. Soft Trim



1.00" Thru 4.00"



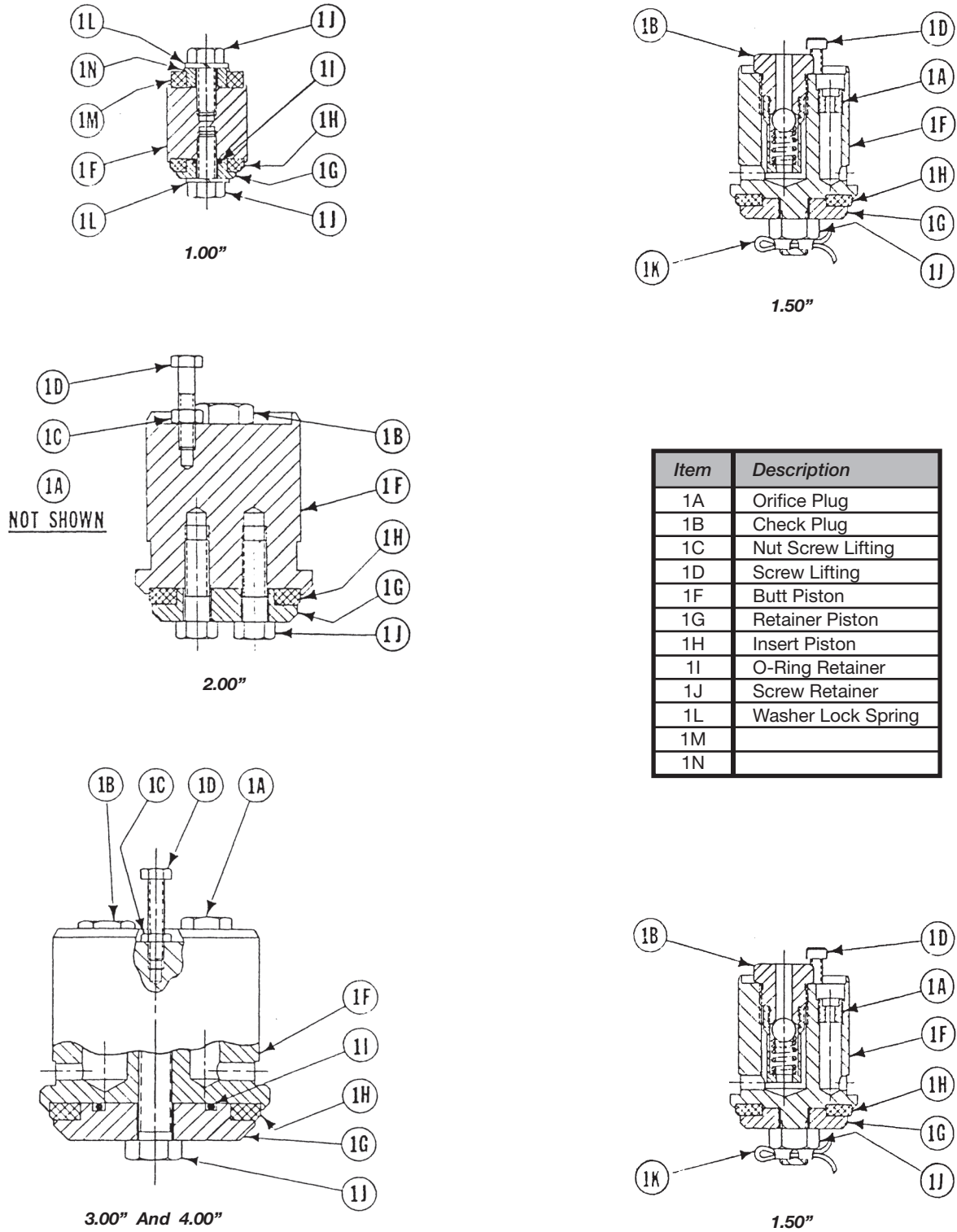
6.00" And 8.00"

Figure 2. Hard Trim

Item	Description
1A	Orifice Plug
1B	Check Plug
1C	Nut Screw Lifting
1D	Screw Lifting
1E	Piston
1F	Butt Piston
1I	Retainer Piston
1I	O-Ring Retainer
1J	Screw Retainer
1L	Washer Lock Spring

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Item	Description
1A	Orifice Plug
1B	Check Plug
1C	Nut Screw Lifting
1D	Screw Lifting
1F	Butt Piston
1G	Retainer Piston
1H	Insert Piston
1I	O-Ring Retainer
1J	Screw Retainer
1L	Washer Lock Spring
1M	
1N	

Figure 3. Soft Trim

If inspection of the insert-type plug shows all components to be in good condition, it is not necessary to disassemble the plug and remove the insert. However, if you need to disassemble it to replace the insert, proceed as follows: (Refer to Figure 3)

- A. Plug may be secured in an inverted position in a vise as it is disassembled. However, if you use a vise, place blocks of wood or other soft material on both sides of the plug to protect the surface finish.
- B. Remove the cap screws (1J) using a wrench size from the Chart 2.
- C. Remove the retainer, insert and O-ring seal from the butt-plug.
- D. To reassemble the plug, install the O-ring, insert and retainer in their respective positions.
- E. Reinstall the cap screws. Recommended values for torqueing cap screws are:

Valve Size	# Of Ball Checks
1"	0
1.5", 2", 3"	1
4"	2
6", 8"	3
10", 12"	3

The orifice plug and ball check contain small fluid passages which must be free of foreign matter for proper valve operation. Use a socket or a wrench to remove the ball check. Examine it and eliminate any foreign matter found. To make sure the ball check is working properly insert a small rod less than 0.25" diameter from the upper end. Only light finger pressure should be required to push the ball off the seat. With the pressure removed, the ball should snap back against the seat. After inspection and cleaning, reinstall the ball check into the valve plug.

Examine the orifice and eliminate any foreign matter found. Reinstall it in the valve plug. This completes the inspection and maintenance of the valve plug.

Valve Size	# Of Screws	Screw Size	Torque (Ft. Lbs.)	Wrench Size
1"	1	5/16-24	8	1/2"
1.5"	1	7/16-20	30	11/16"
2"	2	3/8-24	15	9/16"
3"	1	1/2-13	60	3/4"
4"	1			
6"	4			
8"	4	5/8-11	70	15/16"
10"	6			
12"	12			

After the plug is reassembled, place it upright to inspect the orifice plug and the ball check. All valves have one (1) orifice plug installed in the top of the valve plug, but the number of ball checks varies with the valve size as follows:

3. **Valve Seat:** The beveled seating surface must be free of nicks and scratches. Inspect the under-side of the seat for scratches or other imperfections that would impair the proper sealing against the seat gasket.

4. **Cage, Guide and Load Spring:** These components should not be affected or worn by normal operation. However, examine them to verify they are in good condition.
5. **Valve Body:** With the seat and bonnet gaskets removed from the body, inspect the gasket recesses for scratches or foreign matter that would impair the gasket sealing. Clean the gasket recesses as required.

2.3 Reassembly

NOTE: Each Series 7100 Piston Check Valve requires three gaskets of three different sizes.

1. Place the seat gasket in the body recess and install the seat on top of the gasket.
2. Place the plug guide on the work surface in an inverted position (deep recess facing upward).
3. Install the plug seal in the deep recess. The open side of the seal, with the spring visible, must face the upper end of the guide. As a result, if the guide is in the inverted position, only the TFE jacket will be visible after the seal is installed.
4. Place the valve plug on the work surface in the normal, upright position. Place the valve cage over the plug with the extended shoulder on the cage oriented toward the top of the plug.
5. Turn the guide over to its normal position and slip it over the plug. **NOTE:** Due to the seal ring being squeezed between the guide and the plug, it may be necessary to gently tap the guide into place.
6. Place the smallest of three gaskets into a recess in the top

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of the guide.

7. The entire plug / cage / guide assembly may be picked up by lifting the attachment in the center of the plug. Place the assembly into the valve body, carefully positioning the cage over the locating shoulder on the seat.
8. Install the load spring in the recessed top of the body.
9. Install the remaining gasket in the recessed top of the body.
10. Install the bonnet on the top of the body.

The Bonnet Bolt Torque Chart below shows the stud size in inches and recommended torque value in Ft/Lbs for valve sizes and pressures classes, as listed.

NOTE: *The spiral wound gasket bolt-up characteristics are such that the tightening of one bolt may loosen an adjacent bolt. This will occur on the subsequent tightening of all the bolts until the bonnet-to-body seal is made. This requires several trials on each bolt until the nut does not turn at the given torque.*

11. Tighten the bleeder plug (pipe plug) in the top of the bonnet.

months if it is in normal service (i.e. – no sand or abrasives and low pressure drop). If the seat is in severe service (i.e. – high pressure drop and sanding condition) check it every sixty days.

2. **PISTON:** Follow the guidance in 1.
3. **GENERAL:** When you disassemble any portion of the valve, always check the seal rings and gaskets for damage or wear before reassembly.
4. **BODY:** Under normal conditions the body should last for years. However, under severe conditions (i.e. – corrosion, sand and high pressure drop) the valve life could be numbered in days only.

CAUTION!

Tighten the bonnet-to-body bolts to the recommended torques given in the table below. Make sure to follow good bolting practice and lubricate the bolts.

3.0 Preventative Maintenance

1. **SEAT:** Check the seat every six

BONNET BOLT TORQUE CHART

Valve Size		Ansi Pressure Class					
		150	300	600	900	1500	2500
1"	Stud	.75"				.88"	
	Torque	110			120		250
1.5"	Stud	.62"			.75"		
	Torque	85			160		
2"	Stud	.75"				1.00"	
	Torque	75	80		175		375
3"	Stud	.75"			1.00"		1.38"
	Torque	90			140	275	875
4"	Stud	.88"			1.00"		1.50"
	Torque	145			225	280	1400
6"	Stud	.88"			1.25"		
	Torque	280			375	680	
8"	Stud	1.12"			1.25"	1.38"	
	Torque	425			465	1200	
10"	Stud	1.00"		1.12"	1.38"	1.88"	
	Torque	300		550	1000	2750	
12"	Stud	1.00"		1.25"	1.50"	2.00"	
	Torque	375		750	1300	3600	

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