SCOPE

This manual provides information on installation, operation, maintenance, and parts for Norriseal Series 7100 Piston Check Valve.

GENERAL DESCRIPTION

The Series 7100 Piston Check Valve is designed for low pressure drop and positive prevention of backflow. It is suitable for use with either gas or liquid systems. The control orifice and ball check built into the plug provides a cushioning, or dampening effect for the plug, making this valve suitable for pulsating flows of gas or air.

INSTALLATION

1. Before installing the valve, inspect for shipping damage and/or any foreign material that may have collected during crating and shipping. Remove flange protectors.
2. Flush out inlet piping to remove pipe scale, chips, welding slag, and other foreign material.
3. Valve must be installed so that flow is in direction indicated by arrow cast on side of body. Also note the word "INLET" engraved in flange OD at inlet end of body.
4. Install the valve using good piping practice. For flanges bodies, use a suitable gasket between the body and pipeline flange.
5. If continuous operation is required during maintenance and inspection, install a conventional three-way bypass around the body.
6. The bodies are rated at 150, 300, 600, 900, 1500 and 2500 ANSI class. So do not install the valve in a system where the working pressures exceed those specified in the standards.

NORMAL MAINTENANCE SCHEDULE

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

DISASSEMBLY

NOTE: Numbers in parentheses refer to items shown in Figure 1.

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

CHART 1

Lift	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 bonnet (6) straight up and remove from body (13).
3. Remove load spring (5) by lifting straight up and out of body.
4. Valve plug (1), cage (3), and guide (4) may be removed by means of lifting attachment (1D) screwed into top of plug.
5. After removal from body, the plug, cage, and guide may be separated by lifting guide (4), then cage (3) over top of plug.
6. Remove plug seal (11) from recess in lower end of guide.
7. Remove seat (2) and seat gasket (9) by lifting them out of recess in body.

INSPECTION

Following valve disassembly as outlined above, carefully inspect individual components as follows:

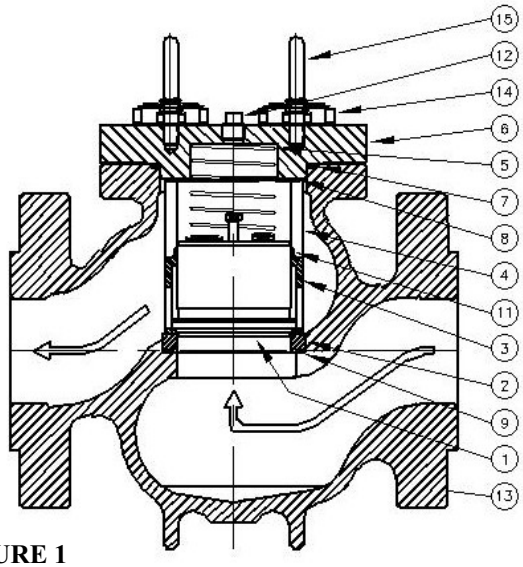


FIGURE 1

Item No.	Parts Description
1	Piston Assy
2	Seat Valve
3	Cage Piston
4	Guide Piston
5	Spring Piston
6	Bonnet Valve w/vent
*7	Gasket Bonnet
*8	Gasket Guide
*9	Gasket Seat
*11	Seal Piston
12	Plug Vent 0.75 NPT
13	Body Flg 2500 RTJ
14	Stud Bonnet w/nut
15	Eyebolt w/nut

1. Plug Seal: Construction consists of a stainless steel spring surrounded by a TFE jacket. Examine spring to be sure it is not bent or permanently crimped. The TFE jacket should be carefully examined under good lighting conditions. In order to function properly, the jacket must be free of scratches, cuts, and tears.

2. Valve Plug: Inspect plug as follows. OD of plug slides through seal ring and therefore, must be free of nicks and scratches that could damage the TFE jacket. Handle plug carefully to avoid damage during maintenance. Examine seating surface for scratches, nicks, or gouges that could impair shutoff. If plug has a non-metallic soft insert, this item should be closely examined, as it is particularly susceptible to damage. Construction may be solid, (1 piece) or may be an assembly of three or more basic components as described below.

a) Metal-to-Metal Seating (Figure 2.):

i) 1.0, 1.5, 2.0, 3.0 and 4.0 valve size-Plug is solid 1-piece construction with integral seating surface machined near bottom of plug.

ii) 6.0 and 8.0 valve size-Plug is a 3-piece construction with replaceable seating insert secure to plug butt with four screws

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

i) valve size consists of five basic components assembled and secured with a screw.

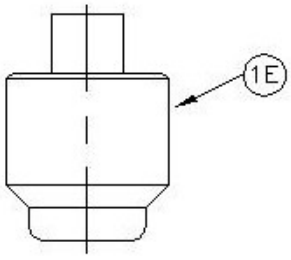
ii) 1.5 valve size consists of three basic components assembled and secured by a castellated nut and cotter pin.

iii) 2.0 valve size consists of three basic components assembled and secured with two screws.

iv) 3.0 and 4.0 valve sizes consist of four basic components assembled and secured by a screw.

v) 6.0 and 8.0 valve sizes consist of four basic components assembled and secured by four screws.

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



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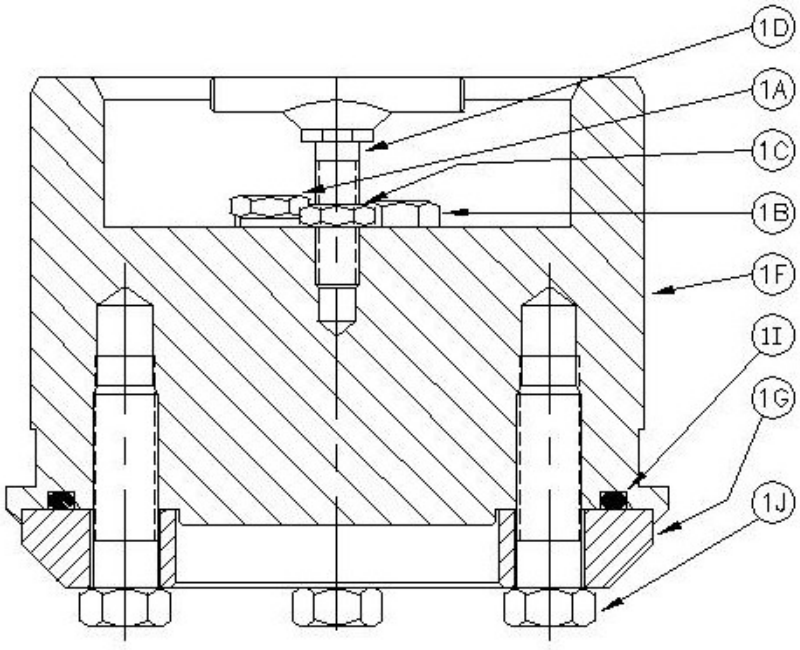
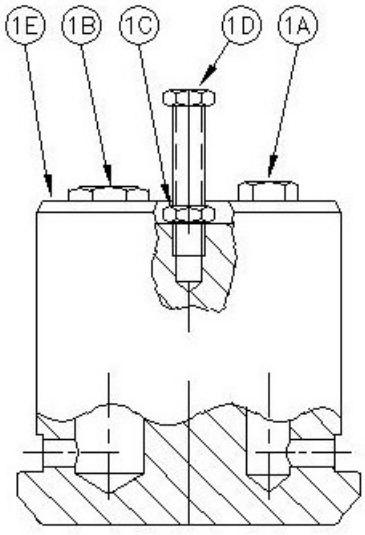


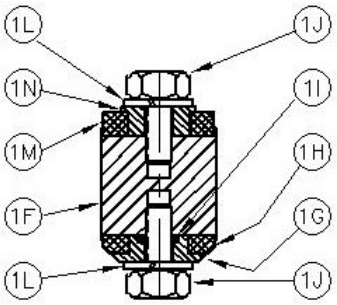
6.00" AND 8.00"



1.50" THRU 4.00"

PISTON ASSEMBLY	
Item No.	Parts Description
1A	Orifice Plug Gas
1B	Check
1D	Screw Lifting
1F	Butt Piston
1G	Retainer Piston
1H	Insert Piston
1I	O-Ring Insert
1J	Screw Retaining
1K	Pin Cotter
1L	Washer Lock Spring
1M	Travel Stop
1N	Retainer Travel Stop

Figure 2



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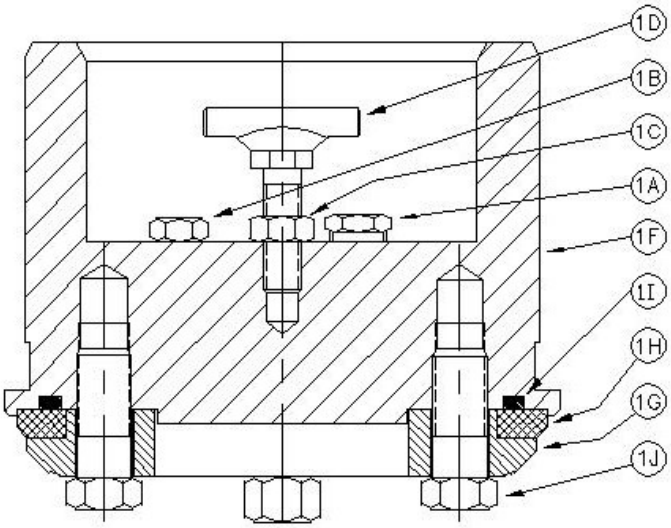
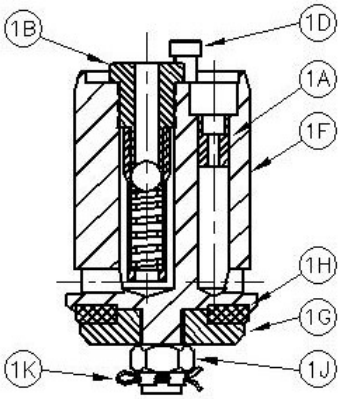


6.00" AND 8.00"



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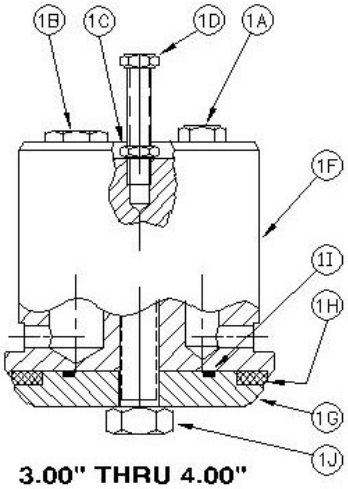
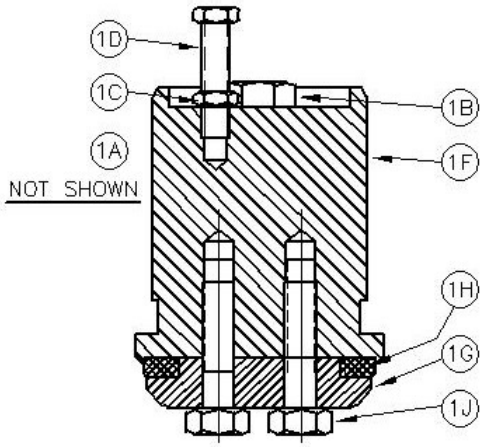


3.00" THRU 4.00"



2.00"

PISTON ASSEMBLY	
Item No.	Parts Description
1A	Orifice Plug Gas
1B	Check
1D	Screw Lifting
1F	Butt Piston
1G	Retainer Piston
1H	Insert Piston
1I	O-Ring Insert
1J	Screw Retaining
1K	Pin Cotter
1L	Washer Lock Spring
1M	Travel Stop
1N	Retainer Travel Stop

Figure 3

i) Plug may be secured in inverted position in a vise for disassembly. However, if using a vise, place blocks of wood or other soft material on both sides of plug to protect surface finish.

ii) Remove cap screws (1J). Use wrench size from Chart 2.

iii) Remove retainer, insert, and o-ring seal from butt-plug

iv) To reassemble plug, install o-ring, insert, and retainer in their respective positions.
NOTE: In 2", 3" and 4" valves, o-ring groove is in retainer. 6" and 8" valves have o-ring groove in end of butt-plug.

v) Reinstall cap screws. Recommended values for torquing cap screws are:

Valve Sizes	No. of Screws	Screw Sizes	Recommended Torque (FT-LBS)	Wrench Size
1.0	1	5/16 - 24	8	1/2
1.5	1	7/16 - 20	30	11/16
2.0	2	3/8 - 24	15	9/16
3.0	1	1/2 - 13	60	3/4
4.0	1	1/2 - 13	60	3/4
6.0	4	1 /2 - 13	60	3/4
8.0	4	5/8 - 11	70	15/16

Following reassembly of plug, place in upright position for inspection of orifice plug and ball check. All valves have one (1) orifice plug installed in top of valve plug, but number of ball checks varies with valve size as follows:

Valve Size	No. of Ball Checks
1.0	None
1.5, 2.0, 3.0	1
4.0	2
6.0, 8.0	3

Orifice plug and ball check contain small fluid passages, which must be free of foreign matter for proper valve operation. Ball check may be removed from valve plug using a 13/16" socket or adjustable wrench. Examine ball check and remove any foreign matter present. Operation of ball check may be verified by inserting a small rod, less than 0.25" diameter from upper end. Only light finger pressure should be required to push ball off seat. With pressure removed, ball should snap back against seat. After inspection and cleaning, reinstall ball check in valve plug.

Orifice plug may also be removed from valve plug using wrench as follows:

Valve Size	Allen Wrench Size
2.0, 3.0, 4.0	5/8 Socket
6.0, 8.0	7/8 Socket

Examine orifice for presence of foreign matter and clean as required. Reinstall orifice plug in valve plug. This completes inspection and maintenance of valve plug.

1. Valve Seat: Beveled seating surface must be free of nicks and scratches. Inspect underside of seat for scratches or other imperfections that would impair proper sealing against seat gasket

2. Cage, Guide, and Load Spring: These components should not suffer any adverse effects from normal operation. However, with valve disassembled, they should be examined to verify that they are in good condition.

3. Valve Body: With seat and bonnet gaskets removed from body, inspect gasket recesses for scratches or foreign matter that would impair gasket sealing. Clean gasket recesses as required.

REASSEMBLY

NOTE: Each series 7100 Piston Check Valve required three (3) gaskets, of three (3) different sizes. These gaskets are positioned in the valve assembly by size, as follows:

Smallest: Top of Guide
Middle: Under Seat
Largest: Top of Body

1. Place seat gasket in body recess, and install seat on top of gasket.
   IMPORTANT: Seat must be oriented with 45 degree beveled surface facing upward.
2. Place plug guide on work surface in inverted position (deep recess facing upward).
3. Install plug seal in deep recess in guide. Orientation of seal must be so that open side of seal, with spring visible, faces upper end of guide. Thus, with guide in inverted position, only the TFE jacket will be visible after seal is installed.
4. Place valve plug on work surface in normal upright position. Place valve cage over plug with extended shoulder on cage oriented toward top of plug.
5. Turn guide over to its normal position and slip over top of plug. NOTE: Due to seal ring being squeezed between guide and plug, it may be necessary to gently tap guide into place.
6. Place smallest of three (3) gaskets into recess in top of guide.
7. Entire plug/cage/guide assembly may be picked up by lifting attachment in center of plug. Place the assembly into valve body, carefully positioning cage over locating shoulder on seat.
8. Install load spring in recess in top of plug.
9. Install remaining gasket in recess in top of body.
10. Install bonnet on top of body.
11. Tighten the bonnet-to-body bolts to the recommended torques given in the following table (Follow good bolting practice and lubricate bolts).
    Chart 5 shows stud size in inches and recommended torque value in FT-LBS for valve sizes and pressure classes, as listed.
    NOTE: Spiral wound gasket bolt-up characteristics are such that tightening of one bolt may loosen an adjacent bolt. This will occur on 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.
12. Tighten bleeder plug (pipe plug) in top of bonnet.

This completes valve re-assembly.

Valve Sizes	ANSI Pressure Class					
	150	300	600	900	1500	2500
1.00 Stud Size	0.75	0.75	0.75	0.75	0.75	0.88
Torque	230	230	230	230	230	350
1.50 Stud Size	0.62	0.62	0.62	0.62	0.62	0.75
Torque	130	130	130	130	130	230
2.00 Stud Size	0.75	0.75	0.75	0.75	0.75	0.88
Torque	230	230	230	230	230	350
3.00 Stud Size	0.75	0.75	0.75	0.75	1.00	1.25
Torque	230	230	230	230	500	1000
4.00 Stud Size	0.88	0.88	0.88	0.88	1.00	1.50
Torque	350	350	350	350	500	1800
6.00 Stud Size	0.88	0.88	0.88	1.25	1.25	-----
Torque	350	350	350	1000	1000	-----
8.00 Stud Size	1.12	1.12	1.12	1.25	1.38	2.00
Torque	800	800	800	1000	1400	4400

PREVENTATIVE MAINTENANCE

1. Seat: Check seat every six (6) months if in normal service, i.e., no sand or abrasives and low pressure drop. If in severe service, i.e., high pressure drop and sanding condition, check every sixty (60) days.
2. Piston: Same as 1.
3. General: When disassembling any portion of valve, always check seal rings and gaskets for damage or wear before re-assembly.
4. Body: Under normal conditions, body should last years. However, under severe conditions, i.e., corrosion, sand and high pressure drop, valve life could be numbered in days only.