

## 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 provide a cushioning or dampening effect for the plug making this valve suitable for pulsating flows of gas or air.

### 1.0 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 materials.
3. Valve must be installed so that flow is in direction indicated by the arrow tag attached to the side of body. Also note the word "INLET" engraved in flange O.D. at inlet end of body.
4. Install the valve using good piping practice. For flanged 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. 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 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.

**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.**

## 2.0 DISASSEMBLY

*Note: Numbers in parentheses refer to items shown in figure 1 and figure 2.*

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

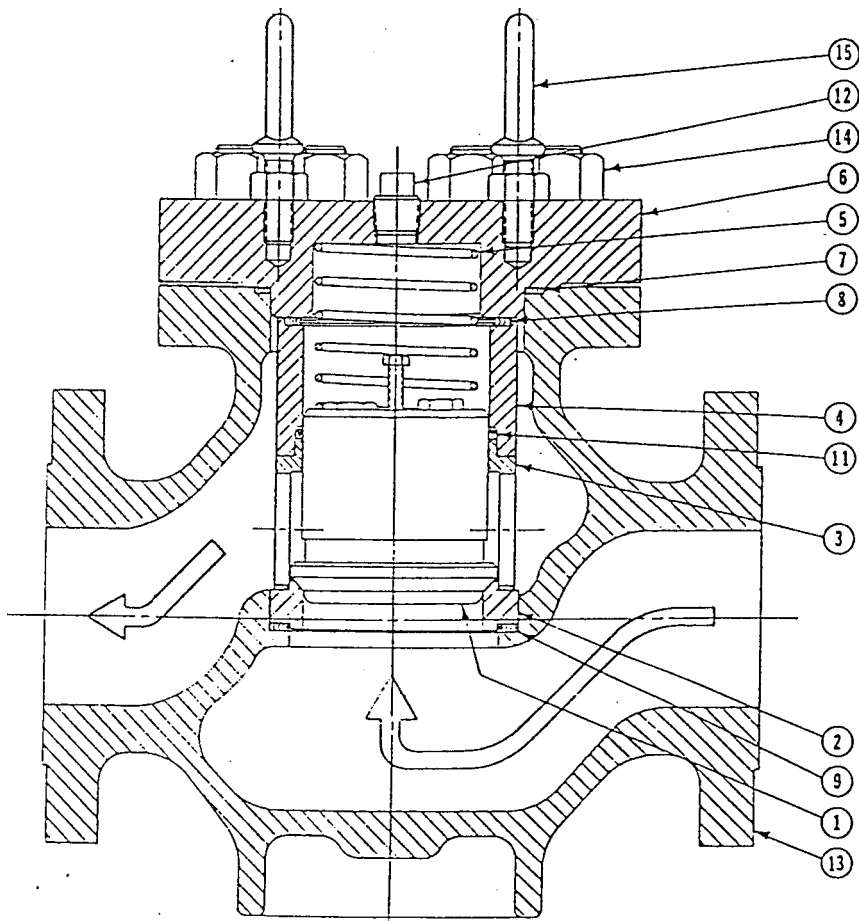
CHART I	
STUD SIZE	WRENCH SIZE
0.62	1.06
0.75	1.25
0.88	1.44
1.00	1.62
1.12	1.81
1.25	2.00
1.38	2.19
1.50	2.38
2.00	3.12

2. Lift 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.

### 2.1 INSPECTION

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

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.



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

.2 Valve Plug: Inspect plug as follows:

O.D. 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.

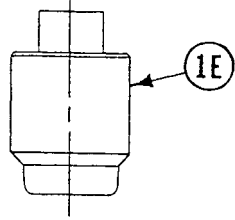
.2A Metal-to-Metal Seating (Figure 2)

- .1 1", 1.5", 2", 3", and 4" valve size: Plug is solid 1-piece construction with integral seating surface machined near-bottom of plug.
- .2 6", 8", 10", and 12" valve size: Plug is multi-piece construction with replaceable seating insert secured to plug butt with four screws.

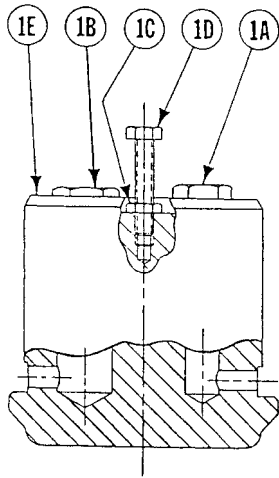
.2B Composition (Non-Metallic)-to-Metal Seating (Figure 3):

- .1 1" valve size consists of five basic components assembled and secured with a screw.
- .2 1.5" valve size consists of three basic components assembled and secured by a castellated nut and cotter pin.
- .3 2.0" valve size consists of three basic components assembled and secured with two screws.
- .4 3" & 4" valve sizes consist of four basic components assembled and secured by a screw.
- .5 6" & 8" valve sizes consist of four basic components assembled and secured by four screws.
- .6 10" valve size consist of four basic components assembled and secured by six screws.

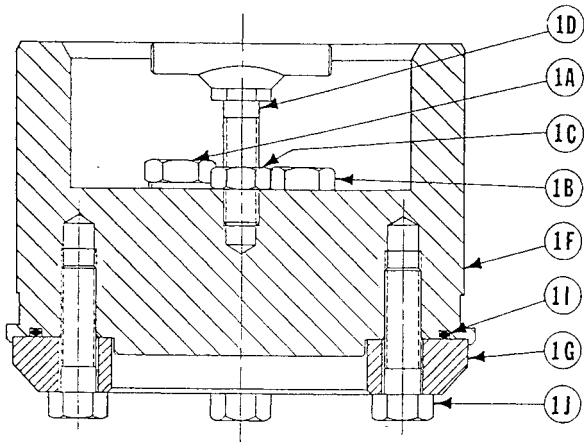
# HARD TRIM - FIGURE 2



1.00"



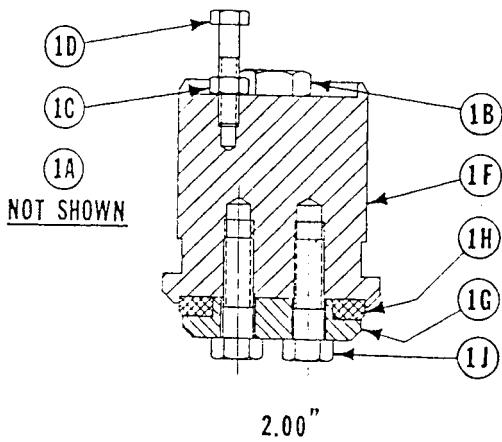
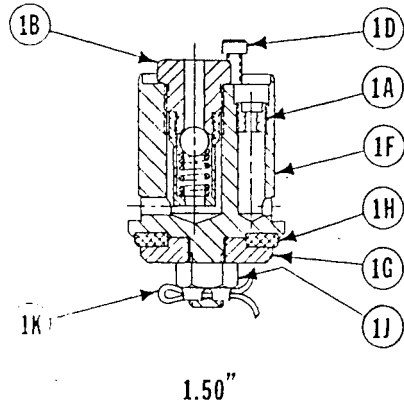
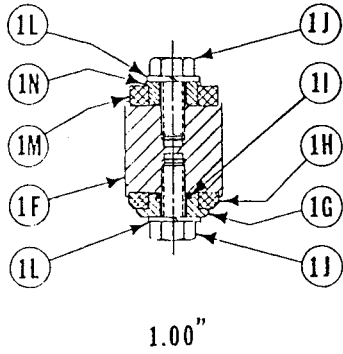
1.50" Thru 4.00"



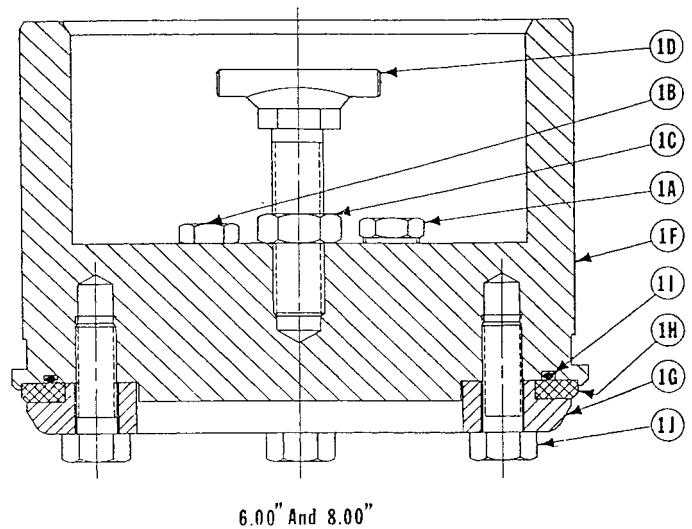
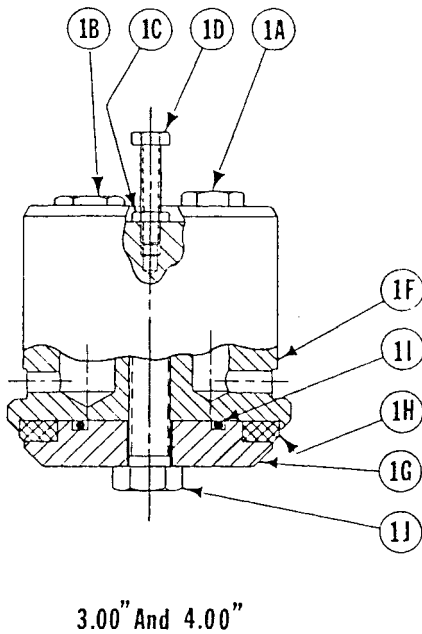
6.00" And 8.00"

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

# SOFT TRIM - FIGURE 3



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	



.7 12" valve size consist of four basic components assembled and secured by twelve 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).

- A) 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.
- B) Remove cap screws (1J) using wrench size from Chart 2.
- C) Remove retainer, insert, and o-ring seal from butt-plug.
- D) To reassemble plug, install o-ring, insert, and retainer in their respective positions.
- E) Reinstall cap screws. Recommended values for torquing cap screws are:

Valve Size	# Of Screws	Screw Size	Torque (Ft. Lbs.)	Wrench Size
1"	1	5/16-24	8	½"
1.5"	1	7/16-20	30	11/16"
2"	2	3/8-24	15	9/16"
3"	1	½-13	60	¾"
4"	1			
6"	4			
8"	4	5/8-11	70	15/16"
10"	6			
12"	12			

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	# Of Ball Checks
1"	0
1.5", 2", 3"	1
4"	2
6", 8"	3
10", 12"	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 socket or 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.

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.

- .3 Valve Seat: Beveled seating surface must be free of nicks and scratches. Inspect under-side of seat for scratches or other imperfections that would impair proper sealing against seat gasket.
- .4 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.
- .5 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.

## 2.2 REASSEMBLY

NOTE: Each Series 7100 Piston Check Valve requires three (3) gaskets of three (3) different sizes.

- .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 **CAUTION:** Tighten the bonnet-to-body bolts to the recommended torques given in the following table (Follow good bolting practice and lubricate bolts).

The Bonnet Bolt Torque Chart below shows stud size in inches and recommended torque value in FT-LBS for valve sizes and pressures 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 reassembly.

### 3.0 PREVENTIVE 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 reassembly.
- .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.

BONNET BOLT TORQUE CHART						
VALVE SIZE		ANSI PRESSURE CLASS				
		150	300	600	900	1500
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	