Installation

Install valve in system, using proper size and type of mating flanges and appropriate gaskets (for RF) or Seal Rings (for RTJ). The valve design allows for line flow in one direction only as indicated by the Flow Direction Arrow on the body casting outside. The large valve sizes 6" and 8", have two lifting eye bolts screwed into the Bonnet top to facilitate valve installation into the piping system. The preferable normal installation position for valve sizes 6" and larger is horizontal with the line pipe and the piston in the vertical-up position. In some installations, for sizes 4" and smaller, the valve may be mounted in a vertical position (which places the piston in a horizontal orientation). In all cases, a special piston spring is required to insure proper closing of the valve. This spring should be requested during ordering. However, it may be field installed by isolating the valve from all system pressure, removing the bonnet and installing the spring.

Note: KF does not recommend installing valve in a horizontal line with the piston positioned in a vertical down orientation. The valve will not function properly when installed in this fashion.

Centrifugal Gas Pump or Compressor Service

It is recommended that all valves have the spring installed to insure fast closing in this service. When discharging into a pressurized system, the piston check valve should be installed downstream of the unit block valve to insure positive checking of backflow under start-up conditions.

Operation

The check valve opens automatically without any outside assistance. As flow proceeds through the valve, the piston is forced upward. This upward movement results in fluid displacement from an area above the piston which is precisely metered by a restrictive orifice. The ratio of orifice area to piston area controls the opening speed. In a backflow condition the piston quickly drops back to the closed position, sealing against the seat, thereby eliminating any possibility of backflow. This dynamic behavior is determined by many different parameters including:

- Piston weight
- Differential pressure across the valve
- Friction of the Piston (rings)

Engineering Solutions for the World’s Flow Control Industry
KF Series 50 Piston Check Valves

Installation, Operation, And Maintenance

GUIDE

- Spring force and rate (when applicable)
- Piston area
- Orifice area

A spring is available to assist piston closure in those applications where valve orientation and liquid or gas media work against normal gravity activation of the piston. Valve should be ordered with spring when complete operating conditions are not known. An optimally balanced piston check valve results in a fine compromise of fast response time to prevent backflow and slow valve seating to prevent seat slamming. Seat or “valve” slam can result in a large pressure pulse and pressure oscillation on the downstream side. This in turn causes a corresponding pressure decline at the upstream side. A properly designed valve allows orifice sizing and spring assistance, where necessary, to assure proper closing velocity, thereby minimizing these effects.

Compressible Fluid “Gas or Vapor” Service

Although the valve assembly may be ordered with any available orifice sizes installed, standard orifice sizing for compressible service is as follows:

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Orifice Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>.031</td>
</tr>
<tr>
<td>3&quot; &amp; 4&quot;</td>
<td>.046</td>
</tr>
<tr>
<td>6&quot; &amp; 8&quot;</td>
<td>.062</td>
</tr>
</tbody>
</table>

Should you experience seat or valve slam, we recommend downsizing to the next smaller available orifice. This will effectively retard the closing speed of the valve.

Non-Compressible Fluid “Liquid” Service

All Series 50 Piston Check Valves that are trimmed for non-compressible fluid applications will include a .218 orifice. Also, the ball is absent in the ball check valve, thereby allowing another passage for the fluid to enter or evacuate the area above the piston. Slamming is generally not a problem in non-compressible fluid applications. In fact, the relatively high viscosity of the flow media actually provides a cushioning effect which helps to eliminate seat slam. From this point on, the operation of the piston check valve is fully automatic and requires no outside assistance, adjustment or regulation. The automatic opening and closure of the valve is governed by the differential pressure across the valve and/or any spring assist that might be included. The following table gives the cracking pressure as a function of valve size and piston ring material. The cracking differential pressure is defined as a minimum differential pressure across the valve required to move the piston of the valve to open.

**Differential Cracking Pressure (psi)**

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Seat Ring Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teflon®</td>
</tr>
<tr>
<td>2&quot;</td>
<td>1.5</td>
</tr>
<tr>
<td>3&quot;</td>
<td>1.8</td>
</tr>
<tr>
<td>4&quot;</td>
<td>2.0</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1.8</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Please note that if: 1) the valve is spring assisted, and 2) the valve is oriented such that the spring assisted piston is positioned in an upright vertical position, then the cracking differential figures from the above listed chart should be doubled. Example: A 3" spring assisted valve with Teflon® rings, oriented as previously described, would have a 3.6 psi crack differential (twice the listed 1.8 psi).
Maintenance
The KF Piston Check Valve functions as an integrated and self-contained unit, requiring no attention during operation.

Reconditioning
Depending on the operating conditions, usage, wear and erosion, the following components may from time to time require replacement:
- Piston Rings
- Piston
- Sleeve
- Orifice
- Sleeve gaskets
- Check Valve
- Seat

Caution! Prior to disassembly the valve must be isolated from system pressure and flow. Bleed pressure through the bleed valve located at the top of the piston check valve at the bonnet. Before opening the bleed valve, note the orientation of the exhaust hole in the bleed valve body. Stand clear of this direction when opening the bleed valve. Never remove the entire bleed valve while the piston check valve is exposed to line pipe pressure.

Since the KF Series 50 Piston Check Valve is a top entry design, the valve can be serviced with the valve remaining in the line pipe. After observing above cautions, loosen the bonnet cap screws (nuts in some cases) (10) and remove bonnet (2). Remove spring (14) if included. Screw small eye-bolt into threaded hole in top of piston (3) and lift piston out of valve. Inspect and replace piston rings (6) as necessary. Remove sleeve (5) and gaskets by using puller hooks under shoulder of sleeve at the bottom. Remove two gaskets (11) which may be stuck to the sleeve, bonnet or body. Once the sleeve is removed a locking pin (15) is exposes. This pin prevents inadvertent seat loosening while the valve is in service. By removing the locking pin the seat (4) may be unscrewed and removed. A special seat removal tool is available. Please consult factory.

Clean all parts, inspecting them for damage, wear and corrosion. Replace parts as required. Inspect orifice (8) that is screwed into the piston top and feed a thin wire through the orifice hole to make sure contamination has not plugged the orifice hole. Remove the check valve(s) screwed into the piston top and inspect the ball check's interior to make sure the check valve is not plugged. Clean or replace if necessary.

To assemble valve again with new parts, reverse procedure, using a liberal amount of grease. KF recommends a multi-purpose grease such as Mystic JT-6. However, grease should be compatible with the process fluid and the piston rings. Install seat, seat locking pin and sleeve, making sure to include the proper flat gasket between the sleeve flange and body. Once sleeve is set in place, install piston. Finish by positioning the remaining flat gasket on top of the sleeve flange and replacing bonnet. Bonnet nuts should be tightened using a cross-tighten method to ensure proper seating. Lastly, reinstall the bleed valve.

Note: A quality thread lubricant should be used when making up the bonnet connection.
## Parts List

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>No.</th>
<th>Description</th>
<th>No.</th>
<th>Description</th>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>5</td>
<td>Sleeve</td>
<td>10</td>
<td>Cap screw</td>
<td>14</td>
<td>Spring</td>
</tr>
<tr>
<td>2</td>
<td>Bonnet</td>
<td>6</td>
<td>Piston Ring</td>
<td>11</td>
<td>Gasket</td>
<td>15</td>
<td>Locking Pin</td>
</tr>
<tr>
<td>3</td>
<td>Piston</td>
<td>7</td>
<td>Ball Check Valve</td>
<td>12</td>
<td>Bleed Valve</td>
<td>16</td>
<td>Eye Bolt</td>
</tr>
<tr>
<td>4</td>
<td>Seat</td>
<td>8</td>
<td>Orifice</td>
<td>13</td>
<td>Drain Plug</td>
<td></td>
<td>Return to top</td>
</tr>
</tbody>
</table>

---

**Engineering Solutions for the World’s Flow Control Industry**

1500 S.E. 89th Street  
Oklahoma City, OK 73143-5249  
http://www.kfvalves.com

©2000 KF Industries, Inc. • KF50IG3/00 • KF reserves the right to change designs, materials or specifications without notice or without obligation to furnish or install such changes on products previously or subsequently sold. KF Industries is a division of CRI International, Inc.

Tel: 405 631-1533  
Fax: 405 631-5034  
Email: kfinfo@kfvalves.com