We appreciate your purchasing our products. Read all the contents of this manual before piping and using them. Also keep this manual in a place accessible to the operator.
This manual applies to the manual operation of the KITZ wafer type check valves.

**CAUTION AND WARNING**

To ensure safe and trouble-free function and performance, please read all the contents of this manual before handling, transportation, mounting and operation of the products. Keep this manual in a place accessible to the operator.

The signs "WARNING" and "CAUTION" are defined as follows:

- "WARNING" indicates potentially hazardous conditions, which may result in serious injury to personnel, if such warnings are ignored.
- "CAUTION" indicates potentially hazardous conditions, which may result in minor or moderate injury to personnel or property damage, if such cautions are ignored.
- "Prohibited" action indicates a prohibited action that must not be carried out.
- "Mandatory" action indicates a mandatory action that must be followed.

**NOTES TO USERS**

This manual covers normal usage of the products. Technical data and instructions for operation, maintenance and inspection of the products are prepared in consideration of safety. However, they are good only to cover typical applications as a general guideline to the users. If technical assistance beyond this manual is required, contact KITZ Corporation or its distributors.

The illustrations given in this manual do not introduce all the details. If more detailed data are needed, refer to our relevant valve assembly drawings.

*Any information provided in this manual is subject to change at any time without notice.*
I. Construction and Design Features

II. Transportation and Storage

III. Valve Installation

IV. Valve Operation

V. Periodic Inspection

VI. Disassembly and Assembly
I. Construction and Design Features

1. Construction and function

1.1 Construction and parts names are as indicated in the figure below.

1.2 The disc is turned with a pivot of the hinge pin by the force of velocity pressure and closed by the force of helical spring and gravity.

1.3 Only unidirectional flow is applied to prevent reverse flow.

1.4 The flow direction of the valve is indicated on the valve body.

1.5 It is recommended to have a distance of 6 times or over the nominal size from the outlet of the pump, reducer and elbow to prevent swirling, turbulence or pulsation.
I. Construction and Design Features

2. Design feature

2.1 Reduction of water hammer
The valve is able to reduce water hammer because the spring assisted disc will close immediately before the flow reversal.

2.2 Compact and light mass
Its compact size is helpful in installations where clearances are minimal.

2.3 Low pressure-loss
The slim configuration allows for minimal pressure loss.
I. Construction and Design Features

3. Valve specifications

3.1 Maximum working pressure and temperature

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature °F</th>
<th>Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDM</td>
<td>200 (1.30)</td>
<td>100 (38)</td>
</tr>
<tr>
<td>NBR</td>
<td>190 (1.31)</td>
<td>94 (35)</td>
</tr>
</tbody>
</table>

- Shell Test (Hydraulic or air) 1.5MPa (217 lb/in²)
- Seat Test (Hydraulic or air) 1.5MPa (217 lb/in²)
- Low-pressure Seat Test 0.05MPa (7.3 lb/in²)
I. Construction and Design Features

4. Dimensions and required quantities of piping bolts

Bolt dimensions and the required quantities of piping bolts are as shown in the table below. The bolts lengths shown in the table are calculated based on the use of a steel flange and a gasket with 3 mm thickness.

<table>
<thead>
<tr>
<th>Type A</th>
<th>Type B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve</td>
<td>nominal size</td>
</tr>
<tr>
<td>2 5/8 4.3</td>
<td>1.50</td>
</tr>
<tr>
<td>2 1/2 4.5</td>
<td>1.50</td>
</tr>
<tr>
<td>3 5/8 4.7</td>
<td>1.50</td>
</tr>
<tr>
<td>4 5/8 5.3</td>
<td>1.50</td>
</tr>
<tr>
<td>5 3/4 5.7</td>
<td>1.75</td>
</tr>
<tr>
<td>6 3/4 6.1</td>
<td>2.00</td>
</tr>
<tr>
<td>8 3/4 7.1</td>
<td>2.00</td>
</tr>
<tr>
<td>10 7/8 7.9</td>
<td>2.25</td>
</tr>
<tr>
<td>12 7/8 9.4</td>
<td>2.25</td>
</tr>
</tbody>
</table>
II. Transportation and Storage

1. Transportation

1.1 Precautions for safety

1. Take care not to damage painting surfaces of valves during transportation, which may subsequently cause corrosion or rust. Damaged surfaces shall be adequately reworked before installation.

2. Take care when handling and storing carton packed products. The high humidity may damage the cartons.

1.2 Transportation

1.2.1 Keep packages as they are delivered until just before installation.

1.2.2 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact shall be avoided.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>প্ল্যান্টের পরিষেবার সময়ে শুধূর কার্যক্ষেত্রে ব্যবহৃত হয়ে থাকা বিনামূল্যের প্ল্যান্টের সাধারণ অনুপস্থিতি সম্পর্কে।</td>
</tr>
</tbody>
</table>

This sheet contains information about the safety precautions during transportation and storage. It is important to follow these guidelines to ensure the safe handling of valves.

Kitz Corporation
### 2. Precautions for safety

1. **DO NOT** store valves in the corrosive environment. It may cause corrosion on the threaded portions of valves.
2. **DO NOT** remove the protection cover until installation. Protection covers prevent foreign objects, which may damage the disc or seat, from entering the valve internal.
3. **DO NOT** place any objects on the valve or **DO NOT** step on the valve. Overloading may damage the valve.
4. **DO NOT** carelessly pile up products. Risk of product damage and personal injury caused by unstable piling shall be avoided.

### 2.2 Storage

#### 2.2.1 Store valves in a dust-free, least humid and well ventilated place. Indoor storage is recommended.

#### 2.2.2 Storage of valves directly on the ground or concrete floor is not recommended. Valves shall be placed on a rack for storage.

#### 2.2.3 Take appropriate measures to prevent valves from direct exposure to dust, rain and sunlight, if stored outdoors.
III. Valve Installation

1. Precautions for safety

(1) Check the valve specifications with catalogs or section 3 in chapter I of this manual before installation. Service beyond the valve specifications may cause fluid leakage and valve malfunctions.

(2) Keep a secure footing for valve installation and operation.

(3) Sufficient lighting shall be prepared for the valve operation.

(4) Piping shall be properly supported, as needed.

(5) The disc shall stick out from the body face-to-face dimension when the valve is in the open position. Install the valve properly so that the disc does not contact the pipe end or gasket.

(6) The valve shall not be connected directly to other valves because the disc, which is similar to the disc of a butterfly valve, sticks out from the body end and may cause interference to the operation.

(7) Install the hinge pin vertically if the valve is installed in the horizontal position. Refer to the figure below.
III. Valve Installation

(8) Valves may be damaged and their product lifetime may be shortened due to fluid vortex, turbulence or pulsation at the pump outlet and the downstream or upstream of the reducer and the elbow. It is recommended to place a valve at a distance of at least 6 times the nominal size using an additional pipe from the above-mentioned devices. Refer to the following figures.

(9) Fluid velocity shall be less than 3.4 m/s (11.2 fps) in the case of water.

1.1 Allow sufficient space for operation, installation and subsequent maintenance of valves.

1.2 For smooth operation, inspection and maintenance, take appropriate measures for the valves installed in a small place.

1.3 Do not install valves in a place where valve functions may be hampered by such outer forces as vibrations.
III. Valve Installation

2. Precautions for safety

(1) Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

(2) Be careful not to catch fingers in flanges when installing.

(3) If the flange is welded, please allow to cool to ambient temperature before installing the valve.

(4) Welding edges of the flange shall be ground to prevent personal injury or valve damage.

(5) Pipes shall be properly supported, if needed.

(6) Before installation, remove foreign objects such as sand, dust and welding spatters from the connecting pipe interior.

(7) Valves shall be properly installed in accordance with the arrows indicated on the valve body.

(8) Use connecting flanges which have no damage or deformation. Remove any foreign objects or rusts from the flange surfaces.

(9) Align the upstream side and downstream side of the pipe accurately. Leakage from flange connections may be caused by inaccurate alignment.

(10) WHEN A VALVE IS HANGING BY A CHAIN BLOCK OR OTHER APPROPRIATE TOOLS, USE AN EYE BOLT ON THE VALVE BODY IN NOMINAL SIZE 150A (6"). THIS VALVE CAN ALSO BE USED IN A VERTICAL POSITION IF THE FLOW IS UPWARD.

(11) Use new gaskets for installation. A gasket having an inside diameter slightly larger than the port diameter is recommended.

Support the pipes first for correct alignment.
III. Valve Installation

3. Installation measures

3.1 Use jack-up bolts if required to keep a space for valve installation. The space shall be 6 to 10 mm wider than the face to face dimension of the valve.

3.2 Firstly, set two bolts into the lower side of the pipe flanges without tightening them and then install the valve between the flanges carefully. Install the gaskets into both sides and set two bolts into the upper side of the pipe flanges.

3.3 Tighten four of the upper and bottom bolts temporarily. Align the pipes and the valve accurately.

3.4 Tighten all other bolts through the holes of the pipe flanges.

3.5 Tighten the bolts evenly, gradually and alternately in a star pattern as shown below. The ends of all tightened bolts shall equally protrude beyond the nuts.

3.6 Gradually raise the line temperature and pressure for a pilot operation. Retighten the threaded portions as required.
IV. Valve Operation

1. Daily inspection

<table>
<thead>
<tr>
<th>Items to be Inspected</th>
<th>Areas to be Inspected</th>
<th>Inspection Method</th>
<th>Remedial Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange areas</td>
<td>Visual check</td>
<td>Soap water</td>
<td>Retighten the flange bolts. Replace the gaskets.</td>
</tr>
<tr>
<td>Threaded portions</td>
<td>Visual check</td>
<td>Soap water</td>
<td>Retighten each threaded portion. Replace the components as required.</td>
</tr>
<tr>
<td>External leakage</td>
<td>Body surfaces</td>
<td>Visual check</td>
<td>Replace the valve.</td>
</tr>
<tr>
<td>Valve body</td>
<td>Auditory check</td>
<td>Consult with a piping engineer.</td>
<td></td>
</tr>
<tr>
<td>Loosened bolts</td>
<td>Auditory check</td>
<td>Retighten the bolts.</td>
<td></td>
</tr>
<tr>
<td>Abnormal noise</td>
<td>Vibration of pipes</td>
<td>Auditory check</td>
<td>Consult with a piping engineer.</td>
</tr>
<tr>
<td>Loosened threaded</td>
<td>Threaded portions</td>
<td>Visual check</td>
<td>Tactual check Retighten each threaded portion.</td>
</tr>
<tr>
<td>Seat leakage</td>
<td>-</td>
<td>Remove foreign objects. Disassemble and inspect the valve components. Replace the valve.</td>
<td></td>
</tr>
<tr>
<td>Valve operation</td>
<td>Un-smooth operation</td>
<td>Auditory check</td>
<td>Disassemble and inspect the valve components. Replace the valve.</td>
</tr>
</tbody>
</table>
2. Precautions for safety

(1) Wear protective items such as goggles, gloves and working boots.

(2) Take safety measures against toxic, flammable and corrosive fluids.

(3) Reduce the line pressure to the atmospheric level before retightening flange bolts and nuts.

(4) Operators shall take protective measures to prevent direct exposure to the fluid in case the fluid spouts out from the flange areas.

2.1 Leakage from flange area

Tighten the flange bolts evenly, gradually and alternately in the star pattern as shown in the figure.

2.2 Possible causes of abnormal noise

- The disc hits the stop pin in the open position due to a turbulent flow of the fluid.
- The disc flaps the body seat due to a low flow velocity. (known as chattering)
- Water hammer phenomenon

When any abnormal noise is found, disassemble and check the components such as disc, pin or spring. Consult with a piping engineer to take appropriate measures against abnormal noises.
### IV. Valve Operation

#### 3. Troubleshooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Possible Cause</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loosening of the flange bolts</td>
<td></td>
<td>Retighten the flange bolts and nuts.</td>
</tr>
<tr>
<td>Uneven tightening of the bolts</td>
<td></td>
<td>Retighten the flange bolts and nuts evenly and gradually.</td>
</tr>
<tr>
<td>Leakage from gaskets</td>
<td></td>
<td>Replace the gaskets.</td>
</tr>
<tr>
<td>Damage of the seat</td>
<td></td>
<td>Disassemble and check the seat.</td>
</tr>
<tr>
<td>Leakage from seat area in fully closed position</td>
<td>Deformation of the seat due to external stress.</td>
<td>Consult with a piping engineer.</td>
</tr>
<tr>
<td>Abnormal noise and vibration</td>
<td>Loosening of the bolts and nuts</td>
<td>Retighten the bolts and nuts.</td>
</tr>
</tbody>
</table>
V. Periodic Inspection

1. Periodic inspection

1.1 Conduct periodic inspections of all valves installed in the pipeline approximately once a year.

1.2 Inspect valves for smooth operation and function.

1.3 See Chapter IV "Valve Operation" for inspection items and inspection methods.

1.4 Conduct periodic inspections of valves which are not operated for long periods of time or not daily inspected.
2. Maintenance and inspection

When maintenance work or inspections are performed on the valve piping facility, carry out leakage and operation tests of the valve. Internal and external seat leakage shall not be accepted. Check for smooth operation without galling and sticking. If any problem is found, disassemble the valve and inspect the valve components. After assembling the valve, re-inspect the valve. The inspection results shall be satisfactory.

2.1 Precautions for safety

(1) Discharge the fluid from the pipes and reduce the line pressure to the atmospheric level. Trapped pressure or fluid is very dangerous and may cause accidents resulting in personal injury.

(2) Operators must take protective measures against a spouting fluid. No fire shall be allowed in the working area.

(3) Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

(1) Wear protective items such as goggles, gloves and working boots.

(2) Keep a secure footing for valve dismantling and installation.

(3) Valves and piping systems shall be properly supported, if needed.

(4) Before dismantling a valve from the pipeline, mark the original position of the valve body and coupled pipe flanges. Reinstall the valve aligning these marks after assembly.

(5) Install new gaskets between the valve and flanges when mounting a valve.

⚠️ WARNING

위의 사항을 수행하십시오. 이는 작업자가 오작동 및 사고를 주의해야 할 중요한 사항입니다. 작업중에는 해당 장비의 유출 관련 사고는 피할 수 없게 되어 있습니다.

❗️ CAUTION

위의 사항들은 작업자들이 주의해야 할 중요한 사항입니다. 작업중에는 해당 장비의 유출 관련 사고는 피할 수 없게 되어 있습니다.

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2.2 Disassembly and assembly

Disassemble and assemble the valve according to the instructions in Chapter of this manual.

2.3 Test and inspection

The followings are main items required for test and inspection of valves.

2.3.1 Operation test

The disc shall move smoothly. And when the valve is fully open, the disc shall be stopped against the stopper.

2.3.2 Shell test and seat leakage test

(1) Precautions for safety

(1) Wear protective items such as goggles, gloves and working boots.

(2) Take adequate precautions for shell test and seat leakage test.

(2) Shell test and seat leakage test

All valves are subjected to hydrostatic or pneumatic shell test and seat leakage test at the required test pressure after assembly.

CAUTION

![Exclamation mark]

- Wear protective items such as goggles, gloves and working boots.
- Take adequate precautions for shell test and seat leakage test.

- Do not operate the valve without checking its condition.
**1. Disassembly procedure**

1.1 Precautions for safety.

(1) Take protective measures against a spouting fluid and a fire.

(2) Wear protective items such as goggles, gloves and working boots.

(3) Be careful not to catch fingers in flanges.

1.2 Before disassembly

1.2.1 Disassemble valves in a dust-free area.

1.2.2 Care shall be taken not to damage body seats, disc seats and gasket sealing surfaces.

1.3 Disassembling

1.3.1 Remove the four plugs (85) from the body (1).

1.3.2 Remove the stop pin (17B) from the body (1).

1.3.3 Remove the hinge pin (17A) from the body (1) pushing some appropriate rod to the plugged hole. When pushing the hinge pin (17A), the spring (124) shall be held toward the disc (4). After pulling out the hinge pin (17A), the disc (4), spring (124) and bearings (47A, 47B and 47C) will come off.

1.3.4 Remove the disc (4), spring (124) and bearings (47A, 47B and 47C) from the body (1).
2. Assembly procedure

2.1 Precautions for safety

1. Wear protective items such as goggles, gloves and working boots.
2. No fire shall be allowed in the working area.
3. Be careful not to catch fingers in flanges.
4. Replace packing and gaskets with new ones for satisfactory sealing performance.

2.2 Before assembly

2.2.1 Check all the required parts before assembly. Replace the parts or valve, if needed.
2.2.2 If parts are reused, clean the parts to remove any oil, dust, or other foreign objects.
2.2.3 Assemble valves in a dust free area.
2.2.4 Care shall be taken not to damage the body seat, disc seat and gasket contact surfaces.
2.2.5 All the threaded parts shall be securely tightened.

2.3 Assembling

2.3.1 Install the disc (4) to the body (1).
2.3.2 Put the hinge pin (17A) into the body (1). Install the body bearing (47A), disc bearing (47B), spring bearing (47C), disc (4) and spring (124) in order, referring to the construction drawing on page 25. Attach both ends of spring to each disc so that the spring force is applied to the discs.
2.3.3 Put the stop pin (17B) into the body (1).
2.3.4 Wind the seal tape around the threaded part of the plugs (85).
2.3.5 Screw the plugs (85) into the body (1) firmly.
3. Typical construction

<table>
<thead>
<tr>
<th>No.</th>
<th>Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BODY</td>
</tr>
<tr>
<td>4</td>
<td>DISC</td>
</tr>
<tr>
<td>17A</td>
<td>HINGE PIN</td>
</tr>
<tr>
<td>17B</td>
<td>STOP PIN</td>
</tr>
<tr>
<td>47A</td>
<td>BODY BEARING</td>
</tr>
<tr>
<td>47B</td>
<td>DISC BEARING</td>
</tr>
<tr>
<td>47C</td>
<td>SPRING BEARING</td>
</tr>
<tr>
<td>75</td>
<td>EYE BOLT</td>
</tr>
<tr>
<td>85</td>
<td>PLUG</td>
</tr>
<tr>
<td>124</td>
<td>SPRING</td>
</tr>
</tbody>
</table>