



KEYSTONE FIGURE V11 BUTTERFLY VALVE

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Please read these instructions carefully



CAUTION - indicates that it may lead to injuries or damages on the properties.

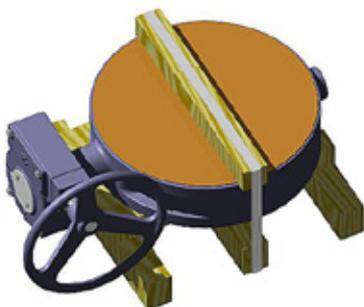
WARNING - indicates that it may lead human body to serious injuries.

DANGER - indicates that it may lead human body to death.

TECHNICAL DATA

Flange accommodation: The Figure V11 is designed by JIS 5K/10K code
 Pressure rating: 5 kg/cm², 10 kg/cm²
 Temperature range: -40°C - 120°C

Figure 1



PIPE FLANGE BOLT TIGHTENING TORQUE

Bolt size	Recommended torque	
		Nm
M12 x 1.75		17
M16 x 2		41
M20 x 2.5		81
M24 x 3		139
M27 x 3		194
M30 x 3.5		281
M33 x 3.5		358
M36 x 4		481

Bolt size U.N.C	Recommended torque	
		Ft-lbs
5/8		30
3/4		50
7/8		80
1		123
1 1/8		195

1. Torques based on 100 Mpa induced stress in fastener threads.
2. Values are based on steel bolting well lubricated with a heavy graphite and oil mixture.
3. For cadmium plated fasteners multiply torque x 0.75.
4. For zinc plated fasteners multiply torque x 1.40.
5. Recommended torques are a minimum. For maximum torque multiply torque x 1.05.

CARRIAGE AND STORAGE

1. Carriage

The valve shall be carried safely not to be impacted or affected by other object. Especially, the wheel of operator and disc edge shall be protected by any means.

2. Storage

The valve shall be stored in the higher place which is able to prevent from being submerged in water and keep off from penetration of rainwater or cover it with waterproof cloth, which Keystone valve LLC. does not provide, to avoid being wetted.

When worker installs the valve, remove the dust and extraneous substances after disassembling the pallet and protective cover.

INSTALLATION

The valves are shipped with flange surface protection. Before installing the valve, remove the protection.

CAUTION

The valve should be installed in the slight opened position whether the gap between disc edge and body flange face is about 10 mm to insure that the seat and disc are not damaged during installation. Particular care should be taken with valves equipped with "single acting" actuators. Failure to insure proper handling may result in damage to the valve.

If the pipe is lined, confirm that the disc rotation does not contact the lining during the opening stroke. Failure to confirm that the disc rotation dose not contact the lining may result in damage to the valve.

The Figure V11 valves are bi-directional and will control flow equally well in either direction.

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Installation in new construction using welding type flanges

1. With the disc in the slight opened position, align and center the companion flange bolt holes to the body alignment holes.
2. Assemble the body and flanges with the flange bolting and make-up the bolting.
3. Using the flange-body-flange assembly for fit-up and centering to the pipe.
4. Tack weld the flanges to the pipe.
5. Remove the flange bolting and valve assembly from between the flanges.

CAUTION

Do not finish weld the flanges to the pipe with the valve bolted between the flanges as this will result in serious heat damage to the valve seat.

6. Finish welding the flanges to the pipe and allow the flanges to cool completely before proceeding.

MAINTENANCE

Routine maintenance or lubrication is not required.

Be sure to be familiar with following facts before installing valves.

Tie up with rope when handling the butterfly valve assembly for Figure V11.

1. Tie up feature with rope when handling the valve assembly vertically. (Figure 2) Lift the valve in the condition of tying upper neck with ropes. Tie up the front and rear side of valve with two ropes, because the rope may be removed when use one rope.
2. Tie up feature with rope when handling the valve assembly horizontally. (Figure 3, 4) Lift the valve in the condition of tying upper and lower neck with ropes. Beware that the rope on the lower neck may not be removed or valve assembly may not be tilted.

DANGER

Use the rope made by synthetic fiber only taking into account of valve weight and safety and pay attention that paint on the valve does not peel. When worker lifts the valve assembly, which is equipped hand wheel including gear box, in the condition of tying hand wheel with rope, he/she shall comply with the specific method which manufacturer provides because the stem may be distorted or the cover may be damaged.

Dismantling the valve from pipe (Figure 5)

1. Be sure that the fluid and pressure in valve and pipe must be removed before dismantling.
2. Close the valve.
3. Cut off the supply of the electric power, hydraulic or pneumatic pressure depending on the kinds of operators attached and disconnect the electric cable, hydraulic or pneumatic hoses.
4. Release the flange bolt in order to disassemble the valve assembly. Disassemble the operator ahead when necessary.
5. Dismantle the valve after open the flanges sufficiently using tools.
6. Disassembly the operator in the condition of fastening the valve assembly on vise.

WARNING

Make sure that the fluid and hydraulic or pneumatic pressures in valve, operator and pipe are removed, and then dismantle the disc in the position of full close after taking safety measures.

Figure 2



Figure 3

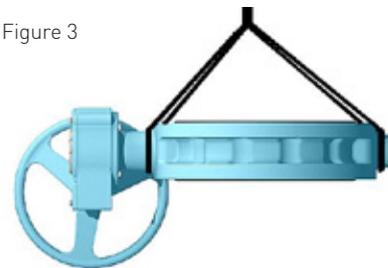


Figure 4

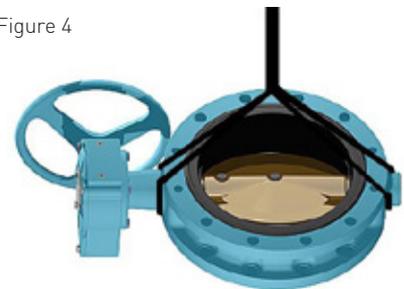
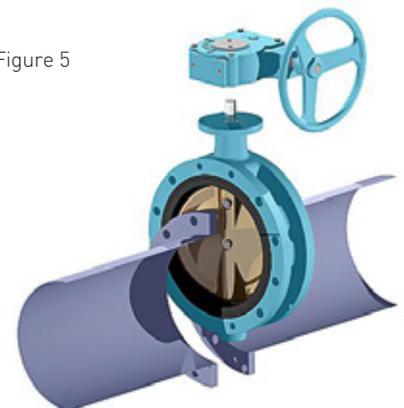


Figure 5



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DISASSEMBLY

CAUTION

When assembling or disassembling the valve, workers have to be careful that each component including disc edge shall not be damaged.

Disassembly of the valve, size NPS 2.5 to 34 (Figure 6)

1. Remove the disc screws and O-ring for the valves.
2. Open the disc.
3. Remove the stem by pulling it out through the valve top plate.
4. Remove the disc from the valve body by pulling or "rolling" the disc out of the seat bore.
5. Remove the seat by prying under both seat edges at one point, collapse the seat into the shape of a round bottom heart, and pull the seat out of the body bore.
6. Remove the bushing, packing and inspect for damage. Replace if needed.
7. Remove the bottom cover screws and spring washer (NPS 22-34).
8. Remove the bottom cover and O-ring (NPS 22-34).

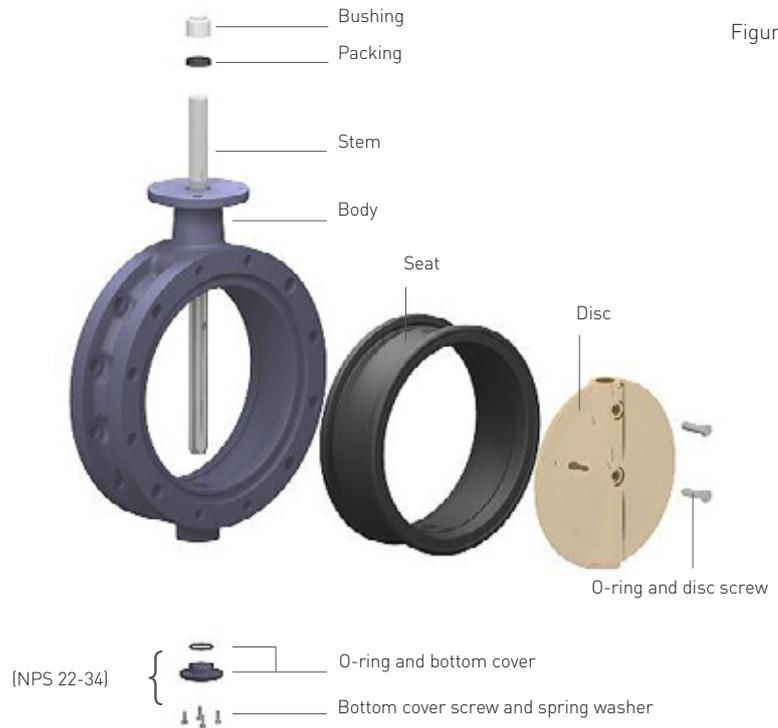


Figure 6

Disassembly of the valve, size NPS 36 to 72 (Figure 7)

1. Remove the disc screws and O-ring for the valves. (In case of NPS 48-72 valves, pull the taper pin out after removing the nut.)
2. Open the disc.
3. Remove the stem by pulling it out through the valve top plate.
4. Remove the disc from the valve body by pulling or "rolling" the disc out of the seat bore.
5. Remove the seat by prying under both seat edges at one point, collapse the seat into the shape of a round bottom heart, and pull the seat out of the body bore.
6. Remove the packing holder, O-ring and inspect for damage. Replace if needed.
7. Remove the bottom cover screws and spring washers.
8. Remove the bottom cover and O-ring.
8. Remove the upper bearing and lower bearing.

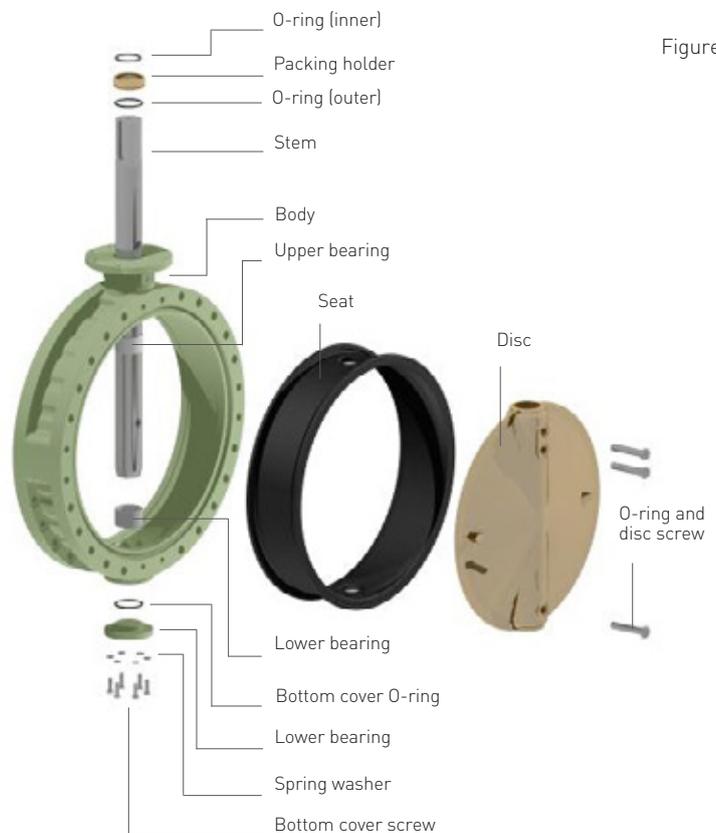


Figure 7

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INSPECTION OF VALVE COMPONENTS

- Inspect the body for any corrosion and damage.
- Inspect the seat for any wear and damage.
- Inspect around the disc edge for any scratch. If there is any scratch on disc edge, polish the edge with sandpaper.
- Use the electric powered wire brush in order to polish the disc edge.
- Use the lathe machine to finish polishing or sanding, when necessary.

ASSEMBLY

Assembly of valve, size NPS 2 to 20

1. Clean all components and settle the valve body on the vise.
2. Insert the packing and bushing to the upper side of the body. (Figure 8)
3. Bend the seat like the shape of heart and insert the seat in the seat pocket with adjusting the stem hole of seat to the stem hole of lower body. (Figure 9)
4. Adjust the stem holes in the body and seat hole by thrusting in and pulling out using stem or T-shape jig, and then thrust the stem into the stem hole with protruding the screwed part 10 mm. (Figure 10)
5. Apply silicon oil to the inner seat and adjust the upper stem hole of disc to the protruded screwed part of upper side. Then, push and insert the disc until the lower side of disc set to the lower stem hole. (Figure 11)
6. Drive the stem into the body until adjust the holes between stem disc and screw hole be matched using rubber hammer. And adjust the screw hole centre of stem by rotating the disc. (Figure 12)
7. Adjust the screw holes between stem and disc correctly using pin or screwdriver and fasten the screw tightly after inserting the O-ring onto the disc screw. (Figure 13)
8. Finish assembling the valve. (Figure 14)

Figure 8



Figure 12



Figure 9

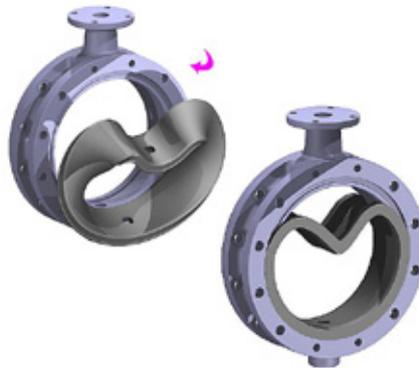


Figure 13

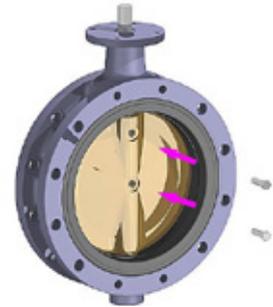


Figure 10



Figure 14



Figure 11



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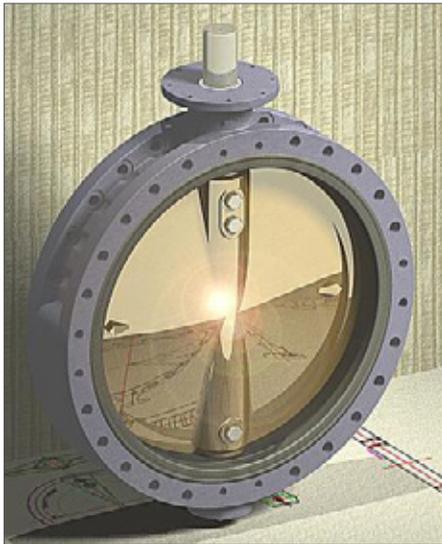


Figure 15

Assembly of valve, size NPS 22 to 72 (Figure 15)

1. Clean all components and settle the valve body on the vise.
2. Insert the packing and bushing at the upper side of body.
In case of size NPS 36-72, insert the packing holder of which has O-ring.
3. Bend the seat like the shape of heart and insert the seat in the seat pocket with adjusting the seat hole of seat to the stem hole of lower body. In case of size NPS 36-72, insert the upper and lower bearings ahead prior to inserting seat.
4. Adjust the seat hole to the body hole by striking with rubber hammer, and then drive the stem into the stem hole with protruding the screwed part 10 mm using rubber hammer.
5. Apply silicon oil to the inner seat and adjust the upper stem hole of disc to the protruded screwed part of upper side. Then, push and insert the disc until the disc set to the lower stem hole using hoist or C-clamp.
6. Drive the stem into the body until the holes between stem and screw hole be matched using rubber hammer. And adjust the hole centre by rotating the disc.
7. Adjust the screw holes between stem and disc correctly using pin or drive. And fasten the screw tightly after inserting the O-ring onto the disc screw. (In case of size NPS 48-72, taper pin instead of disc screw. Fasten the nut at the back side after inserting taper pin.)
8. Fasten the bottom cover screws with spring washer after assembling the bottom cover of which O-ring has been inserted into the body.
9. Finish assembling the valve.

Install the valve assembly into the pipe

1. Fix the valve on the vise and install the worm gear box and actuator.
2. Check the condition whether the gap between disc edge and body flange is about 10 mm. (Figure 16)

CAUTION

Workers shall pay attention to the position of disc because disc edge may be damaged when the disc is opened more than the face of body flange, and the excessive torque may be caused by the distortion of seat when fasten the flange bolt in the state of entire closure.

3. Insert the valve after widening the flanges sufficiently. The gap between flanges shall be wider than the width of valve. When insert the valve in the condition of insufficient flange gap, the seat may be distorted or torn and cause the leakage. (Figure 17)
4. Adjust the valve alignment hole or tap hole to the flange hole, pass the bolt through the flange hole, alignment hole or tap hole and check the position of valve. Tighten the bolt with hand if there is no problem. (Figure 18)
5. Open the disc fully by operating handle in order to check whether or not the edge of pipe and disc edge contact each other.
6. After making sure of smooth operating of valve, fasten the bolts with the tool by the diagonal sequence in the condition of full opening.
7. Finish installing the valve assembly onto the pipe. (Figure 19)

CAUTION

Do not use the flange gaskets.

Figure 16



Figure 17



Figure 18



Figure 19



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TROUBLE SHOOTING GUIDE

Symptom	Possible cause	Resolution
Valve opens only a few degrees and stops (It will not open to the full angle desired)	1. The valve is improperly aligned and improper installation	1. Loosen the flange bolts, realign the valve with flanges and retighten the flange bolts to correct torque per ANSI requirement
Leakage past the flange face	1. Flange bolts are not evenly torqued	1. Loosen the flange bolts and tighten the flange bolts to correct torque per ANSI requirement
	2. Improper flanges	2. Refer to flange accommodation on page 1
Leakage in the closed position (Leakage in the pipe line)	The disc is not closing fully: 1. Actuator is not properly adjust 2. Damaged seat 3. Line pressure exceeds valve's working pressure 4. Damaged valve disc	1. Refer to the adjustment procedures 2. Replace seat 3. Reduce line pressure to valve working pressure 4. Replace disc
Leakage at the valve stem	1. Seat stem hole or packing failure	1. Refer to valve disassembly procedures
Water hammer	1. The valve is closing too quickly	1. Adjust the actuator
Excessively high torque	1. Obstruction in the pipe line 2. Valve stem or disc bent 3. Scale build-up on stem or seat	1. Remove the valve from pipe line and remove obstruction 2. Return the valve to factory for disc or stem replacement (Check for water hammer or freezing of line material) 3. Open and close the valve several times, operate the valve at least once a month, check the valve seat for deterioration