

KEYSTONE FIGURE 990/991 BUTTERFLY VALVES

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood

Potentially dangerous practices:

- disregarding instructions
- improper use of product
- use of insufficiently qualified personnel

Application pressure/temperature must not be higher than the pressure/temperature limits shown on the datasheet.

Application medium must be in accordance with the Keystone Chemical Compatibility list.

1 INTRODUCTION

Keystone Figure 990/991 is a rubber lined butterfly valve suitable for use on all fluids except those designated as 'unstable' according to the Pressure Equipment Directive, 97/27/EC.

Figure 990 is available in sizes 25 mm to 300 mm and has a maximum working pressure of 10 barg over a temperature range of -10°C to +150°C. Figure 990 has a cast iron body of two piece design which enables the use of a one piece disc stem.

Figure 991 is available in sizes 25 mm to 150 mm and has a maximum working pressure of 10 barg over a temperature range of -10°C to +150°C. Figure 991 has a cast stainless steel body of two piece design complete with an integral notch plate for handlever use, and this body also enables the use of a one-piece disc stem.

The one piece disc stem provides the minimum possible flow restriction when the valve is fully open.

2 STORAGE

When valves are to be stored for some time (2 months or more) before being fitted, storage should be in the original delivery crates or cases.

Storage conditions

The valves should be stored off the ground in a clean, dry indoor area. Protect the valve from temperature and humidity extremes, and exposure to excessive dust, moisture, vibration, deformations, sunlight and ozone.

Recommendations

1. Temperature: storage temperature below 25°C, above 0°C preferable below 15°C.
2. Humidity: storage conditions should be such that condensation does not occur, store in a dry environment. Maximal 50% relative humidity.
3. Light: valve rubbers should be protected from light, in particular direct sunlight or strong artificial light with high ultra violet.
4. Ozone: storage rooms should not contain any equipment generating ozone. E.g. lamps, electric motors.

IMPORTANT

Before valves are being installed or used the following actions are recommended.

1. *Valves/parts have to be inspected and thoroughly cleaned if required.*
2. *Rubber parts need to be greased with silicone grease if not present anymore.*
3. *All surfaces in contact with seats have to be thoroughly cleaned and greased with silicone grease if stored for more than 5 months.*



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3 FLANGE AND PIPELINE COMPATIBILITY

Figure 990/991 valves are suitable for use with flanges according to PN 10, PN 16, ANSI 150 and BS table E. Figure 990/991 is a wafer type valve and is intended to be clamped between flanges attached to the pipeline.

The minimum allowable pipeline bore at the flanges shall be the 'Q' dimension shown in the valve data sheet plus adequate allowance to ensure the disc edge does not interfere with the pipeline bore.

D max.: The optimum inside diameter (ID) is equal to the inside diameter of flange standard EN 1092-1, table 8, type 11. For larger than D max inside diameters or other flange types please contact your local Emerson Sales organization, as larger inside diameters might result in reduced valve functionality.

For flanges with a raised face the diameter of the raised face shall be a minimum of 10 mm larger than the 'YY' dimension shown in the data sheet.

Do not use flange gaskets, these lead to valve damage!

4 INSTALLATION

Installation in pipeline

Figure 990/991 valves are bi-directional and there is no need to identify upstream and downstream orientation.

Figure 990/991 valves can be installed in vertical or horizontal pipelines and any intermediate orientation.

There is no restriction on the valve stem position (vertical, horizontal or oblique), although for slurry service and media, which have a tendency to deposit sediment, the recommended installation position is with the stem horizontal and the lower disc edge opening downstream.

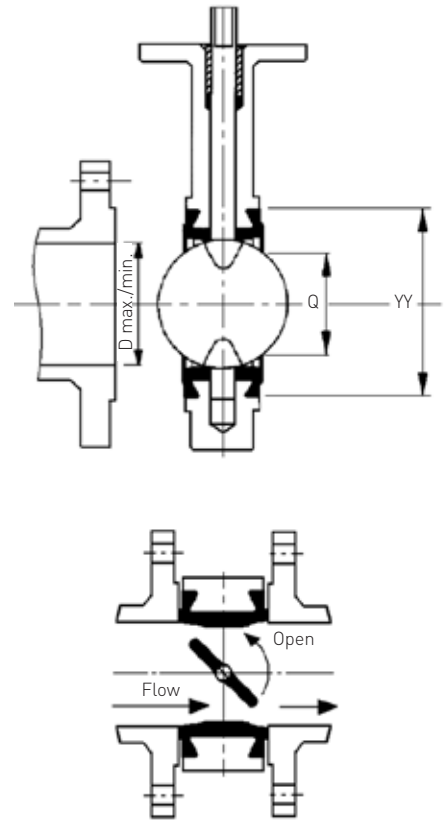
Installation in an existing system (see diagrams)

1. Check that the gap between the flanges can accommodate the valve face to face dimension.
2. Spread the flanges using suitable tooling such as flange spreaders to enable ease of insertion of the valve between the flanges.

WARNING

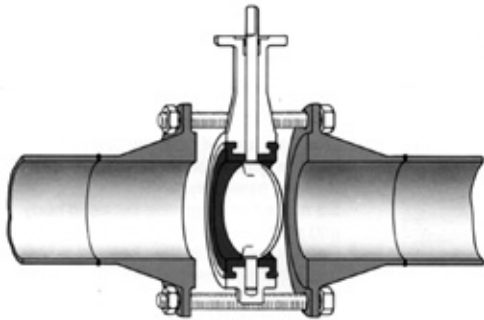
Do not use the valve as a lever for this purpose.

3. Open the valve until the disc is free of the seat but still contained within the face to face of the valve.
4. Loosely insert two or more flange bolts through the holes in the lower part of the flanges to help support the valve.
5. Carefully slide the valve between the flanges, center the valve body with the pipeline axis, and insert the remaining flange bolts.
6. Open the valve fully, checking that the disc edge does not interfere with the pipeline bore.
7. Remove any flange spreaders that have been used and at the same time tighten the flange bolts 'hand tight'. Ensure that the valve remains centered to the pipeline axis by slowly closing the valve (clockwise rotation of the disc stem) to check that adequate clearance has been maintained between the disc edge and the pipeline bore.
8. Re-open the valve (counter clockwise rotation of the disc stem) and tighten all flange bolts to the recommended torque of the bolt supplier using the diagonal sequence method.
9. Operate the valve to the desired position.

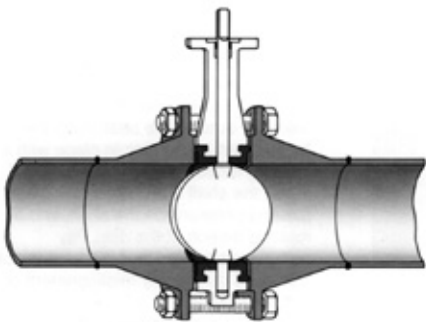


KEYSTONE FIGURE 990/991 BUTTERFLY VALVES
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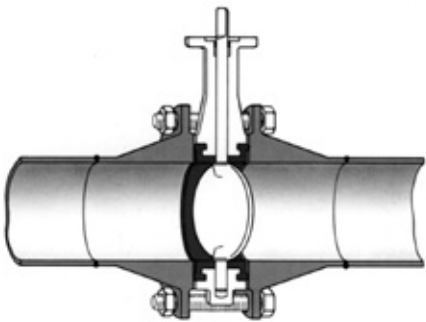
EXISTING SYSTEM



1. Spread the flanges with the adequate tooling. Insert some flange bolts to bear the valve.

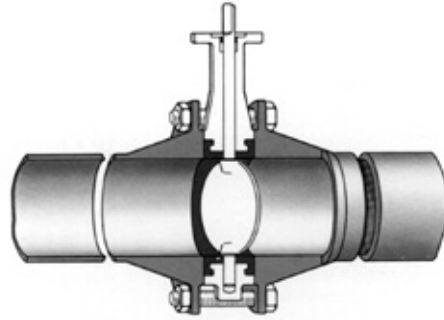


2. Open the valve and remove the flange spreads.

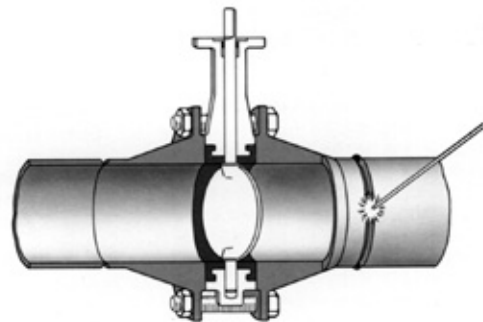


3. Close the valve clockwise, return to open position and cross-tighten all bolting.

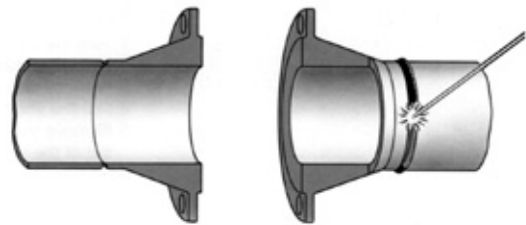
NEW SYSTEM



1. Center a flange-valve-flange assembly between the pipes.



2. Tack weld the flanges to the pipes.



3. Remove the valve and finish weld. Install the valve according to the procedure in the left column.

Installation in a new system (see diagrams)

It is common practice to use the valve to help in alignment of the flanges prior to welding the flanges into the pipeline. In such cases, the following instruction applies:

1. Open the valve until the disc is free of the seat but still contained within the face to face of the valve.
2. Align both mating flanges with the valve center line and secure in position using the flange bolts.
3. Position the flange/valve/flange assembly in the pipeline.
4. Tack weld the flanges to the pipeline.
5. Remove the flange bolts and the valve.
6. Finish weld the flanges to the pipeline and allow to cool fully.
7. Follow the procedure for installation in an existing system.

WARNING

Do not finish weld the flanges to the pipeline with the valve still assembled to the flanges as this will result in serious damage to the valve seat.

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5 MAINTENANCE

Routine maintenance is not normally necessary for Figure 990/991 valves. If, however, the valve does need to be serviced or repaired for any reason, the following applies.

Removing valve from pipeline

1. Turn the disc to the almost closed position (approximately 5° before closed). The parallel flats or the keyway on the stem are in line with the disc.
2. Loosen all the flange bolts and remove enough bolts to allow the valve to be withdrawn from between the flanges.
3. Spread the flanges using appropriate tooling and carefully remove the valve from between the flanges.

Valve disassembly

1. Turn the disc to the open position.
2. Remove the screws that fix the two body halves together.
3. Remove the lower body half by inserting flat ended levers into the opposite splits between the body halves and force the body halves apart. Broad bladed flat head screw drivers are acceptable tools.
4. Remove the disc stem and seat from the top body half.
5. Remove the bushing and packing from the neck bore of the top body half.
6. Deform the seat into a long oval, which is sufficient to release the bottom (short) end of the stem from the seat hole.
7. Pull the long end of the stem from the other seat hole using a twisting action if required.

Valve assembly

1. Clean all components and replace any damaged components.
2. If the seat is TFE lined, it is necessary to immerse the seat in near boiling water (90°C to 98°C) for 30 minutes to give enough flexibility for assembly.

3. Insert the long end of the stem into one of the transverse seat holes using a twisting action. If possible, a smear of silicone grease on the stem will ease this operation.
4. Deform the seat into a long oval sufficient to clear the short end of the stem and push the short end of the stem into the remaining transverse seat hole.

WARNING

Protective gloves should be worn for this procedure especially if a TFE lined seat is being fitted as this will be very hot after immersion in near boiling water.

5. Fit the long end of the disc stem into the top half of the body and ensure that the seat is properly located in the dovetail recess of the body half.
6. Insert the bushing and packing into the top end of the body neck bore.
7. Fit the bottom body half over the short end of the disc stem and to the top body half, ensuring that the seat is properly located in the dovetail recess of the body half, and that the small rectangular bosses on each body half are aligned to each other.
8. Secure the top and bottom body halves together using the two hexagon socket cap screws, which should be tightened to the recommended torque.

Abrasive fluids

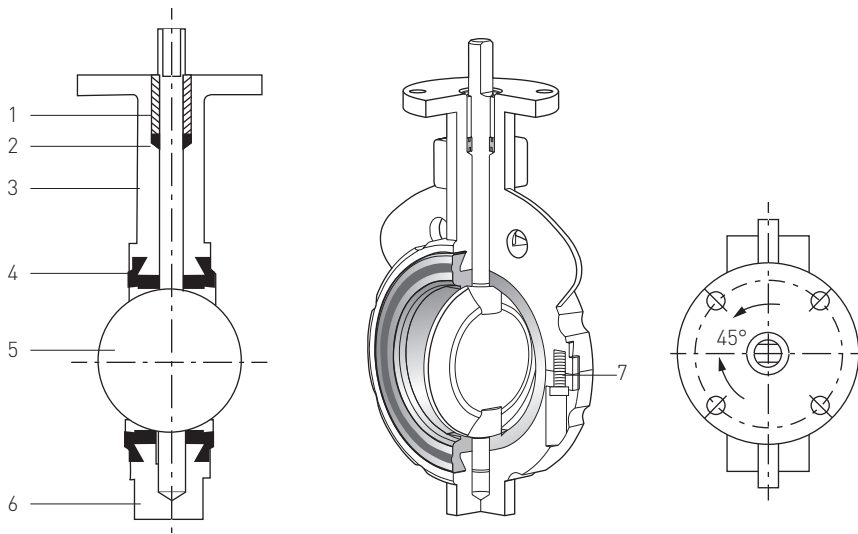
Where abrasive fluids are used in the valve, the condition of the seat and disc should be carefully checked at each maintenance period. Generally, tears or scores in the seat of more than 1 mm deep would require the seat to be replaced. Scores at the sealing edge of the disc of more than 0.5 mm deep would require the disc/stem to be replaced.

RECOMMENDED TIGHTENING TORQUES FOR BODY SCREWS

Valve size (DN)	Bolt size	Tightening torque (Nm)
25	M6	6.0
40	M6	6.0
50	M8	8.0
65	M8	8.0
80	M8	8.0
100	M10	14.5
125	M10	14.5
150	M12	20.0
200	M12	20.0
250	M16	50.0
300	M16	50.0

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Parts list	
1	Bushing
2	Shaft seal
3	Upper body
4	Seat
5	Disc stem
6	Lower body
7	Body screws

6 SAFETY RELATED INFORMATION

1. If in any doubt regarding any aspect of figure 990/991 valves, contact your local Emerson sales office for guidance.
2. Only use properly qualified personnel for installation and maintenance.
3. Ensure that the pipeline is fully drained or vented before removing the valve from the pipeline.
4. Use appropriate protective equipment / clothing, such as goggles, safety shoes, industrial gloves.
5. When used on line fluids with a temperature of 80°C or more, the valve body can become very hot and should not be handled without appropriate protection.
6. The body material is grey cast iron, which is a known brittle material and heavy impacts such as blows with a steel headed hammer should be avoided. The piping design should preclude the occurrence of water hammer at the valve.
7. Where water hammer is a potential problem, ensure that the opening and closing speed will not cause this to occur.
8. These valves are not to be used for end of line service.
9. This product is not intended for use in areas where external fire is a potential hazard.
10. The piping design must take into account the following factors and any other factors which are not listed here, but known to be relevant to the safe operation of the installation.

- 10.1. Valve weights which are shown in the data sheets.
- 10.2. Formation of condensate in gas pipelines.
- 10.3. Elimination of turbulence and vortex potential at the valve.
- 10.4. Pipeline vibrations.
11. The valve design has not taken into account earthquake loading or traffic vibration.

7 OPERATION

1. F990/991 valves are opened and closed by turning the top of the stem through 90° using a lever or a gearbox or a quarter turn actuator.
2. Conventionally, the stem is turned 90° counter clockwise to open the valve and 90° clockwise to close the valve.
3. The valve position is indicated by the orientation of the flats or key on the top of the valve stem.
If the flats or the centerline of the key are transverse to the pipeline axis, then the valve is closed. If the flats or the centerline of the key are in line with the pipeline axis, then the valve is open.
4. When actuators or gearbox are used to operated the valve, the operating instructions of the actuator or gearbox must be complied with.

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