Triple Eccentric Danfoss Butterfly Valve
Operating, installation and maintenance instructions

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1 Overview

Read the entire instructions carefully before commencing the valve installation and start-up work.

The warranty only covers manufacturing and material faults. Danfoss takes no responsibility for any damage caused by improper installation, maintenance or storage.

This sign describes mandatory action.

This sign describes caution, warning or hazard.

2 General

Danfoss butterfly valves, type SBFV, are shut off and control valves developed for installation in the pipelines of District Heating and District Cooling networks.

Danfoss butterfly valve can be used for the following media:

- District heating treated water;
- Glycolic water up to 50%.

For any additional information, please contact the manufacturer.

If the valve is to be operated under deviating operating conditions and in other fields of application, the manufacturer should be consulted.

2.1 Safety notes

These operating and maintenance instructions have to be observed at all times.

To avoid injury of persons and damages to the device, it is absolutely necessary to carefully read and observe these instructions.

Necessary assembly, start-up and maintenance work should only be performed by qualified and authorized personnel.
Please comply with the instructions of the system manufacturer or system operator.
Non-compliance with this operating and maintenance instructions may cause:

- Serious personal injuries
- Damaging nearby equipment

It is not allowed for the user to modify the product or the mounting parts/fittings supplied with it. Danfoss does not assume any warranty or liability for consequential damage arising from the non-compliance with these instructions or caused by improper installation, maintenance or storage.

For further specifications and information such as dimensions, materials and fields of applications, please refer to the related documentations (SBFV data sheet).

2.2 Definition of Application

Danfoss butterfly valves are designed for installation in the pipelines. The technical application limits (e.g. working pressure, medium, temperature etc.) are described in the product-related documentation (SBFV data sheet).

The standard model can be used to allow the flow of the medium in one direction in pressurized pipelines and to prevent the back-flow. Danfoss butterfly valve should be used in media in which there is no risk of clogging. To keep a good sealing and avoid damage of seal, fluid should not contain hard solid particulates.

For any deviating operating conditions and applications the user should obtain the manufacturer’s prior written approval.

3 Transportation, receiving and storage

3.1 Transportation

During transportation, the valve should be stable and protected with special packaging (e.g. container, special pallets) and should be in closed position. The packaging also needs to ensure that the valve is protected against weather influences and damage. When the valve is transported long distance (e.g. overseas) and exposed to special climatic conditions, it needs to be protected by sealing it in plastic wrapping and adding a desiccant.

3.2 Receiving

Upon receipt of product, it is important to follow these unpacking and inspection procedures. If external damage to the shipping container is evident upon receipt of product, please request that a representative of the shipping carrier be present before unpacking the product.

Carefully open the shipping container, following any instructions that may be marked on the container. Remove all packing material surrounding the valve and carefully lift it from the container. It is recommend to keep the shipping container and all packing material for reuse in storage or reshipment.

Visually inspect the valve for any signs of damage including scratches, loose parts, broken parts or any other physical damage that may have occurred during shipment. If damage is observed, immediately file a claim with the shipping carrier. If applicable, please photograph the damage detected on the valve. Valves that are damaged during transportation are the responsibility of the customer.
3.3 Storage

During storage, the valve should be closed and stored dry, protected against impurities (e.g. dust, sand).

3.4 Lifting

Always lift the valve using lifting straps as shown down on the picture (cf. Fig. 1: method A and B). Do not lift the valve from the stem or actuator (cf. Fig 1: method C).

Always note the weight of the valve and secure it firmly to avoid tilt or impact during lifting.
4 Installation in the pipeline

4.1 General installation instructions

Incorrect installation may result in serious personal injury as well as malfunction of the equipment. These instructions should therefore be followed carefully when installing the valve. These instructions do not cover all possible operating scenarios.

For any specific operating condition guidance, please contact the manufacturer.

Before the installation of the valve, its function parts (disc) should be completely opened and closed at least once and their proper running should be tested.

4.2 Site requirements

Butterfly valve should be installed in the pipeline as stress-free as possible. Do not install the valve in section of the pipeline where there is likely to find impurities (e.g. lowest points). If there is ongoing construction work, which may cause dirt (e.g. painting, erection of brick walls or concrete work) at the valve installation area, the valve should be protected with suitable cover.

Before installation, check the valve again for any transport or storage damage. When the valve is installed it should be free of dirt and dust.

Clean the pipework carefully before installing the valve. Any welding debris and other impurities remaining inside the pipework may damage the valve’s shut-off surfaces at a later stage.

4.3 Place of installation

The requirements for the place of installation are:

- To ensure there is enough space to allow function checks.
- To ensure there is enough space to allow maintenance work (e.g. dismantling and cleaning of the valve).

In case of open-air installation, the valve should be protected against extreme weather conditions by covering it properly.
4.4 Installation position

Butterfly valve should be installed into preferred flow direction arrow.

The most recommendable installation position for the butterfly valve is in a horizontal position and into horizontal pipeline (cf. Fig. 2). The butterfly valve can alternately be installed at an angle of maximal 90°.

![Horizontal installation position](image)

**Figure 2: Horizontal installation position**

Flow at the valve should be laminar therefore avoid installing the valve close to the pump or right after the pump or right after the elbow.

*Between the valve and an inspection valve, an elbow, T-pieces and Y-filters should be provided minimal distance of 6xDN (cf. Fig. 3). Otherwise irregular flow may disturb the proper function of the valve.*

If the valve is used as an end stop valve, we recommend closing pipeline with an end plate/closing cap until a later expansion of the system and leaving the valve into open position.

![Installation at elbows and branches](image)

**Figure 3: Installation of the Danfoss butterfly valve at elbows and branches**
4.5 Installation of handwheel

Handwheels are not mounted on the valves when delivered (cf. Fig 4).

To install the handwheel follow the following instructions:

Step 1.: Place the handwheel (cf. Fig 5a and 5b).

Step 2.: Secure the handwheel with the pin (cf. Fig 6a and 6b).
4.6 Welding of valve with welded ends

*Welding of butterfly valve should be done only by an authorized welder.*

*Electric arc welding should be used.*

Valve should be in closed position during the welding to prevent damage of the sealing surface.

If the valve is welded to a vertical pipeline (*cf. Fig. 7*), close the valve and cover the seal and disc with a water cushion of at least 40 mm. The water protects from welding spatters that may damage the seal and disc surfaces during welding.

Pipe ends should be parallel to the valve and correctly aligned. Distance between the pipe ends should be the same as the valve, taking welding gap into consideration.

Valve should first be spot welded to the pipeline by welding 4-6 seams across the valve. After the final welding should be done in order as shown on Figure 8 and 9.

During welding the ground should be connected to the pipeline. It is not allowed to connect the ground to the valve neck, actuator flange or actuator.

The valve extensions may be required before the insulation process. This can be done by the valve manufacturer or the insulation manufacturer. The valve can be extended with valve extension pipes before insulation or delivered by the valve manufacturer with extensions.

*Figure 7: Vertical installation position*
4.7 Installation of flanged valves SBFV FF

The valve should remain closed during installation to ensure that any residue or dirt doesn’t damage the sealing faces.

When the valve is installed between pipeline flanges, the flanges should be plane-parallel and in true alignment. Misaligned pipelines should be put into a true alignment position before the valve is installed. Otherwise the body may be exposed to impermissibly high loads and strain during operation which may even cause the body to break.

The valve should be as long as the distance between the flanges in the pipeline, taking into consideration the gasket.

The flanges in the pipeline should be compatible with valve flanges.

The bolts and nuts used for installation should be selected to match operating conditions. Bolts and nuts should also fulfill requirements of the pressure, temperature, flange material and gasket. Flange bolts should then be tightened using a star or crisscross pattern (cf. Fig. 10) to evenly load the bolts, in accordance with established piping standards. For detailed information please refer to standards EN 1515-1, EN 1515-2 and EN 1515-4.

![Figure 10: Example of bolting sequence pattern](image)

The gasket used on installation should be selected to match operating conditions, temperature, pressure and medium. Gasket dimensions should be compatible with sealing faces of the flanges. For detailed information please refer to the standard EN 1514.
5 Commissioning

Visual inspection of the valve and its equipment, especially all functional parts, should be conducted prior to putting the valve into operation. All screwed connections need to be checked as to whether they are tightly fastened.

The pipeline should be flushed thoroughly once the valve installation has been completed.

5.1 Pressure test

A pressure test of the entire system should be carried out in accordance with manufacturer’s instructions. The maximum pipeline test pressure is: 1.5x PN, the valve needs to be opened. The maximum test pressure is: 1.1x PN, when the valve is closed.

PN- see product label!

5.2 Start-up

Before start-up make sure that the valve- actuator combination functions without any problems.

Always use actuators mechanical travel stops to set valve to opened or close position. Excessive force cannot improve the valve’s tightness therefore do not exceed the manufacturer’s maximum allowable torque values.

If valve is equipped with Auma electric actuator, it should always be opened electrically. If actuator is not mounted from the factory, installation and end switch setting should be set by Auma or Danfoss representative. If needed, valve can be operated with manual override function.
6 Maintenance and servicing

6.1 General safety instructions

Danfoss butterfly valve SBFV is designed to be maintenance free. The proper function of the valve requires a proper water quality and a proper installation however wear can occur in case of impurities in the system. Prior to any inspection and maintenance work to be performed on the valve or mounted parts and attachments, the pressurized pipeline should be shut off, the pressure should be relieved and the system should be secured against unintentional switching on. Depending on the kind and criticality of the medium or fluid conveyed, all the required safety regulations must complied with!
Upon completion of the maintenance work and prior to resuming operation, all connections should be checked for proper fastening and leak-freeness.

6.2 Adjusting, removing or installing manual gear or actuator

End positions of the gears and actuators are fine tuned in the factory to achieve best tightness of the valve, therefore avoid disassembling the manual gear or actuators from the valve!

6.3 Auma adjustment instructions

For all information, please observe AUMA operating instructions delivered with the gearbox to avoid possible damages.

6.4 Pro-gear adjustment instructions

For all information, please observe Pro- gear operating instructions delivered with the gearbox to avoid possible damages.

6.5 Tightening the stem seal

In case of leakage are noticed at valve stem, the stem seal can be tightened by turning tensions screws. Sufficient tightness is achieved when leakage stops.

Avoid excessive tightening of the stem seal as it can influence opening torque of the valve.

6.6 Removing manual gear

Step 1:
Check that pipeline is not pressurized and pressure is relived from the system.
Step 2:
Close the valve fully using the hand wheel
Step 3:
Mark the manual gear in relation to the valve
Step 4:
Remove bolts between valve and gear/ actuator
Step 5:
Remove gear/ actuator
Step 6:
Remove parallel key
6.7 Installing manual gear

Step 1:
Make sure that the valve is in closed position

Step 2:
Place parallel keys

Step 3:
Install manual gear in original position.

7 Troubleshooting

For all maintenance and repair work please observe the general safety instructions under Section 6.1.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve makes noise</td>
<td>Unfavorable installation position causing unfavorable flow around or inside the valve (e.g. installed too closely downstream of an elbow etc.)</td>
<td>Change installation position</td>
</tr>
<tr>
<td>Leakage losses</td>
<td>Remains and dirt on body sealing surfaces</td>
<td>If dirt is crusted, clean sealing surfaces and sealing ring</td>
</tr>
<tr>
<td>Leakage on the shaft seal</td>
<td>Damaged packing</td>
<td>Tighten the gland packing</td>
</tr>
<tr>
<td>Operational torque too high</td>
<td>Dirt between body seat and lamellar ring</td>
<td>Clean body seat and lamellar ring</td>
</tr>
<tr>
<td></td>
<td>Gear stem is not lubricated</td>
<td>Lubricate the gear stem</td>
</tr>
<tr>
<td>Valve blocked</td>
<td>A foreign matter is jammed in sealing area</td>
<td>Use the valve in OPEN POSITION so that the foreign matter is flushed away. If that doesn’t help, dismantle the valve and remove foreign matter</td>
</tr>
<tr>
<td>Cavitation in the valve</td>
<td>Valve operating beyond its design limits</td>
<td>Butterfly valve not suitable for use as control valve. Replace the valve with more suitable valve type</td>
</tr>
<tr>
<td></td>
<td>Operational data changed</td>
<td></td>
</tr>
<tr>
<td>High operating forces</td>
<td>Seat of the valve polluted by deposits</td>
<td>Flush valve, dismantle, if necessary and clean seat area</td>
</tr>
<tr>
<td></td>
<td>Valve is dry in the pipeline, no medium present</td>
<td>Valve can be operated more easily when wet</td>
</tr>
</tbody>
</table>
### 8 Standard materials. Refer to Appendix.

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Body</td>
<td>Carbon steel EN 10028-2 P265GH, EN 10025 S355J2+N</td>
</tr>
<tr>
<td>1.1 Body seat</td>
<td>Stainless steel X5CrNi18-10</td>
</tr>
<tr>
<td>2 Disk</td>
<td>Carbon steel EN 10028-2 P265GH, EN 10025 S355J2+N</td>
</tr>
<tr>
<td>3 Retaining ring</td>
<td>Stainless steel X5CrNi18-8</td>
</tr>
<tr>
<td>4 Lamellar seal</td>
<td>X6CrNiMoTi17-12-2+Graphite</td>
</tr>
<tr>
<td>5 Drive Shaft</td>
<td>Stainless steel X17CrNi16-2</td>
</tr>
<tr>
<td>6 Gland packing</td>
<td>Graphite / PTFE</td>
</tr>
<tr>
<td>7 Ring</td>
<td>Stainless steel X5CrNi18-8</td>
</tr>
<tr>
<td>8 Sealing bush</td>
<td>GGG CrNi20-2</td>
</tr>
<tr>
<td>9 Gland</td>
<td>Carbon steel EN 10028-2 P265GH,EN 10025 S355J2+N</td>
</tr>
<tr>
<td>10 Cover</td>
<td>Carbon steel EN 10028-2 P265GH, EN 10025 S355J2+N</td>
</tr>
<tr>
<td>11 Pin</td>
<td>Stainless steel X17CrNi16-2</td>
</tr>
<tr>
<td>12 Parallel key</td>
<td>Carbon steel C45E</td>
</tr>
<tr>
<td>13 Radial bearing</td>
<td>INA PERMAGLIDE (SS+PTFE)</td>
</tr>
<tr>
<td>14 Axial bearing</td>
<td>INA PERMAGLIDE (SS+PTFE)</td>
</tr>
<tr>
<td>15 Connections</td>
<td>Stainless steel A4-70</td>
</tr>
<tr>
<td>16 Connections</td>
<td>Stainless steel A4-70</td>
</tr>
<tr>
<td>17 Screw</td>
<td>Stainless steel A4-70</td>
</tr>
<tr>
<td>18 “O” ring</td>
<td>EPDM HT / VITON</td>
</tr>
</tbody>
</table>
APPENDIX: Parts list and standard materials