



## BUTTERFLY VALVE

### 31300 SERIES

## INSTRUCTIONS FOR INSTALLATION, USE AND MAINTENANCE



### 1. Overview

Read these instructions carefully before starting the valve installation and start-up work. Safe keep the instructions in the proximity of the valve for easy access by the valve operators.

**HÖGFORS OY takes no responsibility for any damage caused by the valve's incorrect transportation, handling, installation or use.**

**The non-leakage warranty exclusively applies to the valves that are provided with a manual gear or an actuator installed at the manufacturer's factory, provided that the manual gear or actuator in question has not been removed or adjusted by the user.**

### 2. Marking.

The valve's identification shield is attached to the actuator attachment flange in the valve frame. The shut-off seal is located on the opposite side of the frame, seen from the identification shield.

The marking groove on the shaft end indicates the valve disc position. The valve closes clockwise and opens counter-clockwise, by turning 90 degrees in both directions.

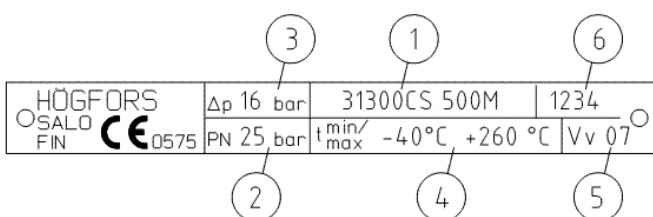


Fig. 1: Product identification shield

Valve manufacturer

1. Valve type
2. Nominal pressure
3. Max shut-off pressure difference
4. Temperature max / min
5. Year of manufacture
6. Serial number

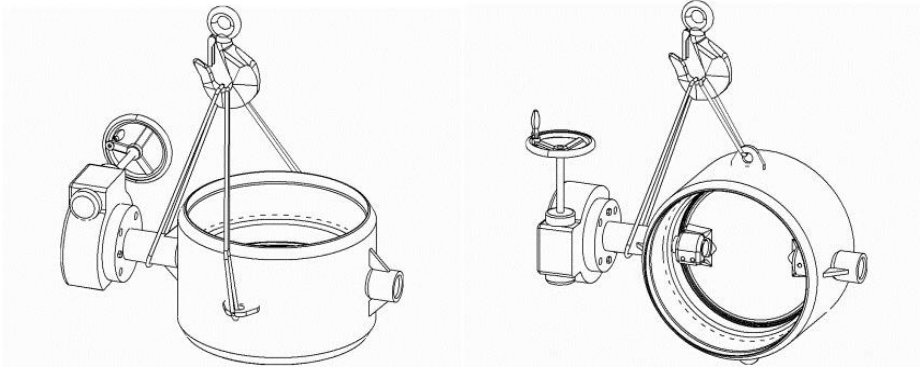
### 3. Receiving, storage and transportation.

During the receiving inspection, check that the valve and its accessories are free from any transportation-induced damage. During storage, the valve must be protected against sand, dust and any other impurities. Avoid long-term storage of the valve outdoors exposed to the effects of rain, sunlight or frost.

When hoisting the valve, always use lifting straps threaded through the lifting lugs and around the valve's upper neck. Hoisting the valve with the lifting straps threaded around the actuator is forbidden. Use special caution when hoisting, transporting and installing the valve. The actuator's centre of gravity may



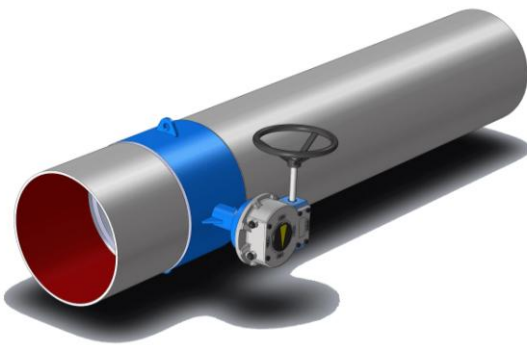
deviate from the valve centre line. This may tilt the valve and actuator during lifting. Even minor impacts may damage the actuator or change the actuator's or valve's adjustments.



Method of slinging

## 4. Installation

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. In this connection, it is also advisable to check that the valve is free from any impurities induced by transportation and storage.

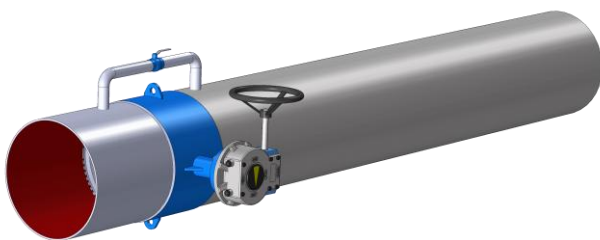


The most recommendable installation position for a butterfly valve is with the valve shaft in a horizontal position and into horizontal pipeline.

Do not install the valve close to a pump or a curved pipe section, due to the turbulent flow that they cause. The flow must be laminar at the valve.

The pipes must be provided with appropriate support. An inadequately supported section of pipework will cause excessive stress on the valve, possibly resulting in leakage from the shut-off surfaces.

Pipework temperature variations will cause thermal contractions and expansions which must be allowed to occur freely, with the aid of bellow-type compensators, for example. Without these, or other similar solutions, pipework expansions will excessively burden the joints.



Fill the pipework via by-pass valves.

Install a by-pass valve in order to avoid pressure impacts and to reduce the forces that are caused by opening the butterfly valve under pressure.

Choose by-pass DN size as 10-20% of DN main valve. General rule: longer pipeline – bigger valve.

The valve disc must not be the final item that separates the content of the pressure vessel (tank and pipeworks) from the environment. However, in cases where this cannot be avoided, secure non-leakage by other means, by welding a solid flange to cover the valve's open end, for example.

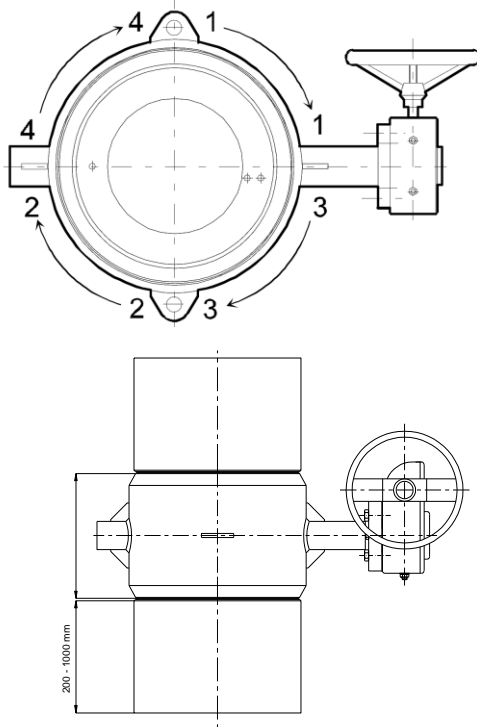


## Welding

During installation and welding, the valve must be in the closed position, so welding debris doesn't come to sealing surfaces. If the valve is welded to vertical pipeline, cover valve's disk at least with 10-15cm water cushion. This water cushion will reduce the risk that the welding spatters from the welding procedure can damage the sealing and disc surfaces.

Pipe ends must be cut by 90° and welding prep has been done.

Valve must be welded by electrical arc-welding.



### Installation directly into horizontal pipeline.

Install the valve in coaxial position with the pipeline and tack-weld by 4-6 cross welds. The order of the final welding is 1-2-3-4.

### Installation with pipe the insertions (recommended method).

The insertions to be weld at local shop with order 1-2-3-4. This method is to provide more possibility to clean inner surfaces from welding debris and impurities. Pre-assembled unit install to the pipeline at site.

## 5. Start-up

Flush the pipework thoroughly once the valve installation has been completed.

All valves delivered to Customer passed the hydro test at the factory; however it is necessary to check that there are no faults due to transportation and handling.

If the valve is used for control application then make sure that there is no cavitation mode. Prolonged operation of valve in cavitation mode can lead to erosion valve's parts and destroy it.

Do not use the first and the last 10% of total stroke of the disk in regulate applications. Recommended angle of the disk is above 15°. If the disk was open at small angle (5°-15°) for prolonged time then open the disk to wider angle (25°-30°). before closing. Thereby the seat area will be flushed up and cleaned. The movable debris from pipeline might stack between valve's body and disk, opened at small angle.

Make sure that the valve-actuator combination functions without problems prior to the start-up procedure.

Always close the valve using the actuator's mechanical travel stops; stay below the maximum torque limit. Avoid the use of excessive force in closing as this cannot improve the valve's tightness.

**A valve provided with an electric actuator must always be opened electrically, with the travel limit serving as the closing limit. In an emergency, you may open and close the valve by turning the electric actuator hand wheel.** In these cases, however, observe that the hand wheel's closing limit has been set to turn the valve disc 2-3 hand wheel revolutions beyond the optimal closed position. This means that the optimal tightness is achieved by turning the hand wheel 2-3 revolutions in the opening direction, starting from the gear's mechanical closing limit.



## 6. Maintenance

Högfors valves are durable and dependable. An appropriately selected and carefully installed valve will not require maintenance during its life cycle.

Leakage from the valve's shut-off surfaces is often caused by wear and tear, pipework impurities or damage resulting from pressure impacts. Impurities can be removed by opening the valve and allowing the flow to flush the shut-off surfaces clean.

Probability of pressure impact can be excluded by using by-pass valves.

The scope of maintenance and repair work consists of:

- Cleaning of internal surfaces.
- Replacement of main gasket.
- Tightening or replacement of stem sealing. This work is possible to carry out when valve is on-line if pipeline is not under pressure. For the rest of the repair works, the valve must be taken away from the line.

### 6.1 Manual gear removal and installation

Avoid removing the manual gear from the valve. The manual gear adjustments have been made at the factory so as to secure the valve's tightness. Removing the manual gear requires that the adjustment sequence be repeated.

Removing the manual gear is prohibited while the valve is under pressure.

#### Removal:

- Turn disk to position "close".
- Mark the manual gear in relation to the valve.
- Turn out bolts between actuator and valve, take out actuator.
- Remove wedges.

#### Installation:

- Install the manual gear with the valve in closed position. Make sure that manual gear is in position close as well.
- Place wedges.
- Install the manual gear in original position. Attach the manual gear to the valve with bolts. Tighten the bolts evenly in a crosswise sequence. Apply locking agent to the bolts.
- Adjust the manual gear as instructed in section 6.2

### 6.2 Manual gear adjustment

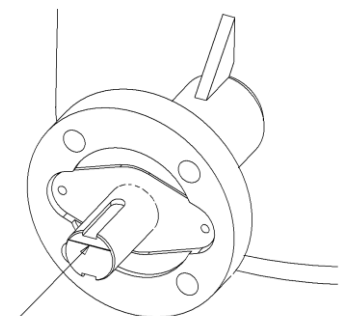
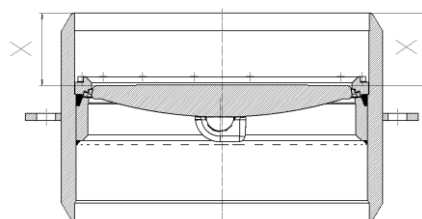
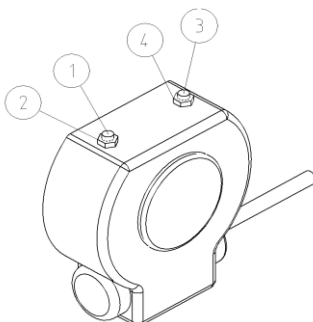


Fig.6: Measuring "X" distance.

Fig. 7: Marking groove



- Open the manual gear travel limit locking bolts 2 and 4, and open adjustment screws 1 and 3.
- Use the turn gear wheel to turn valve in closed position, so that disk is in parallel to the seal. Right position check by measuring distance X from flange of valve to the disk surface (Figure. 6), or from counter flange to the disk. The distance must be equal in both side of the disk. The approximate position of disk can be defined by marking groove on the end of shaft. (Fig. 7). The disk is parallel to the marking groove.
- Adjust stopper of Close position in manual gear. Turn adjustment screw 1 gently until its movement stop. Tighten locking nut 2.
- Turn disk by manual gear by 90 degree until completely Open position.
- Adjust stopper of Open position in manual gear. Turn adjustment screw 3 gently until its movement stop. Tighten locking nut 4.

### 6.3 Installation and adjustment of electric actuator onto valve in MF version.

MF version delivered with installed and adjusted worm gear.

**Attention! Changing the factory settings of the gearbox will void the factory warranty for the valve.**

The valve in MF version can be equipped by manual hand wheel or multiturn motorized actuator at customer site or at Högfors factory in accordance to customer demands.

Check the maximum inlet torque for this combination of valve and MF gear box and do not exceed that value in no circumstances.

Ask from factory what the torque for specific valve and gear combination is.

1. Close the disk by hand wheel.
2. Replace the wheel by multiturn motorized actuator.
3. Set the torque limits to value given by factory. Connect wires and make sure that torque limit switches activated.
4. Set position of the disk as position close.
5. Make test run of actuator and make sure travel limits stop the disk just before torque limit. Adjust limit switch if necessary. Correctly adjusted limit switch must activate in advance to torque switch.
6. Repeat steps 4-5 for open position.

### 6.4 Dismantle and installation of electrical actuator (AUMA SA)

Avoid dismantle of actuator from valve. The adjustment of actuator has been made at the factory so as secure the valve's tightens. Dismantle of actuator requires repeated adjustment.

Dismantle of actuator is prohibited while the valve is under pressure or could be under pressure.

#### Dismantle:

- Turn the valve in close position.
- Switch off voltage supply to the actuator.
- Loosen the actuator attachment bolts and pull actuator out.
- It is necessary to remove the actuator clutch piece, for example, in connection with shaft seal replacement.
- Mark the clutch piece height on the shaft.
- Loosen the locking screw and pull the clutch piece off the shaft.
- Remove the wedges.



**Installation:**

- During installation the valve must be in closed position. Make sure that actuator itself in close position as well.
- Place the wedges. Attach and lock the actuator clutch piece on the valve shaft at its original height.
- Install the actuator to the valve. Attach the actuator to the valve by bolts. Tighten the bolts evenly in a crosswise sequence. Apply locking agent to the threads.
- For addition instructions, see the manual supplied with the actuator.
- Adjust actuator as instructed in section 6.4

**6.5 Electric actuator adjustment.**

Use the actuator hand wheel to turn the disk to the half-open position, and check that the valve disk moves in the correct direction when using the switches.

For detailed instructions concerning the actuator's adjustment see the manual supplied with the actuator.

The actuator's adjustment is correct if the entire tooling list below has been done and checked:

1. The limit switcher in the closed position must stop the turning of the disk when the disk is parallel to the seal. Ensure the correct position of the valve disk by measuring distance "X" (Figure. 6). The measure must be the same on both sides of the disk.
2. The torque switchers are adjusted at the values set by the valve's manufacturer (contact the valve vendor or manufacturer for details).
3. The mechanical stopper in the open position is adjusted so that the actuator hand wheel still has 2-4 revolutions from the open position of the limit switcher until the contact with the stopper.
4. The limit switcher in the open position must stop the turning of the disk when the disk is 90 degrees to the seal. At the same time there must be free gap of 2 - 5 revolutions of the hand wheel from the limit switcher till the mechanical stopper.

Non fulfillment of listed adjustments may cause the valves damage or block the actuator.

**6.6 Other actuators**

For detailed instructions concerning actuator removal, installation and adjustment, contact the valve's supplier or manufacturer.

**6.7 Tightening the valve stem seal**

Tightening the valve stem seal is included in regular maintenance. Avoid excessive tightening. The sufficient tightness level is reached when the leakage stops. The tension screws are indicated by number 20 in the exploded view attached.

**6.8 Valve stems seal replacement**

Prior to commencing the replacement procedure, check that the pipework is pressure-free.

The components referred to in the disassembly and installation instructions are set out in the exploded view contained in **Appendix 1**.

**Disassembling:**

- Remove the actuator as instructed above.
- Remove wedges 21.
- Remove hexagon screws 20.
- Remove seal flange 19.



- Lift out shaft seal bushing 16.
- Remove O-rings 17 and 18 from shaft seal bushing 16.
- Remove shaft seals 15.

**Installation:**

- Carefully clean all surfaces. Prior to commencing the installation work, check that there are no sharp edges on the valve shaft that could damage the O-rings and sealing.
- Place the shaft sealing 15 and push it by hand.
- Place the O-rings 17 and 18 on the shaft bushing 16 and press it into place. Attach seal flange 19 using hexagon screws 20.
- Install and adjust the manual gear or actuator as instructed above.

**6.9 Shut-off seal replacement**

Prior to a shut-off seal replacement, remove the valve from the pipework.

It is not necessary to remove the actuator for a shut-off seal replacement.

Turn the valve disc to the closed position.

The components referred to in the disassembly and installation instructions are set out in the exploded view contained in Appendix 2.

**Disassembling of seal:**

- Remove hexagon screws 12 and retaining ring 11.
- Remove shims 24, 9 and seal 10. Note that new shims must have the same thickness as old ones.

**Installation:**

- Prior to installation of new parts, carefully clean all surfaces of frame, disk and retaining ring. Check the condition of sealing surfaces prior to starting the installation work.
- Keep the valve disk in closed position during the shut-off seal replacement procedure.
- Place on the own place the shims 24, 9 and seal 10.
- Install the retaining ring 11.

Tighten all hexagon screws 12 evenly in a crosswise sequence. Use the torque key to provide equal torque as 25Nm for M8 screws and 50Nm for M10 screws.



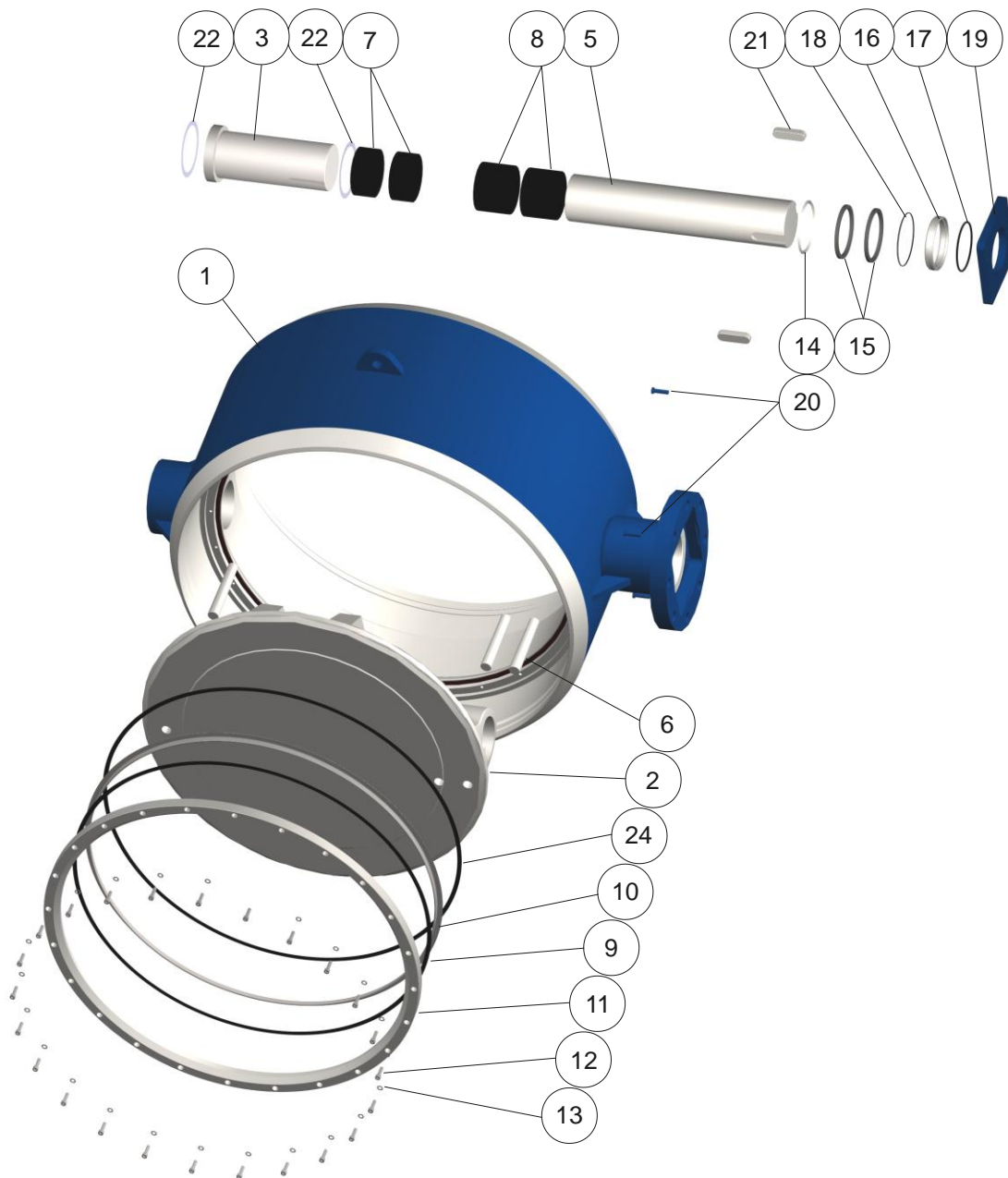
## 7. Standard materials. Refer to Appendix 1.

	Part	Material	
1	Body	Carbon steel EN10028-2 P265GH	
2	Disk	Stainless steel EN10213 1.4408, ASTM A351 CF8M, SS2324	
3	Subshaft	Stainless steel EN10088-3 1.4460 / 1.4418+QT900	
5	Main shaft	Stainless steel EN10088-3 1.4460 / 1.4418+QT900	
6	Conical pin	Stainless steel EN10088-3 1.4462 / 1.4418+QT900	
7	Subshaft bearing	PTFE on stainless steel net	
8	Stem bearing	PTFE on stainless steel net	
9,24	Shim	Carbon Fiber / Graphite	Graphite for steam version
10	Seat ring	Hard chrome plated stainless steel AISI 316L or PTFE+C	
11	Retaining ring	Carbon steel EN10028-2 P265GH	
12	Socket screw	Stainless steel ISO 3506 A4-80	
13	Washer	Stainless steel ISO 3506 A4-80	
14	Back-up-ring	Stainless steel EN10216-5 1.4404	
15	Box packing	Graphite	
16	Shaft seal bushing	Stainless steel EN10216-5 1.4404	
17,18	O-ring	EPDM / FPM	Not fitted in steam version
19	Gland	Stainless steel EN10028-7 1.4436 / 1.4404	
20	Hexagonal screw	Stainless steel ISO 3506 A4-80	
21	Key	Carbon steel 1.0503 DIN 6885A	
22	Bearing plate	PTFE on stainless steel net	





## APPENDIX 1: Parts list and standard materials

**Spare part kit for seat ring replacement.**

- Seat ring, pos 10,
- Shim, pos 9 and 24.
- Washers, pos 13

**Spare part kit for stem sealing replacement.**

- Box packing, pos 15,
- O-rings, pos 17 and 18.