

**MODEL**

**HB**



## **INSTALLATION, OPERATION & MAINTENANCE MANUAL**

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### **HB Knife Gate Valve**



# INSTALLATION, OPERATION & MAINTENANCE MANUAL

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## 0. INTRODUCTION

The HB model is a bi-directional high pressure wafer style knife gate valve designed for general industrial service applications. The design of the body and seat assures non-clogging shut-off with suspended solids.

The HB valve complies with the following European directives:

- Machinery Directive

When applicable it can also comply with the following additional directives:

- Pressure Equipment Directive
- Potentially Explosive Atmospheres (ATEX)

It is the user's liability to verify the maximum working conditions (PS, TS), medium (gas or liquid) and dangerousness group (1 or 2) and if the fluid is unstable to properly classify the valve according to the PED directive.

ORBINOX offers, supplies and certifies valves according to the information received from the customer. The customer is liable to make sure this information is accurate and according to specific working conditions requirements where the valve will be installed.

**For EU Directives and other Certificates, please see the document:  
Directives & Certificates Compliance - Knife Gate Valves - IOM**

## 1. HANDLING

The valves are packed according to the appropriate transport standards. If you receive the packing damaged, please inform the transport company in writing and contact you ORBINOX representative.



When handling an ORBINOX valve please pay attention to the following points:

- DO NOT ATTACH LIFTING GEAR TO THE VALVE ACTUATORS OR GATE GUARDS. They are not designed to bear the weight and could easily be damaged.
- DO NOT LIFT THE VALVE BY THE VALVE BORE.  
This can cause damage to the seating surfaces and seals.
- Check that selected lifting gear is rated to carry the weight of the valve. The valve can be handled using eyebolts, soft straps, or slings.

- **EYEBOLTS:** make sure the eyebolts have the same thread as the bolt holes and they are all well secured. Ideally when using lifting gear to move an ORBINOX valve, it should be supported by two or more eyebolts screwed into the tapped fixing holes in the valve body.
- **SOFT STRAPS:** with the valve in the closed position, the straps should be placed between the gland area and the bore such that the valve is balanced.

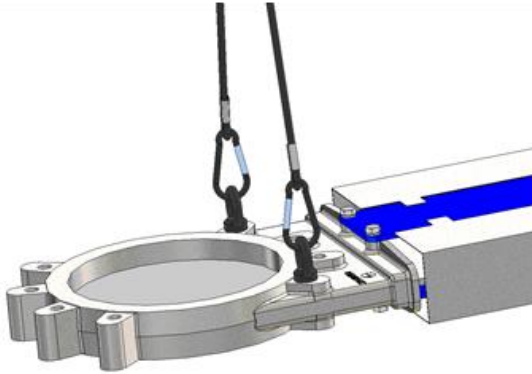


Fig. 1 Handling with eyebolts

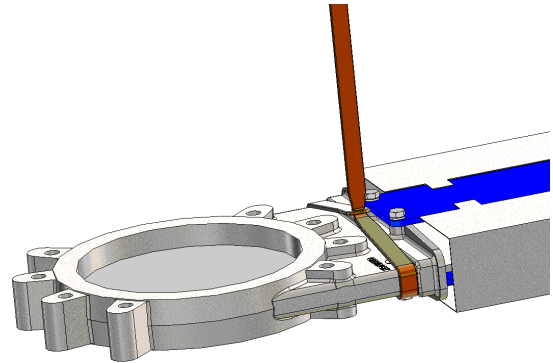
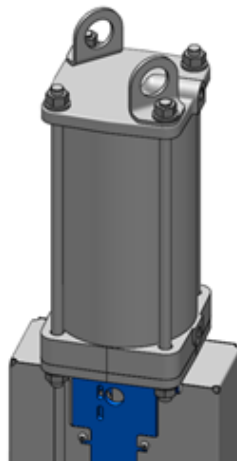


Fig. 2 Handling with soft straps

#### PNEUMATIC ACTUATED VALVES (Non-standard valves shall be checked case by case)

ORBINOX pneumatic valves (with Ø125 cylinder and above) are supplied with 2 lifting lugs for a safe handling of the valve for vertical movements

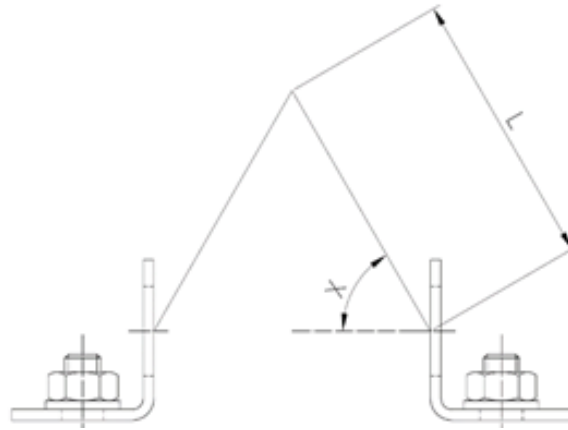


#### **Handling WARNING:**



Lifting lugs are not machined so they could have sharp corners; soft straps or slings are forbidden to be used with these lifting lugs

Below table shows the maximum weight of valve + pneumatic cylinder that 2 lifting lugs can hold depending on lifting chain angle (X):



CYLINDER	With 2 lifting lugs: max. weight valve + cylinder (kg.)			
	L: minimum lifting chain length			
	X: 60°		X: 75°	
	Kg.	Lmin (mm)	Kg.	Lmin (mm)
125	170	130	310	220
160	270	170	500	280
200	390	220	710	380
250	740	300	1335	500
300	1140	360	2030	600
350	1615	440	2835	720
400	2105	500	3660	830

- For horizontal movement, the valve shall be lifted mainly from the body and the yoke. See above instructions for further instructions
- Cylinder's lifting lugs can only be used during horizontal movement of the valve to help balance the valve given the weight is hold at the body lifting point (center of gravity is approx. centered on the body)
- The valve can be lowered from vertical to horizontal position when it is hanging from the cylinder's lifting lugs

Below table shows approximate weight of standard HB pneumatic valves (kg):

DN (mm)	Kg.
DN 80	20
DN 100	25
DN 150	43
DN 200	86
DN 250	146
DN 300	175
DN 350	235
DN 400	375
DN 450	480
DN 500	750
DN 600	825

## 2. INSTALLATION

**For EU Directives and other Certificates, please see the document: Directives & Certificates Compliance - Knife Gate Valves - IOM**

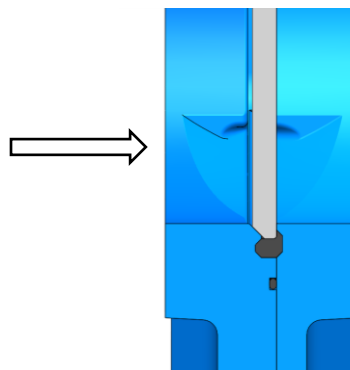


In order to avoid personal injury or damage to property when handling and installing the valve, it is important to observe the following warnings:

- It is the User's responsibility to verify compatibility of valve parts materials with the internal fluid
- Qualified and trained personnel must carry out the handling and maintenance of the valve
- Use suitable Individual Protection Equipment (IPE) (gloves, safety footwear...)
- Disconnect all lines affecting the valve and put up a notice notifying that work is being carried out on the valve
- Isolate the valve completely from the process
- Release process pressure
- Drain the fluid from the valve

Before installation, inspect the valve body and components for any damage that may have occurred during shipping or storage. Make sure the internal cavities within the valve body are clean. Inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and that the flanges are clean.

The HB valve is bi-directional. The standard seat can be installed without taking the direction of fluid into consideration. However, HB valves have a preferred installing direction.

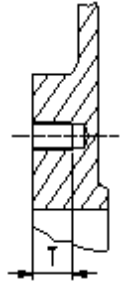


Special care should be taken to maintain the correct distance between the flanges and to ensure that they are parallel to the valve body. Incorrect alignment of the valve can cause deformations, which can lead to difficulties in operation.

Place the valve between flanges. First tighten the side bolts (1) and then the upper and lower bolts (2).

The following table shows recommended torque values for the valve fixing bolts and the maximum depth (T) of blind tapped holes:

DN (mm)	T (mm)	PN-16 (EN 1092-1)	CL150 (ASME B16.5)	Torque (N.m)
80	12	M16	5/8" - 11 UNC	70Nm
100	12	M16	5/8" - 11 UNC	70Nm
150	14	M20	3/4" - 10 UNC	140Nm
200	13	M20	3/4" - 10 UNC	140Nm
250	15	M24	7/8" - 9 UNC	235Nm
300	18	M24	7/8" - 9 UNC	235Nm
350	18	M24	1" - 8 UNC	235Nm
400	18	M27	1" - 8 UNC	350Nm
450	25	M27	1 1/8" - 7 UNC	350Nm
500	31	M30	1 1/8" - 7 UNC	470Nm
600	34	M33	1 1/4" - 7 UNC	645Nm

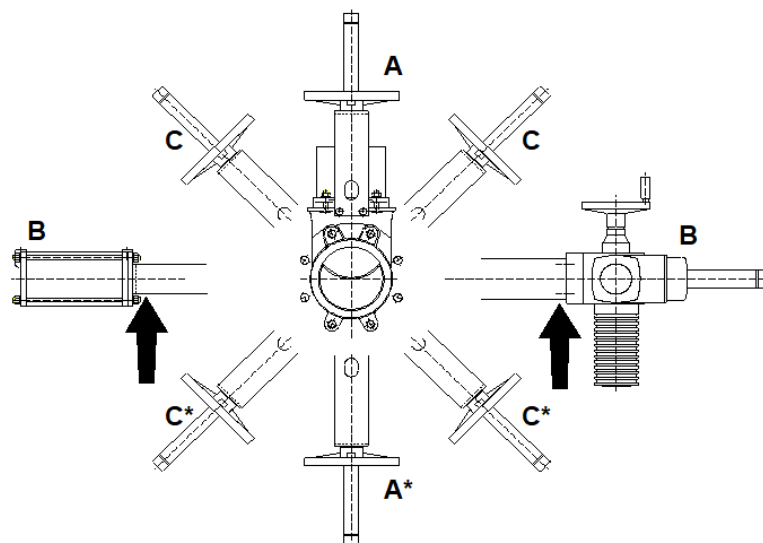


Select the recommended torque based on bolt size for other flange drilling patterns.

Make sure that cross-pattern tightening sequence is always followed.

The valve can be mounted in any position regarding the pipe. However, it is advisable to place it vertically in horizontal pipeline (A) if the installation allows it. (Please consult the technical department at ORBINOX).

With larger diameters (> 300 mm), heavy actuators (pneumatic, electric, etc.), or with the valve installed horizontally (B) or at an angle (C) on a horizontal pipeline, the installation will require the construction of suitable supports. (See the following diagram and consult the technical department at ORBINOX).

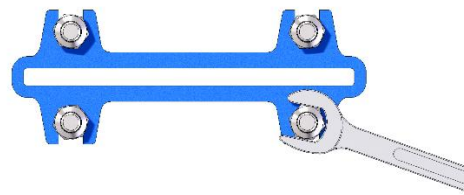


\* For these positions please consult ORBINOX

The installation of suitable supports is advised when significant vibrations coming from the piping are present.

Once the valve is installed, test that the flanges have been fastened correctly and that all electrical and/or pneumatic connections have been properly made.

First, operate the valve with no flow in the pipeline. Then test operation and valve seal with flow. It should be noted that the packing material might settle in shipping/storage, which can cause minor leakage. This can be remedied by tightening the gland (8) during installation. The nuts shall be tightened gradually and crosswise until the leakage stops (see the next figure). Check that there is no metal contact between the gland follower (8) and the gate (2).



If the gland follower nuts are pulled to hard, the force needed to operate the valve will increase, the valve function will be affected and the box packing lifetime will be shortened.

The table below shows the maximum torque value for tightening the gland follower nuts.

DN	Torque (N.m)
80 - 150	30
200 - 350	45
400 - 500	55
600	65

The following table shows the required tightening torque for the connecting bolts of the 2 half bodies:

DN	Metric	Minimum torque Nm	Maximum torque Nm
80 - 100	M8	20	32
150 - 200	M10	40	65
250	M12	65	110
300 - 500	M16	160	290
600	M20	250	570

Make sure that cross-pattern tightening sequence is always followed

Once performance has been tested, the valve can be put into operation.



### 3. ACTUATORS

**For EU Directives and other Certificates, please see the document:  
Directives & Certificates Compliance - Knife Gate Valves - IOM**

#### 3.1. HANDWHEEL

To open the valve, turn the handwheel anticlockwise. To close turn the handwheel clockwise.

#### 3.2. BEVEL GEAR

Bevel gear designed to get a pull force below 30 Kg.

To open the valve, turn the handwheel (11) counter clockwise. To close, turn the handwheel clockwise.

#### 3.3. PNEUMATIC

Valves are usually supplied with a double acting pneumatic actuator although, upon request, we can supply single-acting actuators. In either case the feed pressure can vary between 3,5 and 10 bar. However, the size of the actuator for each valve has been designed for a feed pressure of 6 bar.

It is essential for a good maintenance of the cylinder that air should be well dried, filtered and lubricated. Air quality shall fulfil the following requirements:

- ISO 8573-1 Grade 5:4:3 for regular process (ON / OFF services).
- ISO 8573-1 Grade 5:3:3 for regular process at low temperature (-20 °C).
- ISO 8573-1 Grade 3:4:3 for cylinders with positioners.
- ISO 8573-1 Grade 3:3:3 for cylinders with positioners at low temperature (-20 °C)

It is recommended to actuate the cylinder 3-4 times before the start up, once it is installed in the pipeline.

#### 3.4. ELECTRIC ACTUATOR

Depending on the type or make of the electric actuator, specific instructions (i.e. a manufacturer's manual) will be supplied.

## 4. MAINTENANCE

### For EU Directives and other Certificates, please see the document: Directives & Certificates Compliance - Knife Gate Valves - IOM

The valve must not undergo any modifications without a previous agreement with ORBINOX. ORBINOX shall not be liable for any damages that may arise due to the use of non original parts or components



To avoid personal injury or damage to property from the release of process fluid:

- Those in charge of handling and maintenance of the valve must be qualified and trained in valve operations.
- Use appropriate personal protection equipment (gloves, safety shoes, etc).
- Shut off all operating lines to the valve and place a warning sign.
- Isolate the valve completely from the process.
- Release process pressure.
- Drain the process fluid from the valve.

The only maintenance required is to change the gland packing (5) or the seal (3).

The life of these elements will depend on the working conditions of the valve such as: pressure, temperature, abrasion, chemical action, number of operations, etc.

#### 4.1. Replacement of the gland packing (5):

1. Depressurise the circuit and place the valve in close position.
2. Remove the gate guards (for automatically actuated valves only).
3. Non rising stem. Photo 1: Release the stem nut from the gate (2).  
Rising stem valves. Photo 2: Release the spindle or stem (9) from the gate (2).
4. Loosen the screws of the yoke (10) and remove it (without losing the actuator).
5. Loosen the nuts of the gland followers (8) and remove them. (Photo 3)
6. Remove the old packing system (5+6+7) and clean the stuffing boxes.
7. Insert the new packing system (5+6+7)
8. Once the necessary packing rings (5+6+7) have been inserted, proceed with a steady initial tightening of the gland followers (8). (Photo 3)
9. Place the yoke (10) (with the actuator) and screw it.
10. Fix the stem nut to the gate. (Non-rising stem. Photo 1) or fix the stem (9) or the spindle to the gate (2) (Rising stem valves. Photo 2).
11. Remount the gate guards.
12. Carry out some operations with a loaded circuit and then re-tighten the gland followers (8) to prevent leakage.



Photo 1



Photo2

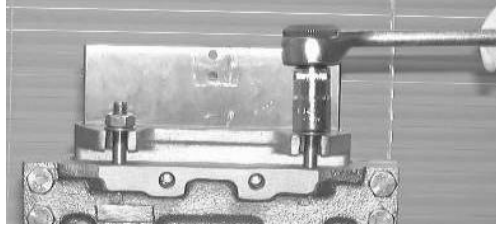
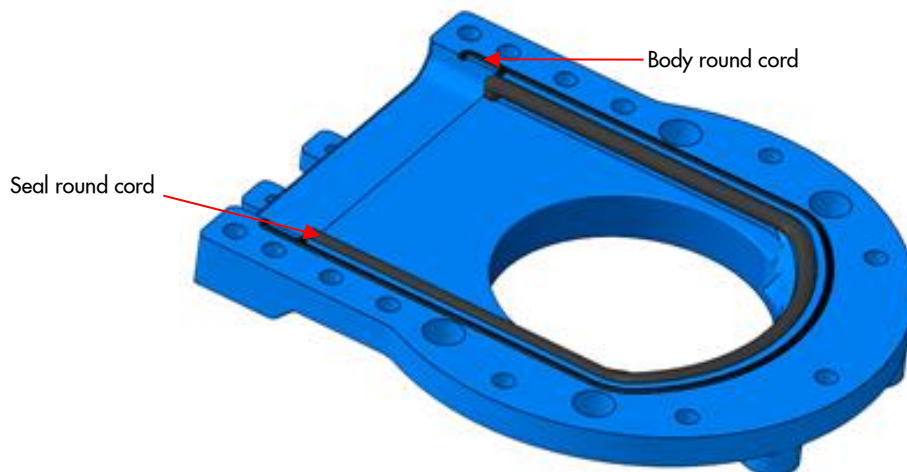


Photo 3

#### 4.2. Replacement of the main round cord seal (4) and the secondary round cord between bodies (4):

1. Remove the valve from the pipeline
2. Remove the packing gland follower by losing bolts (13) and packing system
3. Open the body and have the two body parts separated
4. Remove the seat and the secondary round cord between bodies
5. Clean the glue residues
6. Apply adhesive in the body round cord groove. Place the new body round cord in the body groove
7. Apply adhesive in the seal round cord groove. Place the new seal round cord in the body groove



8. Place the second half body and aligned it with the bolts
9. Reinstall the gate
10. Follow instructions described on page 8 regarding connection bolts tightening
11. Once the necessary packing rings (5+6+7) have been inserted, proceed with a steady initial tightening of the gland follower (8). (Photo 3) following the steps of point 4.1

#### 4.3. Lubrication:

Lubricate the stem every 30 days with a calcium-based grease with the following characteristics: highly water resistant, low ash content, and excellent adherence.

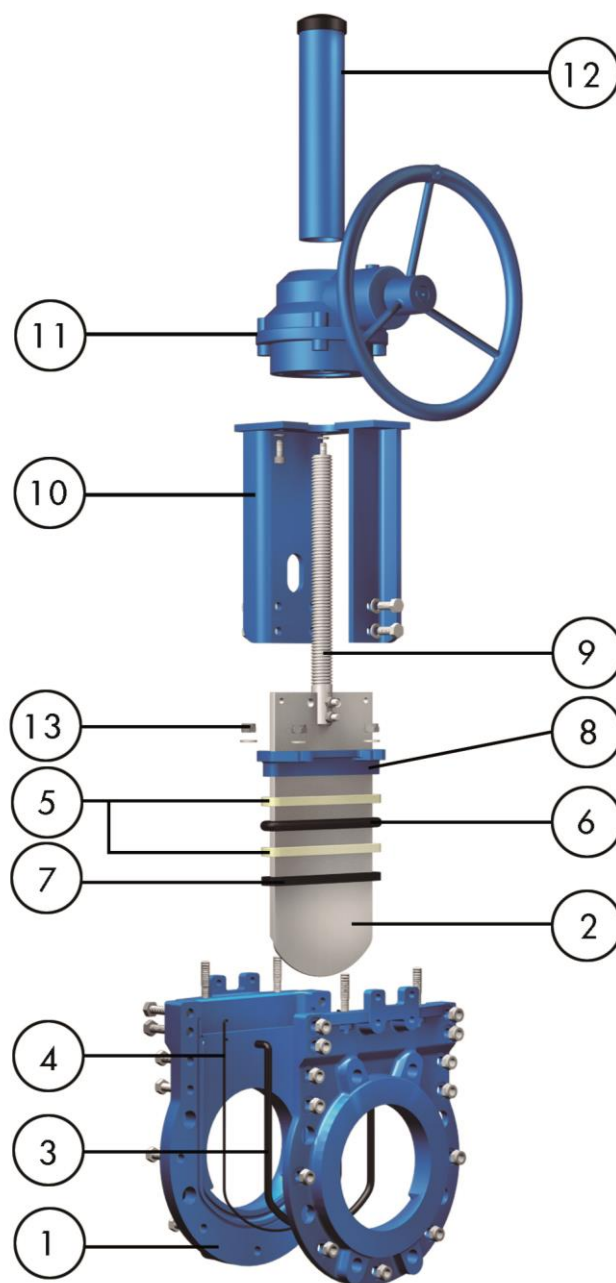
## 5. STORAGE

- For long storage periods keep the valves indoors in a safe and dry place and protect it from any impact and or vibrations
- Storing temperatures: -10°C to +40°C
- Valves must be stored in either full open or full closed position
- For any component installed in the valves, electric motors, solenoid valves, etc, please refer to their own instructions manuals

## 6. ENVIRONMENTAL CONSIDERATIONS

- The packaging is made from environmentally friendly materials. Dispose of the packaging through the available recycling channels
- The valve is designed and manufactured with materials that can be recycled by specialised recycling firms. Once the life of the product is expired, you have to consider a proper disposal of the product in order to prevent any negative impact on the environment and allows for the recycling of valuable commodities
- Please follow the local environmental rules in your country for proper disposal

**7. PARTS LIST & DRAWINGS**



1. BODY	8. GLAND FOLLOWER
2. GATE	9. STEM
3. SEAT ROUND CORD	10. YOKE
4. BODY ROUND CORD	11. BEVEL GEAR
5. PACKING	12. STEM PROTECTOR
6. PACKING ROUND CORD	13. PACKING BOLTS
7. PACKING RESILIENT	