

MODEL

BX



INSTALLATION, OPERATION & MAINTENANCE MANUAL

BX Knife Gate Valve



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0. INTRODUCTION

The BX model knife gate is a bi-directional wafer valve specifically designed for the isolation of pulverized coal burner lines on coal fired boilers during maintenance. The valve is dust tight which makes it suitable for other bulk handling applications, such as silo outlet valves.

This valve has been designed for use in potentially explosive areas (ATEX) and it complies with DIN EN 14460:2007-07 (Explosion resistant equipment). This valve can be used as an effective system against flame propagation with gate in closed position in the event of an explosion.

The BX 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 clearly inform 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.

Limits of 2014/34/EU

These valves have been classified in Device Group II and fall in the following categories:



- II 1GD / 3GD c → Category 1G or 1D inside the valve / Category 3G or 3D outside the valve
- II 1GD / 2GD c → Category 1G or 1D inside the valve / Category 2G or 2D outside the valve

Intended Use: Dust and gas handling
 Dust classification: St1 (coal dust)
 Gas classification: IIC (Hydrogen) → this class covers any gas or steam

Valves Pressure rating DN 700-1000: 3 bar

DIN EN 14460:2007-07

Valve housing resistance to explosion pressure and ignition disrupting resistance against St1 dust explosion in closed position: DN 700-800: 9,6 bar
 DN 900-1000: 10,5 bar

Note: these pressures are based on an initial atmospheric pressure condition

IMPORTANT: Pressure rating of the valve refers to maximum working pressure of the valve. The maximum explosion pressure exceeds many times the working pressure, so 2014/34/EU limits must always be observed.

It is the user's liability to clearly inform 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 the 2014/68/EU 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.

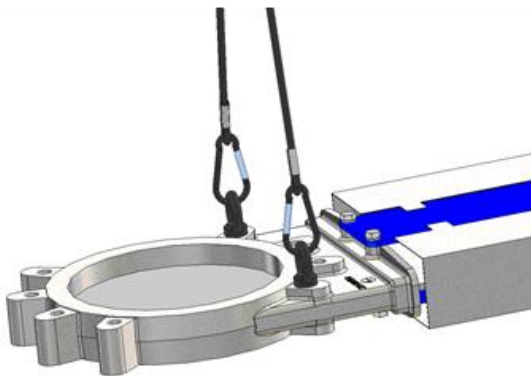


Fig. 1 Handling with eyebolts

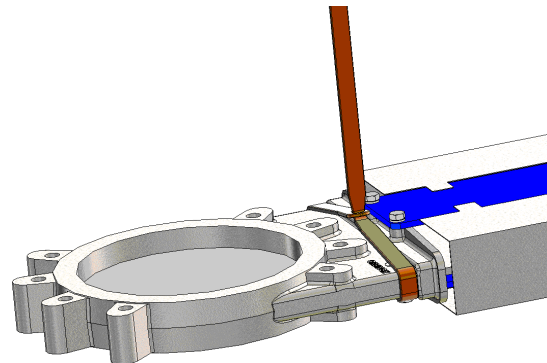
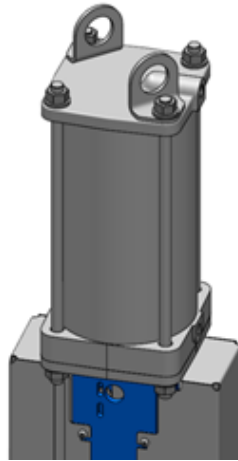


Fig. 2 Handling with soft straps

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

ORBINOX pneumatic valves (with $\varnothing 125$ cylinder and above) are supplied with 2 lifting lugs for a safe handling of the valve for vertical movements

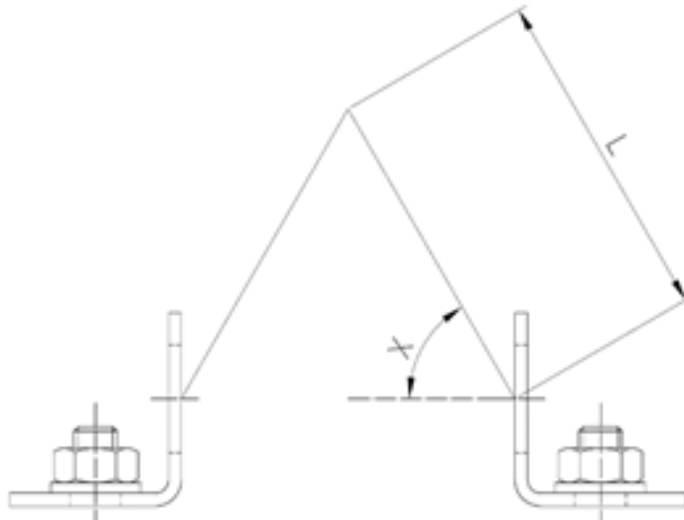


Handling WARNING:



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

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

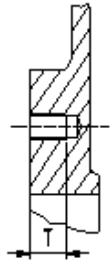
Before installation, inspect the valve body and components for any damage that may have occurred during shipping or storage. Make sure the internal cavities within the valve body are clean. Inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and that the flanges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

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.

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-10 (EN 1092-1)	CL150 (ASME B16.5/B16.47 Series A)	Torque (N.m)
700	20	M27	1 1/4" - 7 UNC	350 Nm
800	20	M30	1 1/2" - 6 UNC	470 Nm
900	20	M30	1 1/2" - 6 UNC	470 Nm
1000	20	M33	1 1/2" - 6 UNC	645 Nm

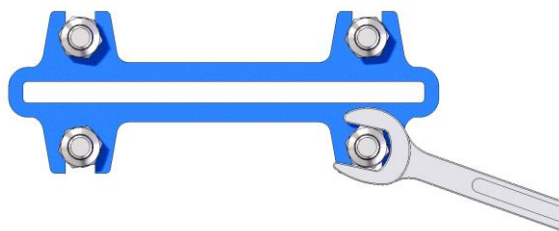
Select the recommended torque based on bolt size for other flange drilling patterns. Make sure that cross-pattern tightening sequence is always followed.



This valve is typically installed in vertical pipes. Arrow in the body indicates fluid direction for appropriate valve orientation. The construction of suitable supports is always recommended. (Please check your ORBINOX representative for further information).

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 follower (5) 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 glandfollower (5) and the gate (2).



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If the glandfollower nuts are overtorqued, 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 absolutely maximum torque value for tightening the glandfollower nuts. Overtorque might result in body and/or packing gland breakage.

DN	Torque (N.m)
700 - 1000	120

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

Approximate weight of the handwheel-operated valve (rising stem):

DN (mm) : kg
DN 700: 405 kg
DN 800: 512 kg
DN 900: 680 kg
DN 1000: 865 kg

3. ACTUATORS

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

3.1. HAND OPERATED (BEVEL GEAR)

Turn the hand wheel anticlockwise to open the valve. Turn the hand wheel clockwise to close the valve.

3.2. 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.

3.3. ELECTRIC ACTUATOR

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



Special requirements for ATEX valves when used as an effective system against flame propagation in closed position:

1. Hand operated: When closed, a minimum 25kg of pull force must be applied to the wheel to guarantee the right tightness and be considered effective.
2. Pneumatic: In closed position, 6bar air pressure must be permanently switched on and air pressure must be controlled.

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 (4) if the valve is a resilient seated type.

The life of these components 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. • Rising stem valves. Photo 1: Release the stem from the gate (3)
 - Non rising stem. Photo 2: Release the stem nut from the gate (3)

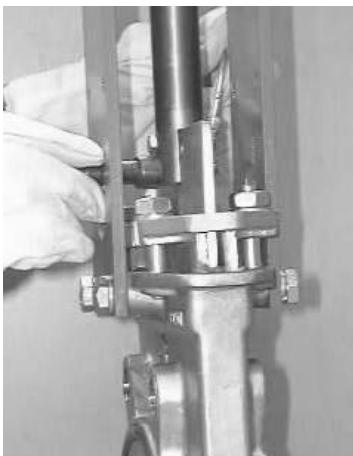


Photo 1

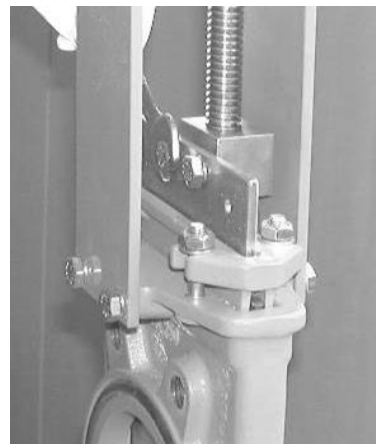


Photo 2

4. Loosen the screws of the yoke (8) and remove it (without loosening the actuator).
5. Loosen the nuts of the gland follower (7) and remove it. (Photo 3)
6. Remove the worn packing lines (5), the worn O-ring (6) and clean the stuffing box.
7. Insert the new packing lines (5) and the new O-ring. (Fig. 4)
8. Once the necessary packing lines (5) have been inserted, proceed with a steady initial tightening of the gland follower (7). (Photo 3)
9. Place the yoke (8) (with the actuator) and tight it.
10. Fix the stem to the gate (3) -Rising stem valve; Photo 1-, or fix the stem nut to the gate - Non rising stem; Photo 2-.
11. Put back the gate guards.
12. Carry out some operations with fluid pressure and then re-tighten the gland follower (7) to prevent any leakage. See recommended tightening torques in table 1.



Photo 3

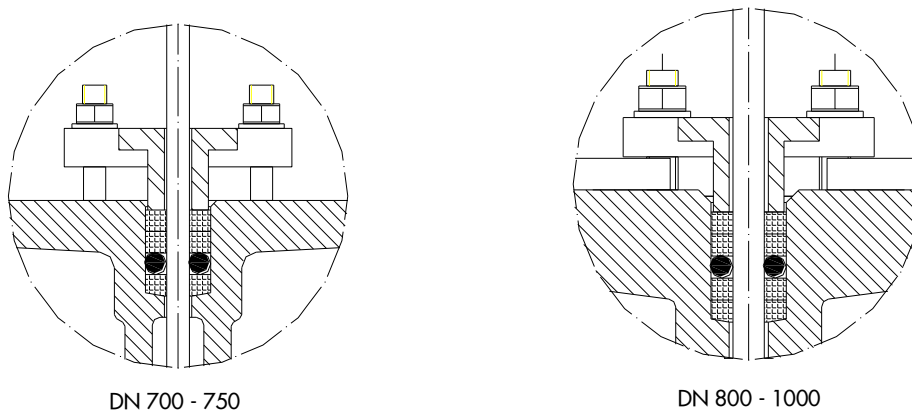


Photo 4

4.2. Replacement of the seal (4):

1. Remove the valve from the pipeline.
2. Remove the gate guards (for automatically actuated valves only).
3. Release the stem from the gate (3) -Rising stem valves; Photo 1 -, or release the stem nut from the gate -Non rising stem; Photo 2-.
4. Loosen the screws of the yoke (8) and remove it (without losing the actuator).
5. Loosen the nuts of the gland follower (7) and remove it.(Photo 3)
6. Remove the packing lines (5), the O-ring (6) and the gate (3) and clean the stuffing box.
7. Loosen the screws which hold together body (1) and counter body (2).
8. Remove the worn seal (4) and clean the seal housing.
9. Once the new seal (4) is cut to necessary length (table 4), put it into the seat housing of the body (1) as shown in Fig. 5.

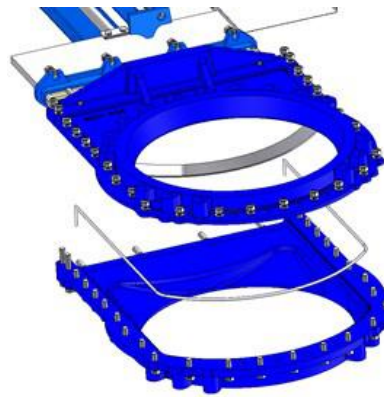


Photo 5

SEAL LENGTHS

DN	450	700	800	900	1000
L (mm)	1750	2350	2660	2945	3255

11. Assembly body (1) and counter body (2) back and tighten the bolts.
12. Insert the gate (3) into the body. Proceed to reinstall the packing, O-rings, gland follower, yoke and actuator as shown in 4.1.

4.3. Lubrication:

To those hand wheel operated valves, twice a year, it is recommended to apply to the stem calcium-based grease with the following characteristics: highly water resistant, low ash content, and excellent adherence.

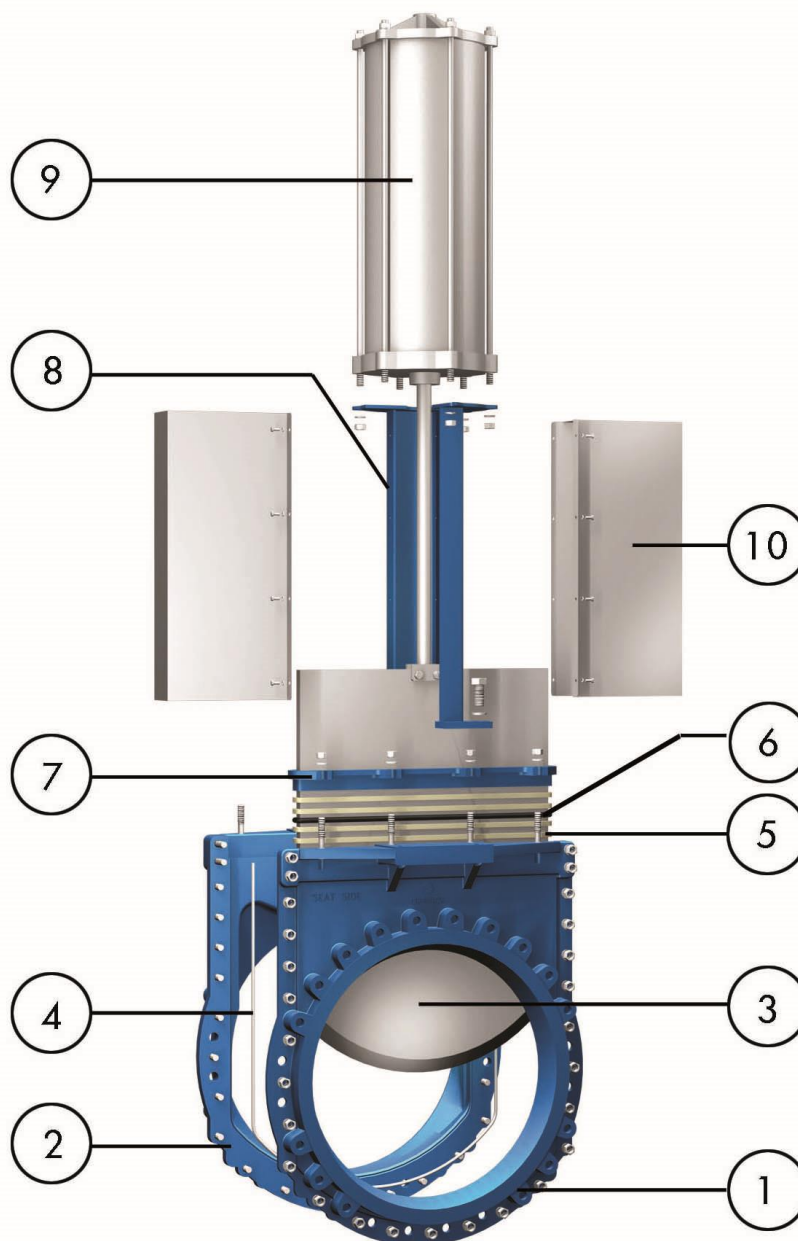
5. STORAGE

- 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	6. O-RING
2. COUNTER BODY	7. GLAND FOLLOWER
3. GATE	8. YOKE
4. SEAL	9. PNEUMATIC CYLINDER
5. PACKING	10. PROTECTION GUARDS