

MODEL

BT (SER.22)



INSTALLATION, OPERATION & MAINTENANCE MANUAL

BT (SERIES 22) Knife Gate Valve



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0. INTRODUCTION

The BT (SER.22) model knife gate is a bi-directional valve and consequently it can be installed without considering the flow direction.

This valve is designed for general industrial service applications. The design of the body and seat assures non-clogging shut-off with suspended solids.

The BT (SER.22) 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 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.

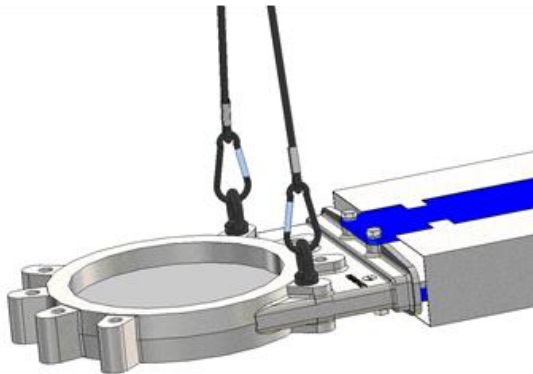


Fig. 1 Handling with eyebolts

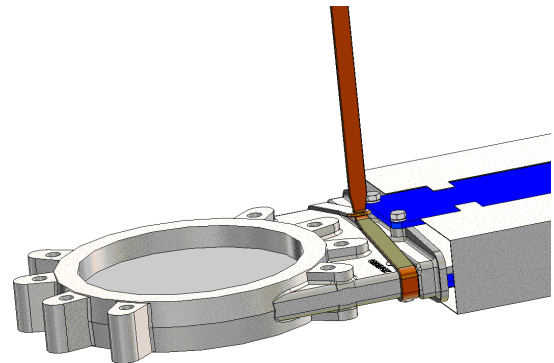
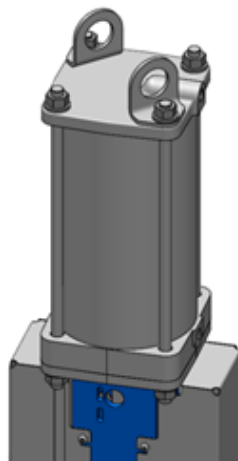


Fig. 2 Handling with soft straps

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

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

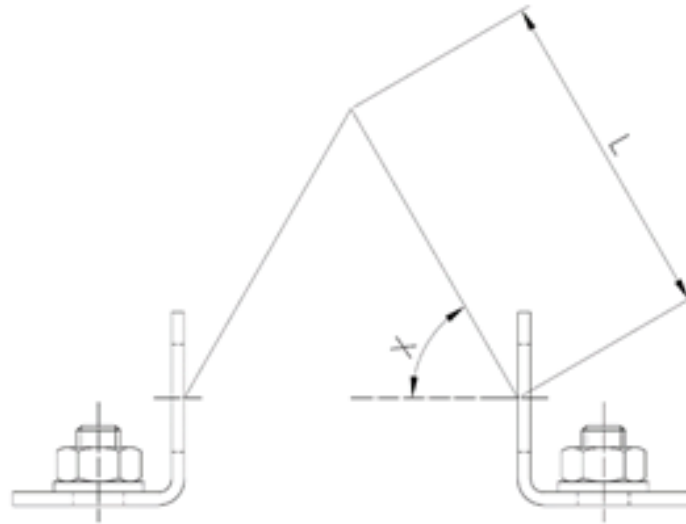


Handling WARNING:



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

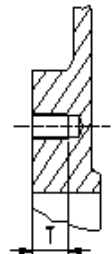
Before installation, inspect the valve body and components for any damage that may have occurred during shipping or storage. Make sure the internal cavities within the valve body are clean. Inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and that the flanges are clean. Note that these bi-directional knife gate valves are not suitable for dead-end service without a slight modification or a counter flange, please consult factory.

Standard BT (SER.22) valves are not suitable in all sizes for use with Slip on Angle Flanges. For use with this style flanges, please contact an ORBINOX representative for additional information.

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.

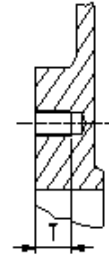
The following table shows recommended torque values for the valve fixing bolts and the maximum depth (T) of blind tapped holes:

DN (inch/mm)	T (inch)	CL150 (ASME B16.5/B16.47 Series A)	Torque (lbf x ft)
2" / 50	7/16"	5/8" - 11 UNC	52
3" / 80 - 4" / 100	11/32"	5/8" - 11 UNC	52
5" / 125	3/8"	3/4" - 10 UNC	52
6" / 150	3/8"	3/4" - 10 UNC	103
8" / 200	7/16"	3/4" - 10 UNC	103
10" / 250 - 12" / 300	18/32"	7/8" - 9 UNC	103
14" / 350	1/2"	1" - 8 UNC	103
16" / 400	1/2"	1" - 8 UNC	173
18" / 450	18/32"	1 1/8" - 7 UNC	173
20" / 500	1"	1 1/8" - 7 UNC	173
24" / 600	7/8"	1 1/4" - 7 UNC	258
30" / 750	1 1/8"	1 1/4" - 7 UNC	258
36" / 900	1 1/4"	1 1/2" - 6 UNC	347



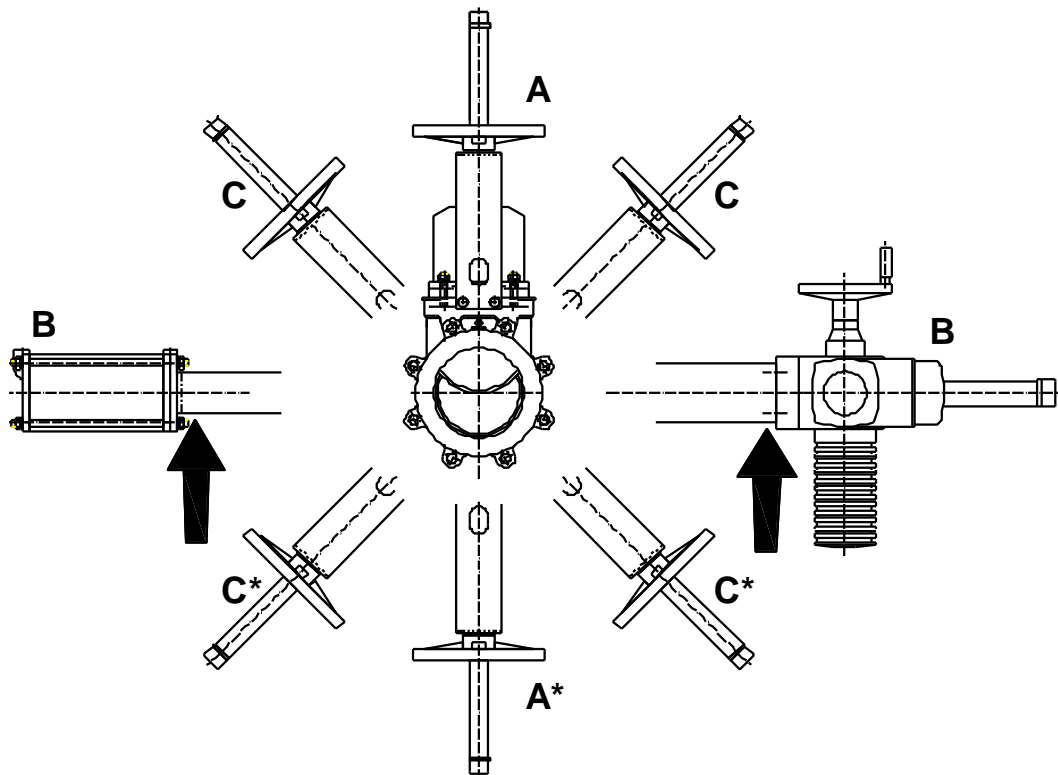
Select the recommended torque based on bolt size for other flange drilling patterns.
Make sure that cross-pattern tightening sequence is always followed.

DN (inch/mm)	T (mm)	PN-10 (EN 1092-1)	Torque (N.m)
2" / 50	11	M16	70Nm
3" / 80 - 4" / 100	9	M16	70Nm
5" / 125	10	M16	70Nm
6" / 150	10	M20	140Nm
8" / 200	12	M20	140Nm
10" / 250-14" / 350	14	M20	140Nm
16" / 400	14	M24	235Nm
18" / 450	17	M24	235Nm
20" / 500	24	M24	235Nm
24" / 600	22	M27	350Nm
36" / 900	32	M30	470Nm



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

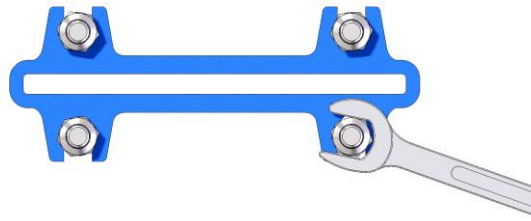
With heavy actuators (pneumatic, electric, etc.), with the valve installed horizontally (B) or at an angle (C) on a horizontal pipeline, the installation might require the construction of suitable supports. (See the following diagram and consult the technical department ORBINOX).



** For these positions please consult ORBINOX*

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 (6) 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 (6) and the gate (2).



If the gland follower nuts are over-tightened, the force needed to operate the valve will increase, the valve function will be affected and the packing lifespan will be shortened.

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

DN (inch/mm)	Torque (N.m)	Lbsf x ft
2"/50 - 8"/200	15	11
10"/250 - 12"/300	25	18
14"/350 - 24"/600	30	22
30"/750 - 36"/900	35	25

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

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

DN (inch/mm)	Weight (lbs /kg)
DN 2" / 50	15 lbs / 7 kg
DN 2,5" / 65	17 lbs / 8 kg
DN 3" / 80	20 lbs / 9 kg
DN 4" / 100	24 lbs / 11 kg
DN 5" / 125	33 lbs / 15 kg
DN 6" / 150	40 lbs / 18 kg
DN 8" / 200	66 lbs / 30 kg
DN 10" / 250	97 lbs / 44 kg

DN (inch/mm)	Weight (lbs /kg)
DN 12" / 300	127 lbs / 58 kg
DN 14" / 350	96 lbs / 211 kg
DN 16" / 400	124 lbs / 273 kg
DN 18" / 450	168 lbs / 370 kg
DN 20" / 500	192 lbs / 423 kg
DN 24" / 600	245 lbs / 540 kg
DN 30" / 750	455 lbs / 1003 kg
DN 36" / 900	680 lbs / 1499 kg

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 (11) counter clockwise. To close turn the handwheel clockwise.

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 air supply pressure can vary between 55psi/3,5 bar and 150psi/10 bar. However, the size of the actuator for each valve has been designed for an air supply pressure of 90psi/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 / -4F°)
- 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 / -4F°)

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.

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 sleeve (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.

To change the sleeve, remove the valve from the line.

4.1. Replacement of the gland packing (5) and the sleeve (3):

1. Depressurise the circuit and place the valve in close position.
2. Remove the gate guards (for automated valves only).
3.
 - Non rising stem valves. Photo 1: Release the stem nut (8) from the gate (2).
 - Rising stem valves. Photo 2: Release the spindle or stem (7) from the gate (2).

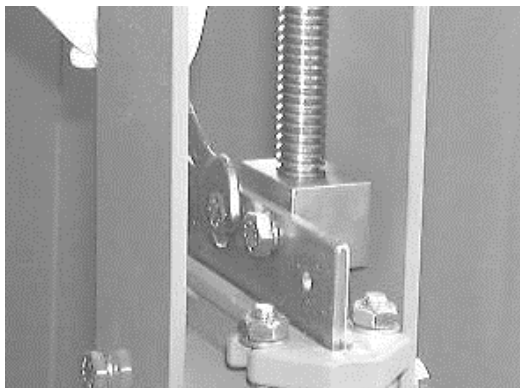


Photo 1



Photo 2

4. Loosen the screws of the yoke (9) and remove it (without loosening the actuator).
5. Loosen the nuts of the gland follower (6) and remove it. (Photo 5)
6. Remove the old packing rows (5), gate (2), 2 seat rings (4) and the old sleeve (3). Clean the stuffing box area.
7. In order to have the sleeve correctly positioned, have the new sleeve (3) greased and insert it in the body (1) cavity.
8. Introduce the gate (2) completely until the sleeve is totally centered. (Photo 3)
9. Fix the 2 seat rings (4) and secure them by means of bolts. (Photo 4)

DN (inch/mm)	Seat ring screws	Torque (N.m)	Torque (Lbsf x ft)
2"/ 50 - 4"/100	M4	5	3,5
5"/125 - 8"/200	M5	5	3,5
10"/250 -12"/300	M6	5	3,5
14"/350 -18"/450	M8	10	7
20"/500 -30"/750	M10	20	14
36"/900	M12	30	22

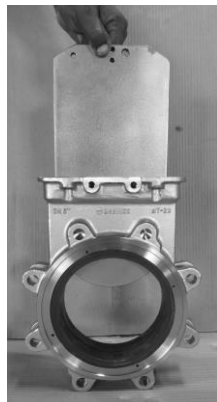


Photo 3



Photo 4

10. Once the necessary new rows of packing (5) have been inserted, proceed with a steady initial tightening of the gland follower (6). (Photo 5)



Photo 5

11. Reinstall the yoke (9) (with the actuator) and tighten it.
12. Reinstall the stem nut (8) to the gate (2) (Non rising stem valves. Photo 1) or reinstall the stem (7) to the gate (2) (Rising stem valves. (Photo 2).
13. Reinstall the gate guards (for automated valves only).
14. Carry out some operations with a loaded circuit and then re-tighten the gland follower (6) to stop any leakage.

4.2. Lubrication:

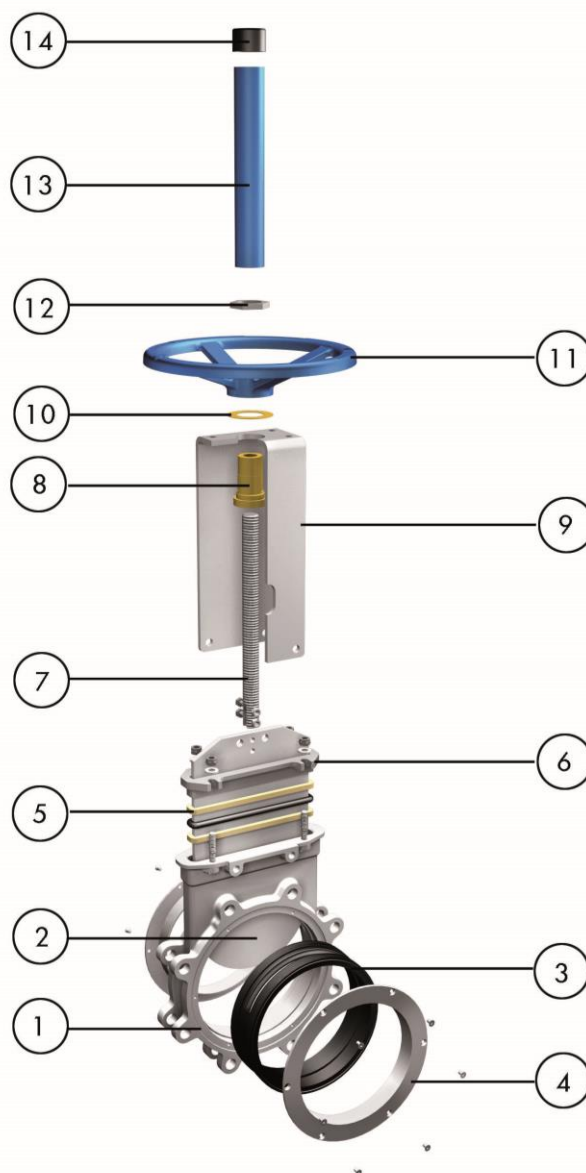
Twice a year, it is recommended to remove the protection cap (14) and fill up the stem protector (13) halfway with a calcium-based grease with the following characteristics: highly water resistant, low ash content, and excellent adherence.

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
- Storage temperatures: -10°C/ 14°F to +40°C/104°F
- 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. STEM NUT
2. GATE	9. YOKE
3. SLEEVE	10. THRUST WASHER
4. SEAT RING	11. HANDWHEEL
5. PACKING	12. NUT
6. GLAND FOLLOWER	13. STEM PROTECTOR
7. STEM	14. CAP