

MODEL

PA



INSTALLATION, OPERATION & MAINTENANCE MANUAL

PA Pinch Valve



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0. INTRODUCTION

The PA model pinch valve is a heavy-duty enclosed construction full bore valve that employs elastomer sleeves for flow shut-off and control in applications with abrasive and corrosive slurries. The sleeve is the only part in contact with the media, no other mechanical parts are required, and it is a maintenance free part

1. Valve main components

- Body: two cast part body design for installation between flanges, designed for heavy duty applications. The enclosed construction protects the sleeve from ambient conditions and avoids premature sleeve wear. As standard in ductile iron, other materials or fabricated construction also available upon request
- Sleeve: flexible, long-lasting, self-cleaning rubber sleeve available in a wide variety of elastomers suitable for any application. The sleeve is the only part exposed to the slurry materials. Self-cleaning by flexing the sleeve with opening /closing cycles prevents build-up scaling deposits. The full bore design without any pockets or cavities also avoids any slurry accumulation
- Pinch system: single ductile iron construction plug for sizes up to DN 4"/100 and double pinch rod system in mild steel construction with stainless steel tie rods for sizes from DN 6"/150 up to DN 12"/300. Heavy-duty design for high cycle operation conditions
- Stem: Made of stainless steel to provide high resistance to corrosion and a long life
- Actuators: all actuators supplied by ORBINOX are interchangeable, and supplied with a standard mounting kit for installation purposes on site

2. Valve main features are as follows

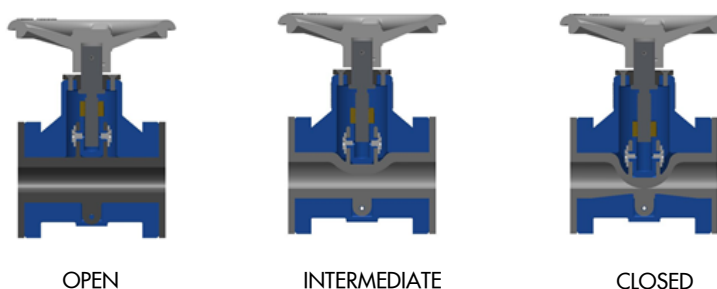
- Bi-directional operation, both for on/off and throttling service
- Clog resistant, 100% full bore design with no flow restrictions and turbulence, and self-cleaning
- Enclosed body, protecting the sleeve from outside conditions
- Sleeve is the only part exposed to the line process, no other mechanical parts required
- Single and double pinch closing mechanisms
- No packing, therefore drop-tight to the outside
- Reduced process downtime and maintenance cost with easy and quick replacement
- Manual and pneumatic (single and double acting) actuators. Electric and hydraulic actuators available upon request
- Same face-to-face distance as that for gate, plug or ball valves up to 6"/DN150
- Operation under vacuum conditions feasible

3. Valve operation

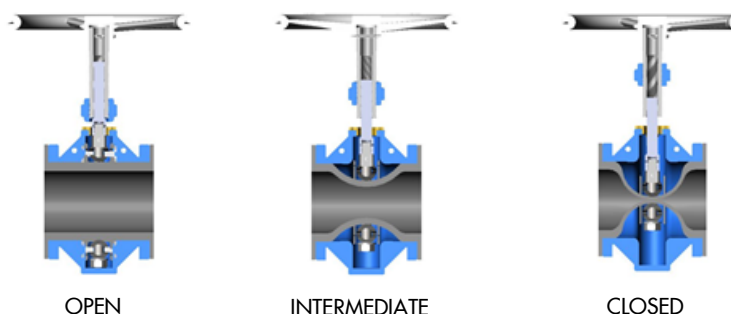
Valve closes and opens by means of the pinch system

For sizes up to DN100, a single pinch bar driven by the torque or thrust applied by the actuator pushes the sleeve to the closed position. When opening, the pinch bar simply retreats back and the elastomer sleeve recovers its normal position (also helped by the line pressure)

Single pinch:



Double pinch:



For sizes from DN150, two pinch rods driven by the torque or thrust applied by the actuator push the sleeve both from the top and also from the bottom to the closed position. When opening, the pinch rods simply retreats back and the elastomer sleeve recovers its normal position (also helped by the line pressure)



When operating the valve do not introduce tools or parts in the valve space with moving parts

4. General recommendations

The PA valve is recommended for slurry applications where resistance to abrasion and erosion is critical. Slurry is defined as a liquid with relatively small particles, held in suspension

5. Certifications and Directives

The PA valve complies with the following European directives

- DIR 2006/42/EC (machines)
- DIR 2014/68/EC (PED) Fluid: Group 1 (b), 2 (Cat. I, mod.A)

1. STORAGE AND HANDLING

1.1. Storage

- Indoor storage in a well-ventilated, clean and dry room is recommended, to avoid moisture and condensation on the equipment.
- Valves should not be exposed to temperatures higher than 25°C
- Avoid exposure to ozone producing equipment as well as chemicals
- Avoid sunlight. If outdoor storage cannot be avoided, precautions should be taken to keep valves clean and dry. Cover the valve and protect it from sources of heat or direct sunlight.
- During the storage, the valve must always be kept in the open position. The only exception is when the valve is supplied with a single acting cylinder (spring to close). In this case the valve will be supplied in the closed position, with the spring cylinder fully extended. **DO NOT STORE** the valve with the spring in a compressed, fully energized position
- Do not stack any other goods on top of the valve
- Avoid dirt and/or moisture contamination of the stem. Grease the stem generously before storing
- To prevent contamination in the cylinder air supply ports ensure actuators have appropriate pipe plugs installed
- Prior to start-up, clean the valve and apply grease
- For all other commercial components installed on the valves, such as electric motors, solenoids, etc., please, consult their respective operational manuals.

1.2. Handling



For valve weighing more than 25 Kg, lifting equipment must be used

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

- When lifting the valve secure ropes or slings around the body. Lift the valve securely from the body, verifying the center of gravity and supporting the valve to avoid turning
- Valve can also be lifted using the lifting holes of the body
- Do not lift the valve from the actuators. They are not designed to bear the weight and could easily be damaged
- Do not lift the valve from the valve bore as it may cause damage to the sleeve
- Ropes and slings to be used must be verified to make sure they can carry the weight of the valve

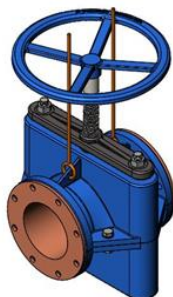


Fig. 1 Handling with eyebolts

2. INSTALLATION



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 sleeve inside is clean. Inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and that the flanges are clean.



The valve is bi-directional, and consequently permits installation without considering the flow direction. Always install and keep the valve in the open position until it starts normal operation. Use bolts of correct length that will not extend beyond body flange back face

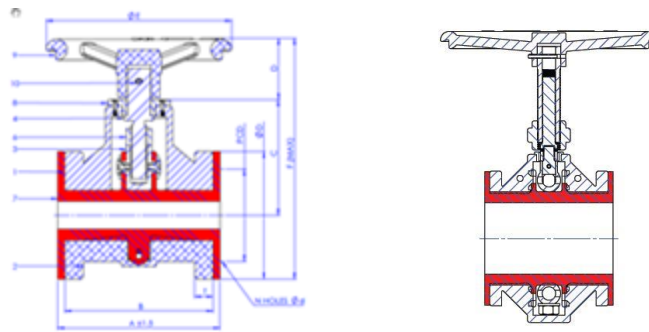
Special care should be taken to **verify the piping** on which the valve is going to be installed

- Piping is correctly supported
- Piping is correctly aligned both axially and radially. Valve sleeves are not designed to absorb any forces transmitted by the piping
- Correct distance between piping flanges is assured and that these flanges are parallel to the valve body.
- Use caution not damage to the sleeve by forcing the valve into an opening that is too narrow when the valve is being positioned between the pipe flanges. It is possible to use a lubricant (non- petroleum-based lubricant such as silicone or ordinary liquid soap) to help slip the valve between the pipe flanges
- PA valves have been designed to be used with full flat or raised face metal flanges. Additional flange gaskets are not required as the outer face of the sleeve acts against the flange face to provide a tight seal. Piping counter flange ID should match sleeve ID
- For other type of piping counter flanges, please contact ORBINOX for technical assistance and instructions

PA pinch valves have been designed for horizontal position installation. For any other installation position, please contact ORBINOX for technical assistance and instructions

When installing the valve

- See Chapter 1.1 for Valve Handling instructions
- Do not use sharp tools on the sleeve rubber during installation as sleeve might damage and cause potential leakage between flanges
- See here below Valve Bolting Data



DN (mm)	BOLTS ANSI B16.5 #/SIZE		BOLTS EN1092-2 PN-10 #/SIZE		T mm	(A-B)/2 mm
25	4	M12	4	M-12	16	6
40	4	M12	4	M-16	18,5	6
50	4	M16	4	M-16	19	6
65	4	M16	8	M-16	21	6
80	4	M16	8	M-16	23	6
100	8	M16	8	M-16	24	7
150	8	M19	8	M-20	25	10
200	8	M19	8	M-20	28	10
250	12	M22	12	M-20	29	14
300	12	M22	12	M-20	32	15

- Bolts must be **tightened following a cross pattern**, first at approx. 50% the torque value and, once all bolts are in position, to 100% following the same cross pattern. Tighten all bolts evenly
- Do not use bolts that are too long, body can be damaged if bolts get out too much for body flange rear faces

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With the valve installed in the piping

- Generously grease the stem using a silicone-based grease
- Verify that all bolts are correctly tightened
- Verify, if required, that all pneumatic connections are tight
- First, operate the valve with no flow in the pipeline
- Then test valve operation with flow
- When performance has been tested, the valve can be put into operation

Approximate weight of PA pinch valve:

DN (mm)	HANDWHEEL kg	PNEUMATIC kg
25	5	6
40	10	10
50	16	16
65	20	22
80	25	29
100	42	43
150	80	125
200	140	160
250	175	190
300	210	230

3. ACTUATORS

3.1. HANDWHEEL

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

3.3. PNEUMATIC

Single-acting or double-acting, in either case the supply pressure can vary between 4 and 7,5 bar. The cylinder stroke is a fixed length and does not require any adjustments

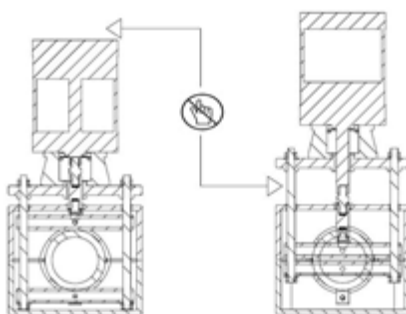
It is essential for a good maintenance of the cylinder that air should be well dried, filtered and lubricated

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



For DN 150 - 300 (DN 6" - 12")

When the valve operates, the actuator and the support moves. Do not put part of your body or tools between the moving parts of the valve.



4. MAINTENANCE

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
- According to EN 13463-1 (15), during installation and maintenance operations, use hand tools (non electric) with Working Allowance

Valve 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 . Preventive Maintenance Instructions

- General visual inspection on a monthly basis to verify general valve situation and also for troubleshooting
 - Valve difficult to operate: verify stems (lubrication), air supply, fittings, accessories, ...
 - Valve doesn't fully close: verify there is no obstruction in line
 - Leaks between flanges: verify bolts tightening, length (not hitting body), ...
- In manual pinch valves, grease stems periodically
- For pneumatic pinch valves, please see ORBINOX Pneumatic Cylinder – Maintenance Manual
- Valves should be operated minimum once every month
- Sleeves are the only part in contact with the media, therefore the only valve recommended spare part. The sleeve doesn't require any preventive maintenance operation

4.2. Lubrication

- A silicone-based lubricant is recommended
- If valves don't operate much, less than once per month, lubrication prior to each stroke is recommended
- Under no circumstances should a hydrocarbon-based lubricant be used

Standard PA valves have no packing. All manual valves are delivered pre-treated with silicone lubricant. Prior to putting into service, make sure the valve is well lubricated



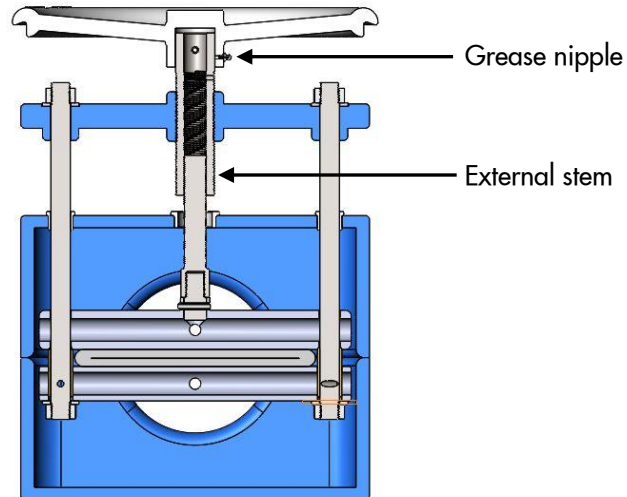
Lubrication hole

Apply lubricant on external stem directly.

Pipe bushing lubrication through grease nipple on external lead screw.

Note:

Apply lubricant in valve closed position.



4.3. Sleeve Replacement

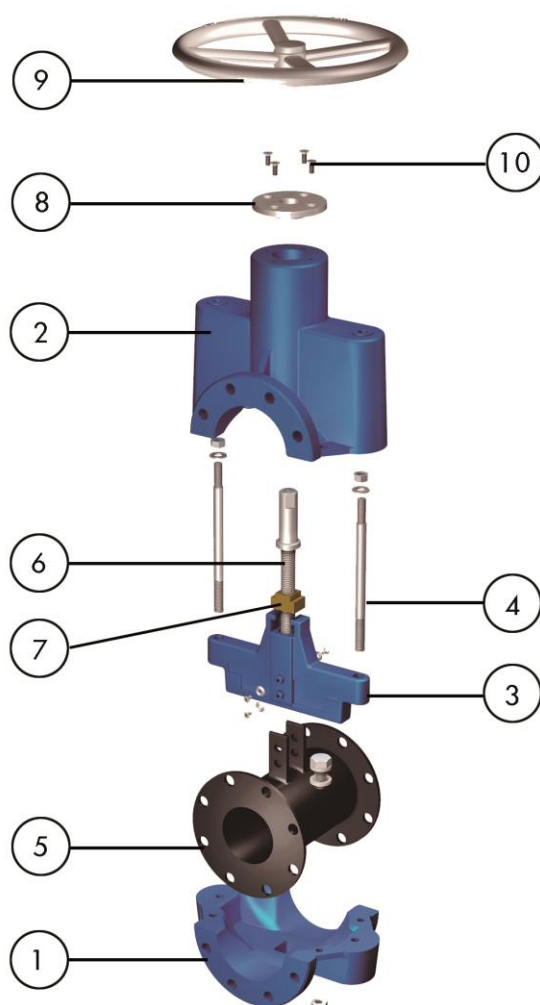
Follow the steps below to change out the elastomer sleeve while the PA pinch valve is installed in the pipeline.

- PA valve should be isolated from the plant process and actuated to its open position. Take appropriate lock-out measures to prevent accidental actuation of the PA valve until it is ready to be put back in operation. Review section 2 about the safety measures around the PA valve.
- Remove flange bolts supporting the lower valve body. Loosen, but do not remove, the flange bolts supporting the upper valve body.
- Open the bolts between the valve body halves and detach the lower part of the body. As all PA valve sleeves are equipped by opening tabs attached to the pinching mechanism, detach them from the upper pinch bar (DN25 up DN100) or from the upper and lower pinch bar (DN150 up to DN300)
- Remove the old sleeve and replace it with the new one, fixing the opening tabs to the pinch mechanism. The moulded opening tabs are already shaped to be fixed with gaskets.
- Replace opening tabs bolts, nuts and washers if needed. Use flat washers on every hole. Make sure that bolts will not puncture the sleeve in closed position.
- Make sure the flange holes in the rubber sleeve are aligned with the drilled holes in the metal body frame.
- Check the body sealing between the body halves and the condition of the bushing. Apply a coat of silicone sealant to the mating flanges of the body assembly.
- Assemble the valve and adjust the pinch bars before installing the valve to the pipeline.
- Leave the valve to OPEN position until it is installed and follow the storage instructions if the valve is placed in stock.
- Tighten the flanges
- Operate the valve a couple of times before leaving it in the position required for the process

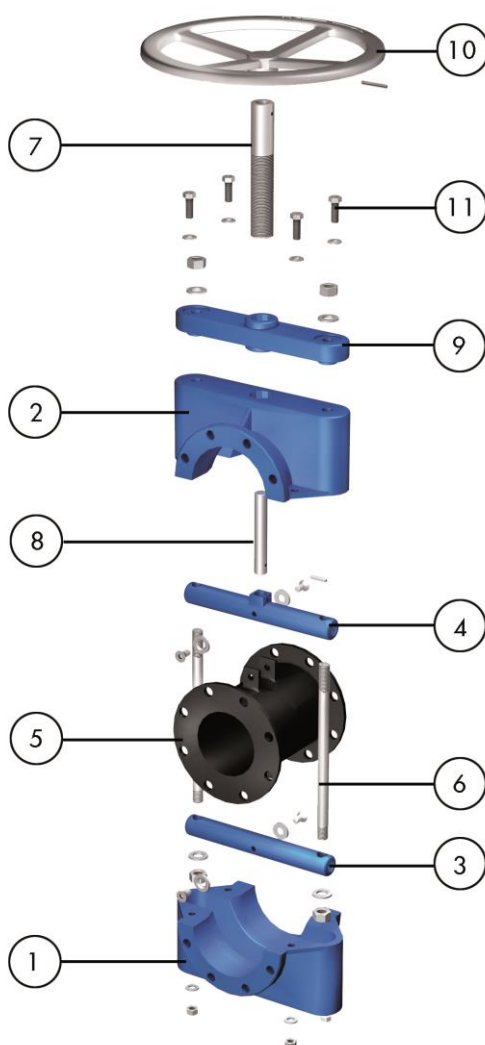
4.4 Pneumatic Cylinder seal replacement

See Pneumatic Cylinder – IOM for actuator preventive maintenance operations

5. PARTS LIST & DRAWINGS FOR DN 25 - DN 100 (DN 1" - 4")



1. LOWER BODY	6. STEM
2. UPPER BODY	7. DRIVE NUT
3. PINCH BAR	8. RETAINER
4. TIE ROD	9. HANDWHEEL
5. SLEEVE	10. FASTENERS

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1. LOWER BODY	7. STEM
2. UPPER BODY	8. PIPE BUSHING
3. LOWER PINCH ROD	9. SUPPORT
4. UPPER PINCH ROD	10. HANDWHEEL
5. SLEEVE	11. FASTENERS
6. TIE ROD	