

Installation, operation, and maintenance instructions for Flowrox valves Open Valve (PV) & Enclosed Valve (PVE)



These instructions must be read carefully and understood prior to the installation, use, and servicing of this product.

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1 GENERAL

1.1 General safety instructions for PV & PVE valves

In this manual, the following symbols are used to highlight the parts requiring particular attention:

SYMBOL	DESCRIPTION
	<p>Risk to personal safety: Neglecting the safety measures can cause serious personal injury or death.</p>
	<p>Electrical safety: Neglecting the safety measures can cause serious personal injury or death.</p>
	<p>Machinery or environmental risk: Incorrect maintenance or operation of the product can harm the environment or the product.</p>
	<p>Read the operation and maintenance instructions: Read and understand the operation and maintenance instructions before using the product.</p>

2 INTRODUCTION TO DEVICE

2.1 Intended use

Open type PV.

The open body is available in diameters starting from 80mm.

The open body construction is designed for applications with:

- Low pressures
- Low temperatures
- Non-hazardous media

The open body construction is light and simple, which makes it easy to access for service. The open body also tolerates misalignment and vibration.

Enclosed type PVE.

The valve sleeve is covered by the body housing and thus protected from the environmental impacts and sunlight.

- Body construction prevents leakage of flowing media to the environment
- The valve body can be equipped with a gauge indicating pressure changes inside the body

2.2 Construction of device

Flowrox valves are made of three main components:

- flanged valve sleeve
- valve body, either open PV or enclosed PVE
- actuator and actuator control components, if applicable

The valve sleeve is the only part of the valve which is in contact with the medium flowing in the pipeline.

All valve bodies are flange ended. The standard flange drillings can be made to meet all standards (e.g. DIN, ANSI, BS, AS, JIS).

The face to face dimensions of Flowrox valves are according to ANSI/ISA 75.10.02:

- 165 mm for valves DN25...DN65
- 2 ½ times the nominal diameter for valves DN80 and bigger

2.2.1 Open body valve PV

In the open body model the body and the actuator are connected only to one of the end flanges (Fig. 1.). The construction allows a slight deviation in the pipe angle and the valve can act as a vibration absorber.

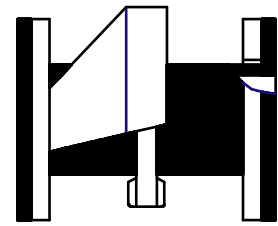


Fig. 1.



Note that in case of a sleeve breakage, the flowing liquid will leak to the environment.

2.2.2 Enclosed body valve PVE

The body of the enclosed model prevents leakage of flowing media to the environment (Fig. 2.). The lower part of the body has a plug, which can be opened to check for sleeve failure.

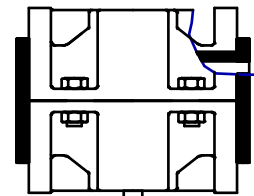
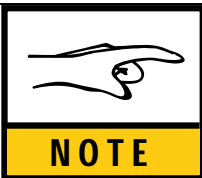


Fig. 2. plug




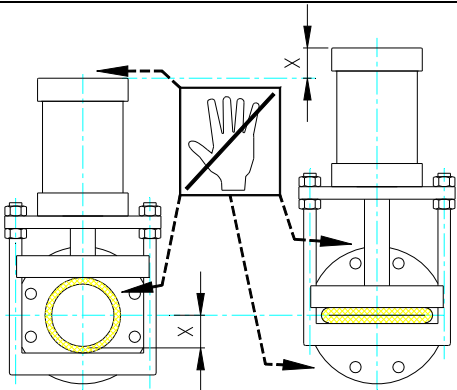
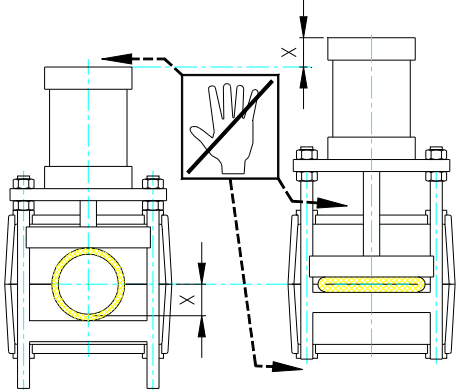
In case of a sleeve failure, slight leakage will occur through the bushings.
If you open the plug for checking, be careful as the medium may flow out.




Changing the sleeve at appropriate intervals prevents leakages.

2.3 Valve function

	<p>When the valve closes the actuator moves. Do not put tools or parts of your body between the moving valve parts. Note the injury risks (see drawings 3A and 3B).</p>
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<p>Note the dangerous places (see drawings 3A and 3B)!</p> <p>When the pinch valve closes, two pinch bars, moved by the actuator, squeeze the sleeve, closing on the center line. As the valve is fully closed, the actuator has raised one half of the valve diameter.</p> <p>The actuator raises in both models (PV and PVE) $0.5 \times$ valve nominal diameter (measure X).</p> <p>In the open model the space between the pinch bars, the space between the upper pinch bar and fixing plate of the actuator and the space below the lower pinch bar.</p>	
<p>Fig. 3A - PV open model</p>	
<p>In the enclosed model the space between the valve body and the fixing plate of the actuator and the ends of the guide bars of lower pinch bar below the valve body.</p>	
<p>Fig. 3B - PVE enclosed model</p>	

Regarding the actuators, follow the instructions of the manufacturer.

	<p>Note the possible remote control of automatic valves and turn it off before starting maintenance.</p>
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3 TRANSPORTATION, STORAGE AND LIFTING

3.1 Receiving

Check the condition of the valve package on arrival. If it shows signs of transport damage, check the operation of the valve carefully. Normally, a visual inspection of the valve is sufficient. However, if valve has been damaged during transport, contact your nearest Flowrox sales office immediately.

3.2 Storage

The sleeves must be stored as follows:

- The storing temperature should not exceed +25°C, preferably below +15°C but not under +5 °C. Keep the storage temperature as constant as possible.
- Store the sleeves in a dry place. Prevent water from condensing on sleeve surfaces.
- Avoid ultraviolet light. Protect the sleeves against straight sunlight. Use warehouse instead of storing outside.
- Remove all equipment generating ozone from the room where sleeves are stored. Minimize the store room ventilation.
- Store sleeves so that they are free from tension. Sleeves should be stored in vertical position on smooth support. Do not store sleeves one on top of another.
- Keep the sleeves off the chemical effect of solutions, semi-solids, impurities and solvent vapours during storing.
- Try to keep the storing time of sleeves as short as possible. Always use first the material which has been longest in stock.

3.3 Lifting

When lifting the valve, fasten the ropes to the valve body or around it. Note the center of gravity and support the valve to avoid it turning around. In some models the center of gravity is located towards the actuator.

4 INSTALLATION

4.1 Open body model (PV)

The sleeve has not been designed to withstand axial forces. The pipes must therefore be supported properly so that neither tension nor compression is caused. Use cross-tightening for flange bolts. Do not overtighten bolts.

Make sure that no inappropriate items get between the pinch bars and the sleeve.

If possible, protect the sleeve from direct sunlight. Direct sunlight and UV light deteriorate certain rubber qualities; this must also be considered during normal use.

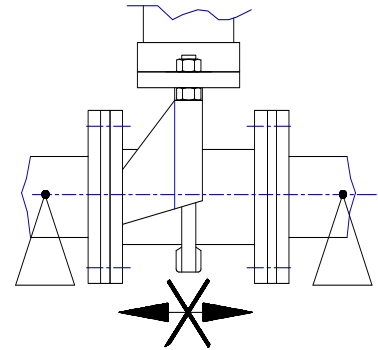


Fig. 4.

A lengthwise angle deviation of max. 5° in the pipe is allowed (Fig. 5).

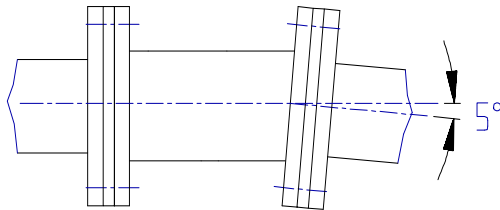


Fig. 5.

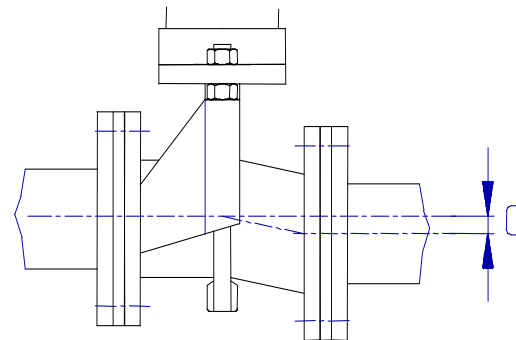


Fig. 6.

Deviation in the center line of the pipe (C), (Fig. 6):

PV 80...100	max. 5 mm
PV 125...250	max. 10 mm
PV 300...500	max. 15 mm
PV 550...1000	max. 20 mm

4.2 Enclosed body model (PVE)

Make sure that no inappropriate items get between the valve body and the actuator.

4.3 Both models (PV and PVE)

The valve nominal size means the inner diameter of the sleeve. The pipe inner diameter should match this diameter as closely as possible. Whenever possible, install the actuator in a vertical position. Valve can be assembled either way in terms of flow direction.

If you have to install the actuator horizontally, it has to be supported to ensure the operation, especially if the actuator is heavy. Install a sliding surface under the actuator (Fig 7).

The support can be fixed on the wall (1), on the floor (2) or the pipeline (3).

The valve can be installed in either way depending on the flow direction.

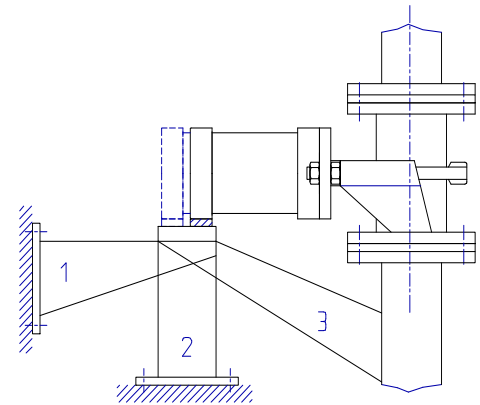


Fig. 7.

When installing the valve to the pipeline, it has to be in the open position. Tighten the flange bolts smoothly crosswise



Do not fasten actuator or any part of it to the support.

5 OPERATION

5.1 First use

Flowrox valves are normally delivered fully assembled and ready to use. Check the condition of the valve visually.


After installation to the pipeline, check that all connections are leak-proof.

5.2 During operation

During the operation the valve does not normally require any maintenance. The sleeve change is described in 6.2.

To ensure smooth operation, it is recommended to change the valve sleeve regularly.

Regarding the actuators, follow the instructions of the manufacturer.


 NOTE	Note the valve functions, see 2.3.
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6 MAINTENANCE


6.1 Schedule

The sleeve is the only part of the valve which is in contact with the medium flowing in the pipeline. With regular sleeve changing, the likelihood of malfunctions in the process decreases. Wear resistance of the sleeve depends on the circumstances of the process and may vary a lot.

If there is a flow through closed valve or leakage through bushings (PVE) or through damaged sleeve (PV), change the sleeve immediately.

	<p>PVE: In case of a sleeve failure, slight leakage can occur through bushings.</p> <p>PV: In case of a sleeve breakage, the flowing liquid will leak into the environment.</p>
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6.2 Changing the valve sleeve

	<p>Control the valve functions (see 2.3) and follow the instructions for adjusting of valve (6.3) to prevent accidents and to ensure the correct operation of the valve.</p>
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6.2.1 Changing the valve sleeve in open model valve (PV)

See appendix A. Open the valve and detach it from the pipeline. If the valve is equipped with opening tags, loosen the fixing screws (8 pcs) at the pinch bars and pull out the opening tags (Fig. 8).

Remove the broken sleeve by bending the rubber flange of the sleeve and by wrenching it e.g. with a pry bar / bending iron.

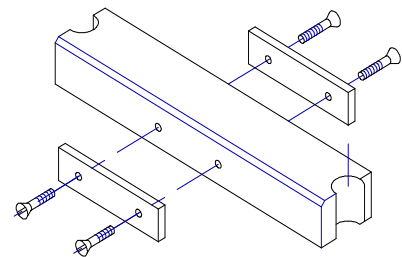



Fig. 8.

Put in the new sleeve by pressing the rubber flange on the opposite sides together, pushing its edge as far as possible through the steel flange and wrenching the rest of the sleeve through the flange e.g. with a pry bar / bending iron (see Fig. 9).

 <p>NOTE</p>	<p>The rubber flange of the sleeve allows bending. Do not damage the sleeve with a sharp tool.</p>
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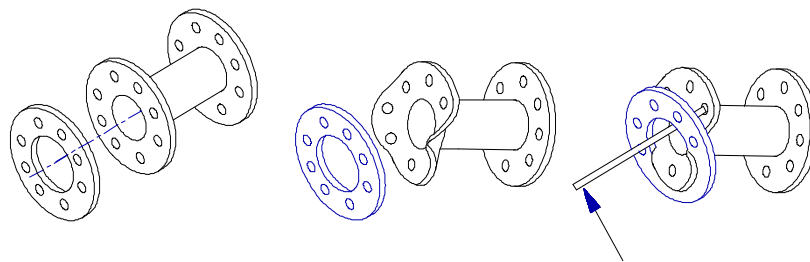




Fig. 9.

After putting in the new sleeve, fix the opening tags to the pinch bars. The excessive length of the tags can be cut away. Adjust the pinch bars before installing to the pipeline.

 <p>NOTE</p>	<p>At sleeve change, it is always important to check and adjust the position of the pinch bars. See 6.3.</p>
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6.2.2 Changing valve sleeve with enclosed model valve PVE

See appendix B. (Part numbers refer to drawing number 410006 in appendix A). Open the valve and detach it from the pipeline. Open the bolts (6.) between the valve body halves and detach the lower part of the body. If the valve has opening tags, detach them (16.) from upper (2.) and lower pinch bars (3.), 8 pcs screws (Fig.8). Take out the damaged sleeve and put in a new one. If the sleeve is stiff, detach the lower pinch bar. Remember to fix the opening tags if applicable. Check the body sealing (15.) between the body halves and the condition of the bushings (4.). A worn sealing and/or worn bushings may cause leakage to the environment in the event of a sleeve breakage. Assemble the valve and adjust the pinch bars before installing the valve to the pipeline.

 <p>NOTE</p>	<p>At sleeve change, it is always important to check and adjust the position of the pinch bars. See 6.3.</p>
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6.3 Adjusting the valve

After every sleeve change, the closing of the valve has to be checked and adjusted. A wrong adjustment may shorten the lifetime of the sleeve and cause leakage from the valve when the actuator is in the closed position.

	<p>Control the valve functions (see 2.3). Do not put tools or parts of your body between the moving valve parts.</p>
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Before reinstallation of the valve into the pipeline:

- Close the valve by using the actuator. Adjust the pinch bars parallel to each other with the nuts, which are on both sides of actuator fixing plate (Fig.10, nuts 1 and 2), so that from one end of the sleeve an even, narrow light strip (appr. 0.5 mm) is shown on the whole squeezed point of the sleeve or symmetrically on both sides (Fig. 10.1).
- Tighten both nuts (1) equally so, that the strip of light disappears.
- Unscrew the lower nuts (Fig. 10.2, nut 2) X mm from the attachment plate (see the dimension X in the table, Fig. 11).
- When the nuts (Fig. 10.3, nut 1) on the upper side of the attachment plate are tightened, the lower pinch bar rises and causes a sufficient squeeze on the sleeve to close the flow against the pressure in the pipeline. After this has been done, open the valve and it is ready to be installed to the pipeline.

If the valve is hand wheel operated, it is enough to check that the pinch bars are parallel and the light slit is shown (Fig. 10.1). A sufficient squeeze is achieved by turning the hand wheel 1/3...3/4 rounds after the valve feels tight: if the pressure in the pipeline is 1 bar - appr. 1/3 of a hand wheel rotation; PN 10 bar - appr. 1/2 of a hand wheel rotation; PN 25 bar - appr. 3/4 of a hand wheel rotation. If the valve is supplied with a reduction gear, the number of rotations is multiplied by the gear ratio.

- A. Attachment plate
- B. Upper pinch bar
- C. Sleeve
- D. Lower pinch bar

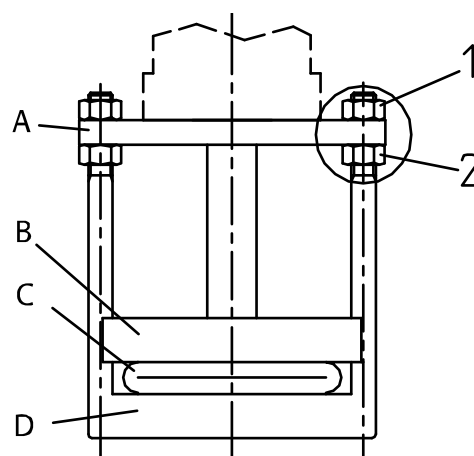
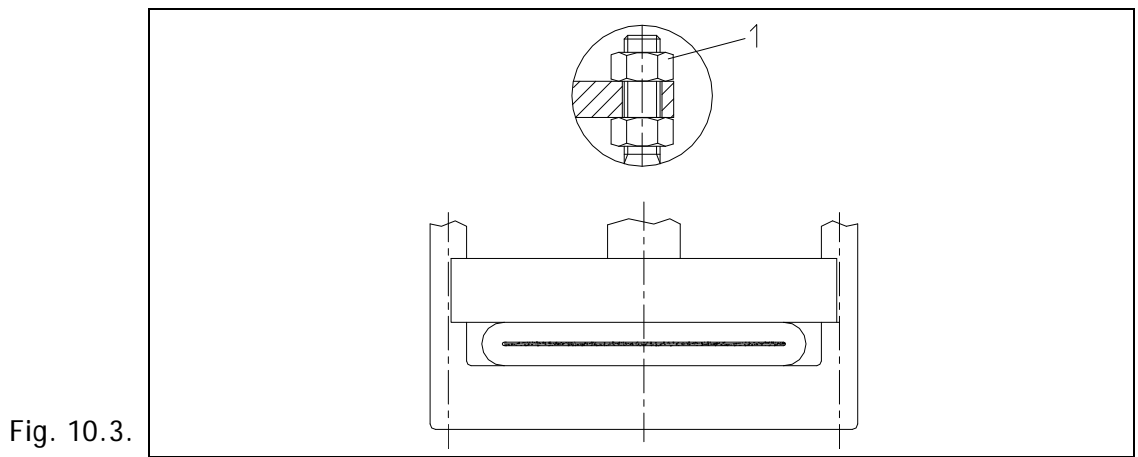
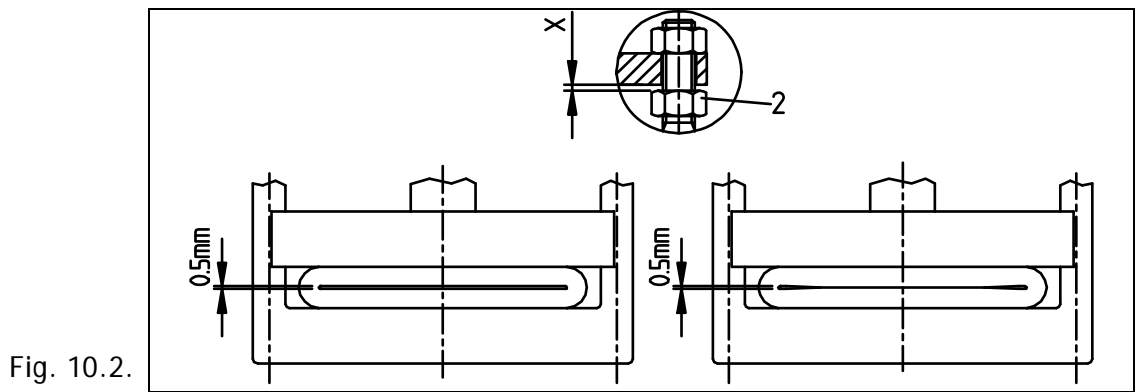
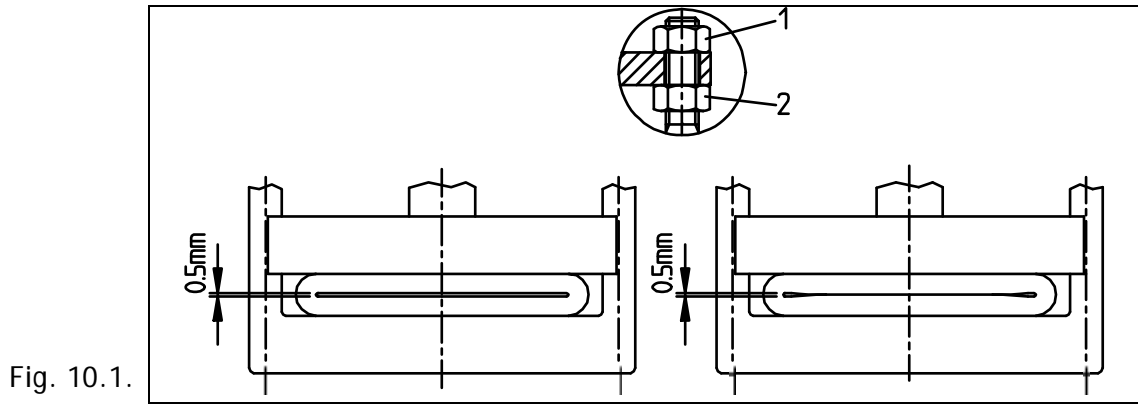


Fig. 10.



DIMENSION X [mm]

VALVE SIZE (mm)	PRESSURE CLASS (Bar)		
	1	6...10	16...25
25...100	1.5	2.5	3.5
125...250	2.0	3.0	4.0
300...500	3.0	4.0	
550...	4.0		

Fig. 11.

6.4 Troubleshooting

PROBLEM	POSSIBLE REASON	ACTION
Valve leaks into the environment.	1. Sleeve breakage. 2. End flanges loosely tightened.	1. Change and make adjustment of sleeve 2. Tighten the flange end screws
Leakage or flow through the valve when valve should be closed.	Sleeve breakage.	(models PVE, PVS): check by the plug - change and make adjustment of sleeve
	Sleeve is not closed with sufficient squeeze.	Manual valves - turn the hand wheel more tight. Pneum. and hydr. actuators - check the supply pressure for cylinder; if the pressure is too low, the sufficient squeeze for the sleeve cannot be reached. Check the compactness of the cylinder seals.
	Wrong adjustment of the sleeve.	Make the adjustment
Shorter lifetime of the sleeve than before.	Sleeve is not closed with sufficient squeeze.	Manual valves - turn the hand wheel more tight. Pneum. and hydr. actuators - check the supply pressure for cylinder; if the pressure is too low, the sufficient squeeze for the sleeve cannot be reached. Check the compactness of the cylinder sealings.
	Wrong adjustment of the sleeve.	Make the adjustment.
	1. Pneum. valves: wrong adjustment of the end cushioning in front end-block of cylinder. 2. Wrong adjustment of the pneum. spring.	1. End cushioning in front end-block of cylinder should be fully open. 2. Check adjustment of pneumatic spring .
	Changes in customer process e.g. * composition of medium / temperature * flow capacity	Check the best rubber qualityl with FLOWROX. Select another valve size with FLOWROX (particularly valves with positioners).
Sleeve is flapping and/or flow capacity is not sufficient.	Vacuum or pressure shocks in pipeline, rubber has hardened and does not open totally.	Check that the opening tags are fixed.

In case you cannot find the solution to your problem in the above table, please turn to the nearest Flowrox representative. The serial number and type identification of the valve in question will help getting the prompt answer.

7 TECHNICAL DATA

7.1 Model and spare part codes

7.1.1 Valve model selection

PVE	100	AK	10	-	2	0	3	L	R
TYPE	SIZE (DN)	ACTUATOR	PRESSURE CLASSES (PN)	-	FLANGE DRILLINGS	BODY MATERIAL	SHAPE OF FLANGE	OPENING TAGS	AUXILIARIES
PV = open	25-1000	M=handwheel	1= 1bar		1 = -	0 = Cast iron / Welded steel	types 1 - 4	L = opening tags	Q = quick exhaust valve R= inductive limits S= magnetic proximity limits T= mechan. limits Z= solenoid valve X = must be specified
PVE = enclosed		A=pneumatic	6= 6 bar		2 = DIN PN 10	1 = -	Determined by the valve manufacturer		
PVS = sealed		AB=with manual override	10= 10 bar		3 = DIN PN 16	2 = AISI 316			
PVE/S = enclosed/sealed			16= 16 bar		4 = DIN PN 25	3 = aluminium			
		AK=with el.pneum. positioner	25= 25 bar		5 = DIN PN 40	4 = other			
			40= 40bar		6 = ANSI 150	5 = plastic			
		AN=with pneum. positioner	64= 64 bar		7 = ANSI 300				
			100 =100bar		8 = BS TABLE D				
		AU=with pneum. spring	AV=with mech. spring		9A = AS TABLE D				
					9B = AS TABLE E				
	H=hydraulic		9C = JIS 10						
HP=with hydraulic positioner		9D = JIS 16							
E=electro mechanical		Other on request							
EO=electric for control									

7.1.2 Sleeve model selection

SBRT	10	100	/	250	/	3	L	2
SLEEVE MATERIALS	PRESSURE CLASSES (PN)	SLEEVE INNER DIA (mm)		SLEEVE LENGTH (mm)		SHAPE OF FLANGE	OPENING TAGS	FLANGE DRILLINGS
SBRT = styrene butadiene EPDM=ethylene propylene CR = chloroprene CSM = chloro-sulphone-ethene FPM = fluorine rubber HNBR = hydrogenated nitrile IIR = butyl NBR = nitrile NBRF = nitrile foodstuff quality NR = natural rubber NRF = natural rubber foodstuff quality PU = polyurethane _ /PU = PU-coating inside the sleeve _ /M = Flowrox SensoMate sleeve _ /VAC = Vacuum sleeve	1= 1bar 6= 6 bar 10= 10 bar 16= 16 bar 25= 25 bar 40= 40bar 64= 64 bar 100 =100bar	25-1000		Depend on the sleeve inner diameter according to ANSI/ISA 75.10.02;		type 1 - 4 Determined by the valve manufacturer (depending on the valve diameter / pressure class)	L = yes	1 = - 2 = DIN PN 10 3 = DIN PN 16 4 = DIN PN 25 5 = DIN PN 40 6 = ANSI 150 7 = ANSI 300 8 = BS TABLE D 9A = AS TABLE D 9B = AS TABLE E 9C = JIS 10 9D = JIS 16 X = Other, must be specified
In spare sleeve orders, please use 4- or 5- figure code marked on the sleeve.								

7.1.3 Sleeve materials for Flowrox valves

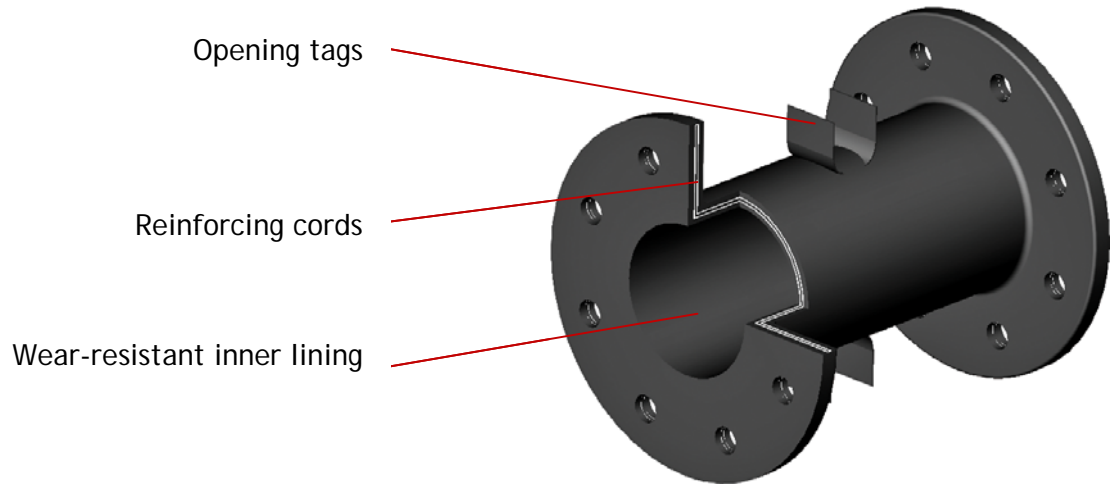
STANDARD SLEEVE MATERIALS FOR FLOWROX VALVES

RUBBER QUALITY	APPLICATION EXAMPLES	TEMPERATURE RANGE	TYPICAL MEDIA
SBRT Styrene Butadiene, Flowrox Blend	Heavy wearing High cycle frequency	-40°C - +110°C	Abrasive materials Diluted acid, alkali and chemical applications
EPDM Ethylene Propylene	Chemical applications • Applicable to 75% of all industrial chemical applications	-40°C - +120°C	Concentrated and oxidizing chemicals

OTHER SLEEVE MATERIAL OPTIONS

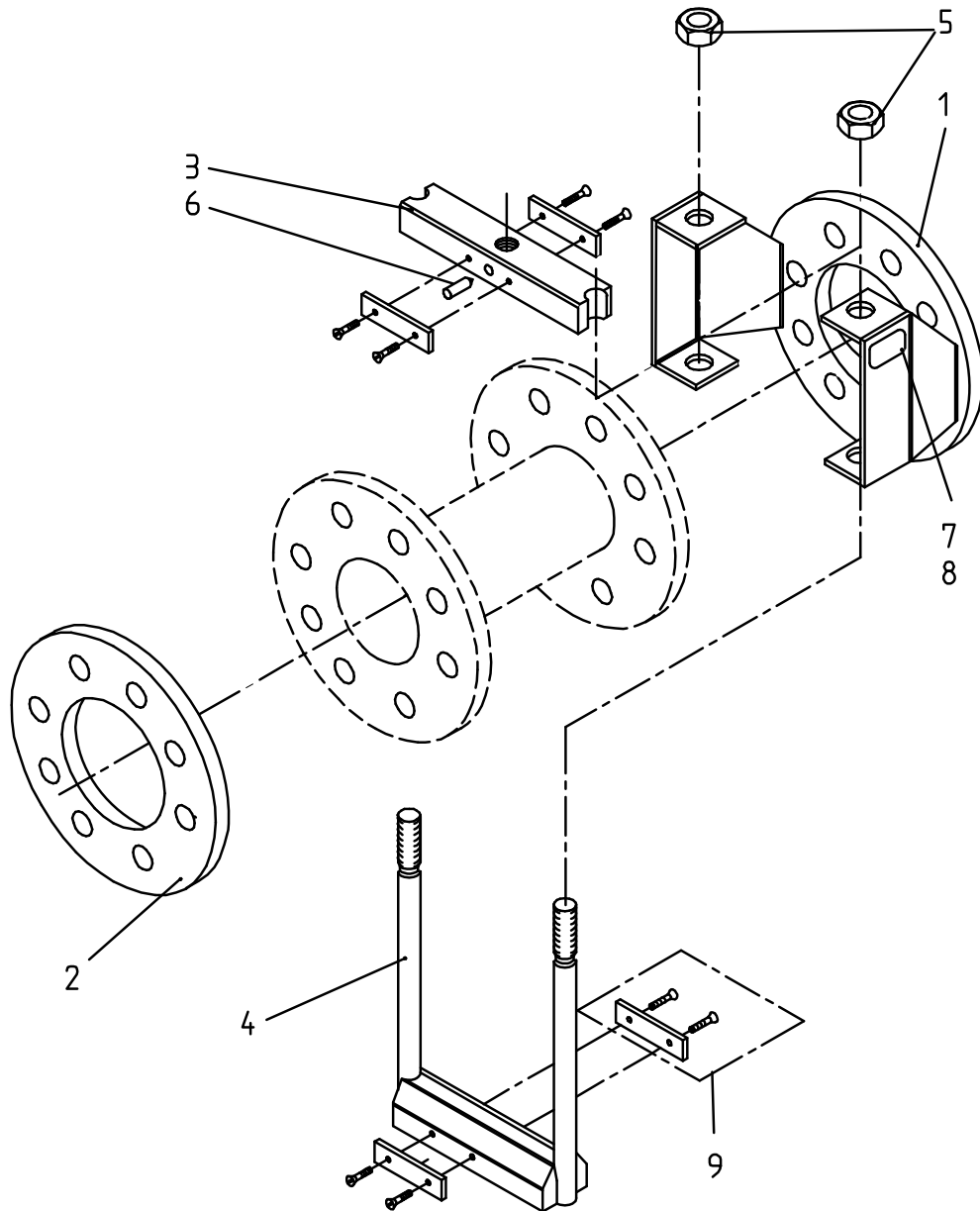
RUBBER QUALITY	APPLICATION EXAMPLES	TEMPERATURE RANGE	TYPICAL MEDIA
NBR Nitrile Rubber	Applications involving oils, fats and hydrocarbons	-30°C - +100°C	Oils, Fats, Fuels Hydrocarbon, Lubricants
NR Natural Rubber	High wear applications	-40°C - +75°C	Abrasive materials Diluted acids, alkali and chemicals
HNBR Hydrogenated Nitrile	High temperature Applications	-30°C - +160°C	Oils, Fats, Fuels Hydrocarbon, Lubricants
NRF Natural Rubber Foodstuff Quality White inner lining	Foodstuff applications Fulfils FDA (Food and Drug Administration) requirements	-40°C - +75°C	Media used in food and other CIP (clean-in-place) processes Alcohols
NBRF Nitrile Rubber White inner lining	Applications involving fatty foodstuff Fulfils FDA (Food and Drug Administration) requirements	-30°C - +100°C	Vegetable and animal oils and fats
EPDM/B Ethylene Propylene, Flowrox Blend	Pulp and paper industry's green liquor applications	-40°C - +100°C	Green liquor Alkaline and extraneous matter in green liquor processes
CR Chloroprene Rubber	Special-purpose chemical applications • Resilient to ozone and averse weather	-40°C - +100°C	Chemicals, Acids Several solvents Aliphatic oils Fats, Lubricants
FPM Fluorine Rubber (Viton®)	Special-purpose chemical applications • Resilient to ozone and averse weather	-20°C +120°C	Chemicals Aliphatic oils Aromatic and halogenated hydrocarbon
CSM Chloro-sulphone-ethylene (Hypalon®)	Special-purpose chemical applications • Resilient to ozone and averse weather	-40°C - +100°C	Chemicals, Acids Several solvents Aliphatic oils Fats, Lubricants
IIR Butyl	Special-purpose chemical applications • Impermeable to gas	-40°C - +100°C	Concentrated and acidic chemicals Vegetable oils
PU Polyurethane • With PU lining or solid PU	Abrasive media applications	-10°C - +80°C	Abrasive materials Diluted chemicals Hydrocarbons Oils, Lubricants

For more information on sleeve materials for Flowrox valves, contact your nearest Flowrox representative.



8 APPENDIXES

8.1 APPENDIX A: PV- Open Body Assembled



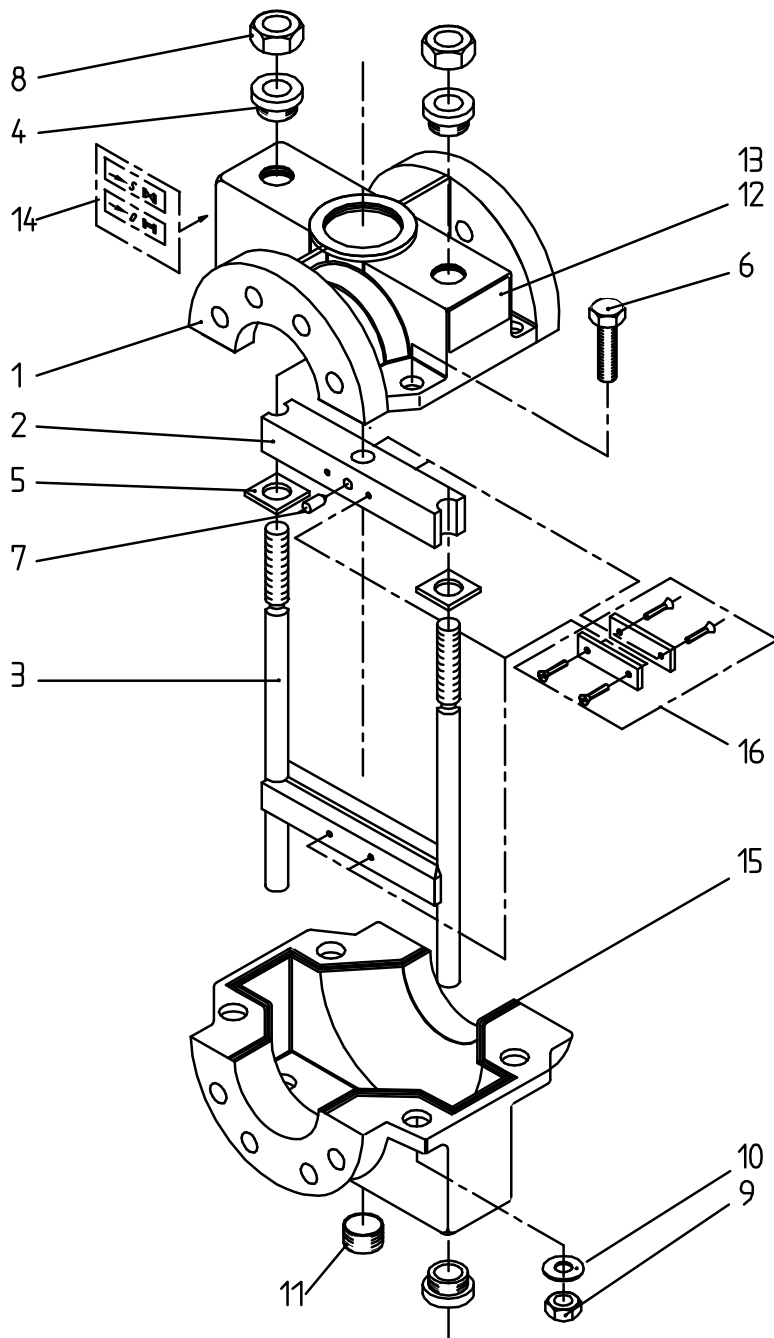
FLOWROX

PV-OPEN BODY ASSEMBLED

Dwg. no. 410158b

- | | |
|--------------------|--------------------------------|
| 1. Valve body | 6. Allen screw |
| 2. Flange | 7. Valve plate |
| 3. Upper pinch bar | 8. Drive screw |
| 4. Lower pinch bar | 9. Fix. parts for opening tags |
| 5. Hex. nut | |

8.2 APPENDIX B: PVE-Enclosed Body Assembled



FLOWROX

PVE- ENCLOSED BODY ASSEMBLED

Dwg. no. 4'10006a

- | | | |
|--------------------|-----------------|---------------------------------|
| 1. Valve body | 7. Allen screw | 13. Drive screw |
| 2. Upper pinch bar | 8. Hex nut | 14. Sticker open-closed |
| 3. Lower pinch bar | 9. Hex nut | 15. Sealing |
| 4. RCH-bushing | 10. Washer | 16. Fix. parts for opening tags |
| 5. Guide | 11. Plug | |
| 6. Hex screw | 12. Valve plate | |