

# Installation, operation, and maintenance instructions for Flowrox™ PVG DN50 – 250 (DN 2" – 10") valves

Installation, maintenance and operating instructions



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

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# Table of Contents

<b>1</b>	<b>Declaration of Incorporation</b>	<b>4</b>
<b>2</b>	<b>Introduction</b>	<b>5</b>
2.1	General safety instructions	5
2.2	Applications and purpose of use	5
2.3	General description	6
2.4	Technical data	7
<b>3</b>	<b>Transportation, Storage and Lifting</b>	<b>8</b>
<b>4</b>	<b>Installation</b>	<b>8</b>
4.1	General	8
4.2	Flow direction, support, and valve position	9
4.3	Valve installation	9
<b>5</b>	<b>Operation</b>	<b>10</b>
5.1	Commissioning and decommissioning	10
5.2	Recycling and disposal	10
<b>6</b>	<b>Maintenance</b>	<b>10</b>
6.1	General maintenance and checks	10
6.2	Changing the sleeve	11
6.3	Testing and adjusting valve stroke	13
6.4	Troubleshooting	16
	<b>Appendix A: Main Dimensions of Valves</b>	<b>17</b>
	<b>Appendix B: Type Code</b>	<b>18</b>

## **READ THESE INSTRUCTIONS FIRST!**

These instructions provide information about safe handling and operation of the product.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

## **SAVE THESE INSTRUCTIONS!**

Addresses and phone numbers are printed on the back cover.

# 1 Declaration of Incorporation

This declaration is issued under the sole responsibility of the manufacturer:

VALMET FLOW CONTROL OY

Marssitie 1

53600 Lappeenranta

Finland

Tel. +358 (0)10 417 5000

Product model/type: Pinch Valve (PVEG, PVG)

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Machinery Directive 2006/42/EC: Annex IIB partly completed machinery

As the product may be used as parts or components in machinery, we declare that this product must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.

Follow the valve installation, operating and maintenance instructions in this manual.

Person authorised to compile the technical file is Technology Manager Jarmo Partanen.

On behalf of Valmet Flow Control Oy

In Lappeenranta, 1st April 2022



Riku Salojärvi







Head of Operations

## 2 Introduction





### 2.1 General safety instructions


The symbols in Table 1 are used in this manual to highlight the parts requiring particular attention.

Hazard severity panels.

	 <b>DANGER!</b>
	DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	 <b>WARNING!</b>
	WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	 <b>CAUTION!</b>
	CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**Table 1. Warning and safety signs.**

Symbol	Description
	Risk to personal safety: Neglecting the safety measures can cause serious injury or death.
	Crushing hazard.
	Read the operation and maintenance instructions: Read and understand the operation and maintenance instructions before using the product.
	Mandatory action symbol: Obey these instructions to prevent machine malfunctions.

Symbol	Description
	Forbidden action.

Prevent accidents and ensure the valve's appropriate operation by complying with the installation, safety, and maintenance instructions in this manual. Installation and maintenance of the valve must be carried out by persons with appropriate training. Electrical installation work of the actuator must be performed by a qualified electrician.

Access to the IOM-manual must be guaranteed at all times at the place of operation of the valve. It is required to observe the IOM-manual in all work tasks for the valve.

Use personal protective equipment when performing any checks or maintenance operation for the valve (goggles, helmet, clothing and gloves). Always follow the factory safety regulations.

In case of any discrepancies between translations, the English version shall prevail.

### 2.2 Applications and purpose of use

Flowrox PVG is made for processes involving pressure resistance, abrasion, corrosion and aggressive slurries. In open position, the PVG valve is at full bore with no flow restrictions.

The core of the PVG valve is an elastic sleeve, which is the only part in contact with the process medium. Designed to withstand wear, corrosion and chemicals, Flowrox sleeves guarantee non-clogging, trouble free operation and extended lifetime. The sleeves are bubble tight and easily replaceable if necessary.

#### Restrictions on use for PVG valves

The valve temperature and pressure range must not be exceeded. The temperature ranges are given in Temperature ranges for PVG valves. for standard sleeve materials. Check the pressure class from the valve type plate. Do not use higher pipeline pressure than rated for the valve.

**Table 2. Temperature ranges for PVG valves.**

Sleeve material	SBRT	EPDM
Min valve operating temperature °C (°F)	0 (32)	0 (32)
Max valve operating temperature °C (°F)	+110 (+230)	+120 (+248)

### Using the valve in explosive conditions

This valve type is not designed for Ex-areas.

For use in explosive conditions the valve must have the required Ex-classification and the grounding cables must be connected to earth. Check actuator, solenoid valve, and limit switch documentation for more information about operation in explosive conditions.

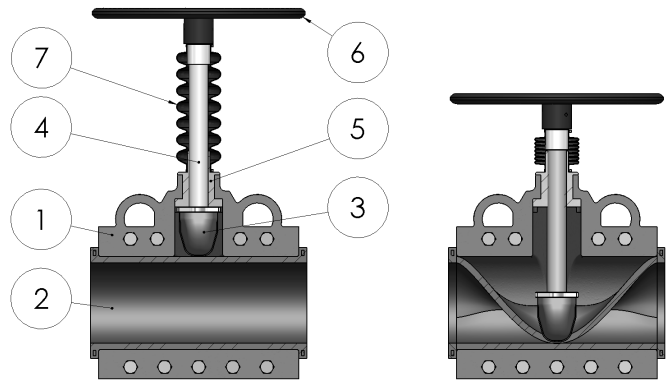
### 2.3 General description

#### Principle of operation

Flowrox PVG valve is built with a cast body and a rubber sleeve as a standard structure. Removable sleeve means no metal parts are in contact with the process medium.

In the open position the valve provides full bore through which the medium can travel. There are some structural differences between valve sizes, but the main components are shown in Figure 1.

Closing the valve forces the actuator side of the sleeve progressively towards the other side until it reaches the fully closed position. When the valve is fully closed, the sleeve is squeezed between the pusher on actuator and valve body, effectively sealing and completely containing the line pressure.



**Figure 1. Main components of PVG valve with manual actuator.**

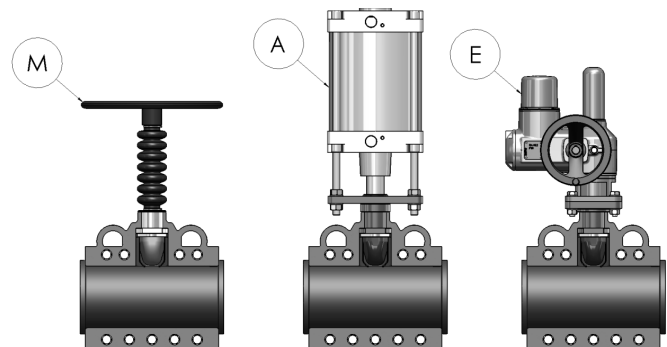
Part	Description	Part	Description
1	Body	5	Threaded bushing
2	Sleeve	6	Hand Wheel
3	Pusher	7	Bellows
4	Stem		

The valve must not be used to throttle the flow as this will lead to premature failure of the sleeve.

This valve is intended for on-off operation only.

#### Mechanical structure

The alternative actuators are displayed in Figure 2.



**Figure 2. Alternative actuators.**

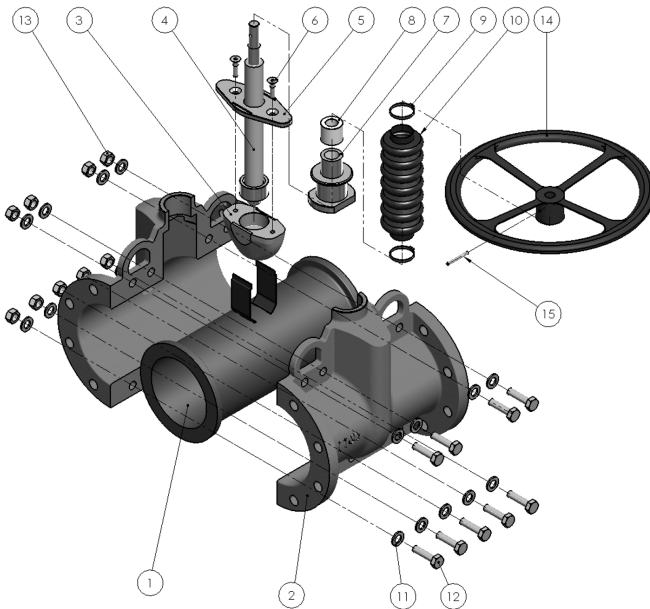
**Table 3. PVG valve actuator options.**

Part	Description
M	Manual actuator
A	Pneumatic actuator
E	Electric actuator

An exploded view of PVG valve with manual actuator is shown in Figure 3 and valve part list in Part list of PVG valve with manual actuator..

**Table 4. Part list of PVG valve with manual actuator.**

Part	Description	Part	Description
1	Sleeve	9	Cable tie
2	Valve body	10	Bellows
3	Pusher	11	Washer
4	Stem	12	Hex screw
5	Pusher plate	13	Nut
6	Hex socket screw	14	Hand wheel
7	Thread bushing	15	Spring pin
8	Bellows bushing		

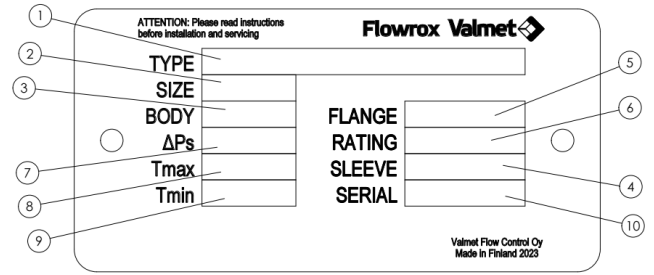


**Figure 3. Exploded view of PVG valve with manual actuator.**

## 2.4 Technical data

### Product identification

Flowrox valve type plate is shown in Figure 4.



**Figure 4. Valve type plate example.**

**Table 5. Description of type plate items.**

Item	Description	Item	Description
1	Type designation	6	Pressure rating
2	Size	7	Maximum shut-off pressure differential
3	Body material	8	Maximum temperature
4	Sleeve material	9	Minimum temperature
5	Flange drilling	10	Serial number

## Actuators

Standard actuators:

- Manual
- Pneumatic
- Electric

Manual valves are closed by turning the hand wheel clockwise.

Pneumatic actuators are with a fixed stroke and do not require external controls. The pneumatic actuator is designed for a nominal supply of 6 bar (90psi). Use correct sized pneumatic hoses to ensure sufficient air flow.

The air must be clean, dry, lubricated and properly filtered. An air quality of minimum requirement to ISO 8573-1:2010 [7:4:4] is recommended. If any component used on the valve has a stricter requirement, the stringent shall prevail.

Pneumatic actuator noise level may exceed 85 dB and it is recommended to use ear protectors when working near the valve.

Electric actuators

Electric actuators have open/close limit switches preset

at the factory. A separate instruction from the actuator manufacturer is always included in the shipment.

Consult the manufacturer's instructions on actuator requirements or/and limitations. If actuator is changed or valve needs adjustment, follow the Maintenance instructions.

Make sure that the 3-phase electrical connection is done correctly. If the connection is done wrong, the limit or torque switches will not trigger as designed. This will allow the actuator to move beyond limits and cause damage to the valve.

### 3 Transportation, Storage and Lifting

Check and document any damages in the valve packages or valves. Contact the transportation company in case of damage. When new or unused valves are sitting idle for long periods, the following procedures should be complied with:

1. Prior to storage, thoroughly drain valves of all water.
2. Indoor storage is required. For unfavourable environment, cover the equipment with protective tarpaulin that will allow proper air circulation.
3. Protect the equipment from temperature and humidity extremes and exposure to excessive dust, moisture, vibration and sunlight.
4. It is preferred to store valves in the open position.
5. Avoid dirt and/or moisture contamination of the stem (threaded rod).
6. Ensure pneumatic cylinder actuators have appropriate pipe plugs installed in the respective supply ports to prevent contamination of the cylinders.
7. Protect valve sleeves from heat, sunlight and exposure to ozone.
8. Cover the flange openings.
9. Do not store any objects on top of the rubber sleeves.
10. Follow the actuator instructions for storage.
11. Before start-up clean the valve.

When storing used valves, wash the valve with fresh water and follow the steps above. For storage periods greater than 36 months, please contact Neles as the rubber parts need to be changed before use.

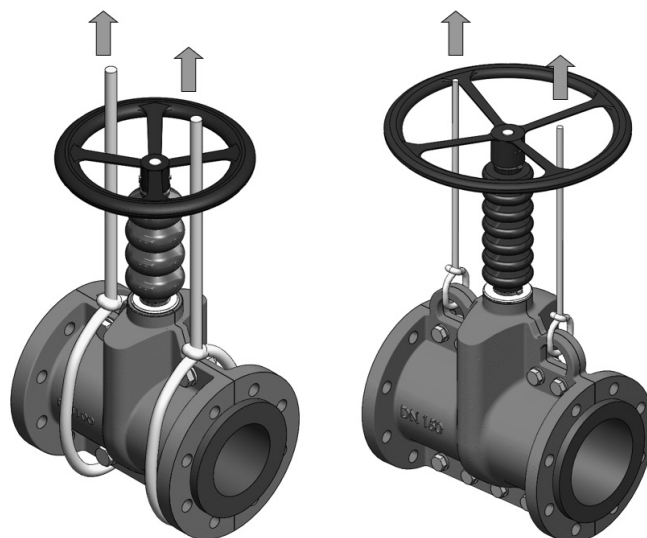




Figure 5. Valve lifting examples.

Do not attach lifting equipment to the valve bore or actuator as they can be damaged.

For valve dimensions and weight, refer to Appendix A.

### 4 Installation

<b>WARNING!</b>	
	<p>Crushing hazard.</p> <p>Do not put your hands or fingers inside the sleeve when the valve cycles.</p> <p>Do not energize the actuator before the valve is properly attached to the pipeline.</p> <p>Disconnect and de-energize the actuator before installation and maintenance work.</p>
	<p>High pressure injection hazard.</p> <p>Do not use higher pressure than rated for the valve.</p> <p>Higher pressures can cause serious damage to the valve or harm to operating personnel.</p>

#### 4.1 General

Flowrox valves are normally delivered fully assembled and ready for use. The valve can be installed either way in terms of flow direction. Only personnel with appropriate training

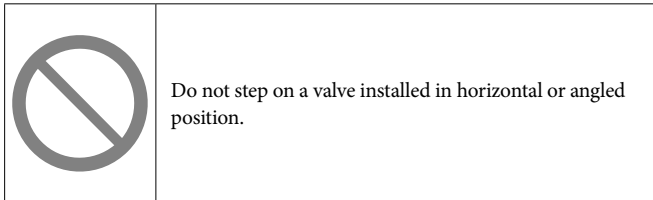


are allowed to install the valves. If the valve is delivered without an actuator or accessories, they must be installed in accordance with the manufacturer's instructions.

Flowrox valves have connections with DIN or ANSI bolt drillings as standard design, but some other drillings are also available on request.

Reserve enough space for safe installation and maintenance. See Appendix A for valve dimensions.

## 4.2 Flow direction, support, and valve position



The valve does not have an intended flow direction; therefore, it can be installed either way in the pipeline.

Proper pipe support must be placed on either side of the valve to support the weight. The valve must never be used to support the pipes.

The valve can be installed in any position.

## 4.3 Valve installation

At least the following must be ensured before valve installation:

- The pipeline is isolated from the process and there is no pressure in it.
- The pipeline is empty, clean, and cooled down.
- The pipeline flanges are parallel, concentric and with correct distance.
- The flange connection bolts size is correct. Shown in PN10 flange bolt nominal diameter and compression values for rubber sleeve flanges.
- The valve is in OPEN position.

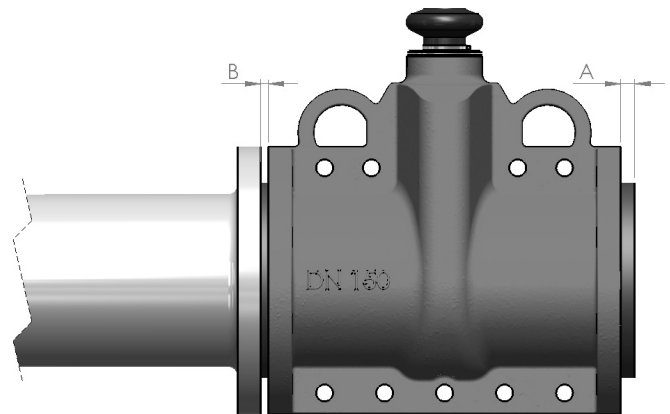
1. Disconnect automatic actuator from power supply if connected.
2. Lift the valve on place with appropriate lifting equipment.
3. Tighten the flange bolts evenly in a crosswise sequence as shown in Figure 7. Flange bolt tightening example. Recommended compression for the rubber sleeve flange is shown in PN10 flange bolt nominal diameter and

compression values for rubber sleeve flanges.

4. Connect automatic actuator to power supply.
5. Check that all connections have been fastened and the actuator is connected correctly.
6. Run a few open/close cycles without pressure in pipeline. Refer to Troubleshooting if the valve does not operate smoothly or without extra force.

**Table 6. PN10 flange bolt nominal diameter and compression values for rubber sleeve flanges.**

Valve size (DN)	Recommended compression for rubber sleeve flange mm (in)	DIN Bolt nominal diameter	ANSI150 Bolt nominal diameter
50 (2")	2-3 (0.08-0.12)	M16	5/8"-11 UNC
80 (3")	2-3 (0.08-0.12)	M16	5/8"-11 UNC
100 (4")	3-4 (0.12-0.16)	M16	5/8"-11 UNC
150 (6")	3-4 (0.12-0.16)	M20	3/4"-10 UNC
200 (8")	4-5 (0.16-0.20)	M20	3/4"-10 UNC
250 (10")	4-5 (0.16-0.20)	M20	7/8"-9 UNC



**Figure 6. Compression of the sleeve rubber flange.**

A = Uncompressed rubber sleeve flange mm (in)

B = compressed rubber sleeve flange mm (in)

→ (A - B) = Recommended compression [mm], shown in PN10 flange bolt nominal diameter and compression values for rubber sleeve flanges.

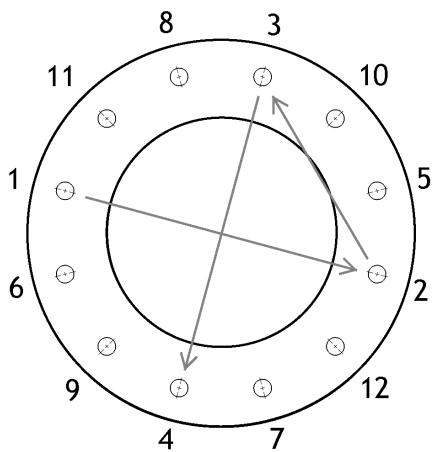


Figure 7. Flange bolt tightening example.

## 5 Operation

### 5.1 Commissioning and decommissioning

Before the valve is operated within the pipeline, ensure that it has been installed in accordance with this manual and applicable safety regulations.

The following must also be ensured:

- Parameters on the type plate are suitable for the process and environment
- The valve is used for the purpose specified at the time of sales
- Required accessories are installed if applicable
- Possible explosive conditions have been taken into account

When a valve is decommissioned, dispose the valve parts and electric/pneumatic devices (actuators) according to the local regulations and the instructions given by the part or device manufacturer.

Collect and dispose dangerous process media, so that people and environment are not endangered. Follow the local regulations.

### 5.2 Recycling and disposal

Most valve parts can be recycled. Separate recycling and disposal instructions are available from the manufacturer. A valve can also be returned to the manufacturer for recycling and disposal for a fee.

## 6 Maintenance

### 6.1 General maintenance and checks

	<b>⚠ WARNING!</b>
	Unexpected start-up hazard.  De-energize actuators before maintenance. Especially pneumatic actuators equipped with a mechanical spring can cause injury to people and equipment if cylinder actuates unintentionally.
	Crushing hazard.  Keep your hands and feet clear of moving parts. De-energize actuators before maintenance.
	<b>⚠ CAUTION!</b>
	Depressurize, empty and cool down the valve before any maintenance work. Valve surface can be hot. Isolate the valve completely from the process and follow the factory safety regulations.
	Do not step on a valve installed in horizontal or angled position.
	Make sure the medium inside the valve is known before any maintenance task is performed. Obey the necessary safety instructions..

Only personnel with appropriate training are allowed to service the valves. For actuator service instructions consult the manufacturer's documentation supplied with the valve.

Check the condition of the valve regularly. When the valve is tight and it actuates flawlessly, periodic inspection is the only mandatory maintenance task. Do not neglect it as sleeves wear over time depending on conditions and process.

### Scheduled maintenance

Include the valves in your factory maintenance program. Maintenance tasks and service intervals are offered as a guideline in Maintenance schedule. 7. Schedules will vary with applications.

**Table 7. Maintenance schedule.**

Maintenance task	Frequency & advice
Do a leakage inspection	Regularly. Refer to <i>Troubleshooting</i> .
Run an open/close cycle	Suggested once a month for smooth and reliable operation.
Examine the valve for erosion and wear	Every six months.

For electric actuator maintenance schedule refer to manufacturer's instructions.

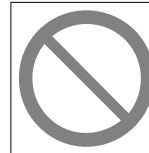
### Spare parts

To ensure correct and quick delivery of spare parts, the order must contain at least the following information:

- Valve type number as in type plate (example: PVG0100JB010A)
- Spare part name and quantity (example: Sleeve, 1 piece)
- You can order the spare parts from VALMET offices, distributors or agents. Contact information is available at [www.valmet.com/flowcontrol](http://www.valmet.com/flowcontrol).
- It is recommended to keep one sleeve as a spare part at your factory warehouse. For part numbers refer to *Mechanical structure*.
- Information regarding wearing components that are not supplied as Flowrox spare parts are also in *Mechanical structure*.

## 6.2 Changing the sleeve

To change the sleeve, the valve needs to be removed from the pipeline. Refer to *Valve dismantling* if further service is required as well. Part numbers refer to *Mechanical structure*.



Do not disconnect a pressurized valve from the pipeline in any case!

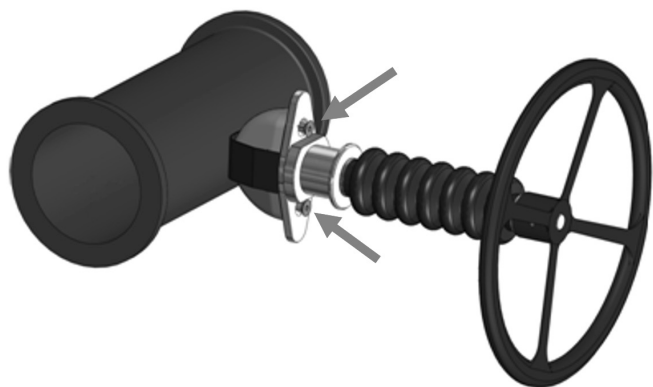
### Removing the sleeve

1. Operate the valve to fully OPEN position.
2. Depressurise and drain the pipeline according to mill specific orders.
3. Disconnect automatic (electric or pneumatic) actuator from power supply to prevent injuries.
4. Remove the flange connection bolts and lift the valve to a suitable working surface. Use lifting equipment on valves weighing over 25kg.
5. Remove the valve body fasteners (parts 11-13) and lift both body halves (part 1) away.



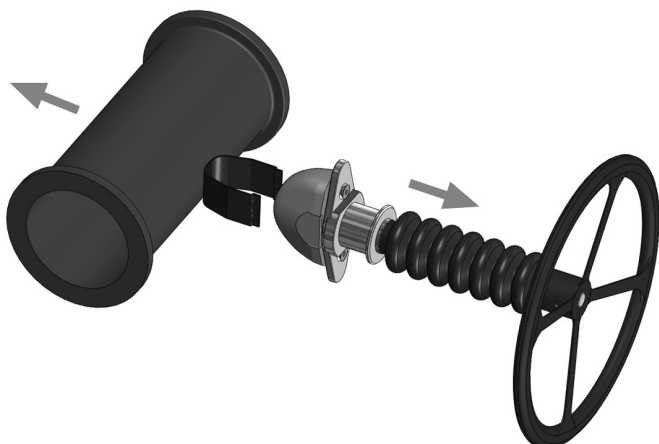
**Figure 8. Removing the valve body parts.**

6. Loosen the pusher screws (part 6) to be able to release the opening tags on the sleeve.



**Figure 9. Releasing the opening tags.**

7. Detach the sleeve (part 2) from the pusher (part 3).



**Figure 10. Removing the sleeve.**

8. Inspect the body halves for visible damage.
9. Check if the pusher (part 3) is damaged and needs to be replaced.
10. Clean the valve body halves.

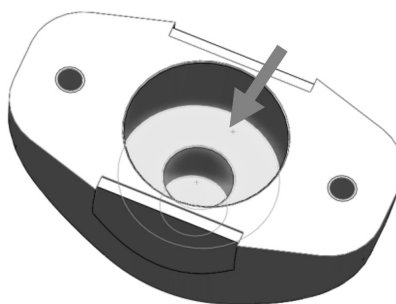
### Installing the sleeve

Follow the general tightening torques in Table 8. General tightening torques (bolt class 8.8, lubrication MoS<sub>2</sub>), when specific tightening instructions are not given in this document or in other supplied documentation. Part numbers in these assembly instructions refer to Mechanical structure.

**Table 8. General tightening torques (bolt class 8.8, lubrication MoS<sub>2</sub>).**

Size	M6	M8	M10	M12	M16	M20	M24
Tightening torques Nm (ft-lbs)	7 (5)	17 (13)	33 (24)	57 (42)	140 (103)	282 (208)	499 (368)

11. Put some grease on the pusher (part 3) where the stem (part 4) will be attached.
12. This is for valves with manual actuator only.



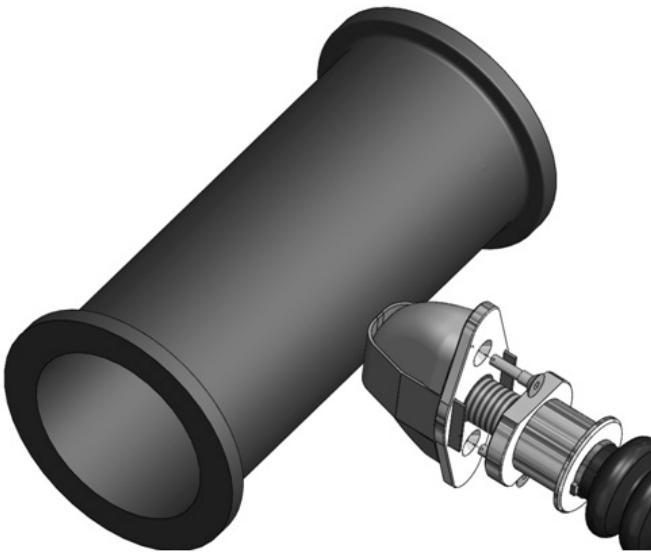
**Figure 11. Lubricating the pusher.**

13. Lubricate the thread on the stem (part 4) lightly in valves with manual or electrical actuator.
14. Start the reassembly by putting the pusher (part 3) against the sleeve (part 2), between the opening tags.



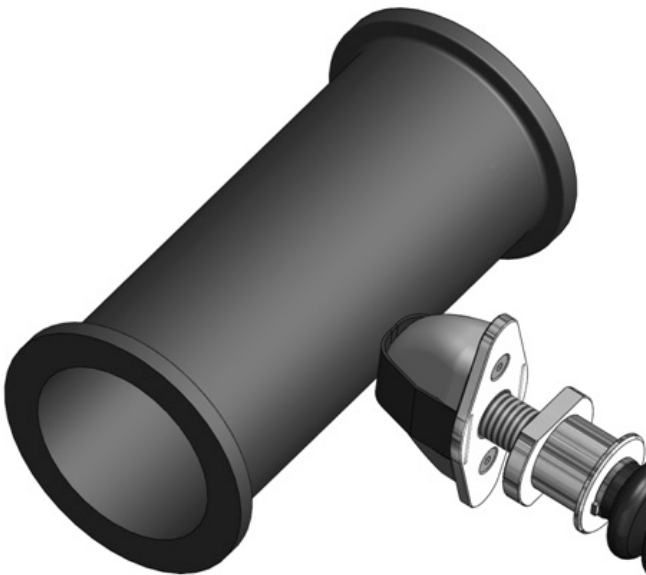
**Figure 12. Installing the sleeve to the pusher.**

15. Install the opening tags through the slots in the pusher plate (part 5).



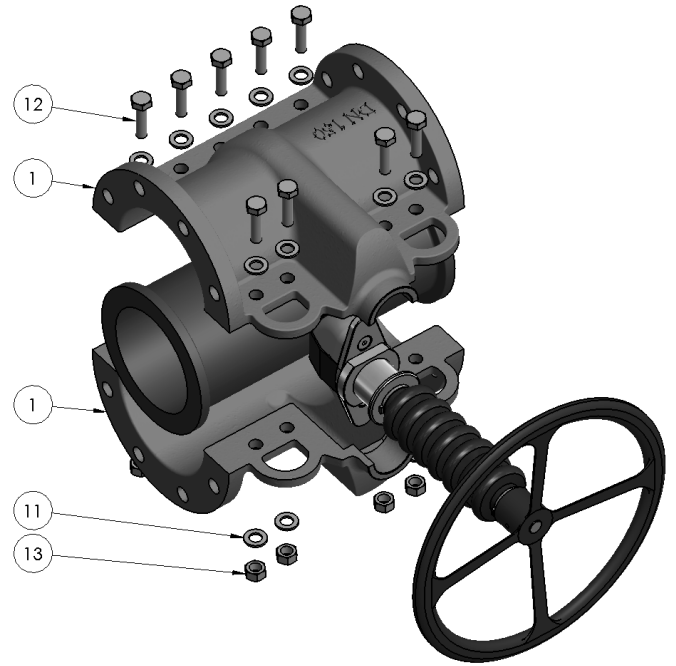
**Figure 13. Installing the opening tags to pusher plate.**

16. Pull the opening tags finger tight and fasten the pusher plate with hex screws (part 6).
17. Check that the tags follow the shape of the pusher (part 3).
18. Cut away the extra length of the tags.



**Figure 14. Fastening the pusher plate screws.**

19. Lift the body halves (1) back and install the fasteners (parts 11-13).



**Figure 15. Fastening the body halves to the valve.**

20. Leave the valve to OPEN position until it is installed and follow the storage instructions if the valve is placed in stock.

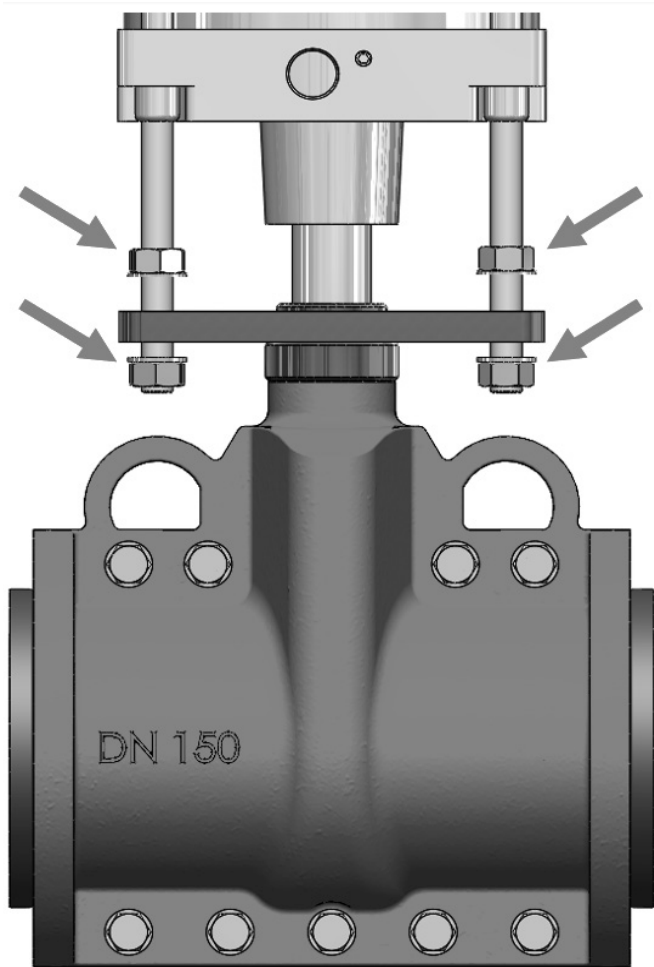
### 6.3 Testing and adjusting valve stroke

Only personnel with appropriate training are allowed to energize the valves. Check and adjust the valve stroke if you dismantle the valve or assemble a pneumatic actuator. This is not needed with manual actuators. Refer to the electrical actuator documentation for specific stroke adjustment instructions.

	<b>! WARNING!</b>
	<p>Crushing hazard.</p> <p>Keep your hands and feet clear of moving parts. De-energize actuators before maintenance.</p>

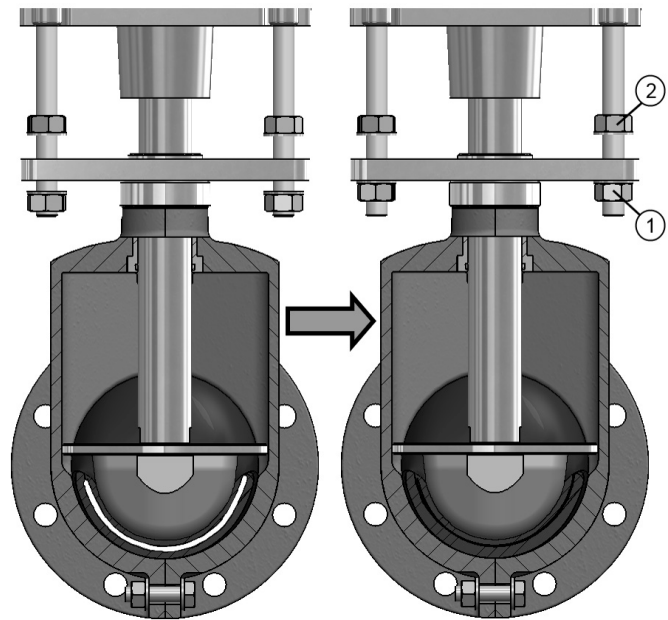
## Adjusting the pneumatic actuator stroke

1. Assemble the valve according to the assembly instructions.
2. Loosen the actuator lower and upper fastener nuts.



**Figure 16. Pneumatic actuator lower and upper fastener nuts.**

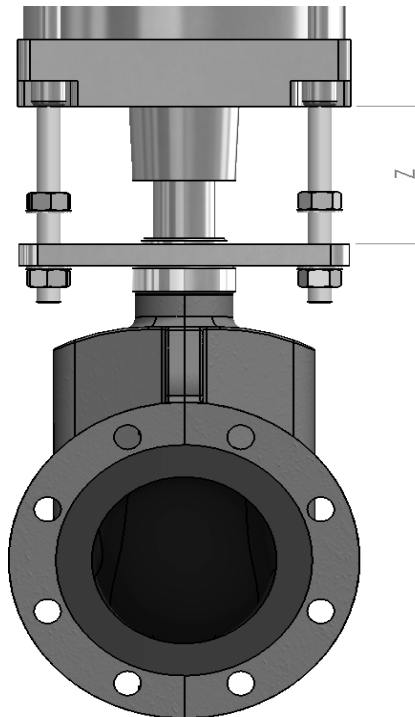
3. Connect the actuator to power source and stroke the valve to fully CLOSED position.
4. Tighten the lower actuator nuts (1) until strip of light disappears. If needed loosen the upper actuator nuts (2) to achieve this.



**Figure 17. Stroke adjustment.**

- 1 Lower nut
- 2 Upper nut

5. Measure the dimension Z from every corner to make sure the actuator is aligned straight.



**Figure 18. Checking actuator alignment.**

6. Adjust the actuator upper nuts (2) to achieve the needed squeeze for the sleeve. Check the correct value for dimension A from the Table 9. Needed squeeze for the valve sleeves (dimension A on the Figure 19. Measuring the compression value.)

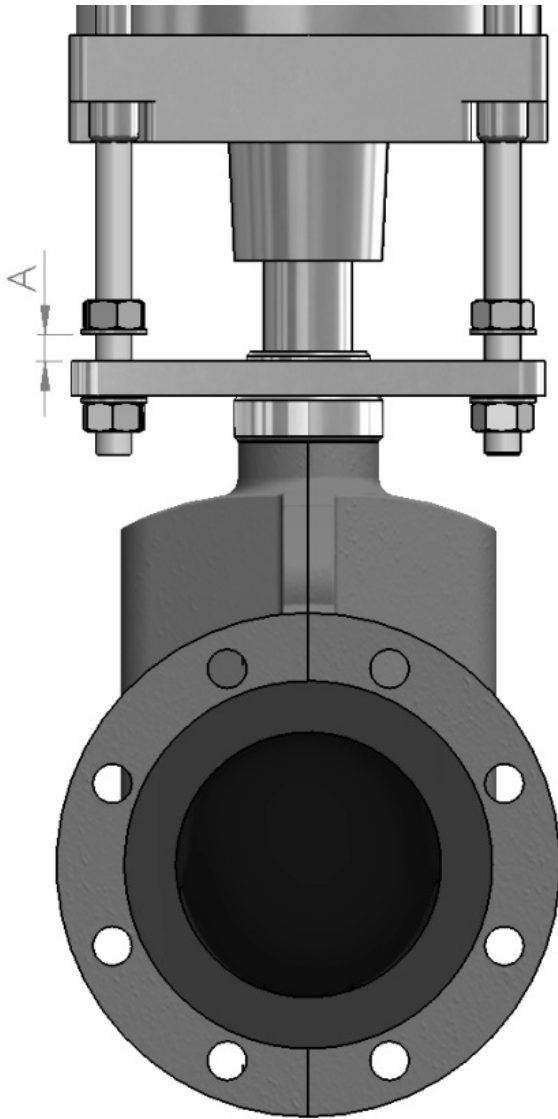


Figure 19. Measuring the compression value.

Table 9. Needed squeeze for the valve sleeves (dimension A on the Figure 19. Measuring the compression value.)

Valve size (DN)	50 (2")	80 (3")	100 (4")	150 (6")	200 (8")	250 (10")
Squeeze mm (in)	3 (0.12)	3 (0.12)	4 (0.16)	4 (0.16)	5 (0.20)	5 (0.20)

7. Tighten the lower actuator nuts (1) until there's no gap between them and the attachment frame. Follow the torque given in Table 8. General tightening torques (bolt class 8.8, lubrication MoS2).

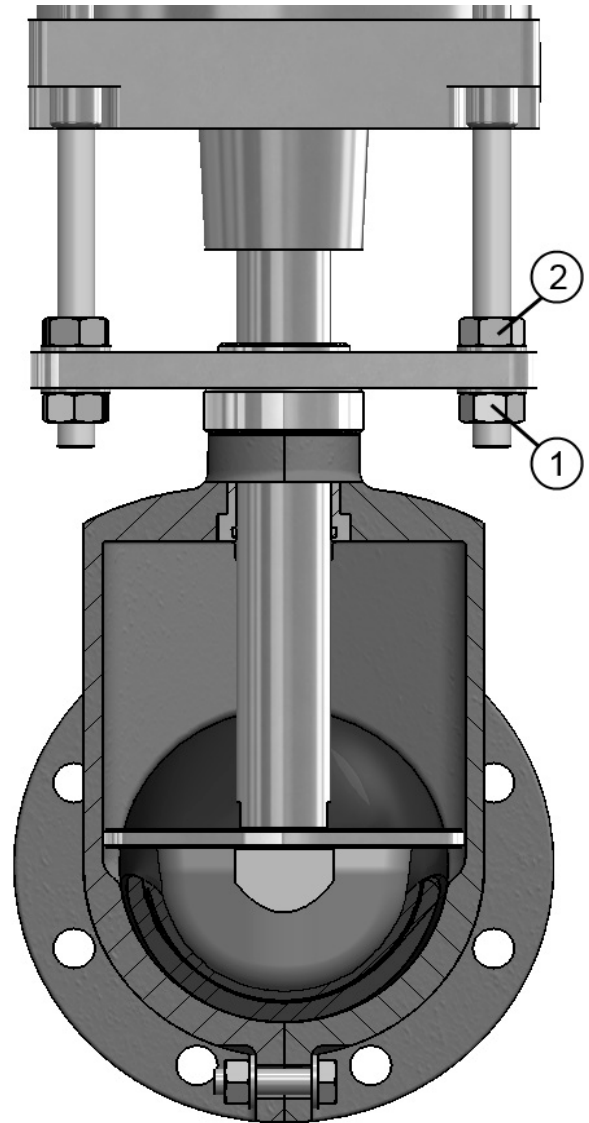


Figure 20. PVG valve with adjusted pneumatic actuator.

8. Test the adjustments by cycling the valve few times between OPEN and CLOSED position.
9. Leave the valve to OPEN position until it is installed and follow the storage instructions if the valve is placed in stock.

## 6.4 Troubleshooting

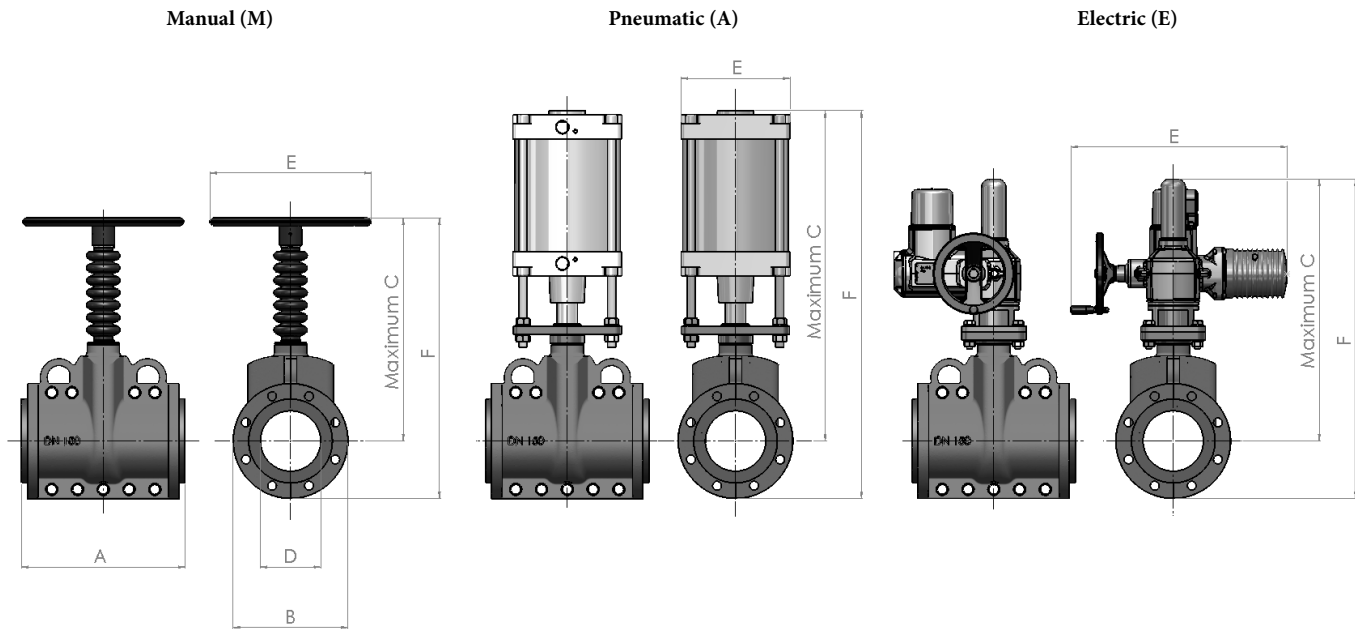
**Table 10. Troubleshooting.**

Problem	Possible reason	Action
Leakage from flange connection	Flange connection is loose	Tighten the flange connection bolts to correct torque
	Pipeline flanges and valve are misaligned	Check that the flanges are parallel and concentric with the valve
Sleeve lifetime is short	Damaged valve body	Check valve body for scrapes and sharp edges and change if damaged
	Unsuitable sleeve material for process	Check with Neles
	Damaged pusher	Check pusher for scrapes and sharp edges and change if damaged
Valve does not open/close or valve is not tight	Fault in actuator or control system	Check and fix actuator operation
	Too low pneumatic supply pressure	Fix air supply
	Damaged sleeve or pusher	Check and change damaged parts
Valve does not open/close smoothly	Insufficient lubrication	Lubricate the actuator.

\* Manually operated valves are actuated with normal hand force



## Appendix A: Main Dimensions of Valves



Valve size (DN)	Dimensions (mm)												Weight (kg)			Max Pressure (Bar)		
	A		C			D	E			F								
	B	M	A	E	M	A	E	M	A	E	M	A	E	M	A	E		
50	190	165	280	398	474	50	150	110	515	363	481	556	14	18	45	10	6	10
80	254	200	344	482	505	80	200	135	515	444	582	605	21	30	53	10	6	10
100	305	228	394	568	526	100	250	176	515	508	682	640	30	43	60	10	6	10
150	406	285	553	774	650	150	400	270	536	696	917	792	49	60	98	10	6	10
200	521	343	645	871	697	200	600	270	536	817	1043	868	96	141	144	6	4	6
250	635	406	785	1412	749	250	600	270	536	988	1615	952	140	215	188	6	4	6

Valve size	Dimensions (in)												Weight (lbs)			Max Pressure (PSIG)		
	A	B	C			D	E			F								
	M	A	E	M	A	E	M	A	E	M	A	E	M	A	E			
2"	7.5	6.5	11.02	16.06	18.66	2	6	4.3	20.27	14.3	19.3	21.9	31	39.7	99	150	75	150
3"	10	8	13.54	19.76	19.9	3	8	5.3	20.27	17.5	23.7	23.8	46	66.1	117	150	75	150
4"	12	9	15.51	23.86	20.7	4	10	6.9	20.27	20	28.3	25.2	66	94.8	132	150	75	150
6"	16	11.22	21.77	32.24	25.6	6	16	10.6	21.1	27.4	37.9	31.2	108	132	216	150	75	150
8"	20.5	13.5	25.4	36.26	27.44	8	24	10.6	21.1	32.16	43	31.2	211	311	317	75	60	75
10"	25	16	30.9	57.56	29.5	10	24	10.6	21.1	38.9	65.5	37.5	308	474	414	75	60	75

M = manual, A = pneumatic, E = electric

Dimensions and weight are for guidance only – detailed drawings are available on request.

## Appendix B: Type Code

1.	2.	3.	4.	5.
PVG	0100	J	B010	A

1. Sign	VALVE SERIES
PVEG	General Pinch valve plastic body
PVG	General Pinch valve Cast iron body

2. Sign	BODY SIZE	
0050	DN50	2"
0080	DN80	3"
0100	DN100	4"
0150	DN150	6"
0200	DN200	8"
0250	DN250	10"

3. Sign	FLANGE DRILLING
C	ASME B16.5 Class 150
J	PN 10 EN 1092

4. Sign	PRESSURE RATING
B006	6 BAR
B010	10 BAR

5. Sign	SLEEVE MATERIAL
A	SBRT Styrene Butadiene, Flowrox™ Blend
B	EPDM Ethylene Propylene

For further information on the new type code on valve and actuators, see the product Technical bulletin.

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