



# USER INSTRUCTIONS

## **Valtek FlowTop**

General Service Control Valve

Type V746 and V748

FCD VLENIM8610A4 11/18

**Installation**  
**Operation**  
**Maintenance**

*This document is the Original Instructions'*



**Experience in Motion**

# General Service Control Valve - Valtek FlowTop

The Valtek FlowTop product line is low cost, compact and light-weight. Yet, it is rugged and can be used safely and confidently in a wide range of general service applications plant-wide. Its modular design provides trim and material options to suit most service situations. Simplicity of design reduces maintenance and parts inventory costs. It is ideally suited for flow and pressure control of liquid and gas media in oil and gas, power, chemical and petrochemical processing and related industries. The Valtek FlowTop control valve package provides flow rates, control accuracy and reliability at levels comparable to special engineered service control valves, but at a significantly lower cost. The Valtek FlowTop is manufactured to ISO 9001 standards.

The following instructions are designed to assist in unpacking, installing and performing maintenance as required on Flowserve Valtek FlowTop control valves. This instruction manual does not include specific product design data. Such data can be found on the valve's serial plate or specification documents; additionally, dimensional information can be found in the Valtek FlowTop technical bulletin. Procure needed documents as necessary before you begin any work on the valve.

User Instructions cannot deal with all possible situations and installation options. It is required that only trained and qualified technicians are authorized to adjust, repair or work on control valves, actuators, positioners and other accessories. Review this bulletin prior to installing, operating or performing any maintenance on the valve. Additional Installation, Operation, and Maintenance Instructions (IOMs) cover other features (actuators, handwheels, packing and positioners).

To avoid possible injury to personnel or damage to valve parts, WARNING and NOTICE indicators must be strictly followed. Modifying this product, substituting non-factory parts or using maintenance procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment and may void existing warranties. This manual should be used in conjunction with applicable local and national laws. Failure to comply with User Instructions will render the manufacturer's guarantee and liability null and void. Unless otherwise agreed, the manufacturer's general terms and conditions of sale shall apply.

**Read the user instructions carefully before use.  
Keep for future reference.**

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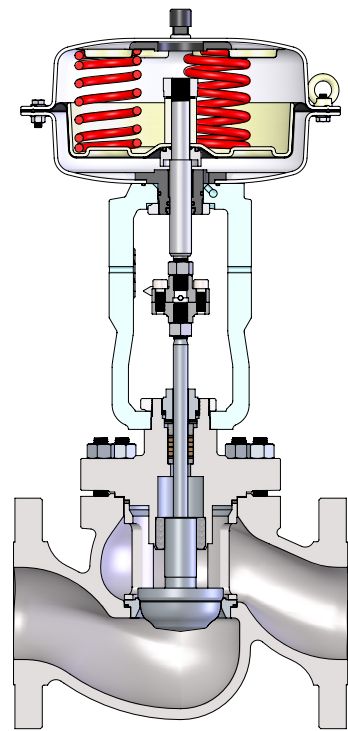


Figure 1: Valtek FlowTop with Standard Bonnet

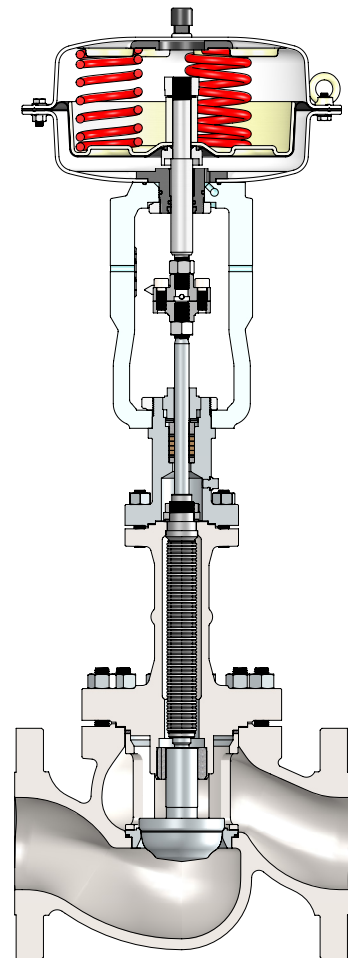


Figure 2: Valtek FlowTop with Bellows Seal

# 1 Scope of Manual

The following user information covers the Valtek FlowTop general service control valve:

- English ASME Units - Class 150, NPS ½ - 6 - Type V746
- English ASME Units - Class 300, NPS ½ - 6 - Type V748
- Assembled with a pneumatic actuator
- Comes with or without ancillary equipment

# 2 Intended Use

**WARNING** Control valves are pressure vessels designed and rated for specific application conditions. Before installation, check the serial number and / or the tag number to ensure that the valve and actuator being installed are correct for the intended application. Do not use the valve outside of its rated design limits. Exceeding the design limits may cause hazardous conditions including leakage of the process media or rupture of the pressure boundary resulting in possible process loss, equipment or environmental damage, or serious personal injury or death.

The specific product design data can be found on the valve's serial plate, data sheet and the calculation sheet (in acc. to the IEC 60534-7:2010).

The Valtek FlowTop handles a wide variety of general service applications, while offering high flow capacity. All sizes come standard with unbalanced trim; for high pressure drop applications optional pressure balanced trim is available for NPS size 3 to 6.

The Valtek FlowTop consists of the body, bonnet, trim, and actuator. The valve is designed with a high level of interchangeability allowing the user to assemble the greatest possible number of variations from a minimum number of components to match each application. There are five bonnet designs: standard bonnet or extended bonnet (either as unbalanced or pressure balanced), and bellows seal bonnets. See *Figure 1* and *Figure 2*.

The Valtek FlowTop is designed in compliance with **EN 1349:2009** - Industrial Process Control Valves (DIN EN 1349 and VDE 0409-1349).

The Valtek FlowTop is designed for use in **MODERATE** and

**WORLDWIDE** environmental conditions, ambient temperature range -40°F to 180°F (-40°C to +82°C), air humidity up to 93% non-condensing, air pollution up to 300 µg/m<sup>3</sup>, unless restricted by the accessories.

The product offering may include optional ancillary equipment, such as positioners, air-filter regulators, solenoid valves, limit switches or boosters. Digital, I/P, or pneumatic positioners can be mounted directly, with a mounting bracket or according to NAMUR standards. Refer to the relevant manufacturer's user instructions for information regarding other ancillary equipment.

# 3 Product Identification

Each Valtek FlowTop (V746 and V748) control valve comes with an attached serial plate which includes key information specifically for each control valve:

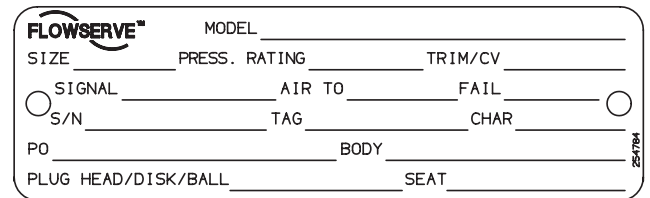


Figure 3: Serial Plate (WW-design, WorldWide)

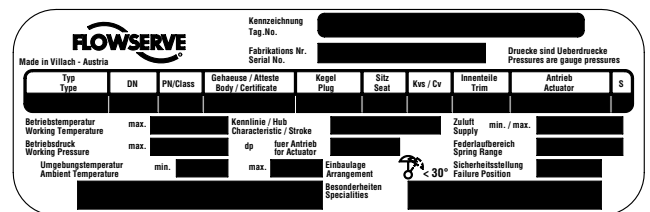


Figure 4: Serial Plate (EU-design, European Union)

The same serial number shown on the plate will appear on all Valtek FlowTop data sheets, dimensional drawings, bills of material, and spare parts lists. Other information located on the serial plate is self-explanatory for the Valtek FlowTop control valve.

You can download .pdf versions of the Valtek FlowTop documentation including a technical bulletin and user instructions at [www.flowserve.com](http://www.flowserve.com). It is the user's responsibility to keep this and related documentation on file and accessible for the Valtek FlowTop product.

# 4 Valtek FlowTop Modification

Valtek FlowTop control valves are generally delivered as tested and assembled units, with factory-mounted actuators.

**Unauthorized modification of the Valtek FlowTop control valve voids the product test certification and product warranties, could drastically affect product performance, and could be hazardous to personnel and equipment.**

**NOTICE** Before Valtek FlowTop re-use, all necessary tests must be repeated and recorded in compliance with all test routines, guidelines and engineering standards.

## 5 Safety

Safety terms - WARNING and NOTICE - are used to highlight specific dangers and / or provide additional information that may not be readily apparent in the User Instructions. WARNING directions must be strictly followed.

**⚠ WARNING** or **⚠** WARNING indicates that severe personal injury, death and substantial property damage can occur if proper precautions are not taken.

**NOTICE** NOTICE indicates practices or provides additional technical information.

**Green fields indicate safety-related informations.**

## 6 Packaging and Transport

**Pay close attention to shipping marks and transport pictograms.**

Careful packing, loading and transport arrangements are required to prevent products from being damaged during transport. Standard packaging includes a cardboard box, with or without a wooden pallet base as needed. Special packaging may include a wooden box. Packaging may use cardboard, plastic wrap, foam, or paper as packing material. Filling material may be a carton type or paper.

4 Shipping marks display product and package dimensions and

weight (for further information see Packaging and Sending Instructions, Form L 002). Packing guidelines for export follow HPE standards. (Nonreturnable packaging may contain up to 90% recyclable materials.)

## 7 Storage

**Maximum storage time for control valves is 6 months.**

**NOTICE** The packing box begins to break down after 6 months. Leakage may develop.

Upon arrival on site, store the Valtek FlowTop on a solid base in a cool, dry closed room. Until its installation, the valve must be protected from the weather, dirt and other potentially harmful influences.

Do not remove the protective covers from the body flanges of the control valve or from the instrument ports of the actuator and accessories until the valve is ready for installation at the site.

## 8 Unpacking

**Hoisting and lifting are inherently dangerous activities and require safe rigging and proper training to mitigate hazards. Use standard industry safety practices, personal protection, and warranted lifting devices.**

**⚠ WARNING** Crushing hazard ! Arrange rigging to prevent tipping of the control valve. Do not allow the valve assembly to rotate during removal. Do not stand under suspended loads. Failure to do so can cause serious personal injury and damage the valve or nearby equipment.

**NOTICE** Be aware that the center of gravity may be above the lifting point. Do not allow the sling to touch the stem, travel indicator or peripheral equipment. Observe the maximum permitted carrying capacity.

1. Check the packing list against materials received to ensure all components and accessories are present.

2. Place a sling around the actuator case just above the yoke.

3. You can alternatively hook a double-leg sling (if necessary a triple-leg sling) into the lifting rings mounted on the actuator (Actuator sizes 500 and 700 cm<sup>2</sup>, observe the permissible loading force).

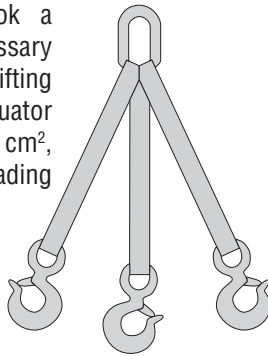


Figure 5: Triple-leg sling

4. Upon removing the control valve from the packaging,

we recommend that you:

- Promptly touch up any damage to the corrosion protection.
- Contact your shipper immediately to report any damage.
- Call your Flowserve representative if you experience any problems.
- Do not remove the protective covers from the body flanges of the control valve or from the instrument ports of the actuator and accessories until the valve is ready for installation at the site.

## 9 Installation

The control valve must be installed and commissioned by qualified staff - personnel who are familiar with the installation, commissioning and operation of this product and possess the relevant qualifications in their field of activity.



**Prior to installation of the actuator, we require, that you check the following conditions to reduce the risk of malfunction and safety related incidents.**

No.	Check	Possible malfunction or safety related incident
1	Confirm that the nominal / operational data on the serial plate matches the operational data of the facility.	<i>An operational mismatch can cause considerable damage to the valve or may lead to a failure at the facility.</i>
2	Confirm that the line is clear of dirt, welding slag, chips, scale or other foreign material.	<i>The risk of control valve damage due to foreign particles will be reduced if a suitable strainer is installed upstream of the valve. (Suggested mesh size of 0.004 inch (0,1 mm))</i>
3	Confirm the piping flanges are coaxial, parallel, and correspond with the face-to-face dimension of the valve.	<i>Incompatible sizing may result in excessive tension, valve malfunction or flange connection leakage.</i>
4	Confirm the piping is routed correctly and the valve is free of additional piping forces.	<i>Incorrect routing may result in leakage and / or potential valve failure.</i>
5	Confirm that the control valve can be installed in an upright position whenever possible.	<i>Non-upright positioning may increase wear in the packing, resulting in leakage and premature wear.</i>

Table 1: Basic safety messages for installing the valve (continued on next page 6)

No.	Check	Possible malfunction or safety related incident																				
6	<p>Confirm the actuator has enough overhead clearance to disassemble the plug from the valve body.</p> <table border="1"> <thead> <tr> <th rowspan="2">Actuator Code</th> <th colspan="2">Removal Space</th> <th colspan="2">≈ R</th> </tr> <tr> <th>mm</th> <th>inch</th> <th>mm</th> <th>inch</th> </tr> </thead> <tbody> <tr> <td>253</td> <td rowspan="3">180</td> <td rowspan="3">7.1</td> <td>260</td> <td>10.2</td> </tr> <tr> <td>503</td> <td>290</td> <td>11.4</td> </tr> <tr> <td>701</td> <td>330</td> <td>13.0</td> </tr> </tbody> </table>	Actuator Code	Removal Space		≈ R		mm	inch	mm	inch	253	180	7.1	260	10.2	503	290	11.4	701	330	13.0	<p>Figure 6: Overhead clearance drawing</p>
Actuator Code	Removal Space		≈ R																			
	mm	inch	mm	inch																		
253	180	7.1	260	10.2																		
503			290	11.4																		
701			330	13.0																		
7	<p>Confirm there are suitable piping lengths upstream and downstream of the valve installation site in order to minimize a sudden pressure surge in the flow.</p>	<p><i>Absence of suitable piping lengths can create critical operating conditions and cause unacceptable levels of noise and vibration.</i></p>																				
8	<p>Confirm removal of all hazards and ensure appropriate protective measures are in place.</p>	<p><i>none</i></p>																				
9	<p>Confirm flow direction to ensure the correct valve installation. Flow direction is indicated by the arrow on the valve body.</p>	<p><i>Improper flow direction causes critical changes to operating conditions that may damage the control valve.</i></p>																				
10	<p>Confirm that the air supply and instrument signal lines are dry and clear of dirt and oil.</p>	<p><i>At a minimum, the instrument air must conform to ISA- 7.0.01-1996 (ISO 8573-1 Compressed Air - Class 2) requirement or those of the accessory manufacturer.</i></p>																				
11	<p>Confirm the valve is grounded in order to prevent an electrical discharge.</p>	<p><i>Noncompliance may result in electrical discharges.</i></p>																				
12	<p>Confirm that the bonnet bolting of valves used in NACE MR 0175 / MR 0103 or ISO 15 156 applications are ventilated.</p>	<p><i>Do not cover or insulate over bonnet flange bolting !</i></p>																				
13	<p>Throttling control valves are typically equipped with a pneumatic actuator and valve positioner. Refer to the appropriate positioner manual for connections and maximum air supplies.</p>	<p><i>The air supply must be limited to less than 87 psig (6 bar) per the actuator serial plate. An air filter regulator should be installed to ensure that the supply pressure to the pneumatic actuator does not exceed the air supply pressure indicated on the WW or EU serial plate.</i></p>																				

Table 1: Basic safety messages for installing the valve

**6** After these requirements are confirmed the valve can be installed and connected in the piping.

1. Remove the protective flange covers and coating from the control valve; clean the flange gasket surface.

**NOTICE** Unsuitable cleaning agents can damage and cause leakage in PTFE and graphite gaskets. Consult a current chemical resistance list before applying.

2. Install the control valve in an upright position whenever

possible. Vertical installation permits easier valve maintenance.

3. Install and connect the control valve to the pipeline. Locate gaskets in the center of the body flanges and secure nuts and bolts.
4. Connect the power supply and instrument signal lines.

## 10 Valve Quick-Check

Apply appropriate personal protective equipment when working on the control valve to prevent hazards arising from the operation. Protect yourself against freezing, burns and cuts by wearing appropriate protective clothing, gloves and eye protection.

Do not over-tighten packing.

Sudden exposure of the control valve to full working pressure and temperature may cause stress cracks.



Prior to valve operation, we require, that you check the following conditions to reduce the risk of malfunction and safety related incidents.




No.	Important information	Possible malfunction or safety related incident
1	Avoid critical operating conditions where excessive noise or vibration levels might occur.	Impermissible continuous operation of a control valves under critical conditions can damage the valve.
2	Avoid frequent system start-ups and shutdowns.	Critical operating conditions, which can damage the control valve, may be encountered during system start-up or shut down.
3	Keep the operating medium free of foreign particles.	Installing a suitable strainer upstream of the control valve can prevent foreign particles from damaging the valve.
4	Instrument air must conform to ISA 7.0.01-1996 (with a dew point at least 18°F (10°C) below ambient temperature, particle size below 1 µm and oil content not to exceed 1 ppm)	Contaminated instrument air can damage the accessories and control valve or cause them to fail.
5	 <b>Do not touch the body and bonnet ! The temperature of the operating medium is transferred to the surface of the linear actuator.</b>	<b>Excessive hot surface temperatures can put you at risk for burns.</b> <b>Frigid surface temperatures can put you at risk for freezing.</b>
6	 <b>Critical operating conditions can cause excessive or hazardous levels of vibration or noise.</b>	<b>Impermissible levels of vibration can cause hearing loss, vascular and nerve damage and damage to joints and bones. Use hearing protection when noise levels exceed 80 dB(A).</b>
7	 <b>Incorrect maintenance can result in the emission of hot, cryogenic, and / or toxic operating media.</b>	<b>Incorrect maintenance can put you at risk for heat related burns, freezing, acid burns or poisoning.</b>

Table 3: Basic safety messages for operating the valve

**WARNING** Due to risk of crushing hazard, do not work between the yoke legs while the valve is in operation.

Prior to start-up, we strongly recommend that you:

1. Stroke the valve and compare the plug position indicator on the stem clamp to the stroke indicator plate. The plug should change position in a smooth, linear fashion.

**NOTICE** If over tightened, excessive friction may impair smooth control.

2. Adjust instrument signals to ensure a full stroke.
3. Check the packing box bolting to ensure the correct adjustment (See Section 11: Valve Maintenance).

**NOTICE** Over tightening can cause excessive packing wear and high stem friction that may impede plug movement.

4. Continuously increase load until operation parameters are reached.
5. Minor relaxation of the flange bolting is possible after initial assembly. Retorque the bonnet flange bolting if necessary before installation or following an initial temperature excursion to ensure the bonnet gaskets do not leak (See Table 4).

Pressure Size	Class 150 <sup>1)</sup>		Class 300 <sup>1)</sup>	
	Nm	ft lb	Nm	ft lb
1/2"	15	11	15	11
3/4"				
1"				
1 1/2"	23	17	24	18
2"	28	21	32	24
3"	24	18	37	27
4"	41	30	71	52
6"	72	53	146	108

<sup>1)</sup> V746 is designed for Class 150 while V748 is designed for Class 300

Table 4: Recommended Body Bolt Torque Values

## 11 Valve Maintenance

Maintenance intervals and service life of a valve can only be determined empirically on site. The intervals specified in the User Instructions are recommendations and serve only as a guide. Under problematic operating conditions, maintenance intervals may be significantly reduced. We strongly recom-

mend a site survey followed by establishing a documented procedure for performing the maintenance work. Maintenance personnel should perform and log the work accordingly. The data collected can be used as a basis for dynamically determining the maintenance intervals and activities.

Recommended Maintenance Actions					
No.	Service	Inter- val	Valve Condition		
			Good	Adequate	Inadequate
1	Visual inspection of the valve	Bi-weekly	No action	Clean valve stem with a soft cloth	Overhaul or replace valve after product lifecycle
2	Visual inspection of the packing	Bi-weekly	No action	Retighten leaky packing box	Replace leaky packing box immediately
	Preventive change of the PTFE-packing	→	Dependent upon results of previous maintenance (see numbers 1 and 2 above) or a minimum of once every 24 months		
3	Visual inspection of body bolting	Yearly	No action	Retighten body bolting if bonnet gasket leaks.	Remove from service and replace body bolting immediately if gasket leakage persists or if bolting is damaged
4	Visual inspection of the actuator	Bi-weekly	No action	Clean actuator stem with a soft cloth	Overhaul or replace actuator after product lifecycle
5	Preventive overhaul of the valve	→	Dependent upon results of previous maintenance (see numbers 1 to 4 above) or a minimum once every 60 months		
6	Operation test	→	No action	Perform 3 full strokes if packing and / or bonnet tightening is modified; check for leakage	



Recommended maintenance actions using the Logix digital positioner with ValveSight diagnostic solution software					
No.	Service	Inter-val	Valve Condition		
			Good	Adequate	Inadequate
7	Visual inspection of diagnostic interface	Weekly	No action - valve is healthy	Take action per warning	Overhaul or replace required part per alarm
8	Check health parameter of valve	Warning	No action - valve is healthy	Replace packing box components per warning	Overhaul or replace valve after alarm
9	Check health parameter of actuator	Warning	No action - actuator is healthy	Check and retighten air supply	Overhaul or replace actuator after alarm
10	Check health parameter of control	Warning	No action - control is healthy	Overhaul or replace valve; trim and bonnet components must be checked and / or repaired after alarm	
11	Check health parameter of positioner	Warning	No action - positioner is healthy	Start step test	Overhaul or replace positioner after alarm

Table 5: Service activities check list



Prior to valve operation, we require, that you check the following conditions to reduce the risk of malfunction and safety related incidents.

No.	Check	Possible malfunction or safety related incident										
1	Check the packing follower for proper tightness.	<p>The packing follower is spring loaded and factory adjusted. If leakage is detected around the packing follower tighten it clockwise using a wrench in quarter turn intervals until the leakage stops.</p> <table border="1"> <thead> <tr> <th>Wrench Size</th> <th>Adjustment Interval</th> <th>Maximum Adjustment</th> </tr> </thead> <tbody> <tr> <td>SW 24 ~ 15/16 AF</td> <td rowspan="3">quarter turn</td> <td>one,</td> </tr> <tr> <td>SW 32 ~ 1 1/4 AF</td> <td>three-quarter turn</td> </tr> <tr> <td>SW 46 ~ 1 13/16 AF</td> <td>one complete turn</td> </tr> </tbody> </table> <p>Table 7: Packing Adjustment</p> <p>Do not overtighten packing.</p> <p>Overtightened packing can cause excessive packing wear and high stem friction that may impede plug movement.</p> <p>If leakage cannot be stopped, the packing must be replaced.</p>	Wrench Size	Adjustment Interval	Maximum Adjustment	SW 24 ~ 15/16 AF	quarter turn	one,	SW 32 ~ 1 1/4 AF	three-quarter turn	SW 46 ~ 1 13/16 AF	one complete turn
Wrench Size	Adjustment Interval	Maximum Adjustment										
SW 24 ~ 15/16 AF	quarter turn	one,										
SW 32 ~ 1 1/4 AF		three-quarter turn										
SW 46 ~ 1 13/16 AF		one complete turn										
2	Check for signs of gasket leakage through the bonnet and end flanges.	Tighten the bonnet bolting nuts. See Section 13: Disassembly and Reassembly for instructions. Also see Table 4 in Section 10.										
3	Check if all nuts and bolts are securely fastened.	<b>Avoid critical operating conditions if excess noise or vibration levels occur during operation.</b>										
4	Check valve for smooth, full-stroke operation. Unsteady stem movement could indicate an internal valve problem.	Internal valve failure requires an immediate overhaul or control valve replacement by qualified staff.										

Table 6: Basic safety messages for maintenance the valve

After these requirements are confirmed proceed with valve maintenance.

**⚠ WARNING** **Crushing hazard ! Failure to keep hands, hair, and clothing away from all moving parts when operating the control valve can cause serious injury.**

1. Clear all dirt and / or foreign material from the plug stem and control valve.
2. If leakage is detected, retighten the packing follower by one full turn clockwise (See Table 7: Packing Adjustment).
3. If retightening packing does not stop the leakage, overhaul the control valve and replace the packing (See Section 13: Disassembly and Reassembly).
4. If leakage is detected, retighten bonnet and flange bolting.

5. Make sure all nuts and bolts are securely fastened.
6. If possible, stroke the valve and check for smooth, full-stroke operation. Unsteady stem movement could indicate an internal valve problem.
7. Make sure all accessory brackets and bolting are securely fastened.
8. Check control valve health parameters:
  - Characteristic curves of the valve with flow
  - Upstream pressure
  - Downstream pressure

into the control room.

**NOTICE** *Monitor trim and bonnet components. If nominal and actual values differ by more than 5%, maintenance may be required.*

## 12 Troubleshooting

**Contact customer service department or contract partner for any fault or defect found, otherwise the manufacturer’s guarantee shall be rendered null and void and the manufacturer released from any responsibility. If the user performs the repairs, these User Instructions must be adhered to and carried out in a competent manner. Original Equipment Manufacturer spare parts must be used to make the repair.**

Defect	No.	Possible Causes	Remedy
Stem does not move	1.1	• No auxiliary energy supply (pneumatic air) to actuator and accessories (positioner, air filter regulator, solenoid valve, limit switch, and/ or special accessories)	• Pneumatic actuators: Check supply for leaks Check air pressure (usually 87 psig; 6 bar)
	1.2	• Mounted accessories do not work	• See User Instructions for accessory manufacturer
	1.3	• Pneumatic actuator is defective	• Contact customer service department or contract partner
	1.4	• Excessive tightening of the packing box	• Loosen packing follower until valve operates properly  <b>NOTICE</b> <i>Make sure there are no leaks.</i>
	1.5	• Valve trim worn or stuck	• Contact customer service department or contract partner
Jerky stem movement	2.1	• Damaged stem	• Contact customer service department or contract partner

Defect	No.	Possible Causes	Remedy
Jerky stem movement	2.2	<ul style="list-style-type: none"> <li>Actuator not powerful enough</li> </ul>	<ul style="list-style-type: none"> <li>Compare actuator specifications on the serial plate with operation specifications of the facility. If incompatible, contact customer service department or contract partner</li> </ul>
	3.1	<ul style="list-style-type: none"> <li>Air supply pressure too low</li> </ul>	<ul style="list-style-type: none"> <li>Provide air at the pressure stated on the serial plate (European production only).</li> </ul>
	3.2	<ul style="list-style-type: none"> <li>Pneumatic actuators: Improper handwheel position</li> </ul>	<ul style="list-style-type: none"> <li>Move handwheel to limit position , otherwise contact factory for information.</li> </ul>
	3.3	<ul style="list-style-type: none"> <li>Improperly adjusted or defective positioner</li> </ul>	<ul style="list-style-type: none"> <li>Readjust positioner to positioner manufacturer's specification</li> </ul>
Excessive valve seat leakage	3.4	<ul style="list-style-type: none"> <li>Foreign particles in valve seat or damaged trim</li> </ul>	<ul style="list-style-type: none"> <li>Contact customer service department or contract partner</li> </ul>
	4.1	<ul style="list-style-type: none"> <li>Damaged sealing surfaces on valve seat or plug</li> </ul>	<ul style="list-style-type: none"> <li>Contact customer service department or contract partner</li> </ul>
	4.2	<ul style="list-style-type: none"> <li>Foreign particles in seat area</li> </ul>	<ul style="list-style-type: none"> <li>Contact customer service department or contract partner</li> </ul>
Leaking packing box system	4.3	<ul style="list-style-type: none"> <li>Plug does not close fully</li> </ul>	<ul style="list-style-type: none"> <li>Refer to No. 3.1 to 3.5</li> </ul>
	5.1	<ul style="list-style-type: none"> <li>Compression force on packing box too low</li> </ul>	<ul style="list-style-type: none"> <li>Slightly retighten packing box</li> </ul> <p><b>NOTICE</b> <i>Make sure stem can still move.</i></p>
	5.2	<ul style="list-style-type: none"> <li>Worn packing</li> </ul>	<ul style="list-style-type: none"> <li>Slightly retighten packing box</li> </ul> <p><b>NOTICE</b> <i>Make sure stem can still move.</i></p> <p>If the packing does not stop leaking, contact customer service department or contract partner</p>
	5.3	<ul style="list-style-type: none"> <li>Dirty stem</li> </ul>	<ul style="list-style-type: none"> <li>Clean stem with suitable cleaning agent</li> </ul>
	5.4	<ul style="list-style-type: none"> <li>Damaged stem</li> </ul>	<ul style="list-style-type: none"> <li>Contact customer service department or contract partner</li> </ul>
Leaking bonnet gasket	6.1	<ul style="list-style-type: none"> <li>Gasket compression is too low</li> </ul>	<ul style="list-style-type: none"> <li>Properly retighten bonnet bolting nuts crosswise</li> </ul>
	6.2	<ul style="list-style-type: none"> <li>Gasket defective</li> </ul>	<ul style="list-style-type: none"> <li>Contact customer service department or contract partner</li> </ul>
	6.3	<ul style="list-style-type: none"> <li>Corrosion</li> </ul>	<ul style="list-style-type: none"> <li>Contact customer service department or contract partner</li> </ul>
Leaking body	7.1	<ul style="list-style-type: none"> <li>Corrosion or high velocity related damage</li> </ul>	<ul style="list-style-type: none"> <li>Contact customer service department or contract partner</li> </ul>
No limit switch signal	8.1	<ul style="list-style-type: none"> <li>Power supply to limit switch interrupted</li> </ul>	<ul style="list-style-type: none"> <li>Check power supply (connections, circuit breakers, voltage)</li> </ul>
	8.2	<ul style="list-style-type: none"> <li>Limit switch out of adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Readjust limit switch operating distance; see limit switch data sheet</li> </ul>
Unstable positioner	9.1	<ul style="list-style-type: none"> <li>Defective positioner</li> </ul>	<ul style="list-style-type: none"> <li>See user instruction of the positioner manufacturer</li> </ul>

Table 8: Trouble-shooting

## 13 Disassembly and Reassembly

The Valtek FlowTop control valve is allowed to be disassembled and reassembled only by qualified staff - personnel who are familiar with disassembling, reassembling, installation and commissioning of this product, and possess the relevant qualifications in their field of activity.

When performing repairs, personnel are to follow these instructions using only **original** equipment manufacturer (OEM) spare parts and recommended special tools to ensure the reliability of the Valtek FlowTop control valve.

Only Flowserve trained and authorized personnel are allowed to repair (disassemble and reassemble) the Valtek FlowTop in hazard areas.

Valves are provided for oil and grease-less service or oxygen service may only disassembled and reassembled in clean rooms (ISO 14644- ISO 8, US FED STD 209 E - M 6.5, or equivalent).

**⚠ WARNING** Control valves are pressure vessels. Improper opening of the valve or actuator can result in bodily injury.

**⚠** Prior to installation of the actuator, we require, that you check the following conditions to reduce the risk of malfunction and safety related incidents.

No.	Important information	Possible malfunction or safety related incident
1	Disregarding these instructions may bring serious or harmful consequences.	<i>Failure to comply with these user instructions will render the manufacturer's guarantee and liability null and void. Unless otherwise agreed, the manufacturer's general terms and conditions of sale shall apply.</i>
2	<b>⚠</b> Always observe system safety instructions when preparing for and performing the repair procedure.	<b>Potential hazards and their sources are under the operator's influence. The operator must observe national and international environmental regulations for control valve removal from the pipe and cleaning. Permissible exposure limits must be maintained, appropriate personal protective equipment must be used and service personnel must be properly instructed in performing the repair procedure.</b>
3	<b>⚠</b> Make sure the pipeline is depressurized in an ambient state, also a suitable rigging (e.g. Endless Sling) and securing devices (e.g. Vee Trough with Stands / Vise) are readily available.	<b>Remove the Valtek FlowTop from the pipeline in a depressurized and ambient state. Failure to do so can cause serious personal injury. The control valve is not equipped with integral stands, therefore guard against the valve from tipping over. Bodily injuries can be the result. Use appropriate clamps, blocking or other stabilizing support. Attachment to overhead crane can ensure stability.</b>
4	Confirm that you have the required spare parts at the site.	<i>Not having the full complement of parts, accessories and tools can slow or stop repair work.</i>
5	<b>⚠</b> Confirm that you have the required tools available to manage the disassembly and reassembly (See Section 16: Special Tools).	<b>Improper tools and / or improper use of tools can result in personal injury or damage to the parts.</b>
6	Review the serial plate information to identify the valve. The serial number and the part numbers needed are required when ordering spare parts.	<i>A serial plate used for product identification is attached on every control valve (See Section 3: Product Identification).</i>
7	Do not damage any valve surfaces during repair.	<i>Damaging the stem surface and / or packing area may lead to premature leakages in the packing area.</i>
8	Check all parts for damage such as scoring, deformities, corrosion or overexpansion.	<i>If in doubt, replace faulty parts. Never reuse gaskets.</i>

After these requirements are confirmed the control valve can be maintained and repaired.

## Description of the Procedure

1. Disconnect the air supply from the actuator and / or assembled accessories.
2. Disassemble the positioner from the valve as necessary (See Figure 7: Remove the positioner).
3. Move the actuator to the open (retracted) position.
4. Turn the cap screws (240) counter clockwise to loosen (See Figure 8: Remove the actuator).
5. Turn the lock nut (113) clockwise to loosen. Keep actuator coupling (345) from turning by securing with a wrench.
6. Turn the yoke lock nut (76) counter clockwise to loosen.
7. Lift off and store the actuator safely.
8. Place the valve body assembly on a table for disassembly.

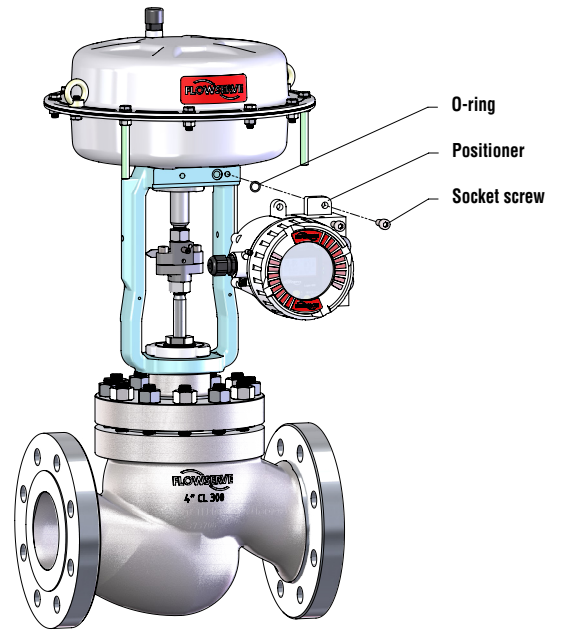


Figure 7: Remove the positioner

## Disassembly instructions of the valve body assembly.

1. Turn the lock nut (113) counter clockwise to loosen.
2. Turn the packing follower (80) counter clockwise to loosen.
3. Remove the Belleville springs (138) (Option, see Parts List - Packing Details).
4. Remove the upper stem guide (87).
5. Turn the bonnet nuts (114) counter clockwise to loosen.
6. Place the Ring Nut Tool (See Section 16: Special Tools) on the stem (51) then slowly turn the bonnet assembly (40).

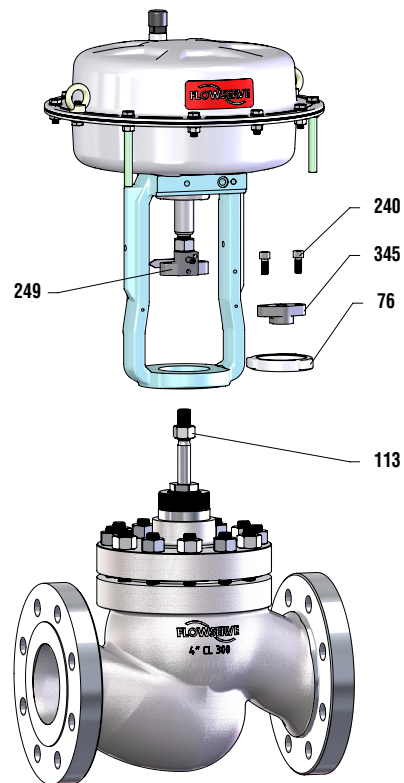


Figure 8: Remove the actuator

**⚠ WARNING** Crushing hazard ! Lifting the bonnet and plug from the control valve involves personal physical risk by falling parts.

Please exercise caution.

Item	Part	Item	Part
76	Yoke Lock Nut	249	Actuator Coupling
113	Lock Nut	345	Valve Coupling
240	Socket Head Srew (2x)		

Table 10: Coupling parts identification

**NOTICE** Exercise care with a pressure balanced plug design. While removing the pressure balanced plug, the retainer may stick to the bonnet then become detached while lifting the plug and stem out of the valve. Secure the seat retainer as you remove the plug and stem.

7. Remove the bonnet gasket (58) and seat retainer gasket (56).
8. Remove the seat retainer (30), seat ring (20) and profile ring (55).
9. Remove the plug assembly (50) from the bonnet (40).
10. Use the Packing Driver Tool (See Section 16: Special Tools) to remove the packing box ring (93), packing (88) and the upper guiding (87) (Details see Parts List - Packing Details).
11. Use a standard brass scraper or other suitable tool to remove all old gasket material; then clean the gasket surfaces.

**NOTICE** Examine the valve trim and bonnet components. If the nominal and actual values differ by more than 5% a control valve overhaul may be required (See Point 8, Page 9).

12. Check stressed surface areas for damage such as scoring and deformities.
13. Use a standard brass scraper or other suitable tool to clean bolting. Check for corrosion or any other damage.

### Reassembly instructions of the valve body assembly.

14. Lubricate all bolt and screw threads and bearing surfaces (stem, underside of the nuts) with a suitable, approved lubricant (See Section 15: Lubricants).

**NOTICE** Never allow lubricants to come in contact with the bonnet or sealing surfaces.

15. Install a new profile ring (55) and seat ring (20).
16. Lower the seat retainer (30) into the body and place it on top of the seat ring (See Figure 9).
17. Lower the plug assembly (50) into the body with the plug touching the seat ring surface.

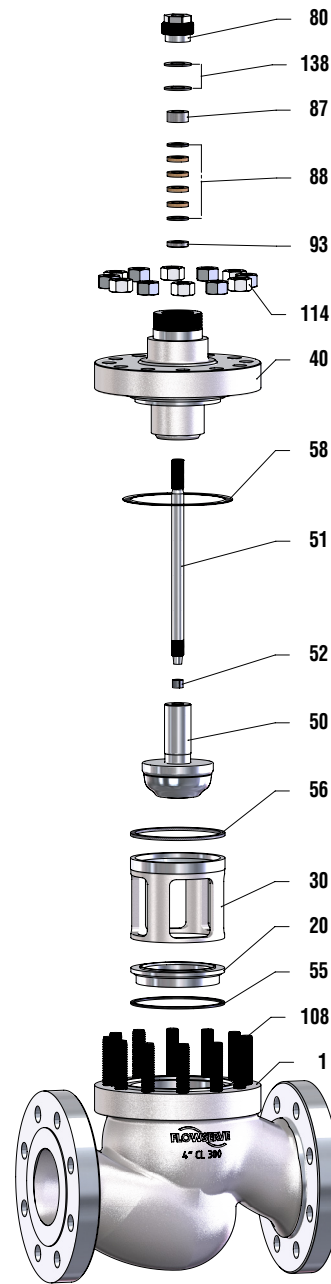


Figure 9: Disassemble / Reassemble the valve

Item	Part	Item	Part
1	Body	58	Bonnet gasket
20	Seat ring	65	O-ring (Figure 10)
30	Seat retainer Sleeve (Figure 10)	66	Backup ring (Figure 10)
40	Bonnet	80	Packing follower
50	Plug	87	Upper guiding
51	Stem	88	Packing
52	Lock bushing	93	Packing box ring
55	Profile ring	108	Stud bolt
56	Seat retainer gasket	114	Hex nut
		138	Belleville spring

Table 11: Valve parts

18. Install the new seat retainer gasket (56) and the new bonnet gasket (58).
19. Carefully lower the bonnet (40) onto the plug in the body of the valve (See right column for pressure balanced trim).
20. Install and finger tighten the bonnet nuts (114) to the bonnet bolts (108).
21. Install the packing box ring (93) and the new packing (88).

**NOTICE** *Install and push two packing rings consecutively using the Tamping Tool and pre-tighten it. Repeat the procedure with remaining rings. Rotate each ring 180° from the overlapping point. Make sure each ring is clean. Dirty rings result in stem leakage.*

**There are different versions - for details see Parts List - Packing Details (see Page 19).**

22. Install the upper guide (87), Belleville springs (138) and the packing follower (80). Tighten the packing follower with your fingers clockwise until resistance can be felt.

**NOTICE** *The belleville springs (138) must be stacked in series.*

23. Tighten the bonnet nuts (114) in four steps - 30%, 60%, 100%, and all around 100% - using a crosswise pattern (See Section 14: Torque Requirements).

**NOTICE** *Check the plug's freedom of movement by lifting it approximately ~10 mm (0.4 inch) between tightenings. Loosen the bolted connection and start again if it proves difficult to move the plug.*

24. Finish packing follower (80) tightening with a wrench (See Table 7, Page 9).
25. Replace the pneumatic diaphragm actuator and accessories (See page 13).
26. After reinstalling the control valve in the pipeline, perform 3 full strokes and check the tightening of the packing follower and bonnet bolting.

**NOTICE** *Do not over tighten the packing. Over tightened packing may produce higher friction and reduce product service life.*

27. Log the maintenance interval and the work performed.

## Bonnet version with a pressure balanced trim:

28. Lubricate all bolt and screw threads and bearing surfaces (stem, underside of the nuts) with a suitable, approved lubricant (See Section 15: Lubricants).

**NOTICE** *Never allow lubricants to come in contact with the bonnet or sealing surfaces.*

29. Reassemble the pressure balanced plug with new backup rings (66) and a new O-ring (65) (See Figure 10).
30. Install a new profile ring (55) and seat ring (20).
31. Lower the sleeve (30) into the body and place it on top of the seat ring (20).
32. Lower the pre-assembled plug assembly (50) into the sleeve (30) with the plug head touching the seat ring.
33. Install the new seat retainer gasket (56) and the new bonnet gasket (58).
34. Lower the bonnet (40) onto the stem (51) of the plug assembly (50) in the body of the valve.
35. Continue with the standard procedure in the chapter 20.

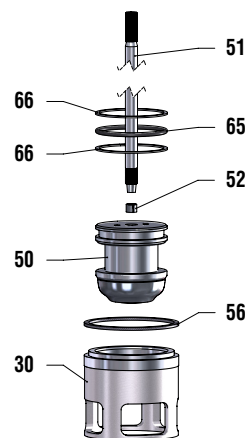


Figure 10: Pressure balanced design

## Disassembly of the valve with a Bellows Seal Bonnet Assembly.

1. Turn the bonnet nuts (114) counter clockwise to loosen (See Figure 11: Disassemble / Reassemble the valve with bellows seal bonnet type A).
2. Turn the packing follower (80) counter clockwise to loosen.
3. Remove the Belleville springs (138).

- Remove the upper stem guide (87).
- Place the Ring Nut Tool clockwise (See Section 16: Special Tools) on the stem (51) and turn slowly.

**WARNING** Crushing hazard ! Lifting the bonnet and plug from the control valve involves personal physical risk by falling parts.

Please exercise caution.

- Remove the bonnet gasket (58) and seat retainer gasket (56).
- Remove the seat retainer (30), seat ring (20) and profile ring (55).
- Turn the bonnet nuts (110) counter clockwise to loosen.
- Remove the head (40) and upper bonnet gasket (59).

**NOTICE** There are two different bellows seal designs.

Type	Size	Twist lock between plug and stem	Connection between bellows and bonnet
A	15 - 50	1/2" - 2"	Lock bushing
B	65 - 150	3" - 6"	Lock pushing

Table 12: Bellows seal bonnet types

- Disassembling each type of Bellows Seal Assembly:

**Type A Bellows Seal Assembly:**

Lower the plug (50) into a three jaw-chuck with soft brackets and turn the plug from the stem and bonnet (51 / 5) counter clockwise to loosen then move the bellows seal assembly up and out.

**Type B Bellows Seal Assembly:**

Turn the hex nut (104) from the bellows seal assembly (51) counter clockwise to loosen, remove the seal carrier (91) and profile ring (60) then move the bellows seal assembly down and out.

**NOTICE** The bolting between plug and stem are secured against twisting. Type A and B bellows seal assemblies are secured with a lock bushing (52). The lock bushing (52) usually remains in the plug (50) and can be reused. If the plug (50) is damaged and replaced, a new lock bushing (52) must be used.

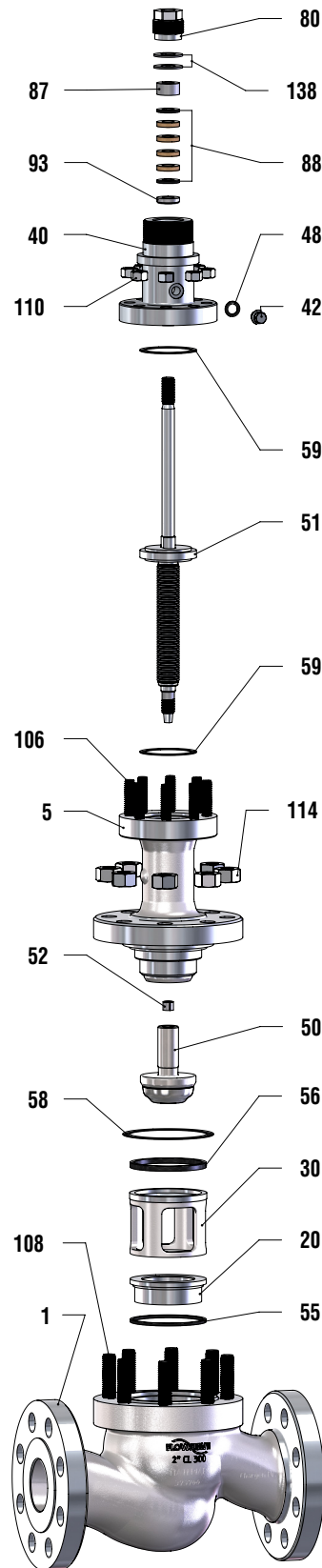


Figure 11: Disassemble / Reassemble the valve with bellows seal assembly for type A designs (Valve parts see Table 13, Page 17)

- Use the Packing Driver Tool (See Section 16: Special Tools)



to remove the packing (88) and the packing box ring (93).

- Use a standard brass scraper or other suitable tool to remove all old gasket material; then clean the gasket surfaces.

**NOTICE** Examine the valve trim and bonnet components. If the nominal and actual values differ by more than 5% a control valve overhaul may be required.

- Check stressed surface areas for damage such as scoring or deformities.
- Use a standard brass scraper or other suitable tool to clean all bolting. Check for corrosion or any other damage.

### Reassembly of the valve with a Bellows Seal Bonnet Assembly:

- Lubricate all bolt and screw threads and bearing surfaces (stem, plug, underside of the nuts) with a suitable, approved lubricant (See Section 15: Lubricants).

**NOTICE** Never allow lubricants to come in contact with the bonnet or sealing surfaces.

- Lower the plug (50) into a three jaw-chuck with soft brackets and install a new lock bushing (52) into the plug (Type A and B).

**NOTICE** The cone of the lock bushing must open to the top.

Reassembling **Type A** bellows:

Carefully lower the bonnet (5) onto the plug. Install a new head gasket (59) and insert the bellows seal assembly (6) from the top of the bonnet (5). Finger tighten the stem (51) clockwise onto the plug (50). Tighten the stem (51) using a suitable torque wrench.

Reassembling **Type B** bellows:

Install the bellows seal assembly (51) clockwise onto the plug (50). Tighten the stem (51) using a suitable torque wrench.

Insert the bellows seal assembly (51) type B through the underside of the bonnet (5), install a new profile ring (60) and seal carrier (91) on top. Turn hex nut

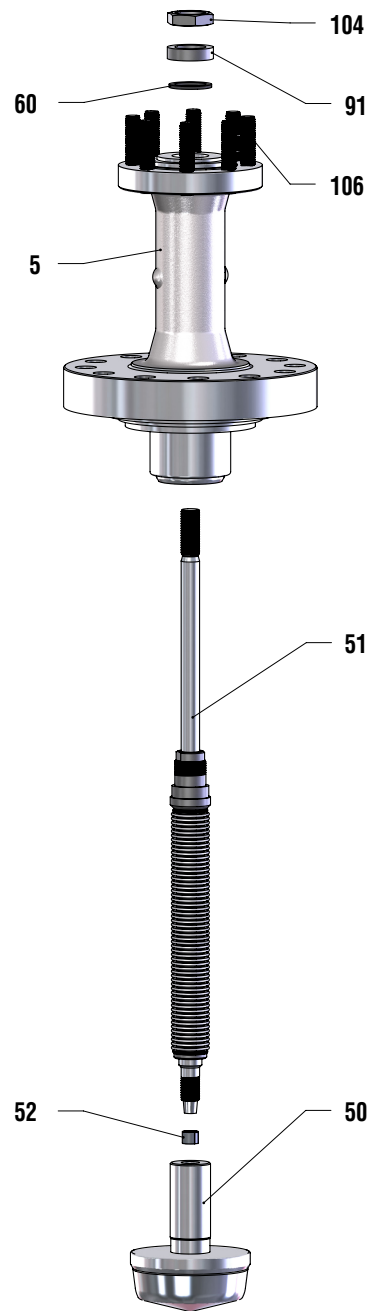


Figure 12: Disassemble / Reassemble the valve with bellows seal assembly for type B design

Item	Part	Item	Part	Item	Part
1	Body	52	Lock bushing	91	Seal carrier
5	Bonnet	55	Profile ring	93	Packing box ring
20	Seat ring	56	Seat ret. gasket	104	Hex nut
30	Seat retainer	58	Bonnet gasket	106	Stud bolt
40	Head	59	Head gasket	108	Stud bolt
42	Plug screw	60	Profile ring	110	Hex nut
48	Plug gasket	80	Packing follower	114	Hex nut
50	Plug	87	Upper stem guide	138	Belleilville spring
51	Stem	88	Packing		

Table 13: Valve parts with bellows seal

- (104) clockwise and finger tighten.  
(See Section 14: Required Torques, for plug and stem)
- 17. Install the new bonnet gasket (58).
- 18. Install a new profile ring (55) and seat ring (20).
- 19. Lower the seat retainer (30) into the body and place it on the seat ring.
- 20. Install the new seat retainer gasket (56) and the new bonnet gasket (58).
- 21. Lower the plug assembly (50) into the body and place it into the seat ring.
- 22. Install and finger tighten the bonnet nuts (114) to the bonnet bolts (108).
- 23. Install the new head gasket (58) and carefully lower the head (40) onto the stem and bonnet.
- 24. Install and finger tighten the nuts (110) to the studs (106).
- 25. Install the packing box ring (93) and the new packing (88).

**NOTICE** *Install and push two packing rings consecutively using the Tamping Tool and pre-tighten it using the Compression Tool. Repeat the procedure with remaining rings. Rotate each ring 180° from the overlapping point. Make sure each ring is clean. Dirty rings result in stem leakage.*

*(See Parts - Packing, Page 20)*

- 26. Install the upper stem guide (87), Belleville springs (138), and the packing follower (80). Tighten the packing follower with your fingers clockwise until resistance can be felt.

**NOTICE** *The Belleville springs (138) must be stacked in series.*

- 27. Tighten the bonnet nuts (114) in four steps - 30%, 60%, 100%, and all around 100% - using a crosswise pattern (See Section 14: Torque Requirements).
- 28. Tighten the nuts (110) in four steps - 30%, 60%, 100%, and all around 100% - using a crosswise pattern (See Section 14: Torque Requirements).

**NOTICE** *Check the plug's freedom of movement by pushing / lifting it approximately ~10 mm (0.4 inch) between tightenings. Loosen the bolted connection and start again if it proves difficult to move the plug.*

- 29. Finish packing follower tightening with a wrench (See Table 7, Page 9).
- 30. Replace the pneumatic diaphragm or multi-turn actuator and accessories (See page 19).
- 31. After reinstalling the control valve in the pipeline, perform 3 full strokes and check the tightening of the packing follower and bonnet bolting.
- 32. Log the maintenance interval and the work performed.

**NOTICE** *Do not over tighten the packing. Over tightened packing may produce higher friction and reduce product service life.*

### MegaStream noise reduction and CavStream anti-cavitation trims:

**Structurally, there is no difference between a seat retainer and a MegaStream retainer; both are assembled and disassembled identically. Follow instructions in Section 13.**



Figure 13: MegaStream

**CavStream should be treated the same as the plug assembly. Follow same instructions as noted on pages 13 through 18.**

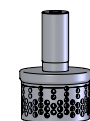


Figure 14: CavStream

**NOTICE** *Care should be taken to observe any wear on the CavStream plug head.*

## Reassemble the actuator and positioner onto the valve:

1. Mount the pneumatic diaphragm actuator onto the bonnet and tighten the yoke lock nut (76) clockwise (see Section 14: Required Torques).

**NOTICE** Position the actuator with the vent plug positioned at the rear.

2. Move the actuator to the open position.
3. Screw in the lock nut (113) and actuator coupling (345) and adjust the distance between the valve coupling (345) and actuator coupling (249) by adjusting the stroke length.

Size	Stroke	
1/2" - 2"	20 +0.5 mm	0.787 +0.02 in.
3" - 4"	40 +0.5 mm	1.574 +0.02 in.
6"	60 +0.8 mm	2.362 +0.03 in.

Table 14: Stroke adjustment length

4. Adjust the valve coupling (345) until the actuator coupling (249) lines up.

**NOTICE** Press the stem / plug into the seat by hand.

5. Move the actuator to the close position and install the cap screws (240).
6. Secure the lock nut (113). Keep actuator coupling (249) from turning by securing with a wrench.
7. Reassemble the positioner on the valve as necessary (see relevant accessory User Instruction).
8. Connect the valve into the pipeline (See Section 9: Installation).
9. After reinstalling the control valve into the pipeline, perform three full strokes and check the tightness of the packing follower and bonnet bolting (See Section 10: Valve Quick-Check).
10. Log the maintenance interval and the work performed.

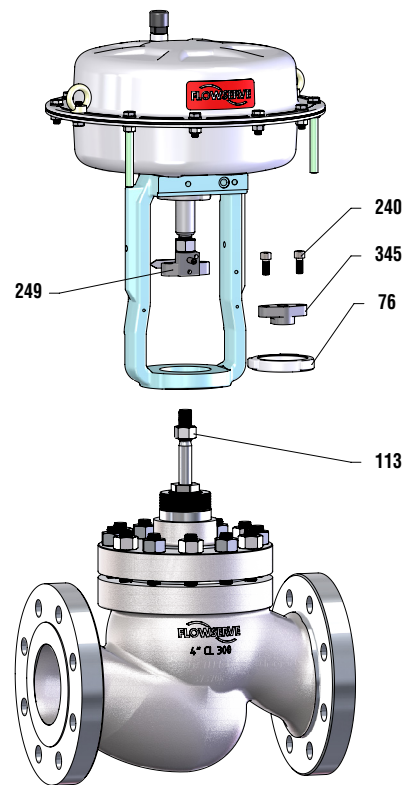


Figure 15: Reassemble the actuator

Item	Part	Item	Part
76	Actuator Lock Nut	249	Actuator Coupling
113	Lock Nut	345	Valve Coupling
240	Socket Head Screw (2x)		

Table 15: Coupling parts identification

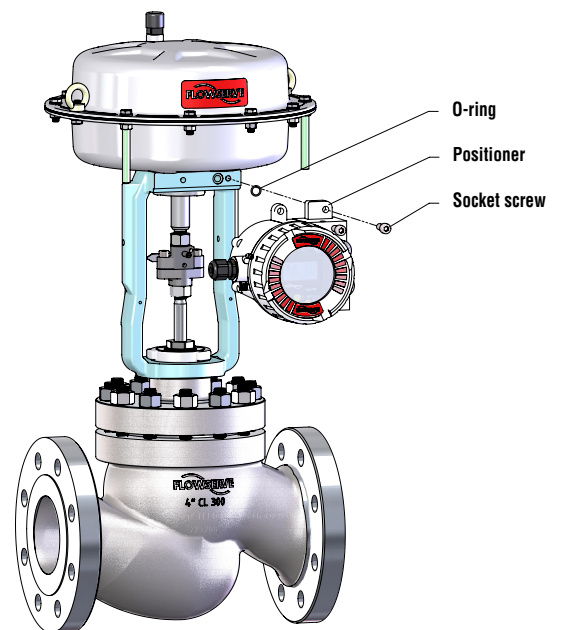
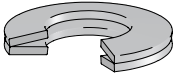


Figure 16: Reassemble the positioner

## Parts - Packing

Detail	Type	Detail			
		PTFE - rings		Graphite - rings	
		Standard	Spring loaded	Standard	Spring loaded
Packing Assembly					
		 The two Belleville springs must be stacked in series !			

## 14 Torque Requirements

Pressure Class	Torque Requirements for BONNET NUTS (1.4) per nominal diameter							
	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"
Class 150 <sup>1)</sup>	Nm	15		23	28	24	41	72
Class 300 <sup>1)</sup>				24	32	37	71	146
Class 150 <sup>1)</sup>	ft lb	11		17	21	18	30	53
Class 300 <sup>1)</sup>				18	24	27	52	108

<sup>1)</sup> V746 is designed for Class 150 while V748 is designed for Class 300

Pressure Class	Torque Requirements for HEAD NUTS (110) per nominal diameter							
	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"
Class 150	Nm	13		14		30		24
Class 300		10		12		25		46
Class 150	ft lb	9.6		10.3		22		17.7
Class 300		7.4		8.9		18.4		34

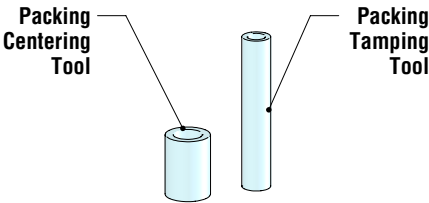


Pressure Class	Torque Requirements for PLUG and STEM (50, 6) per nominal diameter								
	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	
Class 150 / 300	Nm	40				80		170	
Class 150 / 300	ft lb	30				59		125	

**NOTICE** The yoke lock nut (76) should be tighten with a rounded chisel and a 1,5 kg (3.5 lbs) hammer before the 'kickback' effect occurs. The coupling part bolting should be tighten properly by hand in accordance with the relevant technical standards.

## 15 Lubricants

Use		Lubricant / Antiseize	
		WW (World Wide)	EU (European Union)
Standard, from -40°F to +752°F -40°C to +400°C	Threads of the Stem (50/51), Bonnet-Bolting (108/114) and Head Bolting (106)	Fastorq A/G	Klüber HEL 46-450
	Guide of the Plug (50), O-Ring Balancing (65) and Twist-Lock of the Stem (52)		Klüberpaste 46 MR 401
	Threads of the Packing-Follower (80), Coupling (113, 345, 249, 240) and Yoke Locknut (76)	DOW Molykote 55 O-Ring	Klüber Unisilikon L 250 L
	Actuator O-Ring's (272, 271, 275, 278)		Klüberpaste 46 MR 401
	Threads of the Actuator Casing-Bolting (211, 335, 336) and Guide (254)	Fastorq A/G	Klüberpaste 46 MR 401
Low temperature, from -76°F to -40°F -60°C to -41°C	Threads of the Stem (50/51), Bonnet-Bolting (108/114) and Head Bolting (106)	Alcohol 96%	
	Guide of the Plug (50), O-Ring Balancing (65) and Twist-Lock of the Stem (52)		
	Threads of the Packing-Follower (80), Coupling (113, 345, 249, 240) and Yoke Locknut (76)	DOW Molykote 55 O-Ring	Klüber Unisilikon L 250 L
	Actuator O-Ring's (272, 271, 275, 278)		Klüberpaste 46 MR 401
	Threads of the Actuator Casing-Bolting (211, 335, 336) and Guide (254)	Fastorq A/G	Klüberpaste 46 MR 401

## 16 Special Tools

Special Tool	Use															
 <p><b>Packing Centering Tool</b></p> <p><b>Packing Tamping Tool</b></p>	<p><b>Packing Tamping Tool</b></p> <p>Recommended tool for assembling.</p> <table border="1"> <thead> <tr> <th rowspan="2">Description</th> <th colspan="3">Part N°</th> </tr> <tr> <th>Stem Ø 12 mm</th> <th>Stem Ø 16 mm</th> <th>Stem Ø 20 mm</th> </tr> </thead> <tbody> <tr> <td>Packing Centering Tool</td> <td>329834</td> <td>329836</td> <td>329844</td> </tr> <tr> <td>Packing Tamping Tool</td> <td>329835</td> <td>329842</td> <td>329843</td> </tr> </tbody> </table>	Description	Part N°			Stem Ø 12 mm	Stem Ø 16 mm	Stem Ø 20 mm	Packing Centering Tool	329834	329836	329844	Packing Tamping Tool	329835	329842	329843
Description	Part N°															
	Stem Ø 12 mm	Stem Ø 16 mm	Stem Ø 20 mm													
Packing Centering Tool	329834	329836	329844													
Packing Tamping Tool	329835	329842	329843													
	<p><b>Ring Nut Tool</b></p> <p>Recommended tool for disassembling and reassembling.</p> <p>Lifting eye nut according to DIN 582 - size M12, M16, M20</p>															
	<p><b>Packing Driver Tool</b></p> <p>Recommended tool for disassembling.</p> <table border="1"> <thead> <tr> <th rowspan="2">Description</th> <th colspan="3">Dimension (Brass rod)</th> </tr> <tr> <th>Stem Ø 12 mm</th> <th>Stem Ø 16 mm</th> <th>Stem Ø 20 mm</th> </tr> </thead> <tbody> <tr> <td>Packing Driver Tool</td> <td>Ø 15<sup>-1</sup> x 250 mm</td> <td>Ø 21<sup>-1</sup> x 300 mm</td> <td>Ø 25<sup>-1</sup> x 400 mm</td> </tr> </tbody> </table>	Description	Dimension (Brass rod)			Stem Ø 12 mm	Stem Ø 16 mm	Stem Ø 20 mm	Packing Driver Tool	Ø 15 <sup>-1</sup> x 250 mm	Ø 21 <sup>-1</sup> x 300 mm	Ø 25 <sup>-1</sup> x 400 mm				
Description	Dimension (Brass rod)															
	Stem Ø 12 mm	Stem Ø 16 mm	Stem Ø 20 mm													
Packing Driver Tool	Ø 15 <sup>-1</sup> x 250 mm	Ø 21 <sup>-1</sup> x 300 mm	Ø 25 <sup>-1</sup> x 400 mm													

## 17 Disposal

Up to 95 % of the FlowTop control valve is metal. The remaining materials are synthetic, rubber, polytetrafluoroethylene (PTFE), graphite, paint, and lubricants.

The valve should be professionally disassembled and reas-

sembled. Metal parts should be scrapped, with the remaining materials disposed of according the national conditions.

Peripheral units (accessories) should be recycled according the relevant manufacturer's User Instructions.

**NOTICE** Potential hazards and their sources are under the operator's influence. The operator must observe national and international environmental conditions for control valve removal from the pipeline and cleaning. Permissible limit values must be maintained to ensure suitable protective measures; service personnel must be properly instructed in performing the disassembly and reassembly procedure.

# 18 Parts List

<sup>1)</sup> see page 15, <sup>2)</sup> see page 13 and page 19

Item	Part	Available Materials		
1	Body	A216 WCC	A351 CF8M	A351 CF3M
5	Bonnet	A105 or WCC	F316 or CF8M	F316L or CF3M
20	Seat ring	410SS	316SS	316L
30	Seat retainer	410SS	316SS	316L
	Sleeve <sup>1)</sup>	410HT	316SS (nitrided)	316L (nitrided)
40	Bonnet / Head	A105 or WCC	F316 or CF8M	F316L or CF3M
42	Plug screw	A2		
48	Plug gasket	Pure Graphite		
50	Plug	410SS	316SS	316L
51	Stem	17-4PH (con. H1150D)	316L (strain hardened level 2)	
52	Lock bushing	316SS		
55	Profile ring	Pure Graphite		
56	Seat retainer gasket	316SS - Gaphite Layer		
58	Bonnet gasket	316SS - Gaphite Layer		
59	Head gasket	Pure Graphite		
60	Profile ring	Pure Graphite		
65	O-ring <sup>1)</sup>	Buna-N, Viton, EPDM, Kalrez or Chemraz		
66	Backup ring <sup>1)</sup>	PTFE or PEEK		
76	Yoke lock nut <sup>2)</sup>	316SS		
80	Packing follower	316SS		
87	Upper guiding	316SS (nitrided)		
88	Packing	PTFE or Graphite		
91	Seal carrier	316 SS		
93	Packing box ring	316SS		
104	Hex nut	316 SS		
106	Stud bolt	A193 B7	A193 B8 Cl.2	
108	Stud bolt	A193 B7	A193 B8 Cl.2	
110	Hex nut	A194 2H	A194 8	
113	Lock nut <sup>2)</sup>	316SS		
114	Hex nut	A194 2H	A194 8	
138	Belleville spring	1.4310		
240	Socket head screw <sup>2)</sup>	316SS		
249	Actuator coupling <sup>2)</sup>	316SS		
345	Valve coupling <sup>2)</sup>	316SS		

## NOTICE

The specified materials may differ from the delivered product in detail. So they are for rough orientation only. If you need the materials actually used orient yourself to the bill of materials (BOM).

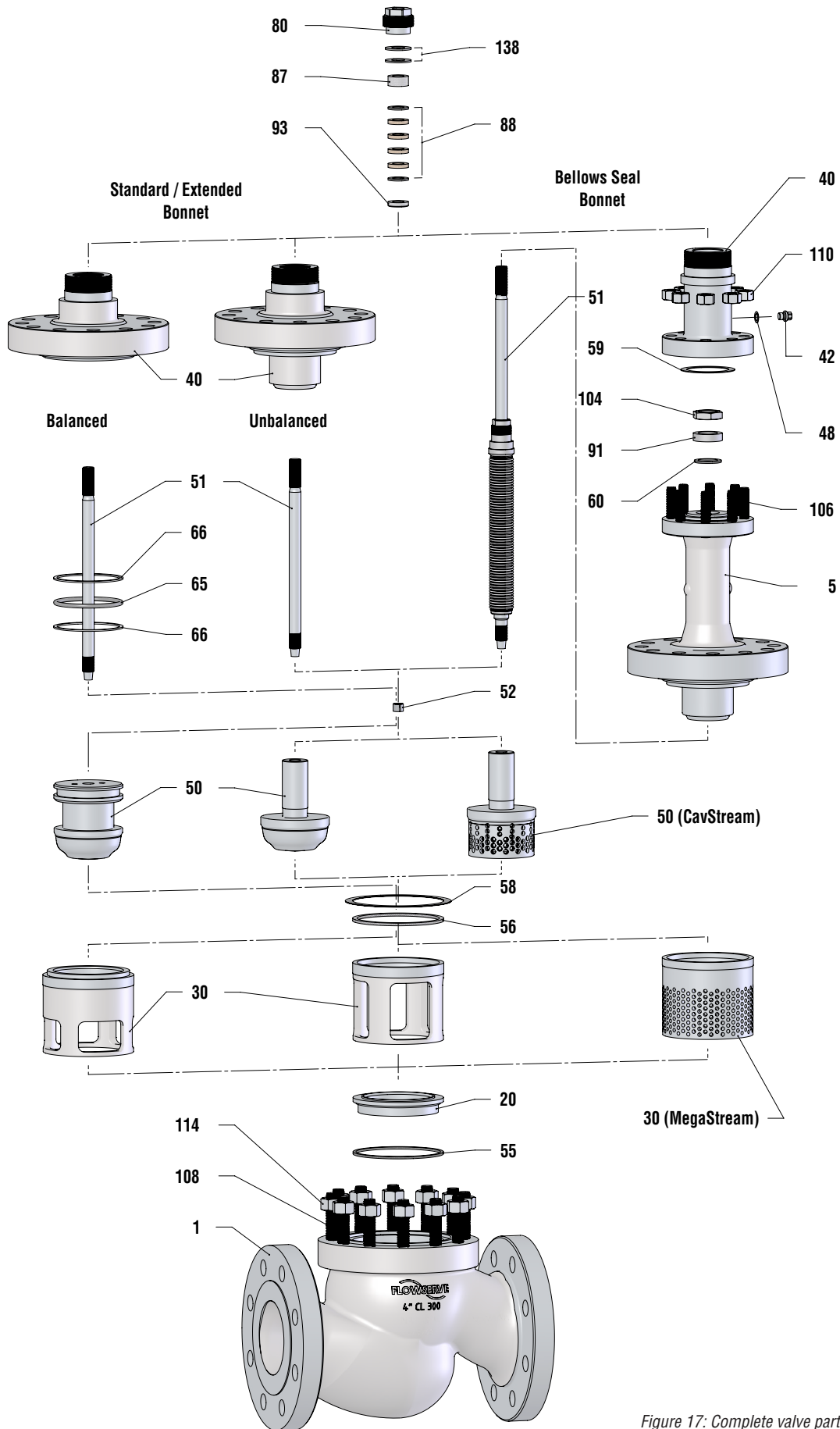


Figure 17: Complete valve parts



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