

Valtek Survivor Control Valves

GENERAL INFORMATION

The following instructions are to assist in unpacking, installing and performing maintenance as required on Valtek® Survivor™ control valves. Product users and maintenance personnel should thoroughly review this bulletin along with Installation, Operation, Maintenance Instructions One, Two and Five prior to installing, operating or performing any maintenance on the valve. Separate maintenance instructions cover additional features (such as handwheels, boosters, etc.).

This publication does not contain information on Valtek positioners. Refer to the appropriate maintenance instructions for installing, maintaining, troubleshooting, calibrating and operating Valtek positioners.

To avoid possible injury to personnel or damage to valve parts, WARNING and CAUTION notes must be strictly adhered to. Modifying this product, substituting nonfactory parts, or using maintenance procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment, and may void existing warranties.

Unpacking

1. While unpacking the valve, check the packing list against materials received. Lists describing valve and accessories are in each shipping container.
2. When lifting the valve from shipping container, position the lifting straps through the yoke legs to avoid damage to the tubing and mounted accessories.

WARNING: When lifting an actuator with lifting straps through the yoke legs, be aware that the center of gravity may be above the lifting point. Therefore, support must be given to prevent the actuator from rotating. Failure to do so can cause serious injury to personnel, damage to the valve or nearby equipment.

3. Contact your shipper immediately if there is shipping damage.
4. Should any problem arise, call your representative.

Installation

To install a Survivor valve, refer to Figure 1 and proceed as follows.

1. Before installing the valve, clean the line of dirt, welding chips, scale, or other foreign material.
2. Check the flow direction to be sure the valve is installed correctly. Flow is always over the plug for both fail-closed and fail-open valves. Flow direction is indicated by an arrow on the bonnet flange.
3. Be sure to provide proper overhead clearance for the actuator to allow for disassembly of the plug from the valve body. Refer to Table I for the necessary clearance needed for valve disassembly.

Table I: Overhead Clearance Requirement

Body Size		Body Rating		Disassembly Clearance	
inch	DN	Class	PN	inch	mm
1	25	150 – 600	16 – 100	2.5	64
		900, 1500	160, 250	3.6	91
1.5	40	150 – 600	16 – 100	4	102
		900, 1500	160, 250	5.6	142
2	50	150 – 600	16 – 100	4.5	114
		900, 1500	160, 250	6.1	155
3	80	150 – 600	16 – 100	5.8	147
		900, 1500	160, 250	8.4	213
4	100	150 – 600	16 – 100	7.5	191
		900, 1500	160, 250	9.7	246
6	150	150	16	10	254
		300 – 600	40 – 100	10	254
		900, 1500	160, 250	12.2	310
8	200	300 – 600	40 – 100	13.8	351
		900, 1500	160, 250	16.7	424
10	250	300 - 600	40 – 100	20	508
		900, 1500	160, 250	18.3	465
12	300	300 - 600	40 – 100	17.5	445
14	350	150	16	18.88	480

- Prior to placing valve in the line, check the plug/seat ring adjustment, per the following instructions.

WARNING: Keep hands, hair, clothing, etc. away from all moving parts when operating the valve. Failure to do so can cause serious injury.

Valves with metal plug and seat – Insert the seat into the bottom of the valve. Stroke the valve by applying air to the top of the actuator. Check for a 0.0625-inch (1.59 mm) gap between the seat and body. If there is no gap, loosen the stem clamp bolt and screw the plug in or out of the actuator stem. Repeat this process as needed to obtain 0.0625-inch (1.59 mm) gap. Then retighten the stem clamp.

Valves with ceramic plug and seat – Insert the seat into the bottom of the valve. Remove the limit stop cap from the cylinder exposing the jam nuts. Stroke the valve by applying air to the top of the actuator. Check for any expansion between the valve body and seat. Continue to stroke the plug back and forth adjusting the jam nuts until the plug barely touches the seat. At this point, stroke the valve to midpoint and lower the jam nuts. The jam nuts should be lowered by 0.0625-inch (1.59 mm) for trims less than 1 inch (25.4 mm); 0.125-inch (3.18 mm) for trims from 1 to 3 inches (25.4 to 76.2 mm); and 0.1875-inch (4.76 mm) for trims larger than 3 inches (76.2 mm). Secure the jam nuts in place. This will ensure a gap between the ceramics of the seat and plug.

CAUTION: Do not allow the ceramic plug to slam against the seat. This could cause the plug and seat to fracture. Should the plug slam into the seat during this operation, refer to the “Disassembly” section and check for damage.

- Place seat ring and seat ring gasket into the downstream pipe, insert valve and bolt the end flanges.
- If the valve has separable end flanges, the half rings must be installed on the valve body before bolting the valve into the line to ensure a tight connection.

WARNING: Failure to install half rings on the valve body can cause serious personal injury.

- Connect the air supply and instrument signal lines. Throttling control valves are equipped with a valve positioner. Two connections are marked: One for the air supply and the other for the instrument signal. Both the actuator and positioner are suitable for 150 psi (10.34 bar) air supply. An air regulator is not required unless the supply pressure exceeds 150 psi (10.34 bar). An air filter should be installed before the positioner unless supply air is unusually clean and dry. All connections must be free of leaks.

NOTE: In some rare cases, the air supply must be limited to less than 150 psi (10.34 bar). In this case, a sticker found near the upper air port on the actuator cylinder will indicate this and an air regulator should be installed to ensure the supply pressure does not exceed the line pressure indicated on the sticker.

Quick-check

Prior to startup, check valve by following these steps:

- Stroke the valve and observe the plug position indicator on the stem clamp compared to the stroke indicator plate. The plug should move through its stroke in a smooth, linear fashion.

WARNING: Keep hands, hair, clothing, etc. away from all moving parts when operating the valve. Failure to do so can cause serious injury.

- Check for full stroke by making appropriate instrument signal changes, such as 3–15, 3–9, 9–15 psi (0.2–1.03, 0.2–0.62, 0.62–1.03 bar) or associated split ranges for pneumatic positioners, 4-20 or 10-50 mA for electro-pneumatic positioners.
- Check all air connections for leaks.
- Make sure the valve strokes in the correct direction in case of air failure. This is done by shutting off the air supply to the valve and observing the direction of plug stem travel.

CAUTION: Most ceramic surfaces can be damaged by turning the plug while the plug is in contact with the seat. Ensure the plug is raised off the seat before adjusting the plug.

- After process temperature excursion has occurred, bonnet flange bolting should be retightened to ensure bonnet gaskets do not leak. See Table III.

Table II: Common Packing Lubricants

Lubricant	Manufacturer	Temperature Range	Description / Applications
Krytox 206	E.I. DuPont	-5° to 550° F -20° to 287° C	Fluorinated general purpose grease; handles common liquids and gases; good lubricity in harsh mediums; nonflammable, chemically inert; won't harm plastic or metal parts
GP 460	Graphite	32° to 1000° F 0° to 538° C	Graphite in petrolatum; high pressures; anti-galling, Products Co. graphite remains above 600 °F (315° C)
Garlock	Garlock Inc.	32° to 500° F 0° to 260° C	General purpose molybdenum disulfide lubricant Luball economical; good in water, steam and common chemicals; not good in harsh mediums where Krytox 206 is recommended

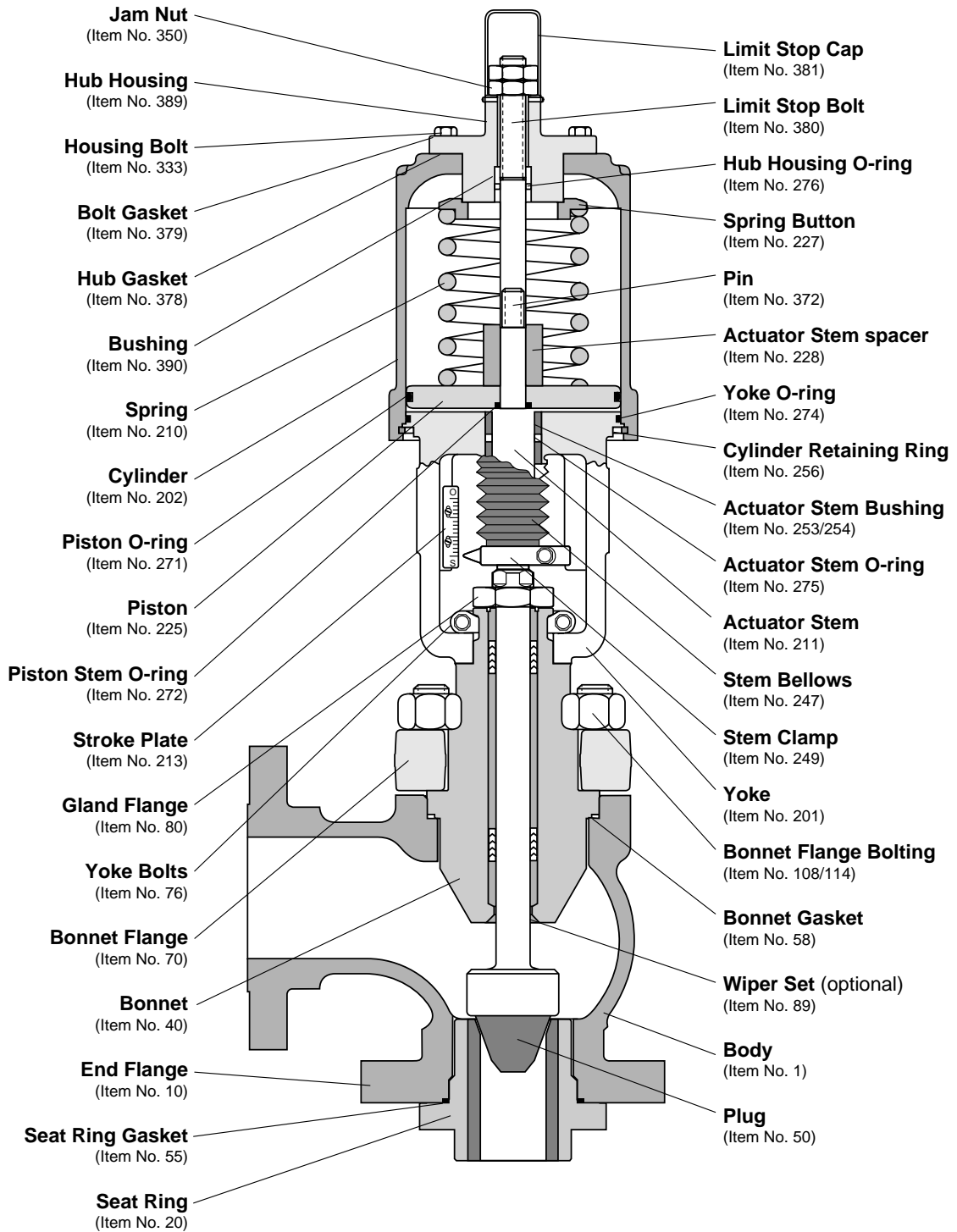


Figure 1: Survivor Control Valve

NOTE: Item numbers correspond directly to the valve's bill of material; refer to it for specific part numbers.

VALVE MAINTENANCE

At least once every six months, check for proper operation by following the preventative maintenance steps outlined below. These steps can be performed while the valve is in-line and, in some cases, without interrupting service. If an internal problem is suspected, refer to "Disassembly and Reassembly" section.

1. Look for signs of gasket leakage through the end flanges and bonnet. Tighten flange and bonnet bolting (if required). See Table III.
2. Examine the valve for damage caused by corrosive fumes or process drippings.
3. Clean valve and repaint areas of severe oxidation.
4. Check packing box bolting for proper tightness. Tighten only as necessary to prevent stem leakage. Use caution to not overtighten the packing. If leakage cannot be stopped, consult factory.

CAUTION: Do not overtighten packing. This can cause excessive packing wear and high stem friction that may impede stem movement.

5. If the valve is supplied with a lubricator, check the lubricant supply and add lubricant if necessary. See Table II for suggested lubricants.
6. If possible, stroke the valve and check for smooth, full-stroke operation. Unsteady stem movement could indicate an internal valve problem.

NOTE: *Smooth operation can be best maintained using packing lubrication and high performance positioners. Contact the factory for special instructions if stroking the valve produces jerky motion.*

WARNING: Keep hands, hair, clothing, etc. away from all moving parts when operating the valve. Failure to do so can cause serious injury.

7. Make sure positioner linkage and stem clamp are securely fastened. If the stem clamp is loose, check plug thread engagement (refer to the "Reassembling the Actuator" section for the correct procedure on aligning the plug with the seat).
8. Ensure all accessories, brackets and bolting are securely fastened.
9. If possible, remove the air supply and observe the actuator for correct fail-safe action.
10. Spray a soap solution around the cylinder actuator retaining ring, adjusting screw and actuator stem guide to check for air leaks through the O-rings.
11. Clean any dirt or foreign material from the plug stem.
12. If an air filter is supplied, check and replace the cartridge if necessary.

VALVE DISASSEMBLY AND REASSEMBLY

Disassembling the Valve Body

To disassemble the valve body, refer to Figure 1 and proceed as follows:

WARNING: Depressurize line to atmospheric pressure and drain all fluids before working on the valve. Failure to do so can cause serious injury.

1. If valve is air-to-close, proceed to step 2. If valve is air-to-open, put air under the piston to lift the plug off the seat before disassembling the valve.
2. Remove the bonnet flange bolting and lift the actuator, bonnet and plug out of the valve.

CAUTION: Most actuators are heavy and may require a hoist. If a lifting ring is provided on the actuator, use it for this purpose; otherwise, lift the valve with the yoke legs using a lifting strap and a hoist. Great care should be taken to lift the actuator and plug straight out of the body to avoid damage to the plug and seat.

3. At this point, the plug and seat sealing surfaces can be visually inspected for damage. If the seat needs to be removed, install lifting lugs in the bonnet bolting holes and attach a hoist to the body. Unbolt the end flanges and carefully lift valve from the line.

WARNING: The Venturi seat ring may remain in the valve body and may subsequently drop causing harm to personnel, seat ring or nearby equipment. Care must be taken to prevent the seat ring from dropping.

4. If seat ring is still in the valve body, remove it and inspect gasket surfaces on seat ring, bonnet and body making sure they are clean and undamaged.
5. To inspect the plug, remove it by loosening the stem clamp and gland flange and screw the plug out of actuator stem. Pull the plug carefully through packing box.

CAUTION: To avoid scoring guides and plug stem, follow the above procedure exactly.

NOTE: *With air-to-close, fail-open valves, it may be necessary to apply a small amount of air to the top of the actuator to move the plug away from the bonnet. Otherwise some galling on the plug may occur.*

6. If seat surfaces are metal and need remachining, both surfaces on plug and seat ring must be reworked. The seat angle on the plug is 30 degrees; seat ring, 33 degrees. Lapping will not be necessary if proper assembly procedures are followed.

CAUTION: If remachining metal surfaces, protect stem during turning. Ensure concentricity of the seat surface with the plug stem (or outside diameter of seat ring, if machining seat).

7. Remove the actuator from the bonnet subassembly by first removing the gland flange and then removing the yoke bolting/clamp. Finally, disconnect the bonnet from the actuator.
8. Remove the wiper set assembly, if supplied. The packing can also now be removed from the packing box using an appropriate sized dowel to push it out.

CAUTION: Do not score or gall the packing box bore or stem guides.

WARNING: For valves equipped with separable end flanges, use extreme care to not over machine body gasket surfaces. Removing excessive body material could cause separable flange lip failure, causing end gasket leakage and valve failure.

CAUTION: When using separable end flanges and spiral wound gaskets, use gaskets with outer backup rings. Failure to do so could result in excess stress in some applications.

NOTE: To prevent flanges from dropping off during shipping, a tack weld or stainless steel rivet has been installed behind the end flanges.

Reassembling the Valve Body

Survivor valves are specifically engineered for each application. Before reassembling, consult the factory for packing and wiper set configuration. To reassemble the valve body, refer to Figure 1 and proceed as follows:

1. Reinstall the packing, guides and packing spacers per factory instructions. If wiper rings are provided, install per the factory drawings. Lubrication of the packing is recommended. See Table II for suggested lubricants. Applying lubrication to the packing at this stage will ease reassembly.
2. Insert the plug into the bonnet being careful to not score or gall either. Be careful to not pinch or score the wiper set. Clamp the bonnet vertically into a vise with the plug supported on a soft surface.

CAUTION: Be careful to not strike the plug head against any object.

3. Insert the packing assembly according to configuration specified by factory. Make sure at least 0.125-inch (3.175 mm) is left at the top of the packing box for the top stem guide to enter. Different spacer lengths permit a wide variety of packing configurations, such as twin seal and vacuum-pressure packing.

Where graphite guides are used, the graphite liners should be replaced each time the valve packing is replaced. Under no circumstances should the valve be rebuilt without graphite liners in the guides.

4. Turn actuator back onto the plug, without turning the plug inside the bonnet. Make sure the gland flange and bonnet flange are in place before engaging the plug stem and actuator stem threads.

NOTE: Do not allow the gland flange to contact and gall the polished plug stem.

Leave approximately four to five plug stem threads exposed. Install the yoke bolting (clamp) and tighten firmly. Tighten gland flange to approximately 12 foot-pounds (53.38 newtons). Use caution to not overtighten the packing.

Table III: Suggested Bonnet Bolting Torque Values (± 10)

Bolt Size inches	Bolt/Stud Material			
	Carbon Steel		Stainless Steel	
	ft-lbs	N	ft-lbs	N
0.625	80	355	50	222
0.75	140	622	90	400
0.875	230	1023	150	667
1	350	1556	220	978
1.125	510	2268	330	1467
1.25	730	3247	460	2046
1.375	990	4403	630	3802
1.5	1320	5871	840	3736

CAUTION: Do not overtighten packing. This can cause excessive packing wear and high stem friction that may impede stem movement.

5. Install new bonnet gasket and lower bonnet/actuator assembly into the valve body. Install the bonnet flange bolting and tighten per Table III.
6. At this point the plug stroke must be preset.

CAUTION: Most ceramic surfaces can be damaged by turning the plug while the plug is in contact with the seat. Ensure the plug is raised off the seat before adjusting the plug.

Valves with metal plug and seat — Insert the seat into the bottom of the valve. Stroke the valve by applying air to the top of the actuator. Check for a 0.0625-inch (1.59 mm) gap between the seat and body. If there is no gap, screw the plug in or out of the actuator stem, repeating the above process as needed to obtain the 0.0625-inch (1.59 mm) gap.

Valves with ceramic plug and seat — Insert the seat into the bottom of valve. Remove the limit stop cap from the cylinder exposing the jam nuts. Stroke the valve by applying air to the top of the actuator.

WARNING: Keep hands, hair, clothing, etc. away from all moving parts when operating the valve. Failure to do so can cause serious injury.

Check for any expansion between the valve body and seat. Continue to stroke the plug back and forth adjusting the jam nuts until the plug barely touches the seat. At this point, stroke the valve to midpoint and lower the jam nuts. The jam nuts should be lowered by 0.0625-inch (1.59 mm) for trims less than 1 inch (25.4 mm); 0.125-inch (3.175 mm) for trims from 1 to 3 inches (25.4 to 76.2 mm); and 0.1875-inch (4.76 mm) for trims larger than 3 inches (76.2 mm). Secure the jam nuts in place. This will ensure a gap between the ceramics of the seat and plug.

CAUTION: Do not allow the ceramic plug to slam against the seat. This could cause the plug and seat to fracture. Should the plug slam into the seat during this operation, refer to the “Disassembly” section and check for damage.

Tighten the stem clamp bolt.

7. Place a flange gasket, seat ring and finally seat ring gasket onto the downstream pipeline.
8. Retract the valve plug and carefully lower the body/ actuator assembly onto the seat ring and gasket.

9. Insert the upstream flange gasket, flange and piping. Slowly stroke the valve to its closed position to center seat ring in pipe line. Install the flange bolting and tighten per industry standards.

CAUTION: Be careful to not strike the plug head against any object during this process.

Troubleshooting Chart

Problem	Probable Cause	Corrective Action
Stem motion impeded	<ol style="list-style-type: none"> 1. Overtightened packing 2. Service temperature is beyond operating limits of trim design 3. Inadequate air supply 4. Malfunctioning positioner 5. Wiper set damaged or missing 	<ol style="list-style-type: none"> 1. Adjust packing box nuts to slightly over finger-tight 2. Reconfirm service conditions and contact factory 3. Check for leaks in air supply or instrument signal system; tighten loose connections and replace leaky lines 4. Refer to positioner maintenance instructions 5. Disassemble valve and replace O-ring
Excessive seat leakage	<ol style="list-style-type: none"> 1. Improperly tightened bonnet flange bolting 2. Worn or damaged seat ring 3. Worn or damaged seat or bonnet gasket 4. Inadequate actuator thrust 5. Incorrectly adjusted plug 6. Improper flow direction 7. Improper handwheel adjustment acting as a limitstop 8. Damaged plug 	<ol style="list-style-type: none"> 1. Refer to step 3 of "Reassembling the Body" section for correct tightening procedure 2. Disassemble valve and replace or repair seat ring 3. Disassemble and replace gaskets 4. Check for adequate air supply to actuator; if supply adequate, reconfirm service conditions and contact factory 5. Refer to steps 8 – 10 of "Reassembling the Body" section for correct plug adjustment 6. Refer to original specifications or contact factory 7. Adjust handwheel until plug seats properly 8. Disassemble and replace plug
Inadequate flow	<ol style="list-style-type: none"> 1. Improper plug adjustment, limiting stroke 2. Malfunctioning positioner 3. Service conditions exceed trim design capacity 	<ol style="list-style-type: none"> 1. Refer to steps 8 – 10 of "Reassembling the Body" section for correct plug adjustment 2. Refer to positioner maintenance instructions 3. Verify service conditions and consult factory
Plug slams	<ol style="list-style-type: none"> 1. Incorrect plug adjustment allowing improper cushion of air between piston and yoke 2. Inadequate air supply 3. Trim sized too large for flow rate 4. Incorrect Jam nut adjustment 	<ol style="list-style-type: none"> 1. Refer to steps 8 – 10 of "Reassembling the Body" section for correct plug adjustment 2. Check air supply to actuator; repair leaks and remove any restrictions in supply line 3. Install reduced trim 4. Refer to step 5 of the "Installation" section
Valve doesn't fail in correct position	<ol style="list-style-type: none"> 1. Incorrect flow direction 	<ol style="list-style-type: none"> 1. Reconfirm direction and, if necessary, correct flow direction through valve

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

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