

GL̄[®] Control Valve

Body Subassembly

08

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1.1 - GENERAL INFORMATION

The Valtek Sulamericana GL̄ Series comprises globe-type cryogenic control valves with single seat, welded cryogenic extension for temperatures as low as -425°F (-253°C) and top entry assembly.

The body weight is kept to a minimum to reduce the vaporization of the cryogenic liquid during the cooling down of the valve and the design of the extension allows easy access to internal components, without disturbing the cold box.

The GL̄ valve plug has small communication orifices or a spring-loaded Teflon sealing that allows that a small fraction of the liquefied gas flows to the inside of the cryogenic extension, where the liquid is vaporized and forms a barrier that protects the packing against ultra-low temperatures. The small quantity of liquid vaporized is not sufficient to create high pressures when the equipment is shutdown, but generates enough pressure to prevent that, in normal service, additional quantities continue to flow into the extension.

The following instructions are designed to assist in the installation, operation and maintenance of GL̄ globe control valve, as necessary. Users and maintenance personnel should read this bulletin carefully before the installation, operation or servicing of the valve, actuator, positioner or any other accessory installed on the valve. Separate maintenance instructions cover additional features, as manual handwheel, limit stops, etc.

Reading the maintenance bulletin of the actuator, positioner and other accessories installed on the valve is also recommended.



WARNING !

If it is necessary to store the products before field installation, Valtek Sulamericana recommends that valves be stored in dry, fresh, closed places. Do not store valves in places where relative humidity is higher than 85% or the room temperature is lower than 41°F or higher than 113°F (5 to 45°C). Environments containing excessive UV radiation, acid or alkaline mist or ozone sources must be avoided.

Product storage in non-recommended places may void the manufacturer warranty.

1.2 - UNPACKING

- When removing the valve from its package, check the packing list or the valve datasheet, comparing it with the received material. A specification sheet of the valve and assembled accessories is shipped inside each shipping container.
- When lifting the valve from shipping container, position lifting straps properly in order to avoid damages to the tubings and accessories assembled in the valve. The GL̄ valves may be lifted by the lifting rings provided on the top of the actuators (only for sizes 25 and 50). In case there is no lifting ring provided, lift the valve using straps attached to the yoke legs.
- In case of damages during transport, immediately contact the shipper.
- In case of any problem, call your Valtek Sulamericana representative.

1.3 - IDENTIFICATION

All GL̄ valves have a stainless steel name plate (see Fig. 1). The name plate provides the following data:

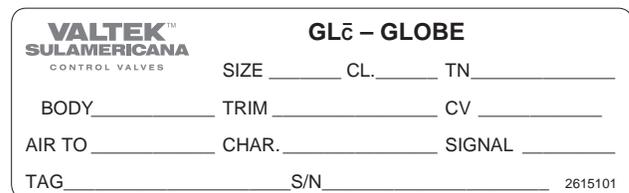


Figure 1 – Name Plate

- SIZE: Valve size in inches
- CL.: Body rating (ANSI)
- TN: Trim Size
- BODY: Body material
- TRIM: Trim material
- CV: Rated Cv
- AIR TO: Air action (open/close)
- CHAR: Flow characteristic
- SIGNAL: Instrument signal range
- TAG: Customer identification
- S/N: Serial number



1.4 - SAFETY WARNINGS

To avoid potential injury and/or damage to the valve parts, **WARNING** and **CAUTION** notes must be strictly observed. Changing the product characteristics, using non-original spare parts or using maintenance procedures different from those presented herein may affect the performance of the valve, be hazardous to personnel and equipment and may void the manufacturer warranty



WARNING

Standard industry safety practices must be applied when using this equipment. Industrial safety standards for personal protection and for equipment handling must also be observed.



WARNING

In case of valves equipped with flanged connections, it is the user responsibility the proper material selection of the fasteners necessary to install the valve in the process. User will take into account the operating temperature, the material strength and its resistance to stress corrosion cracking.

As with any mechanical equipment, periodic inspections for maintenance are required.



CAUTION

Consider the total weight before lifting or transporting the valve. A failure to observe this warning may result in serious injury.

1.5 - INSTALLATION

GL̄ valves supplied with plugs with pressure equalization orifices must be installed at 15° maximum tilt

to the upright position and with the actuator facing upwards. Such positioning is important to maintain the packing isolated from the fluid which flows through the body, keeping the packing temperature closer to the room temperature.

Even though the installation in the upright position is always recommended to facilitate the maintenance, valves using plugs with spring-loaded sealing ring can be installed also in the horizontal position.

- Before installing the valve, clean the piping to remove any debris, scaling and other foreign material. Clean the gasket surfaces to assure that there is no leakage.
- Make sure that there is an adequate clearance above the actuator to allow the disassembly of the actuator from the valve body. Refer to Table I to find the necessary clearance for disassembling the actuator.

Table I: Free space necessary to disassemble the actuator

Valve Size (Inches)	ANSI Rating	Clearance	
		inches	mm
½ to 1	150 - 600	3.0	76
1½ and 2	150 - 600	5.0	127
3	150 - 600	6.0	152
4	150 - 600	8.0	203
6	150 - 600	10.0	254
8	150 - 600	13.0	330
10	150 - 600	14.0	356

- Check the flow direction to make sure that the valve is installed with the correct flow direction, indicated by the arrow plate attached to the cryogenic extension flange. Valves with air-to-close action (fail-open) must be installed with the fluid entering underneath the plug, whereas valves with air-to-open action (fail-close) must be installed normally with the fluid entering over the plug (except in specific cases, which will be clearly indicated in the specification sheet).
- If the valve is welded to the piping, care must be taken to avoid excessive heat transfer to the valve.
- Connect air supply and instrument signal (throt-

ting control valves are generally equipped with positioners). The air ports are identified indicating the air supply and the instrument signal. The actuator can operate with air supply pressure up to 150 psi (10.3 Bar). However, the sticker attached to the cylinder must be checked for maximum pressure allowed. Air filter is recommended, unless the instrument air is clean and dry.

Note: under special circumstances, the maximum air supply pressure must be limited to 80 psi (5.5 Bar) or 100 psi (6.9 Bar) depending on the actuator size and the positioner installed.



For transport reasons, the air filter may be installed out of the vertical position. Before operating the actuator, position the air filter pointing down.

1.6 - QUICK CHECK

Prior to start-up, check the control valve according to the following steps:

- Check the full stroke making appropriate instrument signal change. Observe the position indicator of the plug, located on the stem clamp, and the stroke plate. The plug must move smoothly, from one end position to the other end.



When operating the valve, keep your hands, hair, clothes, etc. away from moving parts. Failure to follow this warning may result in serious injury.

- Check all air connections for leaks. Tighten the fitting connections and replace any leaking ferrule, if necessary.
- Tighten the packing gland nuts evenly with a torque slightly over finger-tight.
- After the valve has been in operation for a short time and temperature gradient has occurred, make sure that the bonnet flange nuts and the pa-

cking nuts are correctly tightened (retighten if necessary). In case there is a leakage in the packing, tighten the packing nuts only enough to stop the leakage.



Do not overtighten packing. This may cause excessive packing wear and increase the friction on the plug stem, blocking its movement.

- Check the failsafe position in case of air supply or instrument signal lack. Position the valve in the middle of its stroke and shutoff the air supply to the actuator or cut-off the instrument signal sent to positioner. Observe the stroke plate to confirm that the plug reaches the specified failsafe position. If specified failsafe position is not reached, refer to the maintenance bulletin of the actuator.

1.7 - START-UP



In the valves with spring-loaded Teflon sealing, it can take hours or even a day for the liquid vaporized inside the cryogenic extension balance the pressure acting on each side of the ring. In the event of air supply lack during this equalization period, a valve with fail-close action may present a trend to open rather than to close, because the sealing effective area of the plug is greater than the effective area of the seat. Once there is a sufficient amount of gas inside the extension, the pressures on each side of the plug sealing will equalize and the valve will operate normally.

Valves provided with pressure communication orifices on plugs do not require time to balance the pressures acting on each side of the sealing ring.

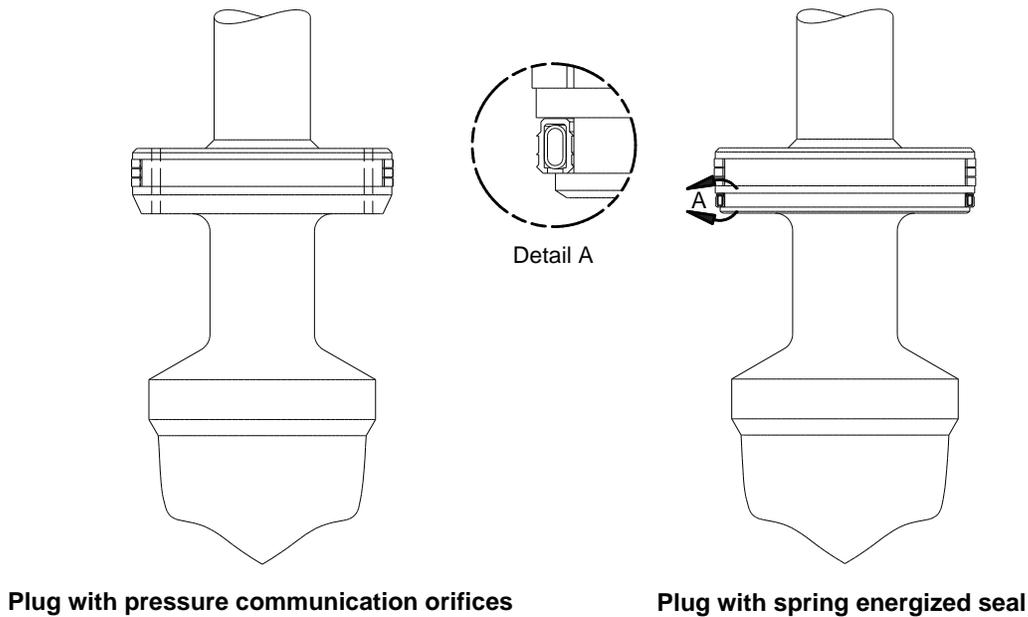


Figure 2 - Comparison of the Pressure Balance Mechanisms of Plugs

1.8 - PREVENTIVE MAINTENANCE

Check if the valve is working properly at least every six months following the preventive steps indicated below.

This sequence can be performed with the valve installed in the line and, in some cases, without disturbing operation. In case there is a potential problem inside the valve, refer to the section “Disassembly and Reassembly”:

- Inspect signs of leakage in the bonnet gasket and check the tightness of the bonnet flange nuts.
- Observe if corrosive vapors or process fluid dripping is damaging the exposed parts of the valve, the actuator and the positioner.
- Clean the actuator and the positioner and repaint areas of severe oxidation.
- Check tightness of the packing box nuts. Packing nuts must be tightened with a torque slightly over finger-tight; however, tighten just enough to avoid leakage through the plug stem.

- If possible stroke the valve and, observing the stroke plate, check if the valve travels its full stroke in a smooth and uniform way. An unsteady movement of the stem may indicate an internal problem of the valve.
- Verify valve calibration, comparing the pressure indicated in the positioner gauges against the stroke plate of the actuator. Make sure that the positioner is calibrated within the correct range. Refer to the positioner instructions for information about preventive maintenance.



When operating the valve, keep your hands, hair, clothes, etc. away from moving parts. Failure to follow this warning may result in serious injury.

- Make sure that mechanical linkage of the positioner with the actuator is connected in a safe way.

Verify also if the stem clamp is properly tightened and if the plug stem is correctly threaded into the actuator stem.

- Make sure all accessories, brackets and bolts are properly tightened.
- If possible, shut-off air supply and observe on the stroke plate if the specified failsafe position is reached.
- Verify if actuator stem bellows is worn out.
- Apply a soap solution around the cylinder retaining ring, adjusting screw and actuator bushings to check if there are air leaks through the O-rings and adjusting screw gasket.
- Remove any contaminant or other foreign material from the exposed areas of valve stem.
- If an air filter is supplied, check and replace cartridge if necessary.

1.9 - TROUBLESHOOTING

In case any internal problem is suspected with the GLC valve, check the following:

- Make sure the valve actuator is receiving air supply with enough pressure.
- Look for signs of leakage through the air supply line, instrument signal line (if applicable) and/or through the positioner.
- Check to see if the valve packing is not too tight. Loose the packing box nuts and retighten them with a torque slightly over finger-tight.



Do not overtighten packing. This may cause excessive packing wear and increase the friction on the plug stem, blocking its movement.

- Check for freezing of condensed moisture in the area where the plug gets out the packing. If this occurs, a longer cryogenic extension may be required to increase the temperature around the packing box.

DISASSEMBLY AND REASSEMBLY

The assembly of the GLC Series trims, made from the top of the cryogenic extension, facilitates the inspection and maintenance of the trims, without needing to remove the valve isolation or the valve itself from the piping.

If it is necessary to dismantle the assembly comprised by the actuator, bonnet and plug, refer to Figure 3 and proceed as indicated in the following sections:



Thoroughly depressurize the piping to the atmospheric pressure and drain all the operating fluid. Failure to perform this procedure may result in serious injury.

1.10 - DISASSEMBLING THE ACTUATOR

- If the valve is normally open in case of air supply lack (air-to-close), proceed to the next step. If the valve is normally closed in case of air supply lack (air-to-open), pressurize the lower chamber of the actuator to retract the plug completely before disassembling the valve.
- Remove the bonnet flange nuts and then lift the assembly comprised by the actuator, bonnet and plug, removing it from the valve.



The seals in the plug head may cause it to get stuck in the valve body, making the removal of the actuator, bonnet and plug assembly difficult. If this occurs, apply air in the upper chamber of the actuator to move the actuator and the bonnet away from the plug head, and place wood blocks with the same thickness in at least three points between the extension flange and the bottom of the

Installation, Operation and Maintenance Instructions

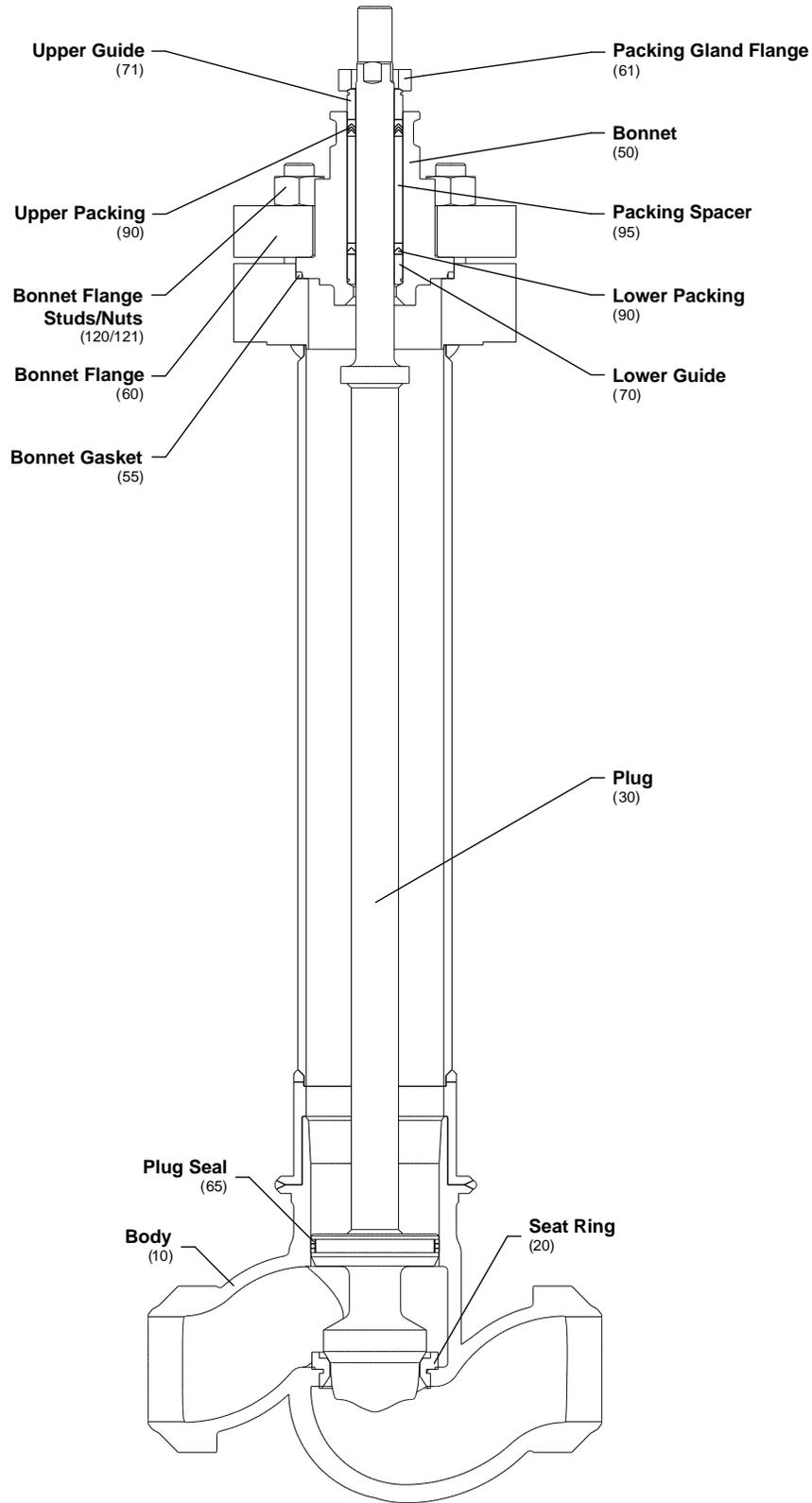


Figura 3 – GLc Control Valve (Body Sub-assembly)

bonnet. With the blocks correctly positioned, apply air in the lower chamber of the actuator to retract the plug.

- Lift the assembly comprised by the plug, bonnet and actuator until the plug is completely out of the cryogenic extension. During the lifting, the assembly must be kept upright during all the time to prevent the plug head from scratching other components impairing the sealing surfaces.

 **CAUTION**

Heavy actuators may require using a hoist for their removal. In case the actuator has one lifting ring, use it to lift the actuator, otherwise, use a hook or pass lifting straps through the yoke legs to raise the assembly. When lifting the assembly using straps passed through the yoke legs, take care when the center of gravity is above the lifting point. An adequate support must be provided to prevent the assembly from turning.

1.11 – DISASSEMBLING THE PLUG FROM THE ACTUATOR

- For inspecting the plug, loosen the stem clamp and the gland flange and unthread the actuator from the plug stem. Then, carefully pull the plug through the packing box.

 **WARNING**

To avoid scratching the guides and the plug stem, do not allow the plug to rotate inside the bonnet while the plug stem is disconnected from the actuator stem. To prevent the plug from turning, use an open wrench in the flat faces machined on the plug stem.

- Remove the packing gland flange, the yoke clamp (or the yoke bolts, as appropriate) and detach the bonnet from the actuator assembly.
- Remove the upper guide, and with the aid of

a hook or one dowel of the same approximate size as the plug stem, remove the packing and other internal components of the valve bonnet.

- Inspect the stem guides and look for scratches or markings. Damaged guides must be replaced, and a new packing set must be used during the reassembly of the valve.

 **WARNING**

Take care to avoid scratching the plug guides and the internal surface of the packing box during the disassembly of the bonnet internal components.

1.12 – REPLACING THE PLUG SOFT INSERT

- Disassemble the plug assembly fitted with the soft insert.

Note: Plugs of valves with sizes up to 1.5 inch have a threaded head design, which holds the soft insert and the insert retainer between the head and the plug stem. Disassemble the plug by unscrewing the head from the stem. A pin can be inserted into the drilled hole of the plug head to help its removal.

Plugs of 2-inches and larger valves have a design with bolts that secure the insert and the plug head in the plug stem. For dismantling the assembly, loosen the hex socket head cap bolts.

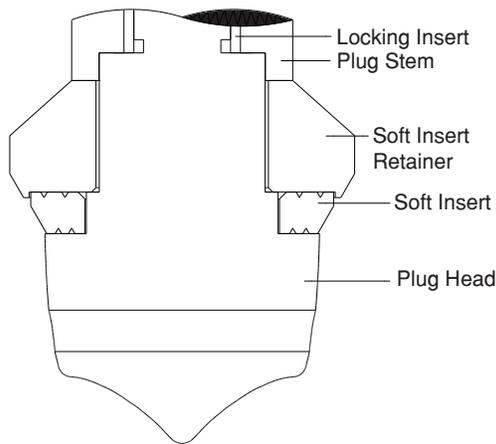
- Thoroughly clean all components.
- Using a new soft insert, reassemble the plug assembly as shown in Figure 4.

Note: In case of small plug heads, make sure that the plug head is firmly tightened to press the soft insert against the insert retainer. Self-locking inserts are used to prevent that the plug head is released from the stem when the valve is in operation.

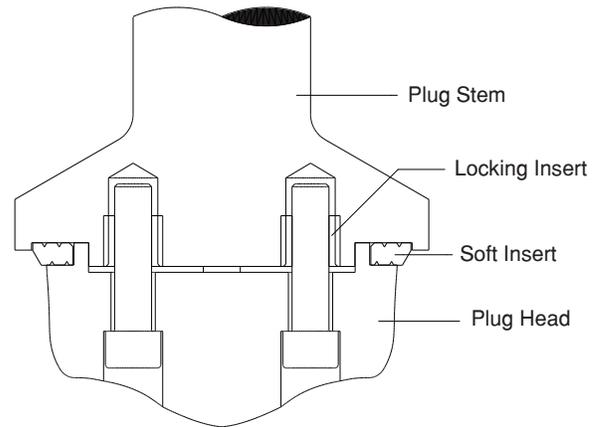
1.13 – INSPECTING THE SCREWED-IN SEAT RING

- Using a suitable tool, unscrew the seat ring from the valve body.

Note: Flat surfaces are machined on the tool used to assemble and disassemble the seat ring. These flat



Valves with sizes up to 1.5"



Valves with sizes 2" and larger

Figure 4 – Configurations of the Plugs with Soft Inserts

surfaces allow the rotation of the tool with the aid of an open wrench. In some cases, it may be necessary to use an additional support to ensure that the tool is correctly aligned with the seat ring.

- Inspect the seat ring and, if there are scratches in the sealing surface, replace the seat.
- Install the valve seat using the appropriate tool for assembling.

1.14 – REASSEMBLING THE GL̄c VALVE

- Install a new bonnet gasket.
- Carefully lower the plug into the extension as far as possible.
- Slide the bonnet through the plug stem, taking care not scratch (and damage) the stem.
- Insert the guides, packing and spacers into the bonnet.
- Check the condition of the actuator rubber bellows and, if necessary, replace this component (do not forget to replace the stem clamp in its place).
- Place the actuator back over the plug, not allowing the plug to rotate inside the bonnet. Make sure that the bonnet flange, the gland flange and the stem lock nut (if any) are in their respective places before tightening the actuator stem onto the plug stem.



WARNING

To prevent damaging the stem and the

plug seals, do not allow the plug to rotate inside the bonnet during the step below.

- On valves with air-to-close configuration, tighten the actuator until there are only two or three threads exposed in the plug stem. On valves with air-to-open configuration, tighten the actuator stem as far as it is possible.
- Install the yoke clamp and tighten the bolts that secure the clamp (depending on the size and pressure class of the valve, the yoke may be bolted directly to the bonnet).
- Apply air in the lower chamber of the cylinder to retract the plug.
- If the plug has not been fully seated during the assembly, you need to use the actuator to move it to the closed position. Partially tighten the bonnet flange bolts and pressurize the upper chamber of the actuator to extend the plug. If necessary, repeat this step until the bonnet is slightly seated in its mounting position on the extension flange.
- Tighten one nut of the bonnet flange in a 1/6 of a turn. Then tighten the nut directly opposed in 1/6 of a turn and continue to tighten the other nuts of the flange in 1/6 of a turn, in an alternately sequence. Tighten securely all nuts in a uniform and complete way, using full force on the wrench to compress the gasket and to seat the bonnet properly. The correct tightening requires a considerably force,

but the bottoming of the bonnet in the extension flange can be easily felt through the wench.

 **WARNING**

The incorrect tightening of the bonnet flange nuts will result in insufficient compression on the gasket.

- On valves with air-to-open configuration, adjust the connection of the plug stem with the actuator stem according to the following steps.

 **WARNING**

The proper connection of the stems is crucial for valves with air-to-open configuration may present pneumatic stiffness and stable control when they have to operate with small opening percentages, with the plug modulating near the seat.

- Move the valve to the closed position, observing the position indicator of the stem and the stroke plate. This position indicates that the piston of the actuator reached its lower travel limit.
- Move the valve to the open position and rotate the plug a half turn, exposing a little more threads. Move the valve to the closed position and observe the position of the plug in the stroke plate. Repeat this procedure, comparing the position of the plug each time until the position shown in the stroke plate is 1/8 in. (3.2 mm) above the starting position or the lower limit of the piston travel. This procedure must be followed to assure stiffness and stable operation of the valve, as well as a good sealing.
- Tighten the packing nuts with a torque slightly over finger-tight.
- Apply air in the upper chamber of the actuator until the plug is seated on the seat ring, adjust the stem clamp to indicate correctly the “Closed” position and tighten the stem clamp bolt.

 **WARNING**

When installing the stem clamp, make sure that the bolt of the clamp is square to one of the flat faces machined on the actuator stem. This assures a more rigid connection.

1.15 – REMOVING THE ACTUATOR, INCLUDING YOKE (Without disassembling the valve body subassembly)

- Fully retract the valve plug until the position indicator shows the “Open” position.
- Loose the stem clamp bolt.
- Loose the packing nuts.
- Remove the yoke clamp (or the yoke bolts, as appropriate).
- Rotate the actuator counter-clockwise to disconnect the actuator stem from the plug.

 **WARNING**

To prevent roughness in the plug stem or in the guides, do not allow that the plug turns inside the bonnet during the maintenance step described above.

 **CAUTION**

Heavy actuators may require using a hoist for their removal. In case the actuator has one lifting ring, use it to lift the actuator, otherwise, use a hook or pass lifting straps through the yoke legs to raise the assembly. When lifting the assembly using straps passed through the yoke legs, take care when the center of gravity is above the lifting point. An adequate support must be provided to prevent the assembly from turning.

1.16 – REASSEMBLING THE ACTUATOR, INCLUDING YOKE (Disassembled according to item 1.15)

- Retract the plug from the seat and rotate the actuator to connect the actuator stem with the plug stem. On valves with air-to-close configuration, tighten the actuator until there are only two or three threads exposed in the plug stem. On valves with air-to-open configuration, tighten the actuator stem as far as it is possible.



Do not allow the plug to rotate when it is seated on the seat and prevent that the plug rotates inside the bonnet. The plug stem is provided with flat faces, which must be used to prevent rotating the plug during the above step.

- Install the yoke clamps (or tighten the yoke bolts, should this be the case).
- On valves with air-to-open configuration, adjust the connection of the actuator stem with the plug stem according to the steps indicated in 1.14 (page 10).
- Tighten the packing nuts with a torque slightly over finger-tight.
- Move the valve to the “closed” position.

- Carefully, slide the stem clamp into the actuator stem until it indicates the “Closed” position of the valve.
- Tighten the stem clamp bolt.

OTHERS

1.17 - SPARE PARTS

For the supply of spare parts it is necessary to inform Valtek Sulamericana the name and the part number of the required item and/or the name of the required component and the valve serial number. To facilitate this task, lists containing the part numbers of all valve and actuator components are provided inside each transport packaging.

In case the valve is disassembled the user may also check the component part number marked in a permanent way in all metallic components of the valve.

1.18 - RECYCLING INFORMATION

GL \bar{c} control valves may present a very long operational life depending on the application they are provided for and the proper maintenance care.

However, at the end of their operational life the part number marked on all metallic components may help the user to adopt the best procedure for disposal of the materials that may be recycled.

In case of doubt, please contact your Valtek Sulamericana representative.

Although Valtek Sulamericana provides precise and detailed installation, operation and maintenance instructions, in accordance with their design reviews, the customer/user shall be responsible for the information provided to generate product specifications, shall understand precisely the operation and maintenance instructions provided with the products and shall provide training for their employees and contracted personnel regarding the safe use of Valtek Sulamericana products, in accordance with the specific applications they were designed for. The information herein shall not be considered as a certificate for assurance of satisfactory results. Valtek Sulamericana products are continuously improved and upgraded and the specification, dimensions and information contained herein are subject to change without notice. For further information or to confirm these presented here, consult Valtek Sulamericana at Rua Goiás, 345, Diadema, São Paulo, Brasil, CEP 09941-690, Phone: 55-11 4072-8600, Fax: 55-11 4075-2477.

Quality Management System



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