



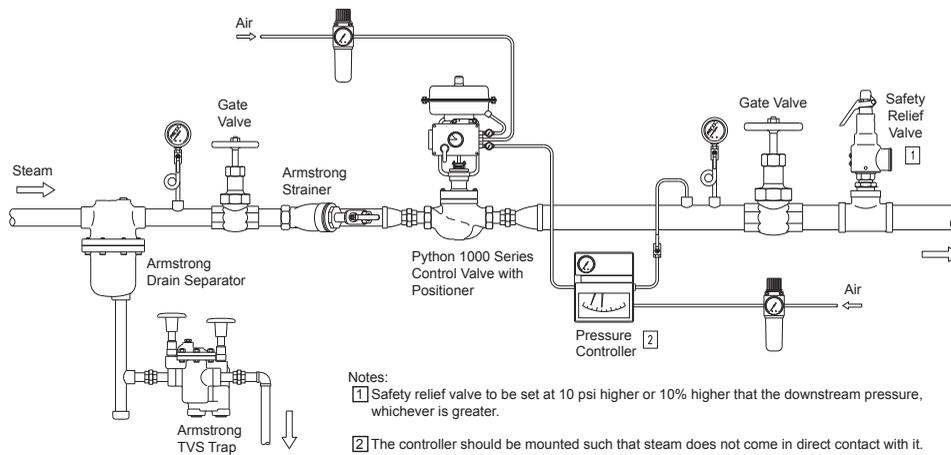
Armstrong Python Series 1100 Control Valve Installation and Maintenance

This bulletin should be used by experienced personnel as a guide to the installation and maintenance of the Armstrong Python Control Valve. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Armstrong or your local representative if further information is required.

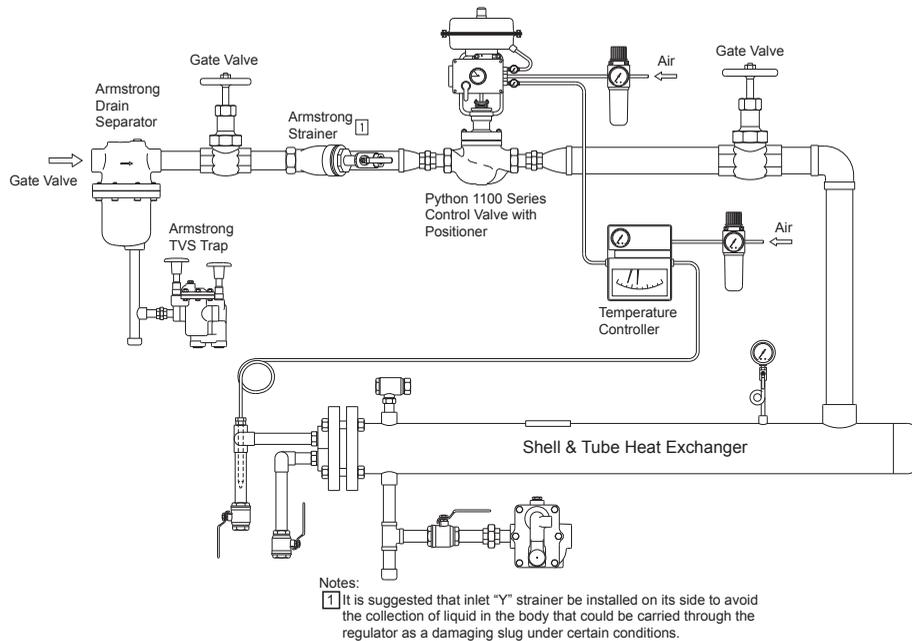
Installation

Caution:

The valve configuration and material of construction have been selected to meet specific pressure, temperature, pressure drop and controlled fluid conditions. Since the body and trim material combinations are limited in their pressure drop and temperature ranges, please contact the factory prior to applying additional conditions not stated as approved.



- Notes:
- 1 Safety relief valve to be set at 10 psi higher or 10% higher than the downstream pressure, whichever is greater.
 - 2 The controller should be mounted such that steam does not come in direct contact with it.



- Notes:
- 1 It is suggested that inlet "Y" strainer be installed on its side to avoid the collection of liquid in the body that could be carried through the regulator as a damaging slug under certain conditions.

1. Inspect control valve for any shipment damage and for any foreign material that may have collected during packaging and shipment.
2. Blow out all pipe lines to remove pipe scale, chips, welding slag and other foreign material.

3. Verify the flow direction marked on the body.
4. Install the control valve, preferably in a straight run of pipe, away from bends or sections of abnormal velocity.
5. Control valves can be installed in any orientation. However the standard method is with the actuator in a vertical position. If the control valve is not installed vertically, the yoke must be supported.
6. If continuous operation is required during maintenance and inspection, a by-pass should be installed.
7. Install the valve using accepted piping practices. For flanged bodies use a suitable gasket between the body and pipe line flanges and tighten the bolts evenly to avoid any strain on the body or cracking of the flange.
8. An Armstrong drain separator (equivalent to line size) draining to a TVS trap is recommended to assure clean dry steam.
9. An Armstrong 100 mesh Y strainer should be installed before the control valve to reduce the chance of dirt fouling.
10. It is recommended to install pressure gauges before and after the control valve.
11. Piping immediately downstream of the control valve should be expanded to accommodate low pressure expansion. The pipe size should be chosen so a maximum velocity of 8,000 ft/min is achieved.
12. Install upstream and downstream gate valves to isolate control valve for maintenance and upgrades.
13. Install a filter regulator on the air line to the actuator or positioner. The maximum air pressure to the actuator is 50 psig.

Before installing weld end bodies, which have soft seating, remove the trim to avoid damage to the soft parts from the heat generated by welding.

Warning:

Personal injury could result from packing leakage. Valve packing was tightened prior to shipment, but if there is gland leakage after installation, tighten just enough to stop gland leakage. Excessive tightening will disturb valve calibration.

After the control valve has been installed verify the following:

- Check all air lines and fittings to the valve actuator and accessories for air leaks.
- Ensure the combined action of the controller, positioner and valve provide the desired valve stem movement. Also verify the required fail safe position of the control valve.
- An occasional cleaning of the valve stem will prevent dirt or grit being carried away into the packing.

Maintenance (Before Disassembly)

1. Use by-pass valve or completely shut off the process to isolate the valve from process pressure. Drain fluid from both ends of the valve.
2. Disconnect any operating lines providing air pressure, electric power or a control signal to the actuator.

Warning:

Avoid personal injury or damage to process system from sudden release of process fluid pressure.

Note: Any gasket once removed should be replaced by a new one upon reassembly. This is necessary to ensure a good joint seal.

Removing Actuator from Valve Body

1. Unscrew the travel indicator lock nut.
2. If reverse acting, apply air pressure to the diaphragm so the valve plug is off the seat while the stem connector is removed.
3. Unscrew the allen bolts from stem connector and remove the two halves of stem connector.
4. Unscrew the yoke/body locking ring and remove from bonnet.
5. Lift the actuator assembly over the stem, off the valve, taking care to avoid damaging parts or accessories attached to the valve.

Note:

The valve plug must be off the seat while the stem connector is being removed. See Figure 1.

Figure 1a.

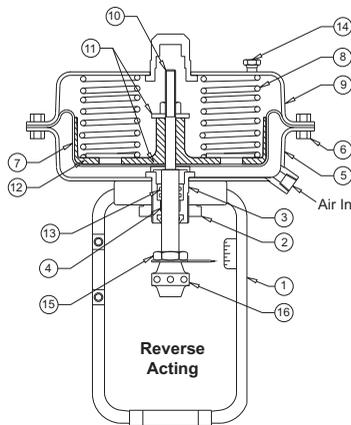


Figure 1b.

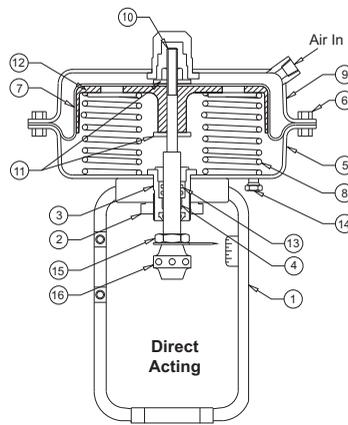
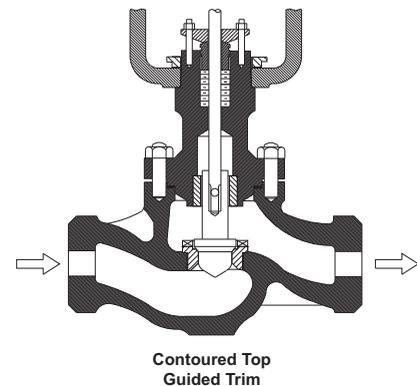


Figure 1c.



Item Number	Description	Item Number	Description
1	Yoke	9	Upper Casing
2	Yoke/Actuator Locking Ring	10	Actuator Stem
3	Seal Box	11	Travel Stopper
4	Guide Bushing	12	Diaphragm Plate
5	Lower Casing	13	'O' Ring Seal (Stem to Seal Box)
6	Casing Nuts/Bolts	14	Exhaust Nipple
7	Actuator Diaphragms	15	Travel Indicator Lock Nut
8	Actuator Springs	16	Stem Connector

Changing valves from reverse acting (fail closed) to direct acting (fail open)

1. Unscrew nuts and bolts (6) holding the upper (9) and lower casings (5) together. Springs are under pressure so take caution to remove bolts evenly.
2. Lift and remove upper casing (9).
3. Remove springs.
4. While securing actuator stem (10) remove nut and lock washer located at top of actuator stem.
5. Remove upper travel stopper (11).
6. Remove diaphragm plate (12) and diaphragm (7).

7. Remove lower travel stopper (11).
8. Move actuator stem to its highest position.
9. Reassemble parts in reverse order.
Note: The upper travel stopper will become the lower travel stopper.
10. Place springs in bottom casing.
Note: Actuators with 9-32 spring range have two size springs. Be certain to alternate by height.

Note: The diaphragm and plate are installed "upside down" in relationship to its prior orientation.
11. Install diaphragm plate. Adjust spring locations for proper fit into diaphragm plate. Install diaphragm.
12. Install travel stopper, washer and tighten nut.
13. Install and tighten the upper casing. When upper casing is tightened, it will push the actuator stem into its proper position. Tighten bolts/nuts in cross pattern for uniform tightness.
14. Remove exhaust nipple (14) and place in the air inlet connection hole in the bottom casing. The open hole in the upper casing is now the air inlet connection.

Changing valves from direct acting (fail open) to reverse acting (fail closed)

1. Unscrew nuts and bolts (6) holding the upper (9) and lower casings (5) together. Springs are under pressure so take caution to remove bolts evenly.
2. Lift and remove upper casing (9).
3. While securing actuator stem (10) remove nut and lock washer located at top of actuator stem.
4. Remove upper travel stopper (11).
5. Remove diaphragm plate (12) and diaphragm (7).
6. Remove springs.
7. Remove lower travel stopper (11).
8. Push actuator stem to its lowest position.
9. Reassemble parts in reverse order.
Note: The upper travel stopper will become the lower travel stopper.
10. Install diaphragm and diaphragm plate.

Note: The diaphragm and plate are installed "upside down" in relationship to its prior orientation.
11. Install springs in diaphragm plate as indicated.
Note: Actuators with 9-32 spring range have two size springs. Be certain to alternate by height.
12. Install travel stopper, washer and tighten nut.
13. Install and tighten the upper casing. Tighten bolts/nuts in cross pattern for uniform tightness.
14. Remove exhaust nipple (14) and place in the air inlet connection hole in the upper casing. The open hole in the bottom casing is now the air inlet connection.

Diaphragm Replacement Reverse Acting (Fail Closed)

1. Unscrew nuts and bolts (6) holding the upper (9) and lower casings (5) together. Springs are under pressure so take caution to remove bolts evenly.
2. Lift and remove upper casing (9).
3. Remove springs.
4. While securing actuator stem (10) remove nut and lock washer located at top of actuator stem.
5. Remove upper travel stopper (11).
6. Remove diaphragm plate (12) and diaphragm (7).
7. Install new diaphragm and assemble in reverse order.
8. When tightening the casings together, use a cross pattern for uniform tightness.

Diaphragm Replacement Direct Acting (Fail Open)

1. Unscrew nuts and bolts (6) holding the upper (9) and lower casings (5) together. Springs are under pressure so take caution to remove bolts evenly.
2. Lift and remove upper casing (9).
3. While securing actuator stem (10) remove nut and lock washer located at top of actuator stem.
4. Remove upper travel stopper (11).
5. Remove diaphragm (7).
6. Install new diaphragm and assemble in reverse order.
7. When tightening the casings together, use a cross pattern for uniform tightness.

Packing Maintenance

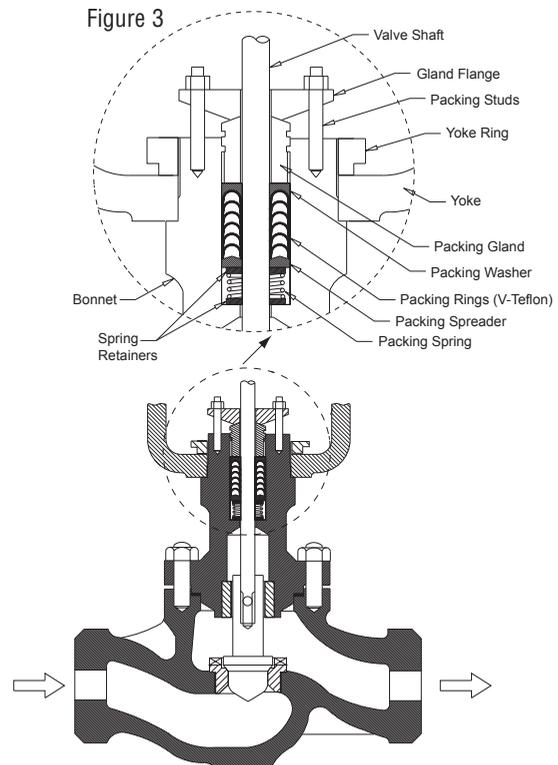
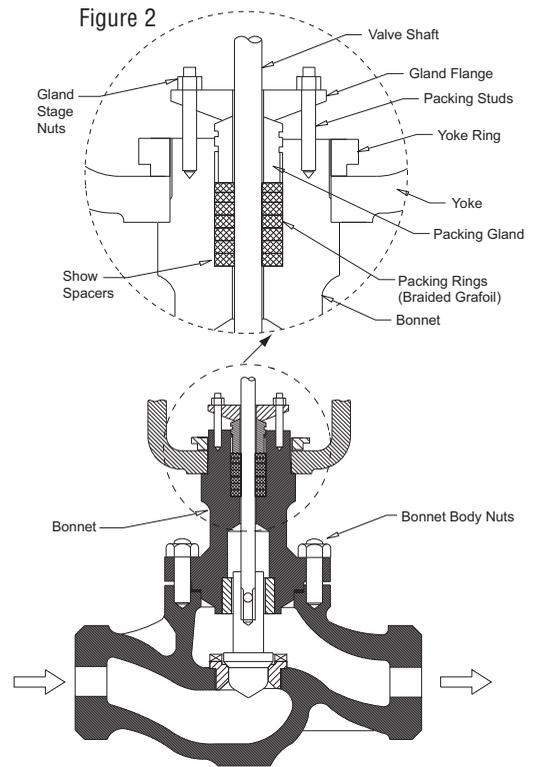
If there is undesirable packing leakage, tighten the gland flange nuts just enough to stop gland leakage, see Figure 2. If leakage cannot be stopped in this manner, proceed to section entitled **REPLACING PACKING**. Do not over tighten the packing as it may disturb the valve calibration.

Replacing Packing

1. Isolate the control valve from line pressure and release the pressure.
2. Remove actuator from valve body as noted in the **REMOVING ACTUATOR FROM VALVE BODY** section on page 3.
3. Remove nuts from the body studs on bonnet and lift the bonnet carefully off the body. If the valve plug and stem assembly starts to lift along with bonnet, use a brass or nylon hammer on the end of the stem and tap it back in place.

Note: Set the bonnet on a protective surface to prevent damage to the bonnet gasket surface.

4. Remove the valve plug and stem assembly from the body. Handle the plug and stem carefully to avoid damage at the seating surface and stem diameter.
5. Remove the gland flange nuts, gland flange and packing gland.
6. Carefully push out packing and spring from the bonnet stuffing box using a rounded rod that will not scratch the stuffing box wall. Clean the stuffing box.
7. Install plug and stem assembly into the valve body. Then slide the bonnet over the stem and onto the body studs.
8. Install new packing set according to Figure 2 for grafoil packing, and Figure 3 for V-Teflon packing.
9. Slide the packing gland and gland flange into position.
10. Lubricate the body studs and install the nuts. Use the proper bolting procedure during tightening so that the body to bonnet joint will withstand test pressures and service conditions. Before tightening the nuts make sure the plug and stem assembly is properly aligned with seat ring.
11. Mount the actuator and reassemble stem connector as specified in the **REASSEMBLY OF ACTUATOR ON VALVE BODY** section on Page 9.



Trim Maintenance (Contoured Top Guided)

Disassembly

1. Isolate the control valve from line pressure and release the pressure from the valve.
2. Remove actuator from valve body as noted in the **REMOVING ACTUATOR FROM VALVE BODY** section on Page 3.
3. Remove nuts from the body studs on the bonnet and lift the bonnet carefully off the body. If the valve plug and stem assembly start to lift along with bonnet, use a brass or nylon hammer on the end of the stem and tap it back down.
4. Remove plug and stem assembly. Inspect for wear or damage. Replace or repair as required.

Lapping Procedure

1. With metal seat trims, seating surface of the valve plug and seat ring can be lapped for improved shut-off. Deep scratches at seating surface may require a new seat.
2. Produce a simple lapping tool. This can be made by welding a nut (same thread as plug stem) to the center of a bar about 1 foot in length. Screw the tool to the end of the plug stem.
3. Apply a lapping compound to the seating surface of the valve plug, lubricate the plug stem where it enters the packing box with light oil. Insert into the body and clamp on the bonnet.

Caution:

If the packing is to be re-used and was not removed from the bonnet, use care when installing bonnet to avoid damage to the packing from the valve stem threads. However the stem threads are always truncated.

4. Rotate the handle in each direction to lap the seat. Lap with short oscillating strokes. Raise the plug occasionally, lower it to another position and resume the oscillating strokes. This ensures an even lap over the entire seating surface of the plug and seat. The weight of the plug, stem and lapping tool provide ample pressure for lapping. **DO NOT BEAR DOWN.**
5. After lapping, remove the bonnet, clean the plug and seating surfaces.
6. Completely assemble as described in the ASSEMBLY portion below and test the valve for shut off.
7. Repeat lapping procedure if excessive leakage is still present. Metal to metal seating (ANSI Class IV) may not have a tight shut-off.

Assembly

1. Clean all gasket surfaces and use all new gaskets for assembly.
2. Insert plug and stem assembly in the body and gently rest over the seat.
3. Slide the bonnet over the stem and onto the body studs.

Caution:

If the packing is to be re-used and was not removed from the bonnet, use care when installing bonnet to avoid damage to the packing from the valve stem threads. However the stem threads are always truncated.

4. If packing is being replaced see **REPLACING PACKING** section on Page 6.
5. Lubricate the body studs and install nuts. Use the proper bolting procedure during tightening so the joint between the body and bonnet will withstand test pressures and application service conditions. Before tightening the nuts make sure the plug and stem assembly is properly aligned with the seat ring.
6. Mount actuator and reassemble stem connector as specified in the **REASSEMBLY OF ACTUATOR ON VALVE BODY** section on Page 9.

Trim Maintenance (Multi-Hole Cage Guided)

Disassembly

1. Isolate the control valve from line pressure and release the pressure from the valve.
2. Remove actuator from valve body as shown in the **REMOVING ACTUATOR FROM VALVE BODY** section on Page 3.
3. Remove nuts from body studs on the bonnet and lift the bonnet carefully off the body. If the valve plug and stem assembly start to lift along with bonnet, use a brass or nylon hammer on the end of the stem and tap it back down.

Caution:

Avoid damaging gasket seating surface. The surface finish of the valve stem is critical for making a good packing seal. The inside surface of the cage is critical for smooth operation of the valve plug and for making a seal with the plug seal ring. Handle these parts carefully.

4. Pull out the cage and seat carefully from the body. If the cage is stuck inside the body use a rubber mallet on exposed portion of the cage at several points around its circumference.
5. Inspect parts for wear or damage. Replace or repair as required.
6. Inspect "U" seal ring on the valve plug. If there is visible damage, unscrew the bolts on the seal retainer and pull the "U" seal out of the plug. Replace seal ring and install seal retainer and its bolts.

Note:

For steam and gas applications, the lip seal must be installed with the lip opening upward.

Lapping Procedure

1. With metal seat trims, seating surface of the valve plug and seat ring can be lapped for improved shut-off. Deep scratches at seating surface may require a new seat.
2. Produce a simple lapping tool. This can be made by welding a nut (same thread as plug stem) to the center of a bar about 1 foot in length. Screw the tool to the end of the plug stem.
3. Apply a lapping compound to the seating surface of the valve plug, lubricate the plug stem where it enters the packing box with light oil. Insert into the body and clamp on the bonnet.

Caution:

If the packing is to be re-used and was not removed from the bonnet, use care when installing bonnet to avoid damage to the packing from the valve stem threads. However the stem threads are always truncated.

4. Rotate the handle in each direction to lap the seat. Lap with short oscillating strokes. Raise the plug occasionally, lower it to another position and resume the oscillating strokes. This ensures an even lap over the entire seating surface of the plug and seat. The weight of the plug, stem and lapping tool provide ample pressure for lapping. **DO NOT BEAR DOWN.**
5. After lapping, remove the bonnet, clean the plug and seating surfaces.
6. Completely assemble as described in the ASSEMBLY portion below and test the valve for shut off.
7. Repeat lapping procedure if excessive leakage is still present. Metal to metal sealing (ANSI Class IV) may not have tight shut-off.

Caution:

To avoid the plug seal ring not sealing properly; do not scratch the surface of the ring groove in the valve plug or the surface of the replacement ring.

Assembly

1. Clean all gasket surfaces and use all new gaskets for assembly.
2. Install the seat gasket seat ring in the body.
3. Install the cage in the body using the appropriate replacement gasket.
4. Insert the plug and stem assembly in the body to gently rest over the seat. For pressure balance plugs make sure the lip seal or piston ring is evenly engaged into the entrance chamber at the top of the cage, carefully press the plug into the cage.

Caution:

If the packing is to be re-used and was not removed from the bonnet, take care when installing the bonnet to avoid damaging the packing with the valve stem threads; keeping in mind the threads are always truncated.

5. If packing is being replaced see **REPLACING PACKING** section on Page 6.
6. Lubricate the body studs and install nuts. Use the proper bolting procedure during tightening so the joint between the body and bonnet will withstand test pressure and application service conditions. Before tightening the nuts make sure the plug and stem assembly are properly aligned with the seat ring.
7. Mount actuator and reassemble stem connector as specified in the **REASSEMBLY OF ACTUATOR ON VALVE BODY** section below.

Note:

The above procedures are the same for UNBALANCED Multi Hole cage trims with the exception the trim does not contain a seal ring.

Reassembly of Actuator on Valve Body

Reverse Acting Actuator (Air to Open)

1. Lower the actuator over the valve stem and gland flange to sit squarely on bonnet shoulder.
2. Rotate the actuator to the correct position. Keep the travel indicator plate on the front side.
3. Screw the yoke ring onto the valve bonnet threads and tighten.
4. Before the actuator stem is connected to the valve stem, the plug should rest on its seat and the actuator stem should be lifted approximately 3/32" upward so the diaphragm is not in contact with the top of the yoke.

Apply a little air pressure to the diaphragm so that the actuator stem lifts approximately 3/32". Push the valve stem downward so the plug rests on the seat ring. Press the two halves of stem connector against the actuator stem and valve stem. Lock the stem connector screws in position. Lock the indicator lock nut against the top of the stem connector.

5. Apply full air pressure to diaphragm as indicated on the valve tag so the indicator reads 100% opening on travel indicator. Remove air pressure and once again check the travel.

Direct Acting Actuator (Air to Close)

1. Lower the actuator over the valve stem and gland flange to sit squarely on bonnet shoulder.
2. Rotate the actuator to the correct position. Keep the travel indicator plate on the front side.
3. Screw the yoke ring onto the valve bonnet threads and tighten.
4. Before the actuator stem is connected to the valve stem, both of the stems should be at their lowest position of travel. The plug should be resting on its seat. Apply air pressure to actuator diaphragm to bring actuator stem to lowest position of travel as indicated on the travel indicator. Press the two halves of stem connector against the actuator stem and valve stem. Lock the stem connector screws in this position. Tighten the indicator lock nut against the top of the stem connector.
5. Remove the air supply and check the travel on travel indicator.

Figure 5

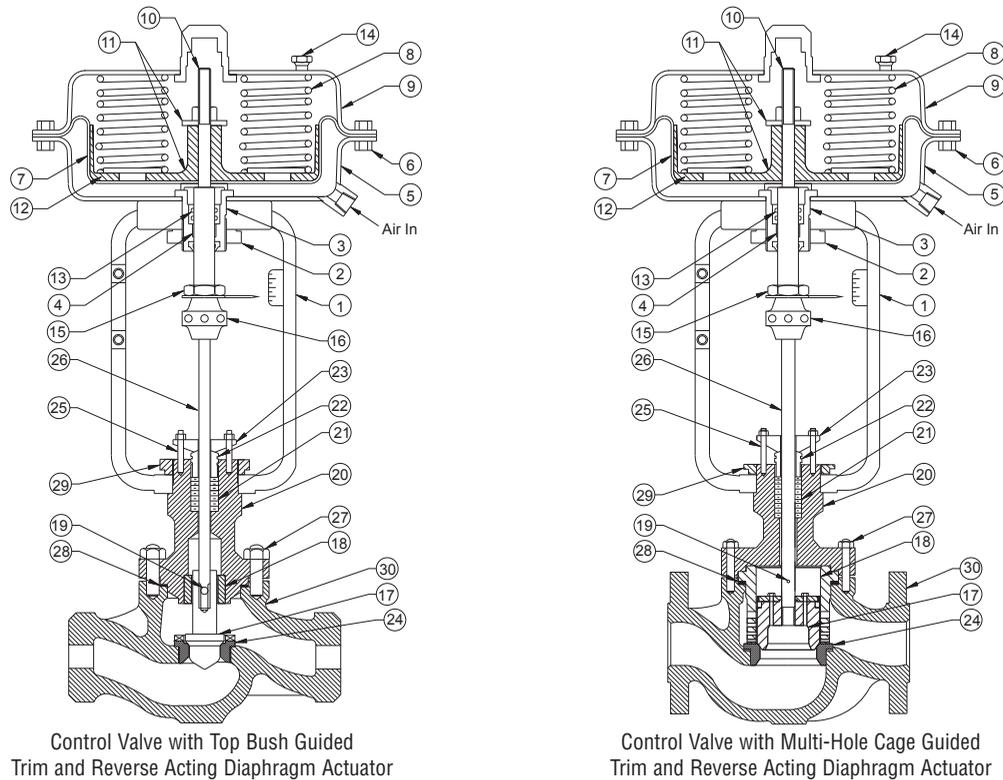


Table 7-1. Actuator Materials of Construction		
Item Number	Description	Material
1	Yoke	Cast Iron
2	Yoke/Actuator Locking Ring	Carbon Steel
3	Seal Box	Aluminum
4	Guide Bush	Teflon Coated Steel Bush
5	Lower Casing	*Steel (C.R.C. Sheet)
6	Casing Nuts/Bolts	Carbon Steel/Cadmium Plated
7	Actuator Diaphragm	Nitrile with Fabric Insert
8	Actuator Springs	Chrome Vanadium Spring Steel
9	Upper Casing	Steel (C.R.C. Sheet)
10	Actuator Stem	SS410/Chrome Plated
11	Travel Stopper	Aluminum/S.G. Iron
12	Diaphragm Plate	Nitrile
13	'O' Ring Seal (Stem to Seal Box)	Carbon Steel
14	Exhaust Nipple	Carbon Steel
15	Travel Indicator Locknut	Carbon Steel
16	Stem Connector	Stainless Steel 410 HTN*
17	Valve Plug	Stainless Steel 410 HTN*
18	Multi-Hole Cage	Stainless Steel 410 HTN*
19	Guide Bush	Stainless Steel 316
20	Locking Pin	Carbon Steel A216 Gr. WCB
21	Gland Packing	V-Teflon - option 1 (366°F Max) Grafoil - option 2
22	Gland Bush	Stainless Steel 316
23	Gland Flange	Steel
24	Seat Ring	Stainless Steel 410 HTN*
25	Packing Studs/Nuts	B8/8 (Stainless Steel 304)
26	Valve Stem	Stainless Steel 316
27	Body Studs/Nuts	B8/8 (Stainless Steel 304)
28	Gasket - Body	Stainless Steel 304 Spiral Wound with Graphite Filler
29	Yoke/Body Locking Ring	Carbon Steel
30	Valve Body	Carbon Steel A216 Gr. WCB

*Heat treated and nitrated

Limited Warranty and Remedy

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