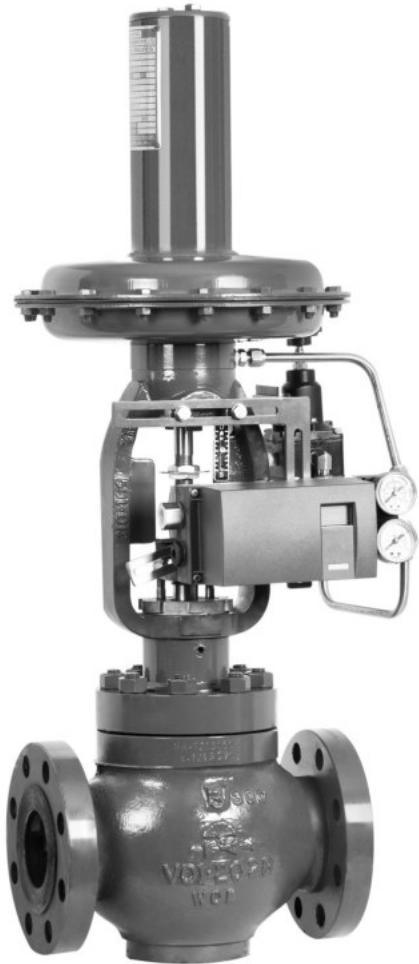


Installation & Operation Manual



**Single Seated Globe
Control Valve
(Series 10)**



**Angle Globe
Control Valve
(Series 70)**



**R.K. CONTROL
INSTRUMENTS PVT. LTD.**

THE CONTROL VALVE SPECIALISTS

An ISO 9001 Certified Company



Following instructions should be thoroughly reviewed and understood prior to Installing, operating or performing maintenance on this equipment. Throughout the Text, safety and/or caution notes will appear and must be strictly adhered to, otherwise, Serious injury or equipment malfunction could result

WARNING

LINE MUST BE CLEANED PRIOR TO INSTALLATION

1.0 Storage

When a valve is to be put into storage before installation, remove connection protection covers and spray a film of machine oil on the internals. Replace the covers. Exposed parts should also be sprayed with a protective film of oil.

A packing list, containing a complete description of the valve and accessories (such as a valve positioner, etc) accompanies each valve when shipped. This list should be checked soon after the shipment has been received. When hoisting the valve, make sure that ropes or cables are positioned so that any tubing or accessories will not be damaged. If the lifting lug is not provided on the valves, the rope or cable should hold the valve from bottom of the valve.

2.0 Unpacking

Care must be exercised when unpacking the valve to prevent damage to the accessories and component parts should any problems arise, contact R.K. Control Instruments Pvt. Ltd. sales department.

4. Installation

Before installing the valve in the line, clean piping and valve of all foreign material such as welding chips, scale. Oil, greases, dirt. Gasket surfaces must be thoroughly cleaned to lake-free joints

3.0 Installation

3.1 Position

The valve should be installed preferably in a straight run of pipe away from bends or section of abnormal velocity. The preferred position is with the actuator vertically above or below the valve body, but it may be installed in horizontal or angled position provided the largest diaphragm actuator (Ax-300) is supported. Correct direction of flow must be observed. A raised metal pattern cast on the body indicates the location of the seat ring bridge and connections are marked 'IN' and 'OUT'. Installation of the valve should be in line with the arrow mark. Clearance should be provided above the actuator to permit its removal for servicing, or for inspection of the valve internals.

3.2 By-Pass

The conventional three valve by-pass should be installed if it is necessary to continue operation during periods of control valve servicing.

3.3 Connections

Pipe threads should be clean and sharp. use pipe compound on the male threads only.

When making flanged connections. tighten the bolts evenly to avoid placing a strain on the body or cracking a flange.

3.4 Instruments

An air supply pressure regulator with filter should be installed in the air line ahead of any valve-mounted instruments. Mounted positioners are piped and adjusted at the factory.

3.5 Packing

All types of packing - The gland nuts will have been tightened at the factory but should there be any gland leakage after installation, further tightening is indicated. Slightly more than hand tightening should be adequate to stop any stem leakage. Over-tightening will restrict stem movement.

See Pages 3/5 for further instruction on packing.

For pack less Bellows Seal construction - See Instruction Manual for Bellows Seal Valve.

3.6 Special Bonnets

The normalizing bonnet is similar to the standard bonnet but has extended length to protect the stem packing from extremes of the temperature. It must not be wrapped with any form of insulating material.

3.7 Final Check

After the valve has been installed, make a final check of the following: Valve travel -vary air supply to the actuator to ascertain that actual travel corresponds with the nameplate indication. Air lines to the actuator - check for leaks. Control instruments/valve action - check to be sure that the combined actions (direct or reverse) of controller, positioner (if any) and valve will provide the desired direction of valve movement and will ensure the required valve position in the event of air failure. Variations in pressure drop across single seated valves may result in a shift in spring range. This can be corrected by adjusting the actuator spring. See Actuator Instruction Manual for this procedure.



4.0 Maintenance

The purpose of this section is to assist maintenance personnel by suggesting methods of component maintenance which is largely dependent on the tools and machine shop equipment available each section should be completely read and understood before proceeding

4.1 General

- A. Maintenance such as diaphragm, packing or trim replacement can be done without removing the valve from the line, but removal of the actuator is so simple that it is usual to work on this item in the workshop. It will also be found more convenient to work on the valve in the workshop whenever possible.
- B. For special instructions relating to valves with Bellows Seal construction, see Section 4.7
- C. For instructions relating to Actuator Maintenance, see Actuator Instruction Manual.

4.2 Removal of Actuator from Valve

1. **NOTE:** The valve plug must be off the seat ring while the stem coupling is being separated - apply air to the actuator if necessary.
2. Remove any existing check nut or other attachment from the end of the stem coupling screw - actuator yoke will pass over the packing flange.
3. Unscrew and remove the coupling screw and remove the coupling halves.
4. Disconnect the air supply and/or any electrical connections to the actuator.
5. Unscrew the locking ring from the bonnet threads and lift it over the plug stem.
6. Lift or hoist the actuator unit off the valve, taking care to avoid damaging the plugstem, instruments or tubing. **NOTE:** The locking ring and yoke will pass over glandflange without dismantling the gland assembly.

4.3 Disassembly of Valve

1. Unscrew the gland nuts and remove gland flange and gland.
2. Remove the bonnet/body stud nuts and lift the bonnet: while holding the plug stem (to prevent the plug from dropping out), carefully off the valve body. Discard the body gasket.
3. Withdraw the plug and stem out of the body, through the cage guide (if present). **CAUTION.** Spline Plugs are seat guided, so that a straight upward pull is required until the plug clears the seat.
4. Using a narrow hook or bent wire, pull the packing rings and lantern ring out of the packing box.
5. By means of a hook remove packing rings insuring not to damage the sealing surface of packing box or plug stem .On or pure PTFE packing rings remove the spacer

4.4 Plugs, Seat and Guide

1. New plugs are usually supplied complete with a new stem, so detachment of the plug from the stem is seldom required. To remove the plug from the stem, drive out the plug stem pin (parallel) and unscrew the stem from the plug.
2. Unscrew and remove the seat ring. **NOTE:** The seat ring should be removed only for re-machining or replacement. It should not be removed for cleaning purposes. Special wrenches are required for seat removal. A lathe or boring mill can be used for unscrewing stubborn seat rings. Heating the valve body or chilling the seat may be required to loosen an extremely tight seat.
3. The pressed-in guide bushing, which is usually in a hard material, will rarely require replacement. The guide is a drive fit in the bonnet and when necessary should be removed in a machine.

4.5 Assembly of Valve

1. New plugs are usually supplied complete with new stems. If only one of these parts is to be replaced, the old plug stem pin must be driven out and the stem unscrewed. After screwing together, the new combination, drill through the plug and stem, countersink, insert & PEEN the 1/4" pin, then machine the pin flush with the plug shank surface. **NOTE:** while pinning is being performed, care must be taken not to damage the seating surface or plug guide .in holding plug (or pilot plug) to tightening the plug stem, always tight jaws of the vise on a no guiding surface of the parts. Always use a soft metal vise jaw with a special machining to hold the shank of the plug.
2. Apply pipe compound to the seat ring threads, then install the seat ring in the body. **CAUTION:** Each Microspline Plug and seat is a matched set precision ground to a selective fit. Extreme care should be taken with Splines to avoid chipping or breakage,
3. Lower the plug and stem assembly into the body, With Microspline Plugs be extremely careful when inserting the plug into the seat ring, to avoid damaging the plug tip.
4. Place a new bonnet gasket on the body. and lower the bonnet carefully over the plug stem and body studs, to its place on the body. Centre the bonnet so that the plug moves freely. **Note:** In case of sprial wound gaskets it is imperative that a new gasket be installed, each time the valve is disassembled.
5. Install the Stud nuts and tighten them evenly.(See body stud and nut torque value and tightening sequence)

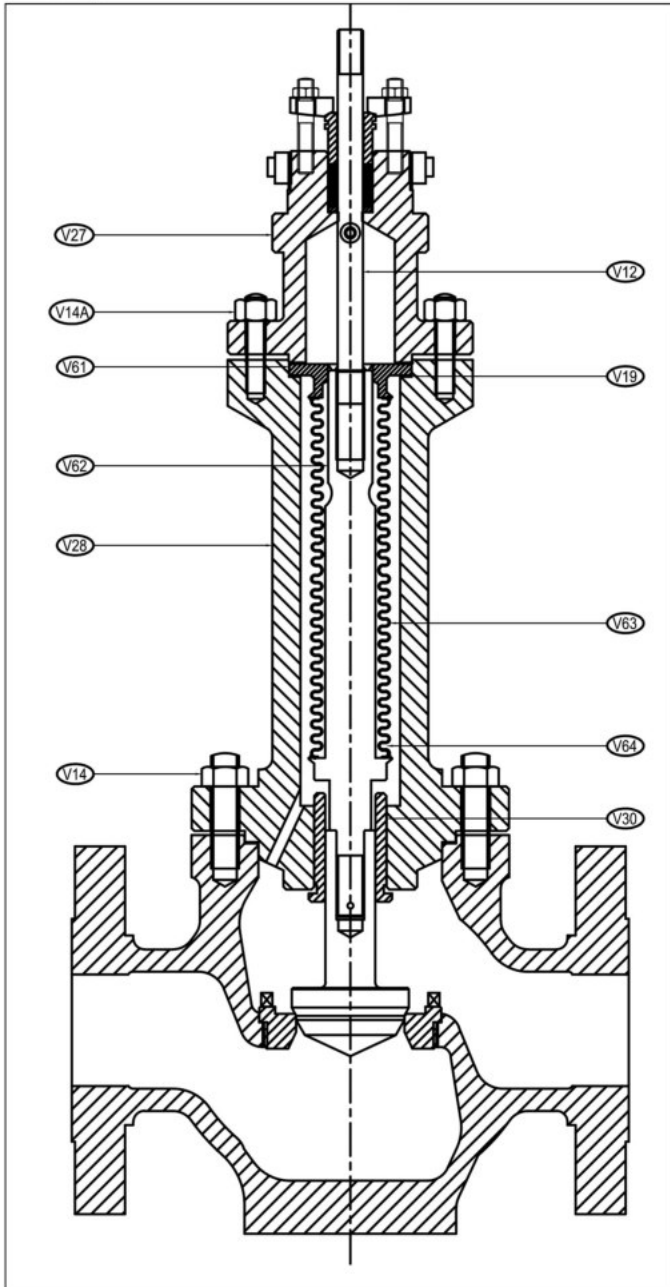


Fig.1
Bellows Seal Bonnet

4.6 Bellows Seal Valve

Plug & stem shall not be turned under any circumstances. there is an built in anti-rotation feature consisting of hexagonal surface machined on bellows stem that slides inside a plug guide with hexagonal machined slot.

4.6.1 Disassembly of Bellows Seal Valve

1. Unscrew the gland nuts & remove gland flange & gland.
2. Remove existing packing using hook or bent wire.
3. Remove upper bonnet stud nut.
4. Remove upper bonnet.
5. Remove body stud nut.
6. Remove lower bonnet while holding the plug stem along with bellows seal assembly.
7. Remove plug from bellows stem by driving out plug stem pin. Unscrew the bellows stem from plug.
8. Remove the bellows from top of the lower bonnet. Also remove bellow bonnet joint gaskets.

4.6.2 Assembly of bellows seal valve

1. Before Assembly make sure to clean all contact surfaces.
2. Assemble a new gasket on top flange of lower bonnet. Insert new bellows from top of the said bonnet.
3. Screw the plug & bellows stem together.
4. After screwing together drill through the plug & stem, countersink, insert 1 pin, then machine the pin flush with the plug shank surface.
5. Assemble the bellows seal bonnet using new body bonnet joint gaskets.
6. install stud nuts & tighten them evenly (see body stud & nut torque value & tightening sequence).
7. install upper bonnet using new joint gaskets.
8. install stud nuts for upper bonnet & tighten them evenly (see body stud & nut torque value & tightening sequence).
9. Follow packing section 4.8 instructions & section 5.0 for actuator mounting.

PART NO.	NAME OF PART
V12	PLUG STEM
V14	BODY STUD & NUT
V14A	UPPER BONNET STUD & NUT
V19	BELLOWS BONNET JOINT PTFE
V27	BELLOWS UPPER BONNET
V28	BELLOWS LOWER BONNET
V30	PLUG GUIDE
V61	BELLOWS STEM GUIDE
V62	BELLOWS STEM
V63	BELLOWS
V64	BELLOWS UNIT ASSEMBLY

4.7 Packing

The instructions for valve packings described below are applicable to all types of packing in the form of rings of rectangular or square section.

Procedure for Graphite & PTFE packings is similar but arrangement is different (See Figures 2 & 3)

4.7.1 Graphite

1. Clean the packing box thoroughly.
2. Slip two or three packing rings over the stem to the bottom of the packing box.
3. Place the lantern ring/Spacer on top of two rings, then place four or five rings on the top of the lantern ring. **NOTE:** Check to be sure that the channel in the lantern ring is opposite the lubricator hole in the valve bonnet.
4. Slip the gland over the stem to rest on the packing and check to see that it enters the packing box at least 1/8"
5. Place the gland flange flat side up over the stem and gland studs to rest on the gland.
6. Screw the gland nuts onto the studs and tighten them evenly to avoid cocking the flange. Just over hand tight should be sufficient.

4.7.2 PTFE

1. Clean the valve packing box thoroughly and check that the stem and packing box surfaces are not damaged.
2. Lubricate the five PTFE rings lightly with silicone lubricant for ease in assembly (one male adaptor, one female adaptor and three chevron rings.)
3. Slide the packing spacer over the valve plug stem to the bottom of the packing box.
4. Drop the packing washer over the stem to rest on the spacer.
5. Place the PTFE male adaptor flat side down, against the packing washer then fit the three chevron rings into the packing box, with grooved sides down. Seat the female adaptor flat side up on the topmost chevron ring. **NOTE:** Avoid damage to the PTFE rings when slipping them over the stem threads, and be sure each ring is pushed firmly into the packing box.
6. Slide the gland over the stem to rest on the female adaptor.
7. Slide the gland flange flat side up over the stem and studs to rest on the gland.
8. Screw the gland nuts onto the studs and tighten them evenly to avoid cocking the flange. Finger tightening is sufficient.

PART NO.	NAME OF PART
V20	LUBRICATOR PLUG
V21	PACKING WASHER
V22	PACKING SPACER
V23	GLAND PACKING
V24	LANTERN RING
V25	GLAND
V26	GLAND FLANGE
V32	GLAND STUD
V33	GLAND NUT
V40	LOCKING RING MACHINING

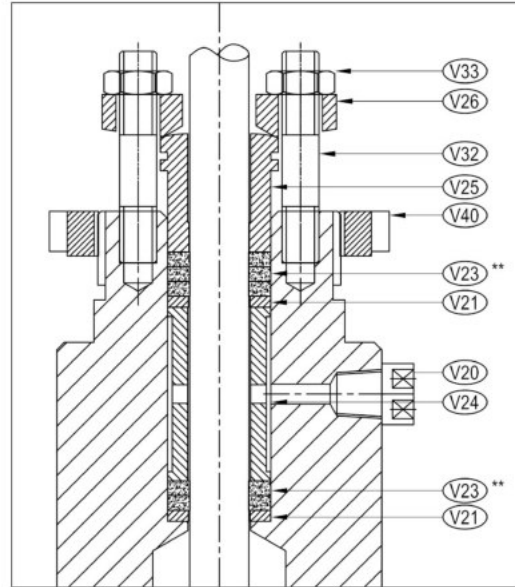


Fig.2
Graphite Packing

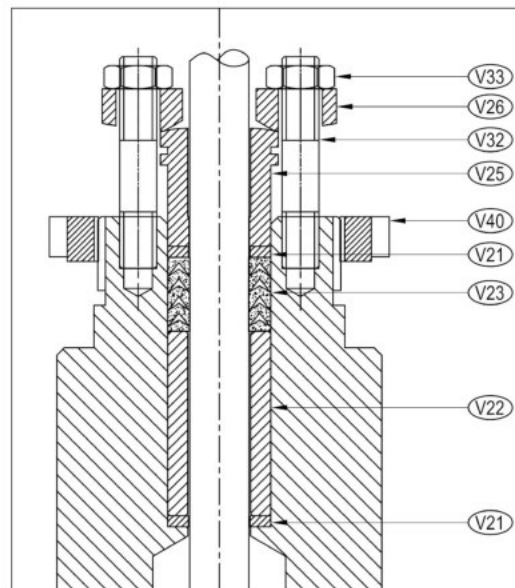


Fig.3
Chevron (PTFE) Packing



4.8 Lapping Seat and Plug

4.8.1 General

Lapping should be carried out with the valve fully assembled (minus actuator) to ensure correct contact between the surfaces to be lapped. Lapping can correct small imperfections in the seating surfaces but deep scratches can only be removed by machining. Excessive lapping produces a groove in the plug which is detrimental to efficient operation.

Plug contours should not be disturbed by machining or lapping as this will change the characteristic and rangeability.

4.8.2 Seat Repair

Any trim part which is scored or otherwise damaged on the guiding surfaces, to the extent that it could interfere with proper valve action should be replaced. Minor scratches or nicks, in the seating surfaces of either the plug or seat ring, should be repaired in the following manner

4.8.3 Lapping Procedure

1. Produce a lapping tool. This can be made by welding a nut (with threading to match the plug stem) to the center of a rectangular section bar about 8' long. Screw and lock the tool to the end of the plug stem.
2. Apply Grade A' compound (or finer) to the seating surface of the seat ring only. Lubricate the plug stem where it enters the packing box, with a light oil.
3. Lap with short, oscillating strokes. The weight of the plug, stem and lapping tool provides ample pressure for lapping • do not bear down.
4. Raise the plug occasionally, lower it to another position and resume the oscillating strokes. This ensures an even lap over the entire seating surfaces of plug and seat.
5. Approximately 5 to 10 minutes lapping time, with Grade A compound, is usually required to obtain a satisfactory fit between a new plug and seat.
6. Clean the plug and seat, then, holding the plug on the seat by hand, apply compressed air to the inlet side of the valve to check the tightness of the lapped parts. Repeat the lapping procedure if necessary.
7. Disassemble the valve and clean all parts thoroughly. Remove all traces of grinding compound.

NOTE: Do not loosen or remove the seat ring for cleaning purposes.

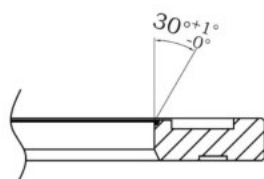


Fig.4 Seat Ring

5.0 Mounting Actuator on Valve.

1. Assemble and adjust the actuator as instructed in the Actuator Instruction Manual.
2. Lower the actuator over the plug stem and gland flange to seat squarely on the bonnet shoulder.
3. Rotate the actuator to a convenient position, then screw the locking ring onto the valve bonnet threads and tighten it securely.
4. The valve plug must be on its seat while the actuator stem is being connected and the actuator stem must be at its lowest position of travel (apply air pressure if necessary).

Press the half of the stem coupling which is threaded for the coupling screw against the actuator stem and valve plug stem so that:

- a) The ends of the stems are equidistant from the tapped coupling screw hole, and
- b) The tapped coupling screw hole is on the same side of the actuator as the positioner or other accessories which may require attachment to the coupling screw.

NOTE : It may be necessary to move the valve plug off its seat a slight distance in order to mesh the valve plug stem threads with the lower coupling threads.

5. Apply the other half of the coupling. carefully engaging threads, then insert the coupling screw and tighten it by hand.
6. Maintaining the actuator stem as its lowest position of travel slacken off the coupling screw slightly and, preventing the stem coupling from rotating, unscrew the valve plug stem from the coupling until the plug is firmly seated,
7. Move the plug off the seat by changing the air pressure. then unscrew the valve plug stem an additional turn out of the coupling to ensure positive seating.
8. Tighten the coupling screw securely.
9. Seat the valve plug firmly by means of the actuator.
10. Adjust the travel indicator scale so that the "Shut" mark is opposite the travel indicator ring.
11. Disconnect the airline used for assembly procedure, then apply the check nut or attachments (If any) to the coupling screw.

For Actuator Installation & Maintenance Please refer actuator Installation & operation manual.

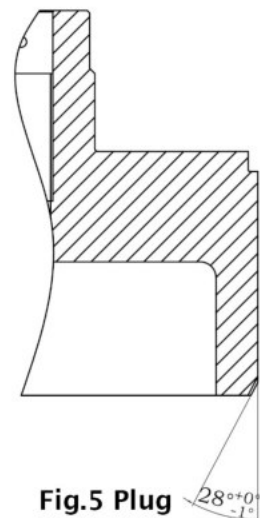


Fig.5 Plug

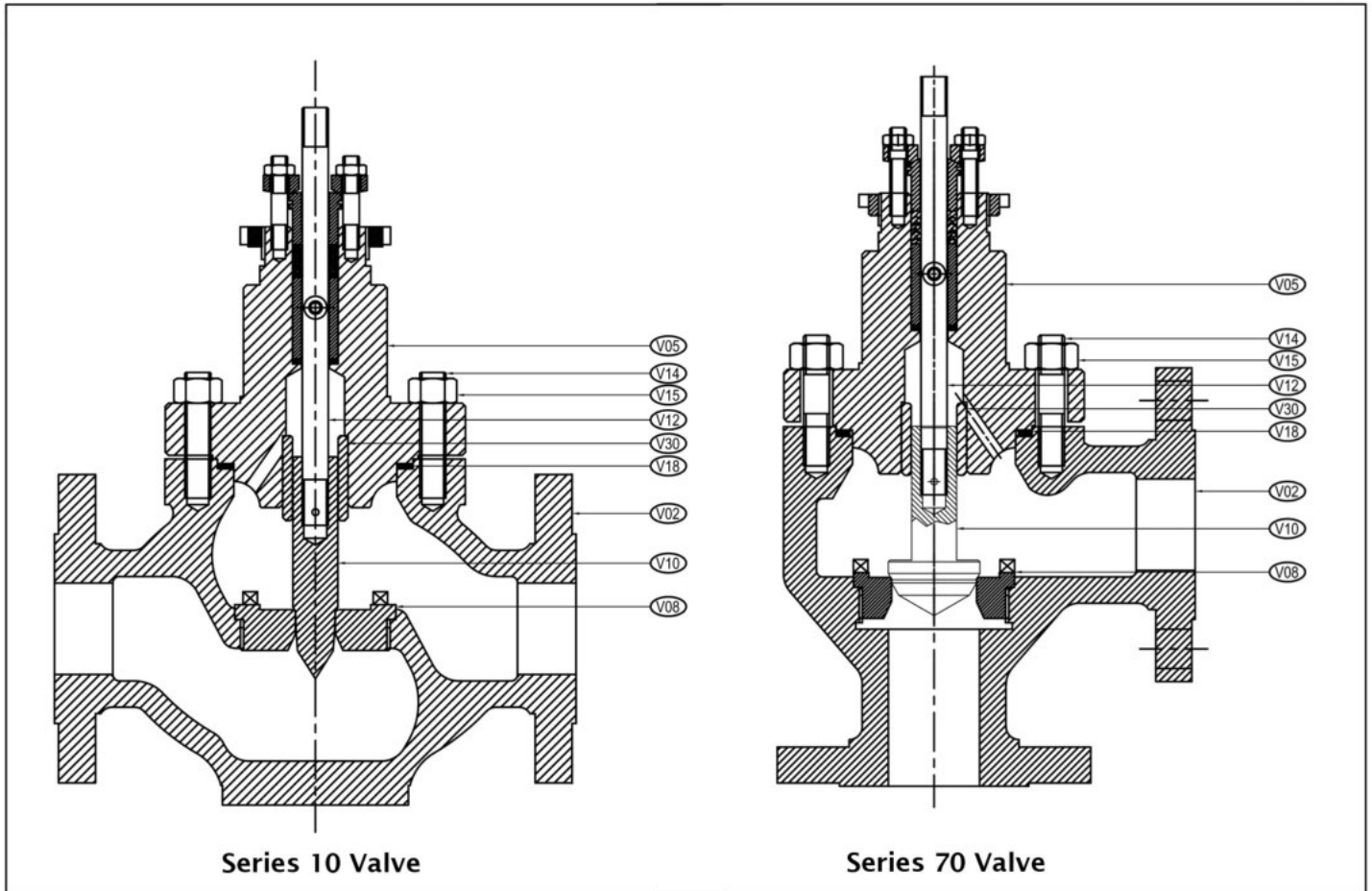


Fig.6
Standard Arrangement for
Top Guided Valve

PART NO.	NAME OF PART
V02	BODY MACHINING
V05	BONNET MACHINING
V08	SEAT RING MACHINING
V10	PLUG MACHINING
V12	PLUG STEM
V14	BODY JOINT STUD
V15	BODY JOINT NUT
V18	BODY JOINT GASKET
V30	PLUG GUIDE BUSH

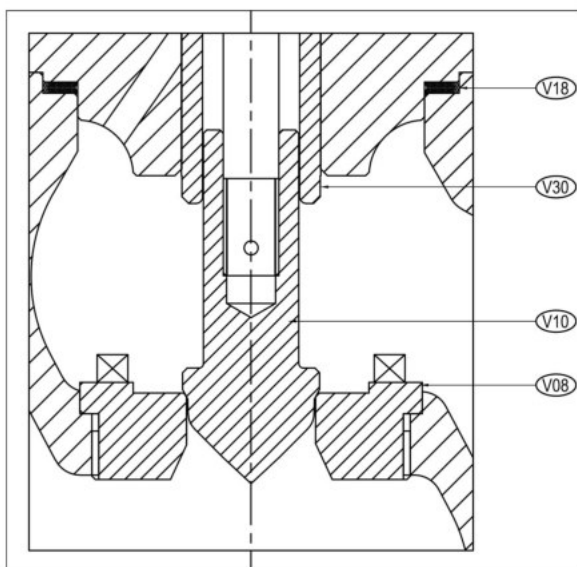


Fig.8
Arrangement for
Contoured Plug

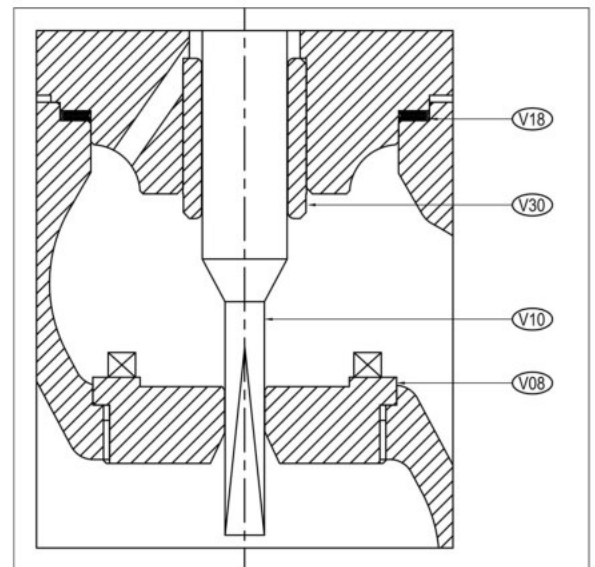


Fig.9
Arrangement for
Microslpline Plug

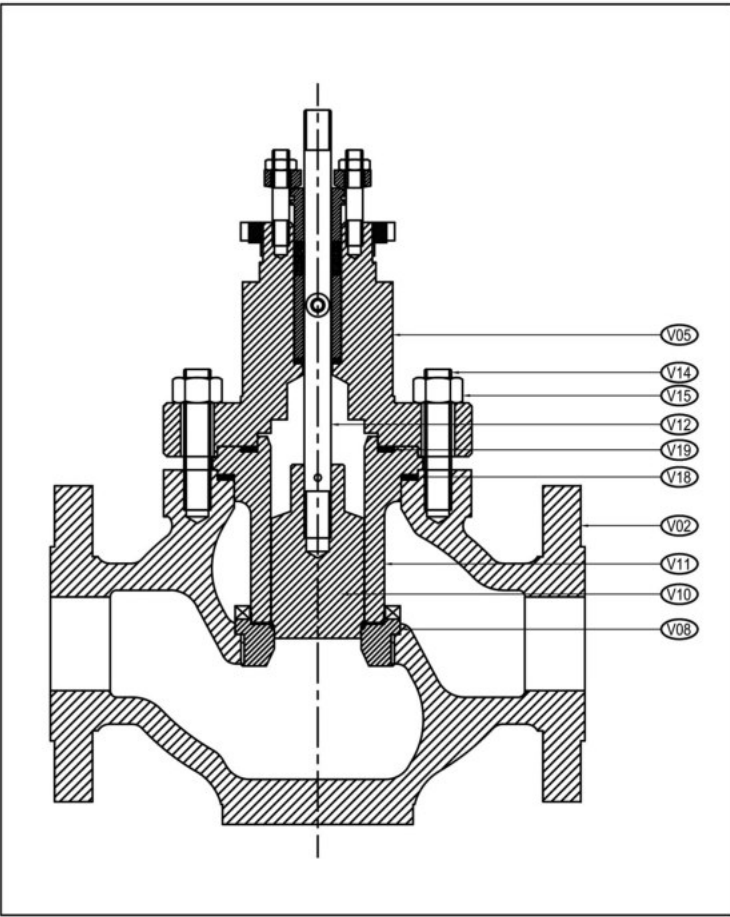


Fig.9
Standard Arrangement for
Cage Guided (HF) Unbalanced Valve

PART NO.	NAME OF PART
V02	BODY MACHINING
V05	BONNET MACHINING
V08	SEAT RING MACHINING
V10	PLUG MACHINING
V11	PLUG GUIDE MACHINING
V12	PLUG STEM
V14	BODY JOINT STUD
V15	BODY JOINT NUT
V16	RETAINER MACHINING
V17	SEALING RING
V18	BODY JOINT GASKET
v19	BONNET JOINT GASKET
V79	SEAT RING JOINT GASKET

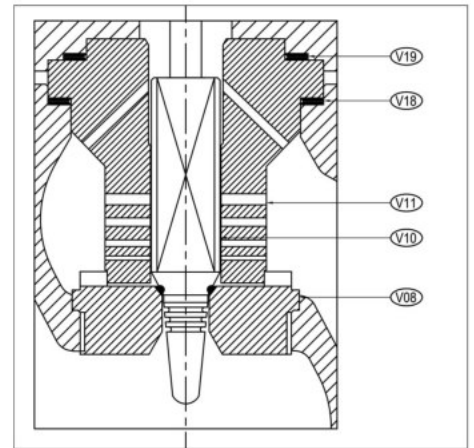


Fig.10
Arrangement for
HF Micropline Trim

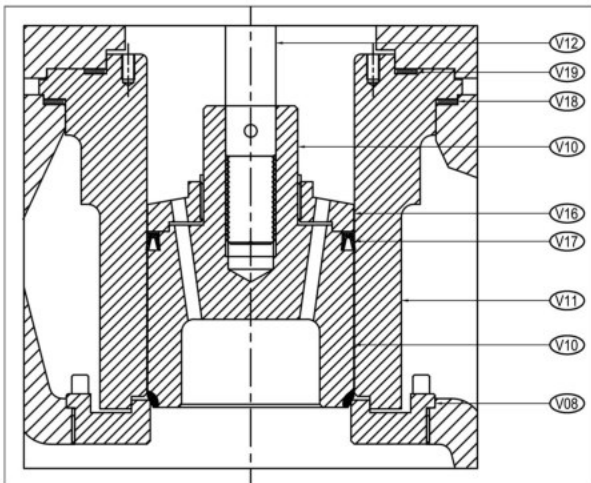


Fig.11
Arrangement for
HF Trim with Balancing Ring

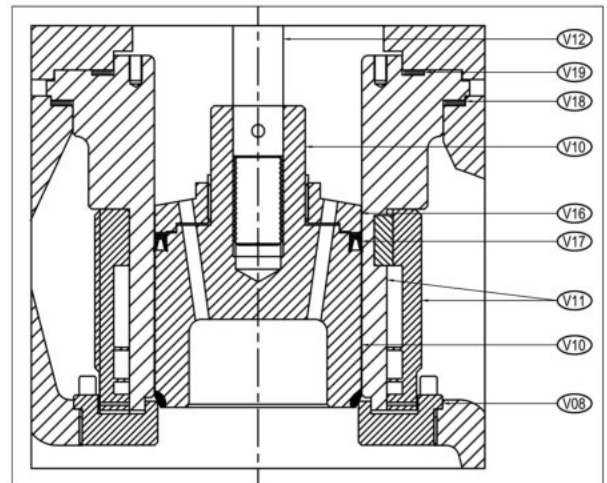


Fig.12
Arrangement for
HFD Trim with Balancing ring

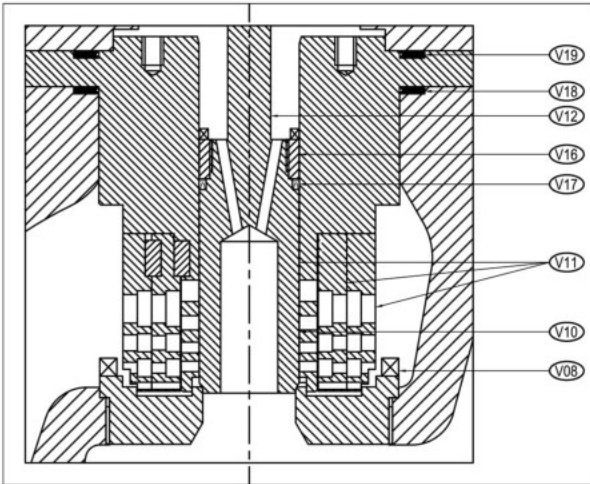


Fig.13
Arrangement for
HFT Trim with Balancing Ring

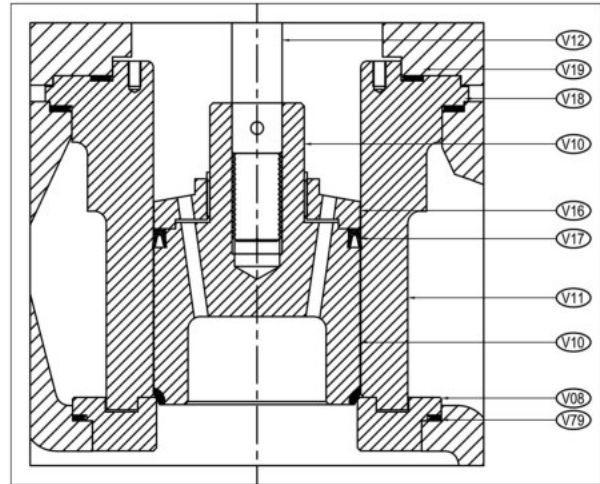


Fig.14
Arrangement for
HF Trim with Balancing Ring
& Clamped Seat Design

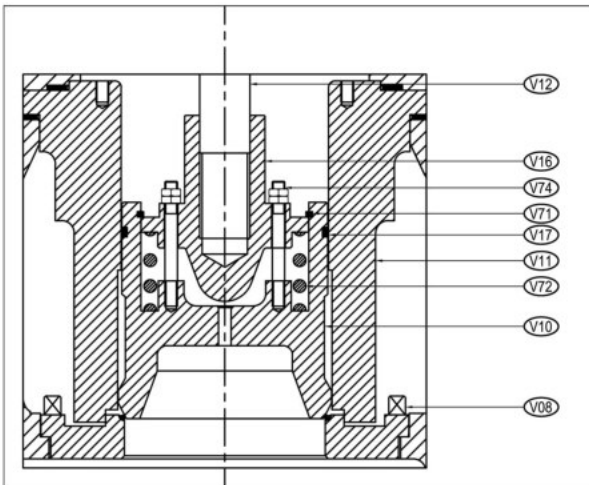


Fig.15
Arrangement for
Pilot Operated Trim

PART NO.	NAME OF PART
V02	BODY MACHINING
V05	BONNET MACHINING
V08	SEAT RING MACHINING
V10	PLUG MACHINING
V11	PLUG GUIDE MACHINING
V12	PLUG STEM
V14	BODY JOINT STUD
V15	BODY JOINT NUT
V16	PILOT PLUG
V17	SEALING RING
V18	BODY JOINT GASKET
V19	BONNET JOINT GASKET
V71	INTERNAL CIRCLIP
V72	AUXILARY SPRING
V74	PRELOAD TIE ROD WITH NUTS

Fig.16
Torque Sequence
for Body Stud Nuts

TORQUE VALUES FOR BODY STUD NUTS						
SL NO	BODY STUD SIZE	ACROSS FLAT WIDTH	TORQUE VALUES			
			MIN		MAX	
			INCH	INCH (MM)	Lbs.Ft	N.m
1	1/2"-13UNC	0.875 (22.23)	62	84	66	89
2	5/8"-11UNC	1.063 (26.99)	120	163	132	179
3	3/4"-10UNC	1.250 (31.75)	207	281	225	305
4	7/8"-9UNC	1.438 (36.51)	332	450	340	461
5	1"-8UNC	1.625 (41.28)	498	675	530	719
6	1.1/8"-7UN	1.813 (46.04)	593	804	640	868
7	1.1/4"-7UN	2.000 (50.80)	800	1085	860	1166
8	1.3/8"-6UN	2.188 (55.56)	870	1180	950	1288
9	1.1/2"-6UN	2.375 (60.33)	1150	1559	1250	1695
10	1.3/4"-5UN	2.750 (68.75)	1750	2373	1900	2576
11	2"-4.5UN	3.250 (82.55)	1960	2658	2100	2848
12	2.1/4"-4.5UN	3.500 (88.90)	2467	3345	2700	3661
13	2.1/2"-4UN	3.875 (98.43)	3315	4495	3450	4678

SAFETY MEASURES

WARNING IN ORDER TO ENSURE OPERATOR SAFETY AND PLANT SAFETY IT IS IMPORTANT THAT:

- A. Installation and maintenance of this equipment is carried out by suitably trained personnel.
- B. Valve should not hoist on holding actuator alone. The ropes or cable should hold the valve from valve bottom.
- C. Before selecting a location and installing the valve all the relevant sections of this manual must be read, and the requirements of associated equipment considered.
- D. Prior to performing maintenance on the valve, isolate valve, vent the process pressure and shut off air supply and signal air or electrical lines in the unit.
- E. Recommended pressures are not exceeded, all piping and pressure connections are adequate for the duty and are fitted correctly to give reliable pressure tight joints. This is important where compressible fluids (gases, etc.) are concerned, since for these applications a failure under pressure can result in an explosive release of energy.
- F. Where equipment such as solenoid valves and limit switches are fitted to the control valve, normal safety precautions must be taken to avoid the possibility of electrical shock.

For any service queries, please reach us on: sales@rkcipl.co.in

The company's policy is one of continuous product improvement and the right is reserved to modify the specifications contained herein without notice.



**R.K. CONTROL
INSTRUMENTS PVT. LTD.**

THE CONTROL VALVE SPECIALISTS

An ISO 9001 Certified Company

- Works** : Plot No. A-250, Wagle Industrial Estate, Opp. Wagle Police Station,
Thane 400 064, Maharashtra, India.
Tel: 022-6606 0943, Email: info@rkcipl.co.in
- Head Office
Mumbai** : 303 Avior, LBS Marg, Mulund West, Mumbai 400 080.
Tel: 022-6632-9600, Email: sales@rkcipl.co.in.
- Sales Office** : Delhi : 25/1 Community Centre, East of Kailash New Delhi -110 065.
Tel: 011-2642 6902, 011-2644 8819, Email: sales@rkcipl.co.in
- Chennai** : No.22/11, G3, Sai Virat Krishna, Lawyer Jagannathan Street,
Behind Le Royal Meridian Hotel, Guindy, Chennai – 600 032.
Tel: 044-4202 3937, 044 – 2233 3358, Email: saleschennai@rkcipl.co.in

Website: www.rkcipl.co.in

ISSUE 2 DATED OCT 2017