Type FLV Axial Control Valve

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⚠ WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire and/or chemical contamination causing property damage and personal injury or death.

Tartarini™ axial control valve must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations and Emerson Process Management Regulator Technologies, Inc. (Emerson) instructions.

If the control valve vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Call qualified personnel when installing, operating and maintaining the Type FLV axial control valve.

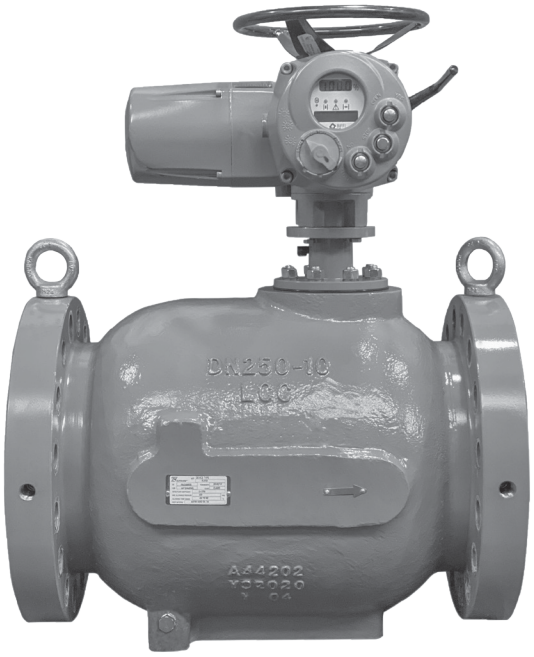


Figure 1. *Type FLV Axial Control Valve*

Introduction

Scope of the Manual

This manual provides instructions for installation, startup, maintenance and spare parts ordering for the Type FLV axial control valve. Refer to separate manuals for information concerning the actuator and other accessories used with this control valve.

PED Categories and Fluid Group

The Type FLV control valve without built-in safety slam-shut devices may be used as a stand-alone safety accessory in a fail close configuration to protect pressure equipment under the Pressure Equipment Directive 2014/68/EU categories. See Table 1.

The technical features of the downstream equipment, protected by this control valve, should be classified under a higher category according to the Pressure Equipment Directive 2014/68/EU.

Specifications

The Specifications section gives some general specifications for the Type FLV axial control valve. The nameplates give detailed information for a specific control valve as built in the factory.

Main Valve

Body Sizes
DN 150 to 300 / NPS 6 to 12

End Connection Styles
CL300 RF and CL600 RF

Maximum Inlet Pressure(1)
CL300 RF: 51.7 barg / 750 psig
CL600 RF: 103 barg / 1500 psig

Maximum Differential Pressure(1)
CL300 RF: 51.7 bar / 750 psig
CL600 RF: 103 bar / 1500 psig

Temperature Capabilities(1)
Nitrile (NBR): -20 to 60°C / -4 to 140°F
Fluorocarbon (FKM): -10 to 60°C / 14 to 140°F

Shut Off Leakage Class
VI per IEC 60534-4

Flow Coefficient
See Table 2

Inherent Flow Characteristics
Linear
Equal Percentage

Cage Type
Window Cage(2)
Multi-path Cage
Silencer Cage for Noise Reduction

Flow Direction
Flow to Open

Accuracy
±1%

Construction Materials
Body: LCC Steel
Sleeve: Stainless steel
Trim: Stainless steel, Steel and Aluminum-Bronze
O-ring: Nitrile (NBR) (standard) or
Fluorocarbon (FKM) (optional)
Disk/Seat Ring and Y-ring:
Polytetrafluoroethylene (PTFE)

Main Valve (continued)

Option
Body Drainage Hole and Plug

Electric Actuator

Input Signal
4 to 20 mA

Power
380V AC / 50Hz

Torque Limits
See Table 3

Actuator Mounting Interface
ISO 5210 Type F10A

Electric Actuator Explosion Proof
ExdIIBT4

Electric Actuator IP Code
IP66 or IP68 (7 m, 72 hours)

Failure Position
Lock-in-Last Position

Approximate Weights

CL300 RF
DN 150 / NPS 6: 232 kg / 511 lbs
DN 200 / NPS 8: 366 kg / 807 lbs
DN 250 / NPS 10: 575 kg / 1268 lbs
DN 300 / NPS 12: 832 kg / 1834 lbs

CL600 RF
DN 150 / NPS 6: 263 kg / 580 lbs
DN 200 / NPS 8: 409 kg / 902 lbs
DN 250 / NPS 10: 664 kg / 1464 lbs
DN 300 / NPS 12: 922 kg / 2033 lbs

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.
2. Do not exceed dP/P1 ratio of 0.60.

***Table 1**. PED Category for Type FLV Axial Control Valve*

PRODUCT SIZE	CATEGORY	FLUID GROUP
DN 150, 200, 250 and 300 / NPS 6, 8, 10 and 12	IV	1

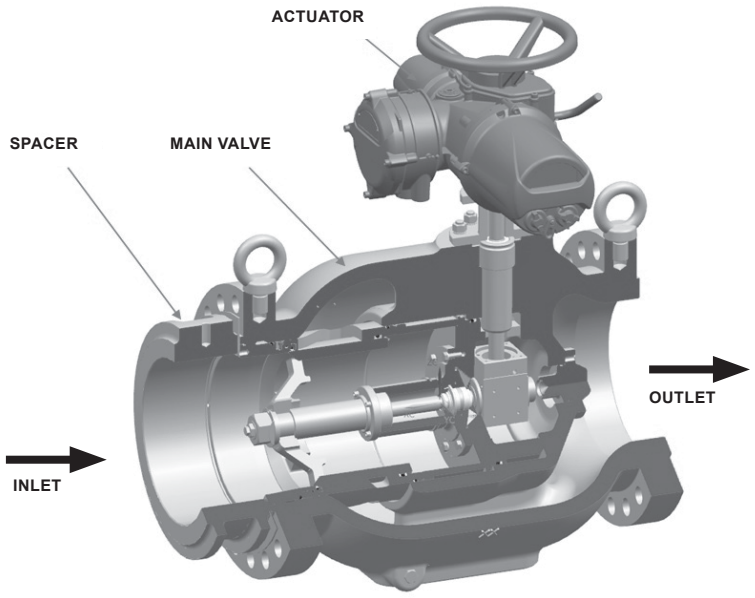


Figure 2. *Type FLV Axial Control Valve Flow Direction*

Table 2. *Flow Coefficients at Maximum Valve Travel*

CAGE TYPE		VALVE SIZE, DN / NPS							
		150 / 6		200 / 8		250 / 10		300 / 12	
LINEAR WINDOW CAGE (DP/P1<0.6)	% Opening	15.6*	100	15.0*	100	11.9*	100	18.3*	100
	C_g	98	20,456	205	37,000	247	58,000	430	82,000
	C_v	2.8	604	6.0	1150	7	1750	14	2650
	C_1	35.0	33.9	34.2	32.2	35.3	33.1	31.9	30.9
	X_T	0.774	0.730	0.738	0.654	0.787	0.694	0.641	0.605
	F_d	0.053	0.143	0.064	0.126	0.060	0.125	0.584	0.112
LINEAR MULTIPATH CAGE	% Opening	16.3*	100	15.7*	100	12.5*	100	14.8*	100
	C_g	145	18,900	200	35,000	296	53,000	260	63,800
	C_v	4.0	535	6	1100	8	1600	8	2100
	C_1	36.3	35.3	36.4	31.8	37.0	33.1	32.5	30.4
	X_T	0.831	0.789	0.836	0.640	0.865	0.694	0.668	0.583
	F_d	0.101	0.033	0.094	0.022	0.081	0.018	0.094	0.034
EQUAL PERCENTAGE WINDOW CAGE (DP/P1<0.6)	% Opening	16.8*	100	18.1*	100	13.7*	100	17.3*	100
	C_g	135	17,888	165	30,476	235	46,963	340	64,500
	C_v	3.6	507	5.0	912	7	1622	10	2136
	C_1	37.5	35.3	33.0	33.4	36.2	29.0	32.7	30.2
	X_T	0.889	0.790	0.688	0.710	0.826	0.530	0.676	0.576
	F_d	0.194	0.399	0.404	0.373	0.289	0.398	0.420	0.371
EQUAL PERCENTAGE MULTIPATH CAGE	% Opening	17.9*	100	16.6*	100	13.8*	100	15.9*	100
	C_g	102	12,818	200	24,464	288	38,598	330	55,436
	C_v	3.5	403	7.5	897	8	1409	11	1875
	C_1	29.1	31.8	26.7	27.3	34.3	27.4	30.8	29.6
	X_T	0.537	0.640	0.450	0.470	0.743	0.470	0.601	0.550
	F_d	0.230	0.039	0.191	0.028	0.202	0.022	0.213	0.037

* Do not operate below this minimum value as seat erosion may result.

ATEX Requirements: Conformity to Use in Explosive Atmospheres

The Type FLV main valve conforms the basic method and requirements for design, construction, testing and marking of non-electrical equipment specified in ISO/IEC 80079-36:2016 that are intended for use in explosive atmospheres. And the Type FLV main valve also conforms the requirements of constructional safety “c” in ISO/IEC 80079-37:2016. See the electric actuator explosion proof information in the Specifications.

The Ex type of Type FLV main valve is:

Ex h IIB T6· · ·T5 Gb

Ex h IIIB 85°C· · ·100°C Db

Product Description

Type FLV axial control valve with flow to open direction is designed according to IEC60534 standard. It is used as pressure or flow control valve on natural gas transmission, storage and distribution.

A multi-path or silencer cage is recommended for high differential pressure applications where high noise is expected to occur with standard window cages. The Type FLV axial control valve comes with an electric actuator as standard; however, it can be fitted with pneumatic actuator on special request.

Type FLV is designed with an easy to access seat ring that can be removed from valve body without removing the control valve from the pipeline. For this, a special spacer is installed upstream of the control valve. This spacer can be removed easily by loosening the inlet line bolting. Once the spacer is removed from its position, the disk holder assembly that contains the PTFE disk can be easily unscrewed from the valve body.

Principle of Operation

Type FLV axial control valve regulates the gas flow in accordance to the desired set system pressure and/or flowrate. Changes in set pressure and/or flowrate are sensed by respective sensors and fed to a controller (PLC). The controller in-turn sends the command signal to the electric actuator which rotates and moves the control valve shaft and plug assembly to regulate the gas flow.

When the downstream demand increases, the downstream pressure will decrease momentarily. The controller will send a command signal to the electric actuator to rotate anti-clockwise and open the control valve more to allow more gas to flow and maintain the downstream pressure.

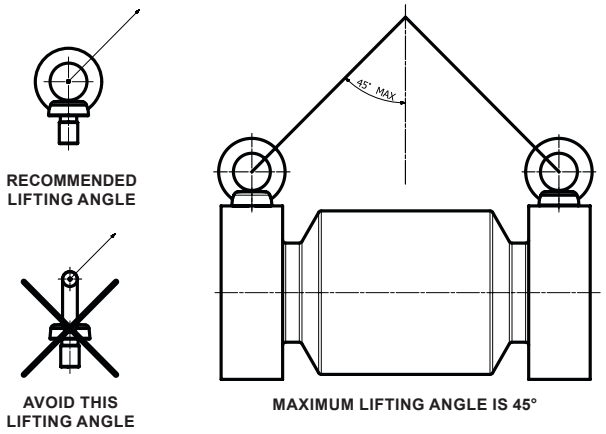


Figure 3. *Hoisting Procedure for Valves*

Conversely, when the downstream demand decreases, the downstream pressure will increase momentarily. The controller will send a command signal to the electric actuator to rotate clockwise and close the control valve to reduce the gas to flow and maintain the downstream pressure.

Transport and Handling

WARNING

Only qualified personnel in rigging may use lifting equipment to transport and handle this unit. If violated, personal injury and/or equipment damage may result.

Do not exceed the specification of lifting equipment and its accessories for transport and handling of this unit. If violated, personal injury and/or equipment damage may result.

Never stand, work or crawl under the load. The load could swing, pieces could drop, or the load could fall or slip. Allow for this possibility by establishing a safe distance between yourself and the load, and never lift the load over others. If violated, personal injury and/or equipment damage may result.

CAUTION

Eyebolts are provided to aid in the transport and handling of this unit. When lifting this unit, use both the eyebolts.

Table 3. *Required Actuator Torque*

VALVE SIZE	TORQUE RANGE
DN 150 / NPS 6	7.5 to 16 N•m / 5.5 to 11.8 ft-lbs
DN 200 / NPS 8	12 to 18 N•m / 8.8 to 13.3 ft-lbs
DN 250 / NPS 10	19 to 25 N•m / 14 to 18.5 ft-lbs
DN 300 / NPS 12	22 to 28 N•m / 16.2 to 20.7 ft-lbs

The load should never be applied at more than 45 degree angle from the bolt center line. Refer to Figure 3 for proper orientation of lifting line and eyebolts.

Eyebolts are designed just for handling the weight of this unit. Do not attempt to lift more weight than that of this unit with these eyebolts.

Loads must be applied only in the plane of the lifting eyebolt. If the plane of the eyebolt is not aligned with the load, estimate the amount of unthreading necessary to properly align the eye. Remove the eyebolt and add shims to adjust the angle of the plane of the eye.

Weight on the lifting straps may cause it to unwind, which can cause a hanging load to rotate. Ensure that the straps are not twisted before lifting, or if necessary, use a tag line attached to one of the eyebolts, to which a person can grip and stabilize the weight during lifting.

Installation

WARNING

Personal injury or equipment damage, due to bursting of pressure-containing parts may result if this control valve is overpressured or is installed where service conditions could exceed the limits given in the Specification section and on the appropriate nameplate or where conditions exceed any rating of the adjacent piping or piping connections.

To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices to prevent service conditions from exceeding those limits. Also, be sure the installation is in compliance with all applicable codes and regulations.

Additionally, physical damage to the control valve could break the actuator off the main valve, causing personal injury and property damage due to bursting of pressure-containing parts. To avoid such injury and damage, install the control valve in a safe location.

Installation procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Only a qualified person shall install or service the Type FLV control valve.

The control valve may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate, causing personal injury, death or property damage due to fire or explosion. Install vent line(s) from the control valve to a remote, safe location away from air intakes or any hazardous location. The end of the vent line or stack opening must be pointed down and protected against condensation or clogging.

CAUTION

Eyebolts are installed to aid in the handling and installation of the Control Valve Assembly only. Always utilize both eyebolts and do not attempt to lift more weight than the control valve with these eyebolts.

Before Installation

- Unpack the control valve and remove the protective shipping covers from the end connections of the body.
- Check the control valve and make sure it has not been damaged or collected foreign material during shipping.
- Remove any debris or dirt in the tubing and the pipeline.

- Use suitable line gaskets and approved piping and bolting practices.
- Make sure gas flow through the control valve is in the same direction as the arrow on the body.
- Under enclosed conditions or indoors, escaping gas may accumulate and be an explosion hazard. In this case, the vent should be piped outdoors.
- For control valve and accessories with vents, the vent should be kept open to permit free flow of gas to the atmosphere. Protect openings against entrance of rain, snow, insects or any other foreign material that may plug the spring case vent or vent line.

Startup and Adjustment

Pre-startup Considerations

Each control valve is factory-set for the functionality specified on the order. If no functionality was specified, the control valve would be factory-set to open with increasing signal to actuator. Before beginning the startup procedure in this section, make sure the following conditions are in effect:

- Block valves to isolate the regulator
- Vent valves are closed
- A bypass, if any, is in operation

In all cases, check the actuator setting to make sure it is correct for the application.

CAUTION

Pressure gauges should always be used to monitor downstream pressure during startup. Procedures used in putting this control valve into operation must be planned accordingly if the downstream system is pressurized by another control valve or a regulator or by a manual bypass.

Actuator Installation and Set-up

WARNING

Installation, configuration, commissioning, maintenance and repairs must be performed by qualified personnel only.

When installing in a hazardous area, verify that the actuator nameplate conforms to site safety requirements.

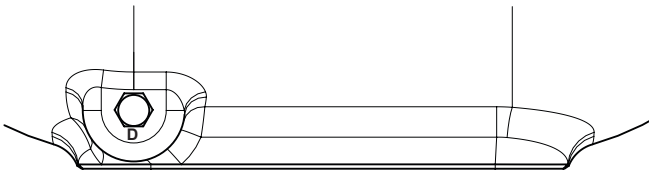


Figure 4. *Optional Drainage Hole and Plug*
(Do not remove plug while unit is pressurized.)

Before connecting power to the actuator, check if the voltage is correct and corresponds to the details on the nameplate.

Do not electrically operate the actuator when the electrical covers are removed. Do not open the actuator covers when an explosive atmosphere may be present.

Do not operate the actuator without checking first the configuration if suitable for the required application.

Ensure that proper earthing connections are provided to the actuator.

If any of the above statement is violated, personal injury or death and/or equipment damage may result.

Refer to actuator instruction manual for details.

1. Install the actuator as per recommended procedure in actuator instruction manual.
2. Check all accessories (including cable glands).It must comply with approved specifications for the site requirements and be certified according to the standard directive.
3. Set torque limits, position limits and closing direction as per procedures in actuator instruction manual.

Note

After maintenance work on control valve and/or actuator, remember to reset the actuator torque in accordance to Table 3.

4. Check the actuator operation using the local panel (where applicable).
5. Check the actuator operation using the remote panel (where applicable).

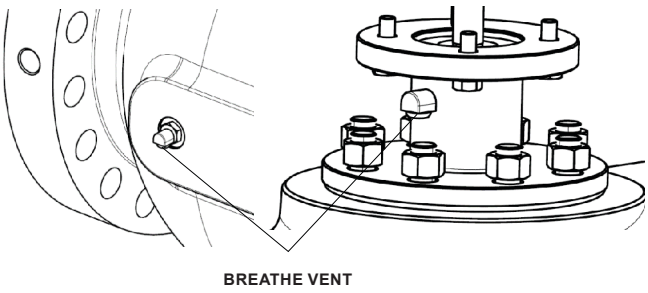


Figure 5. *Breathe Vent*

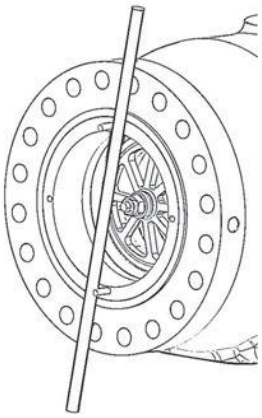


Figure 6. *Main Valve Disk Ring Replacement*

Shutdown

WARNING

To avoid personal injury resulting from sudden release of pressure, isolate the control valve from all pressure before attempting disassembly and release trapped pressure from the equipment and pressure line.

CAUTION

In any installation, it is important to slowly open and close the valves and to vent the outlet pressure before venting the inlet pressure to prevent damage caused by reverse pressurization of the main valve.

1. Switch off power to actuator and/or instruments mounted to the control valve.
2. Disconnect power lines / tubings to the actuator and/or instruments mounted to the control valve. (See user manuals of actuator and instruments for details).
3. Slowly close the valves in the following order:
   a. Inlet block valve
   b. Outlet block valve
   c. Control line valve(s), if used.
4. Open the vent valves to depressurize the system.

Maintenance

WARNING

To avoid personal injury or property damage from sudden release of pressure, isolate the control valve from the pressure system and release all pressure from main valve before performing maintenance operations

Use proper lifting techniques, when lifting the actuator, body (key 5) and spacer (key 1). Refer to actuator instruction manual for actuator weight.

The optional drainage plug mounted in hole D at the bottom of the control valve (see Figure 4), must not be removed in any circumstances unless the control valve is completely depressurized. If violated, serious injury may occur due to sudden release of extremely high pressure.

The control valve parts are subject to normal wear and must be inspected periodically and replaced as necessary. The frequency of inspection and replacement depends on the severity of service conditions and on applicable federal, state and local codes and regulations. **Use Torque Specifications (Table 4) for proper torque values.**

Main Valve (Figures 6 and 8)

WARNING

Installation, operation and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either

condition may result in equipment damage or personal injury. Call qualified personnel when installing, operating and maintaining the unit.

CAUTION

Do not use other type of eyebolt in the control valve. Only Emerson parts can be used to repair the unit.

Eyebolts are installed to aid in the handling and installation of the Control Valve Assembly only. Do not attempt to lift more weight than the control valve with these eyebolts.

Disk Ring Maintenance

CAUTION

Before removing line bolting connecting the pipeline and body, ensure adequate support is provided to prevent body and/or spacer from dropping and damaging and/or deforming the piping and accessories.

1. Remove all piping bolts, connecting pipeline and body flange.
2. Take out spacer (key 1).
3. Screw in two bolts or screws into two threaded holes on disk holder (key 4). Bolt dimensions are M12 for DN 300 / NPS 12, M10 for DN 250 / NPS 10, and M8 for DN 150 and 200 / NPS 6 and 8 valves.

Note

The bolts could be substituted with studs, screws or eyebolts. The recommended length range is 70 to 100 mm / 2.76 to 3.94 in. The strength of the bolt should be equal to or greater than that of class 8.8 material. The thread engagement between bolt and threaded hole on disk holder should be at least 10 mm / 0.4 in.

4. Apply torque counterclockwise on both bolts to slowly back out disk holder (key 4) (see Figure 6). Use a crowbar if necessary.

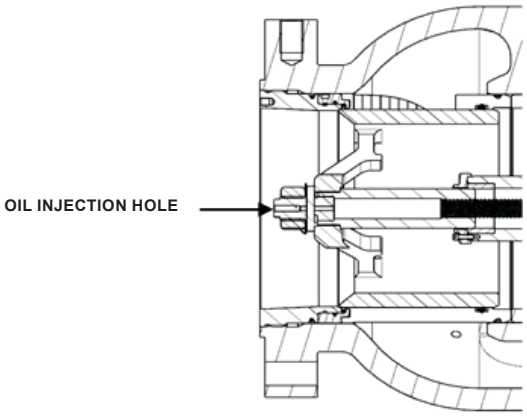


Figure 7. *Oil Injection Hole Schematic*

5. DN 300 / NPS 12 control valve needs disk holder (key 4) to be taken out together with seal ring retainer (key 35). Remove six screws (key 34) on seal ring retainer. Separate disk holder and seal ring retainer, replace disk (key 38) and O-ring (key 37). DN 150 to 250 / NPS 6 to 10 control valves need disk holder to be taken out with seat ring/disk and O-ring. Separate seat ring/disk and O-ring from disk holder to replace them with new parts.
6. Apply anti-seize lubricant on threads of disk holder (key 4) and body (key 5). Reinstall all parts on disk holder in reverse order, screw in disk holder clockwise on body until the top surface of disk holder is perfectly aligned with mating surface of body flange.

General Maintenance

CAUTION

Protect gasket surfaces from scratches and damages on the flanges of body and spacer.

Do not load the weight of trim assembly to reducer (key 23) during the process of disassembly of trim assembly.

1. Loosen bolts (key 18) and dismount actuator. Replace O-ring (key 16).
2. Remove the control valve from the pipeline. Use the eyebolts to lift it. Place the control valve on flat surface. Refer to Figure 3 for lifting instructions.
3. Loosen nuts (key 41) and remove bonnet (key 15). Replace O-ring (key 43). Take out drive shaft (key 49), guide (key 14) and bearing (key 42).

4. Take out disk holder (key 4) together with seal ring retainer (key 45). See “Disk Ring Maintenance” section for details. If needed, place the regulator vertical on flat surface with inlet flange facing up. Protect the gasket surfaces on body flanges from scratches and damage while carrying out this task.
5. Separate disk holder (key 4) and seal ring retainer (key 45). For DN 300 / NPS 12, loosen screws (key 34) and remove seal ring retainer. Replace disk (key 38) and O-rings (keys 10, 36 and 37) and seal retainer (key 87) where applicable.
6. Lift up trim assembly. Use crane as necessary to lift up trim assembly. Separate cage (key 7), nut (key 33), washer (key 65), ring retaining (key 32), sleeve (key 6) and spacer (key 11) in sequence. Replace O-rings (keys 9, 10 and 84), seal retainers (keys 72 and 85) and ring sliding (key 8).
7. Loosen screws (key 61), remove cap fixation (key 27), stem (key 30) and replace stem guide (key 60). Loosen nut (key 18 or 88), take out holder (key 25) then remove gasket (key 47) and replace O-rings (key 50 and 69), seal (key 46) and guide (key 59). Pull out spindle (key 26), replace seal assembly (key 67) and guide (key 68).
8. Loosen bolts (key 51) to remove end cap (key 22). Replace O-ring (key 3).
9. Check all moving parts, paying special attention to plated surfaces. Replace parts that are worn or damaged.
10. Clean all stripped-down parts for reuse.

Reassembly

CAUTION

Install vent (key 63) pointing its exhaust hole downward to prevent entry of rain, snow, insects or foreign material that may clog the vent opening.

Note

When the word “lubricate” is used in this document it is implied that the amount of lubricant used should be enough to cover the surface of the part being lubricated. Using an excess amount of lubricant should be avoided unless otherwise stated.

Reassemble the parts by following the steps below Make sure that parts move freely and without friction.

Lubricate all seals with silicone-based lubricant. Thixotropic methacrylate thread sealant for threads of the sealing screws. Anti-seize lubricant for static application: screw threads, bolts and nuts. Lithium-based grease for spindle (key 26).

1. Install the following components: O-ring (key 13), seal retainer (key 66) and ring (key 70), on barrel (key 12) assembly in which reducer (key 23) and shaft (keys 24 and 48) have been assembled on.
2. Install Y-ring (key 46), guide (key 59), stem guide (key 60) on the holder (key 25). Install gasket (key 47) on the holder with screw (key 62), turn the screw until tight, then unscrew it by 1/4 turn to allow free movement of the gasket. Ensure the head of screw does not protrude outside of gasket mating surface.
3. Install bearing (key 42), guide (key 68) and seal assembly (key 67) on the spindle (key 26).
4. Insert spindle assembly into barrel assembly, then install gasket (key 56) to fit the spindle (key 26) to barrel (key 12).
5. Assemble O-rings (keys 50 and 69) on the barrel assembly and install holder assembly on it. Screw in and tighten bolt (key 18) with washer (key 19). Apply adequate lithium-based grease on screws of the stem (key 30). With screw (key 31) and spindle (key 26), screw the stem to holder bottom. Pay attention to the direction of stem vent hole (see Figure 8). Assemble cap-fixation (key 27) on the holder and tighten screw (key 61) with washer (key 29). Turn the shaft (key 48) to move the stem in and out. Check if the movement of stem and spindle is smooth. Grease all screw surfaces. Put sleeve (key 6) on the stem and ensure that the assembly can rotate smoothly.
6. Bend the washer (key 65) in the ring retainer (key 32) and then put them on the sleeve (key 6). Hold screw (key 31) tightly when installing the nut (key 33). Leave 1/2 to 1 turn unscrewed to keep the ring retainer loose. Note: Do not exceed 2 turns when unscrewing the nut.
7. Assemble O-rings (keys 9 and 10), seal retainer (key 72) and ring sliding (key 8) on the cage (key 7). For sizes DN 150 to 250 / NPS 6 to 10, additional O-ring (key 84) and seat retainer (key 85) are needed due to difference in structure.
8. Install the spacer (key 11) and cage (key 7) on the barrel assembly.
9. Lift the trim assembly by sleeve (key 6) using rope and align the trim position with body. Slowly place the trim in a vertical position. Visually check if guide groove of barrel and guide (key 14) are aligned correctly.

Table 4. *Torque Specifications*[1]

KEY	PART NAME	TORQUE							
		DN 150 / NPS 6		DN 200 / NPS 8		DN 250 / NPS 10		DN 300 / NPS 12	
		N•m	Ft-lbs	N•m	Ft-lbs	N•m	Ft-lbs	N•m	Ft-lbs
18	Bolt	35 to 40	26 to 30	35 to 40	26 to 30	35 to 40	26 to 30	35 to 40	26 to 30
28	Screw	4 to 5	3 to 3.7	4 to 5	3 to 3.7	6 to 8	4.5 to 6	6 to 8	4.5 to 6
31	Screw	20 to 25	15 to 19	20 to 25	15 to 19	20 to 25	15 to 19	20 to 25	15 to 19
33	Nut	35 to 40	26 to 30	35 to 40	26 to 30	35 to 40	26 to 30	35 to 40	26 to 30
34	Screw	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	4 to 5	3 to 3.7
41	Nut	35 to 40	26 to 30	124 to 140	91.5 to 103	124 to 140	91.5 to 103	124 to 140	91.5 to 103
51	Screw	6 to 8	4.5 to 6	16 to 26	11.8 to 19.2	35 to 40	26 to 30	40 to 60	29.5 to 44
61	Screw	4 to 5	3 to 3.7	4 to 5	3 to 3.7	6 to 8	4.5 to 6	6 to 8	4.5 to 6
71	Adaptor	58 to 63	42.8 to 46.5	58 to 63	42.8 to 46.5	58 to 63	42.8 to 46.5	58 to 63	42.8 to 46.5
73	Bolt	35 to 40	26 to 30	35 to 40	26 to 30	35 to 40	26 to 30	35 to 40	26 to 30
88	Bolt	15 to 18	11 to 13.3	15 to 18	11 to 13.3	- - - -	- - - -	- - - -	- - - -
64	Plug	NPT Thread[2][3]							

1. Overtightening may be detrimental to the sealing function of the joint.
2. Joints should be tightened beyond the hand-tight engagement position.
3. Advancing the joint past hand-tight creates interference between external and internal thread flanks, produces a seal (with the use of a sealant), and helps prevent loosening of the joint.

10. Assemble O-rings (keys 10, 36 and 37), disk (key 38) and seal ring retainer (key 35) on the disk holder (key 4). Tighten the screw (key 34) in seal ring retainer. For sizes DN 150 to 250 / NPS 6 to 10, assemble only the O-ring and disk on the disk holder.

11. Screw disk holder assembly into the body (key 5). Disk holder (key 4) outer surface must be aligned with mating surface of body flange. Disk holder should not protrude outside the body flange mating surface. The trim must be kept in fully closed position.

12. Tighten nut (key 33) and then bend the washer (key 65) to touch with the nut. Bend in no less than three places. Then inject a moderate amount of lithium-based grease into the grease chamber (see Figure 7). Then tighten bolt (key 73). When tightening the nut (key 33), hold the screw (key 31) firmly with a wrench.

13. Assemble drive shaft (key 49) with key (key 17), bearing (key 42), bonnet (key 15) and vent (key 63). Pay attention to the bonnet and vent direction. Tighten the stud bolt (key 44) and nut (key 41) with washer (key 45). Rotate drive shaft to check if it can move the sleeve (key 6). Assemble end cap (key 22) with O-ring (key 21) then tighten the screw (key 51) with washer (key 52).

NOTE

For DN 300 / NPS 12, when disassembly of end cap (key 22) is needed, use six M12 bolts (key 51) to unscrew from end cap. Then screw in two M12 bolts into two auxiliary holes on end cap. Pull the two bolts to take out end cap. For DN 150 to DN 250 / NPS 6 to 10, screw bolt into threaded hole at the center of end cap to take out end cap.

14. Assemble O-rings (keys 16 and 43) on bonnet. Install actuator (key 55) on main valve then tighten bolt (key 18) with washer spring (key 19). Assemble plug (key 64), adaptor (key 71) and vent (key 63) on the body. Pay attention to the position of the vent.

15. Set up the open and close limit positions in actuator to match with main valve's open and close positions and verify that the settings are correct. Refer to actuator instruction manual for details.

Parts Ordering

Contact your local Sales Office when ordering replacement parts. Repair kits containing all recommended spare parts are available.

The serial number, type number, spring range, the date of manufacture and other pertinent information are stamped on the nameplate. Always provide this information in any correspondence with your local Sales Office regarding replacement parts or technical assistance.

Spare Parts

Spare parts storage shall be done by proper procedures according to national standard/rules to avoid over aging or any damage.

Parts Lists

WARNING

Use only genuine Emerson replacement parts. Components that are not supplied by Emerson should not, under any circumstances, be used in any Emerson control valve, because they will void your warranty, might adversely affect the performance of the control valve and could give rise to personal injury and property damage.

DN 150 / NPS 6 Body Size

Key	Description	Part Number
	Parts Kit	
	Static and Dynamic (included are keys 8, 9, 10, 13, 16, 21, 38, 43, 46, 50, 59, 60, 65, 66, 67, 68, 69, 70, 72, 84, 85)	
	Nitrile (NBR)	ERAA45034A0
	Fluorocarbon (FKM)	ERAA45035A0
	Dynamic (included are keys 8, 9, 13, 38, 46, 59, 60, 65, 67 and 68)	
	Nitrile (NBR)	ERAA45036A0
	Fluorocarbon (FKM)	ERAA45037A0
1	Spacer	
	CL300 RF	ERAA42901A1
	CL600 RF	ERAA42900A1
2	Gasket	
	CL300 RF	JI2B9650150
	CL600 RF	JI2B9611150
4	Disk holder	
	CL300 RF	
	Stainless steel	ERAA42903A0
	Carbon steel	ERAA42903A1
	CL600 RF	
	Stainless steel	ERAA42902A0
	Carbon steel	ERAA42902A1
5	Body	
	CL300 RF	
	With Drainage Hole	ERAA42904A1
	Without Drainage Hole	ERAA47136A1
	CL600 RF	
	With Drainage Hole	ERAA42905A1
	Without Drainage Hole	ERAA47137A1
6	Sleeve	ERAA42910A0
7	Cage	
	Linear window	ERAA42906A0
	Linear multi-path	ERAA42907A0
	Equal percentage window	ERAA42908A0
	Equal percentage multi-path	ERAA42909A0
8*	Sliding ring, 2 required	ERAA42911A0
9*	O-ring	
	Nitrile (NBR)	ERAA42928A0
	Fluorocarbon (FKM)	ERAA42928A1
10*	O-ring	
	Nitrile (NBR)	ERAA42933A0
	Fluorocarbon (FKM)	ERAA42933A1
11	Spacer	
	316 Stainless steel	ERAA42912A0
	Carbon steel	ERAA42912A1
12	Barrel	
	316 Stainless steel	ERAA42913A0
	Carbon steel	ERAA42913A1
13*	O-ring, 2 required	
	Nitrile (NBR)	ERAA42932A0
	Fluorocarbon (FKM)	ERAA42932A1
14	Guide	ERAA42914A0
15	Bonnet	ERAA42915A1
16*	O-ring	
	Nitrile (NBR)	ERAA42930A0
	Fluorocarbon (FKM)	ERAA42930A1
17	Key	ERAA34052A0
18	Bolt, 4 required	JI1AF100030
19	Spring washer, 12 required	ERAA34047A0
21*	O-ring	
	Nitrile (NBR)	ERAA42936A0
	Fluorocarbon (FKM)	ERAA42936A1
22	End cap	ERAA42917A0
23	Reducer	ERAA42918A0
24	Shaft	ERAA42919A0
25	Holder	
	316 Stainless steel	ERAA42920A0
	Carbon steel	ERAA42920A1
26	Spindle	ERAA42921A0
27	Cap fixation	ERAA42922A0
28	Screw, 4 required	ERAA42956A0
29	Washer, 8 required	ERAA42940A0
30	Stem	ERAA42923A0
31	Screw	ERAA42955A0
32	Retainer ring	ERAA42924A0
33	Nut	ERAA42957A0
38*	Seat ring	ERAA42925A0
41	Nut, 8 required	ERAA44608A0
42	Bearing, 2 required	ERAA42941A0
43*	O-ring	
	Nitrile (NBR)	ERAA42929A0
	Fluorocarbon (FKM)	ERAA42929A1
44	Stud bolt, 8 required	ERAA44607A0
46*	Seal	ERAA42942A0
47	Gasket	ERAA42926A0
48	Shaft	ERAA42939A0
49	Drive shaft	ERAA42927A0
50*	O-ring	
	Nitrile (NBR)	ERAA42931A0
	Fluorocarbon (FKM)	ERAA42931A1
51	Bolt, 6 required	JI1H4060020
52	Washer, 6 required	ERAA34049A1
55	Actuator	
	Rotork, IQM10F10A	ERAA32846A1
	Biffi, ICON-010R/30-48	ERAA42805A0
	Biffi, ICON-010R/30-24	ERAA42805A1
56	Gasket	
	0.05 mm thickness, 1 required	ERAA42943A0
	0.1 mm thickness, 4 required	ERAA42944A0
	0.5 mm thickness, 1 required	ERAA42945A0

*Recommended Spare Part

DN 150 / NPS 6 Body Size (continued)

Key	Description	Part Number
57	Eyebolt, 2 required	
	CL300 RF	M5040004X12
	CL600 RF	ERAA45560A0
58	Eyebolt	JG11000BM12
59	Guide	ERAA42946A0
60*	Stem guide	ERAA42947A0
61	Screw, 4 required	ERAA42960A0
62	Screw, 2 required	ERAA34061A0
63	Vent	ERAA43548A0
64	Plug	ERAA03131A0
65	Washer	ERAA42950A0
66*	Seal retainer	ERAA42949A0
67*	Seal assembly	
	Nitrile (NBR)	ERAA42951A0
	Fluorocarbon (FKM)	ERAA42951A1
68*	Guide	ERAA42952A0
69*	O-ring	
	Nitrile (NBR)	ERAA42938A0
	Fluorocarbon (FKM)	ERAA42938A1
70*	Ring	ERAA43212A0
71	Adaptor	ERAA44044A0
72*	Seal retainer	ERAA42948A0
73	Hex bolt	JI1AF100025
75	Nameplate support	- - - - - - - - - - -
76	Screw, 2 required	ERAA01884A0
77	Flow Arrow	- - - - - - - - - - -
78	Nameplate	- - - - - - - - - - -
84*	O-ring	
	Nitrile (NBR)	ERAA42935A0
	Fluorocarbon (FKM)	ERAA42935A1
85*	Seal retainer	ERAA42953A0
88	Bolt, 6 required	ERAA42958A0
89	Washer, 6 required	ERAA42959A0
92	Key	ERAA46691A0
93	Label	- - - - - - - - - - -

DN 200 / NPS 8 Body Size

Key	Description	Part Number
	Parts Kit	
	Static and Dynamic (included are keys 8, 9, 10, 13, 16, 21, 37, 38, 43, 46, 50, 59, 60, 65, 66, 67, 68, 69, 70, 72, 84, 85)	
	Nitrile (NBR)	ERAA45075A0
	Fluorocarbon (FKM)	ERAA45076A0
	Dynamic (included are keys 8, 9, 37, 38, 46, 59, 60, 65, 67 and 68)	
	Nitrile (NBR)	ERAA45077A0
	Fluorocarbon (FKM)	ERAA45078A0
1	Spacer	
	CL300 RF	ERAA43758A1
	CL600 RF	ERAA43759A1
2	Gasket	
	CL300 RF	JI2B9650200
	CL600 RF	JI2B9611200
4	Disk holder	
	CL300 RF	
	Stainless steel	ERAA43744A0
	Carbon steel	ERAA43744A1
	CL600 RF	
	Stainless steel	ERAA43745A0
	Carbon steel	ERAA43745A1
5	Body	
	CL300 RF	
	With Drainage Hole	ERAA43732A1
	Without Drainage Hole	ERAA47114A1
	CL600 RF	
	With Drainage Hole	ERAA43733A1
	Without Drainage Hole	ERAA47164A1
6	Sleeve	ERAA43746A0
7	Cage	
	Linear window	ERAA43747A0
	Linear multi-path	ERAA44106A0
	Equal percentage window	ERAA43748A0
	Equal percentage multi-path	ERAA44109A0
8*	Sliding ring, 2 required	ERAA43742A0
9*	O-ring	
	Nitrile (NBR)	ERAA43952A0
	Fluorocarbon (FKM)	ERAA43952A1
10*	O-ring	
	Nitrile (NBR)	ERAA43956A0
	Fluorocarbon (FKM)	ERAA43956A1
11	Spacer	
	316 Stainless steel	ERAA43757A0
	Carbon steel	ERAA43757A1
12	Barrel	
	316 Stainless steel	ERAA43752A0
	Carbon steel	ERAA43752A1
13*	O-ring	
	Nitrile (NBR)	ERAA43955A0
	Fluorocarbon (FKM)	ERAA43955A1

*Recommended Spare Part

DN 200 / NPS 8 Body Size (continued)

Key	Description	Part Number
14	Guide	ERAA43755A0
15	Bonnet	ERAA43756A1
16*	O-ring	
	Nitrile (NBR)	ERAA43954A0
	Fluorocarbon (FKM)	ERAA43954A1
17	Key	ERAA34052A0
18	Bolt, 4 required	JI1AF100030
19	Spring washer, 4 required	ERAA34047A0
21*	O-ring	
	Nitrile (NBR)	ERAA43958A0
	Fluorocarbon (FKM)	ERAA43958A1
22	End cap	ERAA43753A0
23	Reducer	ERAA42918A0
24	Shaft	ERAA42919A0
25	Holder	
	316 Stainless steel	ERAA43751A0
	Carbon steel	ERAA43751A1
26	Spindle	ERAA43750A0
27	Cap fixation	ERAA42922A0
28	Screw, 4 required	ERAA42956A0
29	Washer, 8 required	ERAA42940A0
30	Stem	ERAA43749A0
31	Screw	ERAA42955A0
32	Retainer ring	ERAA42924A0
33	Nut	ERAA42957A0
37*	O-ring	
	Nitrile (NBR)	ERAA43959A0
	Fluorocarbon (FKM)	ERAA43959A1
38*	Seat ring	ERAA43743A0
41	Nut, 8 required	JI1E2000M16
42	Bearing, 2 required	ERAA42941A0
43*	O-ring	
	Nitrile (NBR)	ERAA43953A0
	Fluorocarbon (FKM)	ERAA43953A1
44	Stud bolt, 8 required	JI1BJ160065
45	Washer, 8 required	ERAA34532A0
46*	Seal	ERAA42942A0
47	Gasket	ERAA42926A0
48	Shaft	ERAA43760A0
49	Drive shaft	ERAA43754A0
50*	O-ring	
	Nitrile (NBR)	ERAA42931A0
	Fluorocarbon (FKM)	ERAA42931A1
51	Bolt, 6 required	JI1H6080020
52	Washer, 6 required	ERAA42959A1
55	Actuator	
	Rotork, IQM10F10A	ERAA32846A1
	Biffi, ICON-010R/30-48	ERAA42805A0
	Biffi, ICON-010R/30-24	ERAA42805A1

Key	Description	Part Number
56	Gasket	
	0.05 mm thickness, 2 required	ERAA42943A0
	0.1 mm thickness, 4 required	ERAA42944A0
	0.5 mm thickness, 1 required	ERAA42945A0
57	Eyebolt, 2 required	ERAA45560A0
58	Eyebolt	JG11000BM12
59*	Guide	ERAA42946A0
60*	Stem guide	ERAA42947A0
61	Screw, 4 required	ERAA42960A0
62	Screw, 2 required	ERAA34061A0
63	Vent	ERAA43548A0
64	Plug	ERAA03131A0
65	Washer	ERAA42950A0
66*	Seal retainer	ERAA43761A0
67*	Seal assembly	
	Nitrile (NBR)	ERAA42951A0
	Fluorocarbon (FKM)	ERAA42951A1
68*	Guide	ERAA42952A0
69*	O-ring	
	Nitrile (NBR)	ERAA42938A0
	Fluorocarbon (FKM)	ERAA42938A1
70*	Ring	ERAA43764A0
71	Adaptor	ERAA44044A0
72*	Seal retainer	ERAA43762A0
73	Screw	JI1AF100025
75	Nameplate support	----------
76	Screw, 2 required	ERAA01884A0
77	Flow Arrow	----------
78	Nameplate	----------
84*	O-ring	
	Nitrile (NBR)	ERAA43957A0
	Fluorocarbon (FKM)	ERAA43957A1
85*	Seal retainer	ERAA43763A0
88	Bolt, 6 required	ERAA42958A0
89	Washer, 6 required	ERAA42959A0
92	Key	ERAA46691A0
93	Label	----------

*Recommended Spare Part

DN 250 / NPS 10 Body Size

Key	Description	Part Number
	Parts Kit	
	Static and Dynamic (included are keys 8, 9, 10, 16, 21, 37, 38, 43, 46, 50, 59, 60, 65, 66, 67, 68, 69, 70, 72, 84, 85 and 87)	
	Nitrile (NBR)	ERAA44944A0
	Fluorocarbon (FKM)	ERAA44952A0
	Dynamic (included are keys 8, 9, 37, 38, 46, 59, 60, 65, 67 and 68)	
	Nitrile (NBR)	ERAA44953A0
	Fluorocarbon (FKM)	ERAA44954A0
1	Spacer	
	CL300 RF	ERAA44205A1
	CL600 RF	ERAA44204A1
2	Gasket	
	CL300 RF	JI2B9650250
	CL600 RF	JI2B9611250
4	Disk holder	
	CL300 RF	
	Stainless steel	ERAA44175A0
	Carbon steel	ERAA44175A1
	CL600 RF	
	Stainless steel	ERAA44174A0
	Carbon steel	ERAA44174A1
5	Body	
	CL300 RF	
	With Drainage Hole	ERAA44173A1
	Without Drainage Hole	ERAA47111A1
	CL600 RF	
	With Drainage Hole	ERAA44172A1
	Without Drainage Hole	ERAA47112A1
6	Sleeve	ERAA44182A0
7	Cage	
	Linear window	ERAA44181A0
	Linear multi-path	ERAA44546A0
	Equal percentage window	ERAA44180A0
	Equal percentage multi-path	ERAA44548A0
8*	Sliding ring, 2 required	ERAA44222A0
9*	O-ring, 2 required	
	Nitrile (NBR)	ERAA44418A0
	Fluorocarbon (FKM)	ERAA44418A1
10*	O-ring	
	Nitrile (NBR)	ERAA44419A0
	Fluorocarbon (FKM)	ERAA44419A1
11	Spacer	
	316 Stainless steel	ERAA44190A0
	Carbon steel	ERAA44190A1
12	Barrel	
	316 Stainless steel	ERAA44186A0
	Carbon steel	ERAA44186A1
14	Guide	ERAA44189A0
15	Bonnet	ERAA34010A1

Key	Description	Part Number
16*	O-ring	
	Nitrile (NBR)	ERAA34044A0
	Fluorocarbon (FKM)	ERAA34044A1
17	Key	ERAA34052A0
18	Bolt, 12 required	JI1AF100030
19	Spring washer, 18 required	ERAA34047A0
21*	O-ring	
	Nitrile (NBR)	ERAA44420A0
	Fluorocarbon (FKM)	ERAA44420A1
22	End cap	ERAA44187A0
23	Reducer	ERAA32834A0
24	Shaft	ERAA34018A0
25	Holder	
	316 Stainless steel	ERAA44185A0
	Carbon steel	ERAA44185A1
26	Spindle	ERAA44184A0
27	Cap fixation	ERAA32838A0
28	Screw, 4 required	ERAA34048A0
29	Washer, 8 required	ERAA34049A0
30	Stem	ERAA44183A0
31	Screw	ERAA32840A0
32	Retainer ring	ERAA44220A0
33	Nut	ERAA35895A0
37*	O-ring	
	Nitrile (NBR)	M6010140X12
	Fluorocarbon (FKM)	M6020117X12
38*	Seat ring	ERAA44178A0
41	Nut, 8 required	JI1E2000M16
42	Bearing, 2 required	ERAA32948A0
43*	O-ring	
	Nitrile (NBR)	ERAA34045A0
	Fluorocarbon (FKM)	ERAA34045A1
44	Stud bolt, 8 required	JI1BJ160065
45	Washer, 8 required	ERAA34532A0
46*	Seal	ERAA34053A0
47	Gasket	ERAA32844A0
48	Shaft	ERAA44191A0
49	Drive shaft	ERAA44188A0
50*	O-ring	
	Nitrile (NBR)	ERAA34046A0
	Fluorocarbon (FKM)	ERAA34046A1
51	Bolt, 6 required	M5011046X12
55	Actuator	
	Rotork, IQM12F10A	ERAA32846A0
	Biffi, ICON-010R/30-48	ERAA42805A0
	Biffi, ICON-010R/30-24	ERAA42805A1

*Recommended Spare Part

DN 250 / NPS 10 Body Size (continued)

Key	Description	Part Number
56	Gasket	
	0.05 mm thickness, 2 required	ERAA34054A0
	0.1 mm thickness, 4 required	ERAA34055A0
	0.5 mm thickness, 1 required	ERAA34056A0
57	Eyebolt, 2 required	M5040007X12
58	Eyebolt	JG11000BM12
59*	Guide	ERAA34022A0
60*	Stem guide	ERAA34021A0
61	Screw, 4 required	ERAA34060A0
62	Screw, 2 required	ERAA34061A0
63	Vent	ERAA43548A0
64	Plug	1A369224492
65*	Washer	ERAA35898A0
66*	Seal retainer	ERAA44241A0
67*	Seal assembly	
	Nitrile (NBR)	ERAA35896A0
	Fluorocarbon (FKM)	ERAA35896A1
68*	Guide	ERAA35899A0
69*	O-ring	
	Nitrile (NBR)	ERAA35894A0
	Fluorocarbon (FKM)	ERAA35894A1
70*	Ring	ERAA44270A0
71	Adaptor	ERAA44044A0
72*	Seal retainer	ERAA44240A0
73	Screw	JI1AF100025
75	Nameplate support	----------
76	Screw, 2 required	ERAA01884A0
77	Flow Arrow	----------
78	Nameplate	----------
84*	O-ring	
	Nitrile (NBR)	ERAA44416A0
	Fluorocarbon (FKM)	ERAA44416A1
85*	Seal retainer	ERAA44239A0
87*	Seal retainer	ERAA44238A0
92	Key	ERAA46805A0
93	Label	----------

DN 300 / NPS 12 Body Size

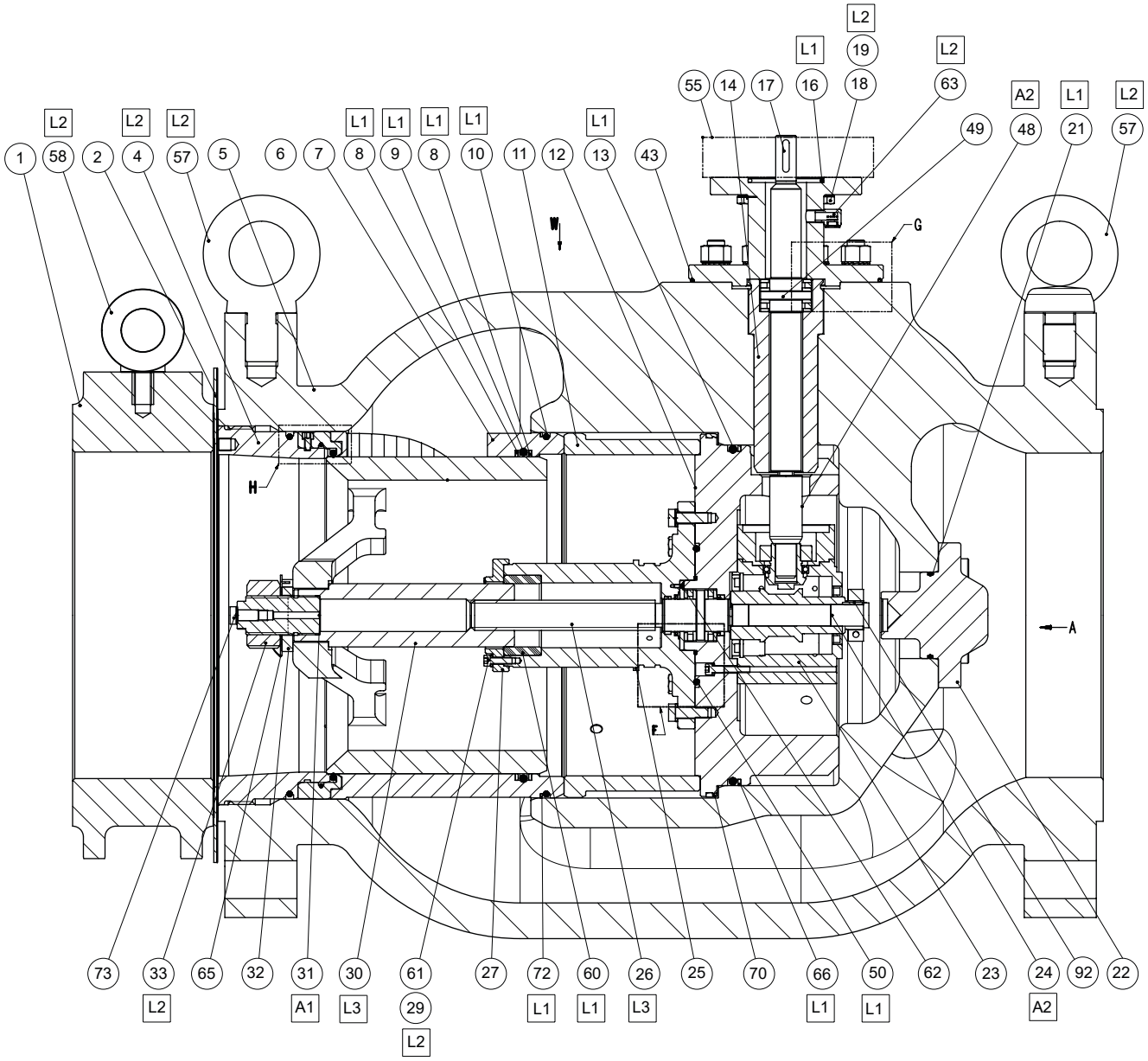
Key	Description	Part Number
	Parts Kit	
	Static and Dynamic (included are keys 8, 9, 10, 13, 16, 21, 36, 37, 38, 43, 46, 50, 59, 60, 65, 66, 67, 68, 69, 70 and 72)	
	Nitrile (NBR)	ERAA36421A0
	Fluorocarbon (FKM)	ERAA42094A0
	Dynamic (included are keys 8, 9, 37, 38, 46, 59, 60, 65, 67 and 68)	
	Nitrile (NBR)	ERAA42059A0
	Fluorocarbon (FKM)	ERAA42060A0
1	Spacer	
	CL300 RF	ERAA33152A1
	CL600 RF	ERAA22310A1
2	Gasket	
	CL300 RF	JI2B9650300
	CL600 RF	JI2B9611300
4	Disk holder	
	CL300 RF	
	Stainless steel	ERAA32121A1
	LCC Steel	ERAA32121A0
	CL600 RF	
	Stainless steel	ERAA22303A1
	LCC Steel	ERAA22303A0
5	Body	
	CL300 RF	
	With Drainage Hole	ERAA34240A1
	Without Drainage Hole	ERAA47146A1
	CL600 RF	
	With Drainage Hole	ERAA32821A1
	Without Drainage Hole	ERAA47147A1
6	Sleeve	ERAA32822A0
7	Cage	
	Linear window	ERAA32823A0
	Linear multi-path	ERAA32824A0
	Equal percentage window	ERAA32825A0
	Equal percentage multi-path	ERAA32826A0
8*	Sliding ring, 2 required	ERAA32827A0
9*	O-ring	
	Nitrile (NBR)	ERAA27823A0
	Fluorocarbon (FKM)	ERAA27823A1
10*	O-ring, 2 required	
	Nitrile (NBR)	ERAA27821A0
	Fluorocarbon (FKM)	ERAA27821A1
11	Spacer	
	316 Stainless steel	ERAA32828A0
	Carbon steel	ERAA32828A1
12	Barrel	
	316 Stainless steel	ERAA32829A0
	Carbon steel	ERAA32829A1
13*	O-ring	
	Nitrile (NBR)	ERAA27826A0
	Fluorocarbon (FKM)	ERAA27826A1
14	Guide	ERAA32830A0
15	Bonnet	ERAA34010A0

*Recommended Spare Part

DN 300 / NPS 12 Body Size (continued)

Key	Description	Part Number
16*	O-ring	
	Nitrile (NBR)	ERAA34044A0
	Fluorocarbon (FKM)	ERAA34044A1
17	Key	ERAA34052A0
18	Bolt, 12 required	JI1AF100030
19	Spring washer, 12 required	ERAA34047A0
21*	O-ring	
	Nitrile (NBR)	ERAA27827A0
	Fluorocarbon (FKM)	ERAA27827A1
22	End cap	ERAA42996A0
23	Reducer	ERAA32834A0
24	Shaft	ERAA34018A0
25	Holder	
	316 Stainless steel	ERAA32836A0
	Carbon steel	ERAA32836A1
26	Spindle	ERAA32837A0
27	Cap fixation	ERAA32838A0
28	Screw, 4 required	ERAA34048A0
29	Washer, 8 required	ERAA34049A0
30	Stem	ERAA32839A0
31	Screw	ERAA32840A0
32	Retainer ring	ERAA32841A0
33	Nut	ERAA35895A0
34	Screw, 6 required	ERAA35520A1
35	Seal Ring Retainer	
	Stainless steel	ERAA23318A1
	Carbon steel	ERAA23318A0
36*	O-ring	
	Nitrile (NBR)	ERAA31727A0
	Fluorocarbon (FKM)	ERAA31727A1
37*	O-ring	
	Nitrile (NBR)	ERAA27837A0
	Fluorocarbon (FKM)	ERAA27837A1
38*	Disk	ERAA22312A0
41	Nut, 8 required	JI1E2000M16
42	Bearing, 2 required	ERAA32948A0
43*	O-ring	
	Nitrile (NBR)	ERAA34045A0
	Fluorocarbon (FKM)	ERAA34045A1
44	Stud bolt, 8 required	JI1BJ160065
45	Washer, 8 required	ERAA34532A0
46*	Seal	ERAA34053A0
47	Gasket	ERAA32844A0
48	Shaft	ERAA34020A0
49	Drive shaft	ERAA34019A0
50*	O-ring	
	Nitrile (NBR)	ERAA34046A0
	Fluorocarbon (FKM)	ERAA34046A1
51	Bolt, 6 required	M5011062X12
52	Washer, 6 required	ERAA34062A0
55	Actuator	
	Rotork, IQM12F10A	ERAA32846A0
	Biffi, ICON-010R/30-48	ERAA42805A0
	Biffi, ICON-010R/30-24	ERAA42805A1
56	Gasket	
	0.05 mm thickness, 1 required	ERAA34054A0
	0.1 mm thickness, 4 required	ERAA34055A0
	0.5 mm thickness, 1 required	ERAA34056A0
57	Eyebolt, 2 required	
	CL300	M5040007X12
	CL600	ERCA00481A0
58	Eyebolt	M5040004X12
59*	Guide	ERAA34022A0
60*	Stem guide	ERAA34021A0
61	Screw, 4 required	ERAA34060A0
62	Screw, 2 required	ERAA34061A0
63	Vent	ERAA43548A0
64	Plug	1A369224492
65*	Washer	ERAA35898A0
66*	Seal retainer	ERAA35897A0
67*	Seal assembly	
	Nitrile (NBR)	ERAA35896A0
	Fluorocarbon (FKM)	ERAA35896A1
68*	Guide	ERAA35899A0
69*	O-ring	
	Nitrile (NBR)	ERAA35894A0
	Fluorocarbon (FKM)	ERAA35894A1
70*	Ring	ERAA35440A0
71	Adaptor	ERAA44044A0
72*	Seal retainer	ERAA36015A0
73	Hex bolt	JI1AF100025
75	Nameplate support	----------
76	Screw, 2 required	ERAA01884A0
77	Flow Arrow	----------
78	Nameplate	----------
92	Key	ERAA46805A0
93	Label	----------

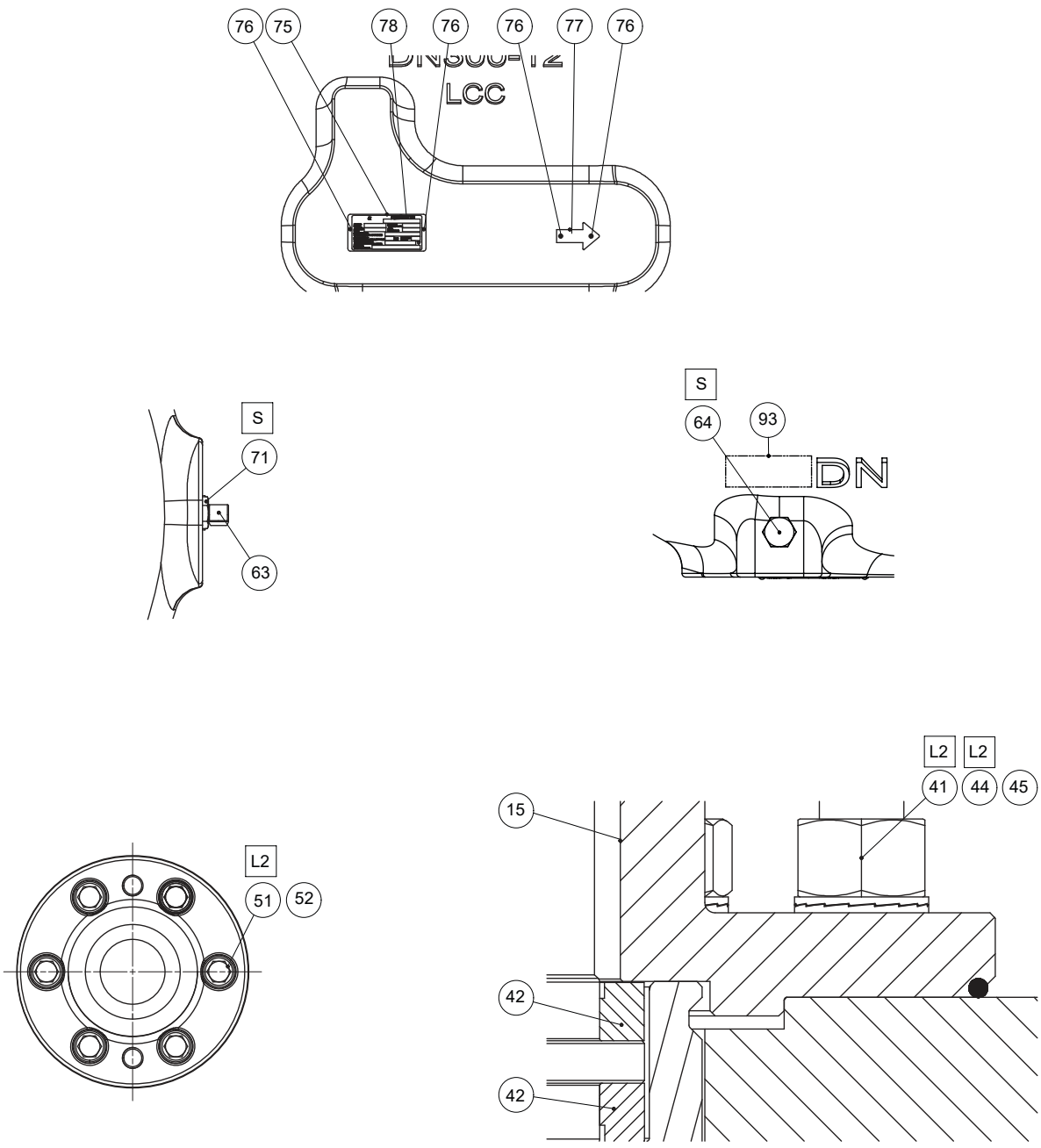
*Recommended Spare Part



NOTE: BE CAREFUL WITH THE DIRECTION OF THE SEAL RETAINER (KEYS 66, 72, 85 AND 87). KEEP THE DIRECTION OF VENT (KEY 63) EXHAUST HOLE PERPENDICULAR AND FACING THE GROUND.

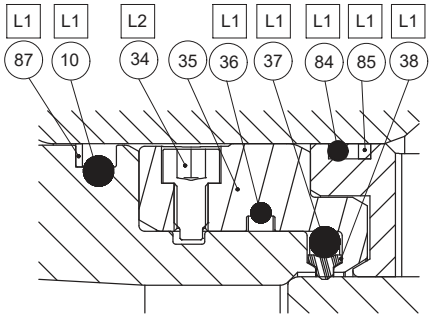
☐ **APPLY LUBRICANT OR ADHESIVE**
L1 = SILICONE-BASED GREASE
L2 = ANTI-SEIZE LUBRICANT
L3 = GENERAL PURPOSE GREASE
A1 = CYLINDRICAL RETAINING ADHESIVE
A2 = THREADLOCKING ADHESIVE

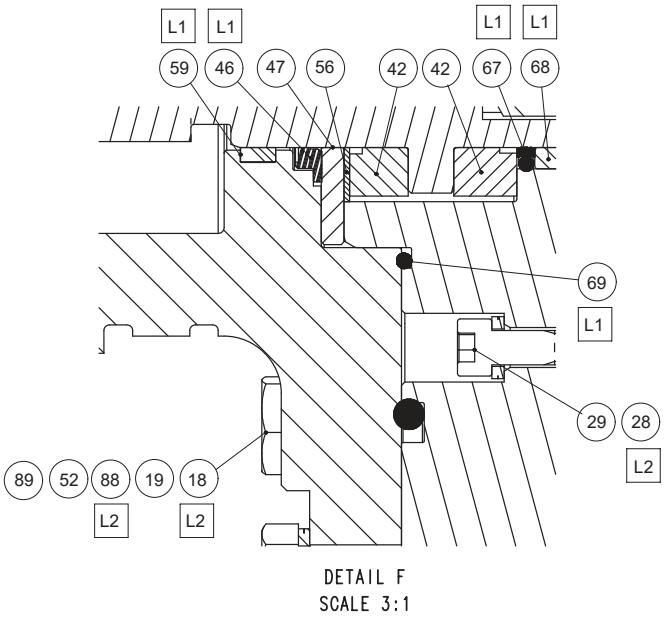
Figure 8. *Type FLV Axial Control Valve*



☐ APPLY LUBRICANT OR SEALANT
L2 = ANTI-SEIZE LUBRICANT
S = THIXOTROPIC METHACRYLATE THREAD SEALANT

Figure 8. *Type FLV Axial Control Valve (continued)*





☐ **APPLY LUBRICANT**
L1 = SILICONE-BASED GREASE
L2 = ANTI-SEIZE LUBRICANT

Figure 8. *Type FLV Axial Control Valve (continued)*

Type FLV

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