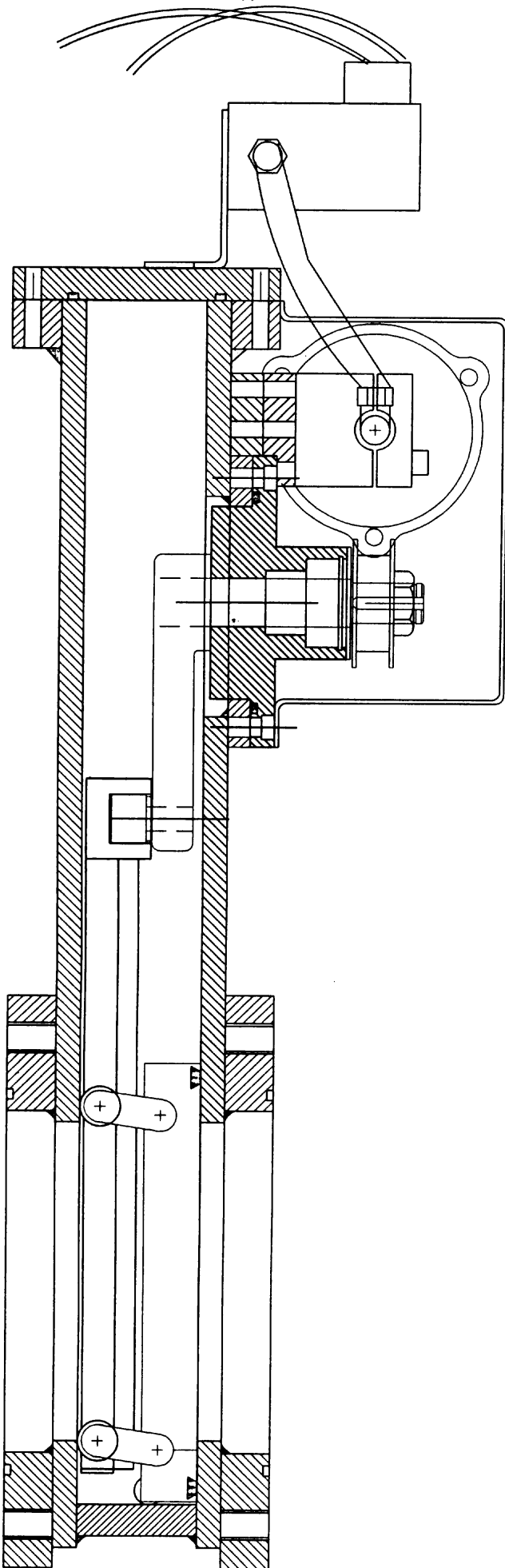




OP SERIES VACUUM GATE VALVES INSTRUCTION MANUAL



INTRODUCTION

The uncomplicated design of the OP series high vacuum valve makes servicing easier than on any other gate valve. Dismantling requires no training or practice, and reassembly errors are almost impossible. There is only one way to put any part or assembly in place and there are no critical adjustments.

The diagram shows the rotary seal principle and the no-gate-contact action, both originally developed by VRL. The gate (disc) O-ring seals in a motion perpendicular to its seat, without O-ring scuffing. The gate carriage assembly stays securely locked in position at the open or closed position because of the dead centers at the extremes of the 180° arc. The half circle swing of the cam is rapid at mid-way point, slowing to stop at top or bottom. This makes very fast action possible without the hammer effect of a plunger type operator. It is built-in cushioning for the stroke which means negligible wear and a long operating life without maintenance.

VRL valves will work equally well in any orientation. It should be determined that the valve and/or adjacent piping of the vacuum system will be adequately supported when assembled. Make certain the mating flanges are in-line, parallel and the correct distance apart to minimize the strain on the valve body. It is important to remember that the sealing gate is on the operator side of the valve on sizes 2" to 8". On sizes 10" and 12" the operator is on the opposite, or open side.

VRL valves will hold vacuum in either direction. However, no gate valve will open easily in a vacuum-to-atmosphere condition with the pressure of atmosphere on the open side, or against the back of the gate. If opening is necessary with a vacuum to atmosphere differential, make sure the gate faces upstream (toward atmosphere or higher pressures) or install a means of equalizing pressure prior to actuation. Gate valves will not close easily against atmosphere if the vacuum side is a very large chamber where the inrush of atmosphere may approach very high velocity.

MAINTENANCE: VRL valves do not require any routine maintenance. However, it is necessary to prevent the accumulation of dirt and debris inside the valve and if your vacuum system is extremely dusty or dirty, cleaning the interior of the valve will be required from time to time. When the valve is disassembled for cleaning, it is recommended that the O-rings be replaced. Note that cleaning O-rings with solvents is never recommended, because the solvent will be absorbed by the O-ring and will produce high outgassing for hours or even weeks after such cleaning. If vacuum grease is used on O-rings, it can also cause outgassing and 'burps' of gas. Only a thin, almost invisible, coating of grease should be used on O-rings in vacuum systems. Flange O-rings shipped with new valves and O-rings shipped as spare or replacement parts have not been greased prior to shipment.

O-Ring Sets for OP Series Gate Valves

Set includes one (1) each Viton Gate Seal, one (1) Bonnet Plate O-Ring, and one (1) Hub O-Ring, plus two (2) Stem and two (2) Flange O-Rings.

Valve Size	Buna-N		Viton	
	P/N	Price	P/N	Price
OP2	X701200BOP	\$13.00	X701200VOP	\$ 47.00
OP3	X701200BOP	\$13.00	X701200VOP	\$ 47.00
OP4	X701400BOP	\$21.00	X701400VOP	\$ 71.00
OP6	X701600BOP	\$37.00	X701600VOP	\$104.00
OP8	X701800BOP	\$37.00	X701800VOP	\$104.00
OP10	X7011000BOP	\$52.00	X7011000VOP	\$124.00
OP12	X7011200BOP	\$55.00	X7011200VOP	\$127.00

Seal Sets for Pneumatic Operators Used on OP Series Vacuum Gate Valves

Set includes two (2) EP Shaft O-Rings and two (2) each Cylinder Cap O-Rings, plus one (1) Rubber T-Seal

Valve Size	P/N	Price
OP2	X701201B	\$13.00
OP3	X701201B	\$13.00
OP4	X701401B	\$13.00
OP6	X701401B	\$13.00
OP8	X701401B	\$13.00
OP10	X7011001B	\$16.00
OP12	X7011001B	\$16.00



WARNING!

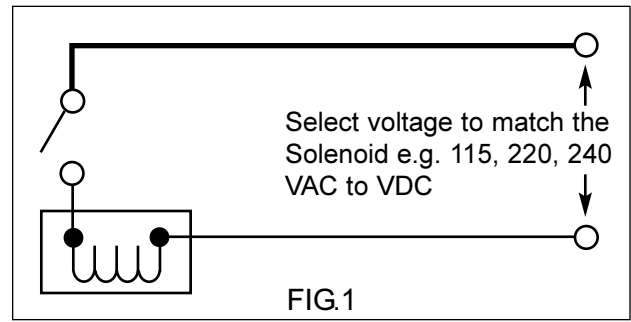
Disconnect electrical and air supply before making any adjustment or repairs.

- Dismantling and Re-assembling:** (1) The first step is to make sure the Gate is completely closed.
 (2) Make sure that the air lines are disconnected. Remove the bolts off the bonnet plate and remove the bonnet.
 (3) Take the (4) bolts (1/4-20) off both EP Brackets and remove the whole EP Assy. along with the brackets. If necessary, take just one of the EP brackets off the EP Shaft by loosening the only bolt. (Caution: make sure that the EP cylinder stays in the same place on the shaft until reassembly of the valve is complete.
 (4) Using the manual lever or a wrench to turn the Hex Nut, move the Gate to approximately halfway open. At this position the internal crankarm will be at the 9 o'clock position.
 (5) Remove the bolts from Hub flange and pull the whole Hub with Stem Crank Assy. intact off the carriage.
 (6) Slide the Gate/Carriage Assy. out of the valve body.
 (7) To re-assemble the valve, slide the gate/carriage assy. back, so that it is in halfway open position. Insert the Hub along with the Stem-crank Assy., so that the cam-follower is placed in the groove of the carriage. Be sure to orient the hub with 10-32 tapped hole for the E.P. cover in the proper position. Replace the Hub flange bolts.
 (8) Using a wrench, turn the Hex Nut and move the gate back to completely closed position.
 (9) The EP Assy. can now be bolted back. Connect the air lines to the solenoid. Try to open and close the gate again electro-pneumatically. See if it closes and stays locked even if the air supply is cut-off to the EP cylinder. If so, you are back in business. If not, the position of the EP cylinder and the pinion needs to be re-aligned.

- Hub and Stem Crank Assy. Installation:** (1) Slide the gate carriage assembly into the valve body until the cam follower slot is visible through the hub hole.
 (2) Apply a very thin coating of vacuum grease to the shaft on the stem-crank assembly and engage its cam follower in the groove on the carriage.
 (3) Install the hub o-ring and slide the hub over the shaft and then carefully slide the stem seal kit on to the shaft. (O-ring, washer, spring, washer, o-ring). Do not try to slide the shaft through an assembled shaft seal kit. Doing so will damage the O-rings and cause a leak.
 (4) Then install the gland spacer with bearing and secure the retaining ring in the groove in the hub.
 (5) Tighten the bolts on the hub flange.
 (6) Attach the pinion gear and guide washers.
 (7) Replace the bonnet plate and o-ring.
 (8) Refer to the pneumatic operator adjustment paragraph and reinstall the EP actuator.

ELECTRO PNEUMATIC (EP) ACTUATORS:

The VRL 'EP' actuators include a 4-way solenoid valve actuator with 24" leads and are mounted, ready for wiring when valves are ordered for pneumatic operation. Recommended air pressure is 65 psi (4.6 kg/cm²). Minimum air pressure 50 psi (3.5 kg/psi cm²). Maximum air pressure 70 psi (4.9 kg/psi cm²).



WIRING: The preferred method, to preclude human error, employs SPST switches as in Fig. 1. Connect two wire leads to power source with a SPST toggle switch in either line. When solenoid is energized, valve opens; when solenoid is de-energized, valve closes. Pressure remains in cylinder.

FAIL-SAFE: When connected this way, the valve will automatically close if power fails. To provide for manual operation during failure, a shut-off and a vent valve must be put in the air line to bleed off high pressure air in the cylinder. You can then operate the valve manually by turning the hex nut on stem with a wrench. With on/off switches, valves will open when power returns unless switched to "off" before power comes on.

WARNING

A valve wired to automatically close on power failure will also automatically open when power is restored. This reopening may be unsafe, and it is recommended that a latching relay be installed so that the valve will not just automatically reopen when power is restored, but will remain closed until an operator decides it is safe to reopen.

CONVERTING FROM MANUAL TO ELECTROPNEUMATIC (EP) OPERATOR: Operators for conversion of manual valves are factory assembled, aligned and tested before shipment, with piston shafts tight to brackets. For installation you must remove the brackets from the shaft and install the brackets on the valve. Then mount the shaft back on to the brackets. If operators are removed from pneumatic valves, it is generally unnecessary to disassemble them. Leave the shaft tightened to brackets for easiest reassembly. With cylinder in place, brackets tightened, replace pinion gear parts on the stem in this order: (1) bronze thrust washer, (2) gear washer without key slot, (3) pinion gear, (4) key, (5) gear washer with key slot, (6) hex nut, (7) retaining ring. When placing pinion gear, engage the nearest rack tooth with it, with cylinder at farthest right, toward the "closed" side, and stem and gear key slots aligned. Slight movement of the cylinder may help to align key slots when inserting key (as in 4). Then proceed with (4) through (8). Secure solenoid valve to its bracket. Install air lines and tighten fittings. Recommended air pressure is 65 psi (4.6 kg/cm²) Minimum air pressure 50 PSI (3.5 kg/psi cm²). Maximum air pressure 70 PSI (4.9 kg/PSI cm²).

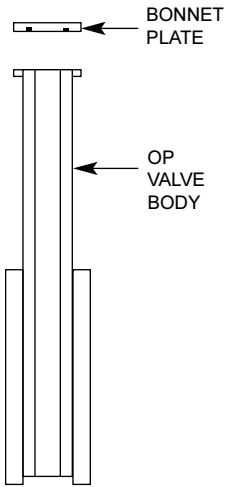
PNEUMATIC OPERATOR ADJUSTMENT

WARNING!

Disconnect electrical and air supply before making any adjustment or repairs.

(1) Disconnect electrical and air supply before making any adjustment or repairs. (2) Refer to the drawing on front page for location of referenced part numbers. (3) Valve gate must be in full closed position. This can be done manually by using a crescent wrench and turning hex nut located in front of pinion gear assembly, Part No. 9C. Remove hex nut and spacer washers from stem-crank assembly, Part No. 4. (4) Rotate air cylinder, Part No. 9F, out of pinion gear, Part No. 9C. Manually move air cylinder, Part No. 9F to closed position. (See the arrow label on the air cylinder.) (5) After reaching fully closed position, back off into open position by the space of one (1) full gear tooth. (6) Rotate the air cylinder, Part No. 9F, to mesh with pinion gear, Part No. 9C. Using rubber mallet, hit mounting bracket, Part No. 9D. (This will mesh rack and gear teeth for proper alignment.) Re-install spacers and hex nut on stem-crank assembly, Part No. 4. (7) Recheck that all bolts on EP bracket are tight (Part No. 9D). (8) Reconnect electrical and air supply. (9) Operate valve and listen for gate locking in closed position.

FOR VRL 'OP' SERIES GATE VALVES



Part Name	OP-2 Price	OP-3 Price	OP-4 Price	OP-6 Price	OP-8 Price	OP-10 Price	OP-12 Price	
Prices subject to change without notice.								
Clean & Test.....	\$ 81.00	\$ 81.00	\$ 81.00	\$136.00	\$136.00	\$136.00	\$136.00	
1. Bonnet Plate.....	114.00	136.00	163.00	179.00	179.00	305.00	305.00	
2.OP Valve Body								
N1 Style, no neck.....	468.00	479.00	664.00	899.00	899.00	1515.00	1667.00	
N6 Style, on seal side.....	534.00	555.00	741.00	991.00	991.00	1787.00	1940.00	
N8 Style, neck on open side.....	534.00	555.00	741.00	991.00	991.00	1787.00	1940.00	
N5 Style, neck both sides.....	621.00	643.00	861.00	948.00	948.00	1656.00	1656.00	
If roughing ports are required specify as RI-KF-16 etc. as described in the Valve Catalog and add the cost to the port section prices shown above.								
	OP-2 & OP-3		OP-4		OP-6 & OP-8		OP-10 & OP-12	
3. Gate-Carriage Assembly with O-ring.....	300.00	X706103rev1	342.00	X706203rev2	454.00	X706303rev2	790.00	X706403rev2
3a,b,g. Carriage Shaft, Roller and Link Assembly with Bushings and Retaining Ring. Set of 4	82.00	X806500	82.00	X806500	82.00	X806500	381.00	X806501
3c. Gate Rollers - Set of 2.....	14.00	X706102	14.00	X706202	21.00	X706302	43.00	X706402
3d. Carriage Side Rollers - Set of 4.....	21.00	X706108	21.00	X706108	21.00	X706108	65.00	X706408
3e. Spring (set).....	7.00	X706106	7.00	X706206	15.00	X706306	38.00	X706406
3f. Gate Link Shafts - Set of 4.....	42.00	X706110	42.00	X706110rev1	42.00	X706110rev1	130.00	X706410rev1
3h. Roll Pin-Set of 6 (2 Gate, 4 Carriage)	2.00	X706105	2.00	X706205	2.00	X706205	3.00	X706205
3j. Retaining Ring (gate shafts) - Set/4	Not Used		1.00	X706119	1.00	X706119	1.00	X706419
3r. Retain. Ring (carriage shafts) - Set/4	1.00	X706119	1.00	X706119	1.00	X706119	1.00	X706419
3y. Gate w/o Shafts, Links, Rollers.....	93.00	X02LP116M	122.00	X04LP116rev1	152.00	X06LP116rev1	643.00	X10LP116rev1
3z. Carriage w/o Shafts, Links, Rollers..	93.00	X02LP117rev1	98.00	X04LP117rev1	104.00	X06LP117rev1	414.00	X10LP117rev1
4. Stem-Crank Assy, with key, Retaining ring & nut	61.00	X706116rev2	105.00	X706216rev2	122.00	X706316rev2	244.00	X706416rev2
5. Hub Assy (spacer design) w/o seal kit	91.00	X706117rev1	114.00	X706WA210	141.00	X706WA317	166.00	X706WA417
5-a1. Gland spacerwith bearing.....	13.00	X02LP108	20.00	X04LP108	20.00	X04LP108	25.00	X10LP108
5-b1. Modified hub with bearing.....	76.00	X106118	87.00	X206118	105.00	X406118	132.00	X506118
5c. Retaining Ring (internal type).....	1.00	X702176	1.00	X702177	1.00	X702177	1.00	X702177
6. Stem Seal Kit: 2 O-rings, (BUNA-N)..... 2 washers, 1 spring (VITON).....	10.00	X706118	10.00	X706318	10.00	X706318	16.00	X706418
	16.00	X706118V	19.00	X706318V	19.00	X706318V	27.00	X706418V
7. Manual Lever Kit Includes Handle, Washer, Key, Retaining Ring	66.00	X706112rev1	66.00	X706312rev2	66.00	X706312rev1	66.00	X706412rev1
8. Body Bolts, S.S.Complete set with nuts...	10.00	1/4-20X1(6)	10.00	1/4-20X1 1/4(6)	15.00	1/4-20X1 1/4(14)	18.00	1/4-20X1 3/4(16)
9. Pneumatic Operator (without solenoid)	299.00	X806104rev1	343.00	X806204rev1	343.00	X806304rev1	626.00	X806404rev1
9a. Piston Assy (w/o O-Rings & TSeal)	130.00	X02LP200	130.00	X04LP200	130.00	X06LP200	228.00	X10LP200
9b. Rack Assembly.....	40.00	X706114	40.00	X706214	40.00	X706314	56.00	X706414
9c. Pinion Gear Assembly.....	40.00	X706126	45.00	X706226	51.00	X706326	86.00	X706426
9d. Mounting Brackets (2).....	91.00	X706131	106.00	X706231	106.00	X706231	106.00	X706431
9e. Cylinder Air Lines (2).....	14.00	X701101	14.00	X701101	14.00	X701101	28.00	X701101
9f. Cylinder.....	19.00	X02LP150	19.00	X04LP150	19.00	X06LP150	28.00	X10LP150
9g. Cylinder End Caps (2).....	44.00	X706132	50.00	X706232	50.00	X706232	78.00	X706432
9h. Cylinder Studs & Nuts.....	20.00	X706130	25.00	X706230	25.00	X706330	35.00	X706430
9i. Guard OSHA Style.....	76.00	X02LP152Z	98.00	X04LP152Z	114.00	X06LP152Z	136.00	X10LP152Z
9j. Hex Nut.....	18.00	X02LP202	18.00	X04LP202	18.00	X04LP202	23.00	X10LP202
9k. Key	3.00	X02LP203	3.00	X04LP203	3.00	X04LP203	3.00	X04LP203
9r. Retaining ring (ext. fits stem crank)	1.00	X702170	1.00	X702171	1.00	X702171	1.00	X702172
10. Solenoid Valve only (specify voltage)....	87.00	X706100	87.00	X706100	87.00	X706100	87.00	X706100
11. Solenoid (with bracket & fittings).....	132.00	X806100	132.00	X806100	132.00	X806100	132.00	X806100

