Honeywell

Comfort Control Systems

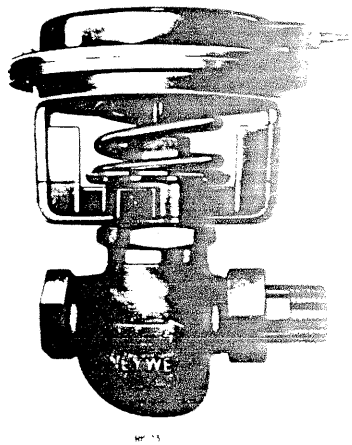
VP512A UNIT VENTILATOR VALVE

Service Data

GENERAL

DESCRIPTION

The VP512A Unit Ventilator Valve is a normally open, single-seated, straight-through or angle globe valve. Modifications in 1959 make old and new operator tops and diaphragms noninterchangeable.



APPLICATION

The VP512A is designed for proportional control of either steam or hot water coils in sequence with outside/return air dampers.

SPECIFICATIONS

BODY

NOMINAL BODY RATING: 150 lb/in^2 (1034 kPa).

VALVE RATINGS: See table I.

CLOSE-OFF RATINGS: See Fig. 1.

OPERATOR

DIAPHRAGM:
1. Molded neoprene (standard)
2. Molded silicone (high temperature)

CONTROL AIR PRESSURE: 25 lb/in^2 (172 kPa) maximum.

OPERATING RANGES:
1. 3 to 8 lb/in^2 (21 to 55 kPa).
2. 6 to 11 lb/in^2 (41 to 76 kPa).

AMBIENT TEMPERATURE: 160 F (71 C) maximum.

OPERATION

An increase in control air pressure moves the valve stem toward the closed position, reducing flow through the valve (Fig. 2.)

Form No 75-1785
Commercial Bldg Group
MLF TAB: II. D. 4.

Rev. 10-80

Table I. Valve Ratings.

Pipe Size in Inches	C_v	Recommended Max. Pressure, lb/in^2 (kPa), Differental for Normal Life of Disc and Seat				Packing or Body Limitation				Normal Limiting Factor
		Two-Position		Proportional		Max. Temperature of Agent, F (C)		Max. Pressure of Agent, lb/in^2 (kPa)		
		Steam	Water	Steam	Water	Steam	Water**	Steam	Water	
1/2	0.63	50 (345)	75 (515)	25 (175)	35 (240)	337 (169)	240 (115)	100 (689)	100 (689)	Disc or close-off
	1.0									
	1.6									
	2.5									
3/4	4.0									
	6.3									
1	10.0									
1-1/4	16.0									
1-1/2	25.0									

**Minimum water temperature, 40 F (4 C). Maximum temperature differential when used with alternating hot and cold water, 140 F (60 C).

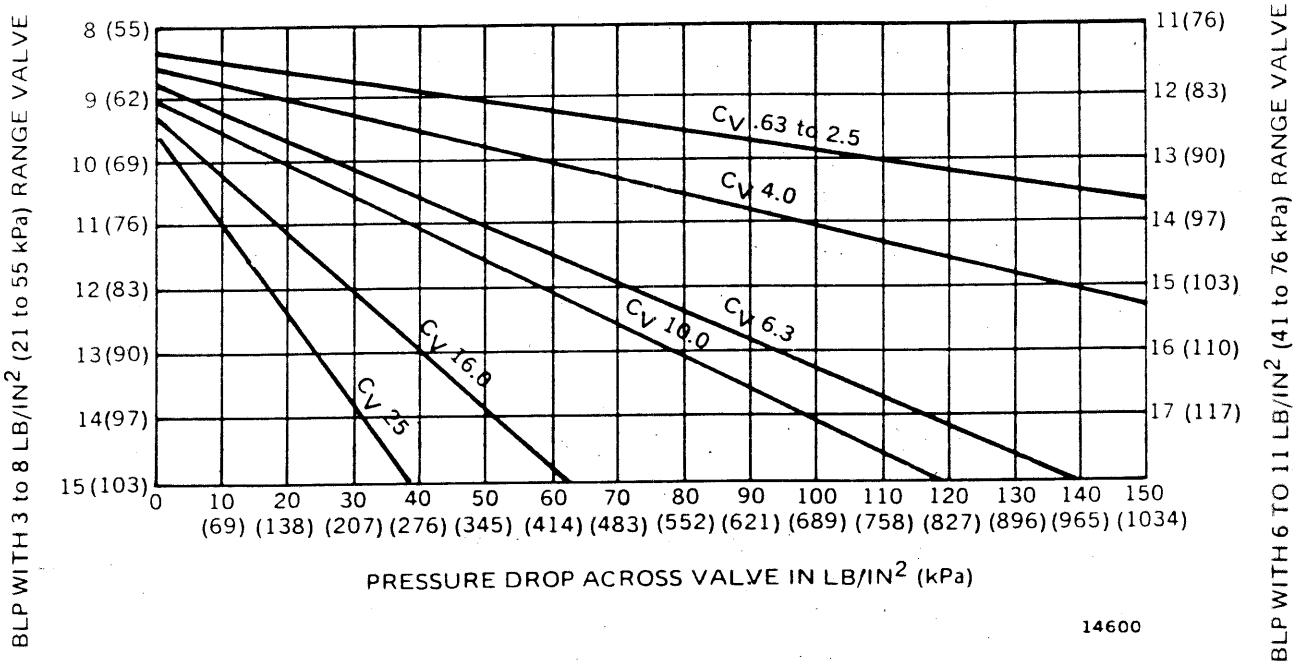


Fig. 1. Close-off Ratings at Various Branch Line Pressures.

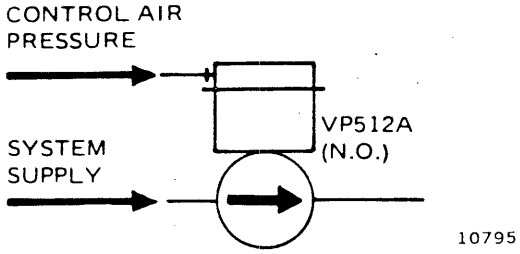


Fig. 2. VP512A Typical Operation.

MAINTENANCE

TOOLS AND MATERIALS

The tools and materials required for maintenance tasks are:

1. Test Gage Kit 0-30 lb/in^2 (0-207 kPa), Honeywell No. 811 or equivalent.

2. Serviceline Tool Kit, Honeywell No. AK 3863 or equivalent.

3. Solvent, Dirt and Grease—Chlorothene or Vythene typewriter cleaners (inhibited 1, 1, 1-trichloroethane).

VISUAL INSPECTION

1. Inspect valve for signs of leakage.
2. During heating season, check room for overheating or underheating before changing thermostat setting.

CLEANING

Vacuum any dust from valve when unit ventilator is cleaned. Use solvent to remove any grease.

LUBRICATION

The valve stem requires lubrication only when repacking the valve.

OPERATIONAL CHECKS (IN HEATING MODE)

The following steps are designed to test the operation of a unit ventilator in addition to the unit ventilator valve. Following each action (step) is the correct response, R.

1. Measure main air pressure.
   1R. Day-Night systems 13 lb/in^2 (90 kPa) (day pressure). Single temperature systems 15 lb/in^2 (103 kPa) (minimum).

2. Remove unit ventilator cover.

> CAUTION
>
> Operating the unit ventilator with the cover off for prolonged periods may overload the fan motor.

3. Install test gage in branch line near valve operator.

4. Turn on unit fan.

5. Set thermostat below room temperature. Then, slowly raise the setting above room temperature.
   5R. Air bleeding should be heard within ±1 F (1/2 C) of room temperature. If not, recalibrate thermostat before proceeding.

6. Set thermostat several degrees above room temperature.
   6R. Test gage reads 0 lb/in^2, valve full open, damper closed to outdoor air, and coil is hot (Fig. 3).

7. Set thermostat 1 F (1/2 C) above room temperature.
   7R. Test gage between 3 and 8 lb/in^2 (21 to 55 kPa), valve partly closed, damper at minimum outdoor air position, and coil remains hot.

   NOTE: The sequence described is ASHRAE unit ventilator cycle II, in cycle I damper full open, and in cycle III damper closed. For full description of all cycles, see Honeywell Form No. 77-2301, Engineering Information for Control of Unit Ventilators.

8. Set thermostat several degrees below room temperature.
   8R. Test gage reads 13 to 15 lb/in^2 (90 to 103 kPa), valve closed, damper fully open, coil cools to mixed air temperature (valve does not leak through).

9. If the outdoor air temperature is above 60 F (16 C).
   9R. The low limit controller cannot be tested operationally—go to step 11.

10. With outdoor temperature below 60 F and thermostat set below room temperature, temporarily replace unit ventilator cover and measure discharge air temperature.
    10R. Discharge air temperature is maintained at low limit control setting of 60 to 70 F (16 to 21 C).

11. Remove test gage, reinstall unit ventilator cover, set thermostat to original setting and fan switch to its original position.

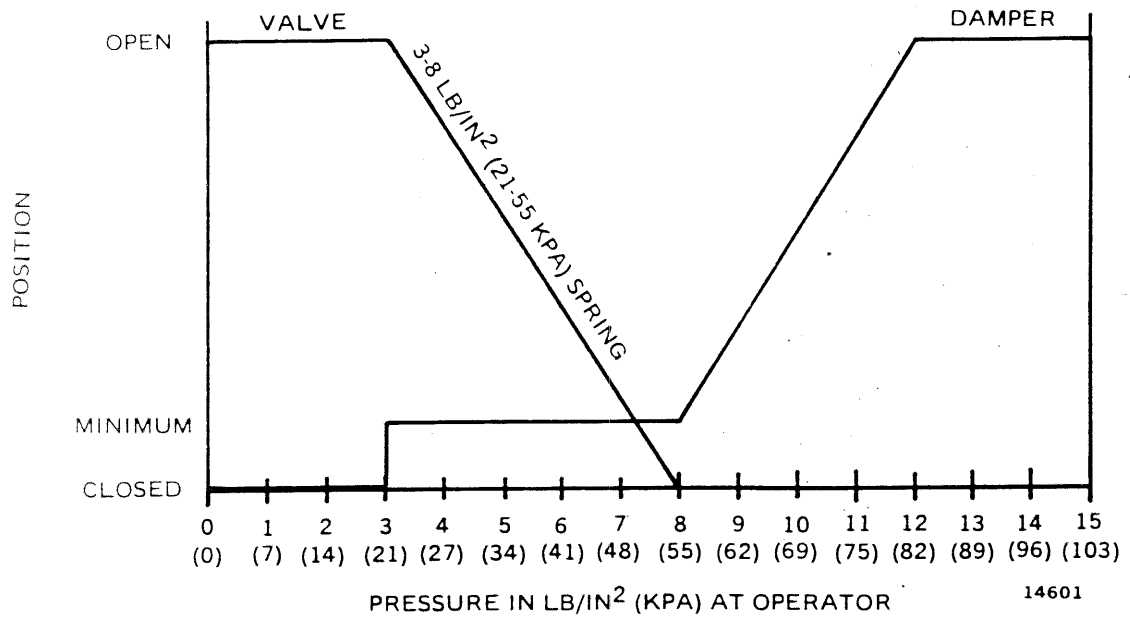


Fig. 3. ASHRAE Unit Ventilator Control–Cycle II.

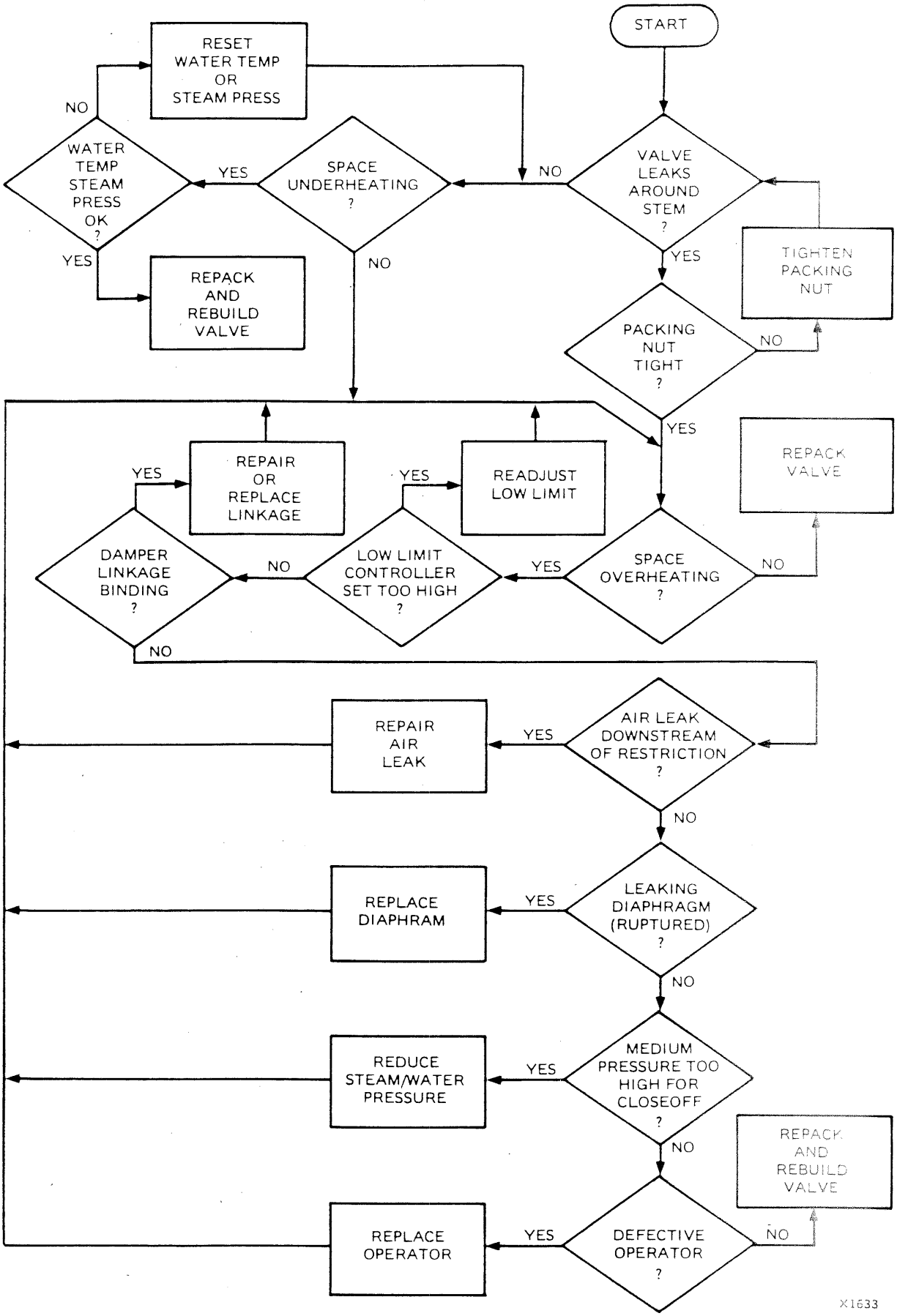
TROUBLESHOOTING

GENERAL

The troubleshooting flow chart also covers unit ventilators, since unit ventilators and their valves are interdependent.

NOTE: The chart assumes that both Visual Inspection and Operational Checks have been completed.

TROUBLESHOOTING FLOW CHART



REPAIR

GENERAL

A disc removal tool is easily made, if needed, by cutting off the head of a No. 8 woodscrew and fitting the screw to a T-handle tap wrench (Fig. 4).

Packing nuts and bonnets require open-end or adjustable wrenches to fit the sizes shown in Table II. Valve seat removal requires deep well sockets for the sizes shown in Table II.

Table II. Packing Nut, Bonnet and Valve Seat Sizes in inches.

Valve Body	Packing Nut	Bonnet	Valve Seat
1/2	1	1-7/8 ⚠1	7/8
3/4	1	1-7/8 ⚠1	1
1	1	2-1/32	1-1/8
1-1/4	1	2-5/8	1-3/8
1-1/2	1	3-3/8	1-5/8

⚠1 Bonnet wrench Memphis Service Center (MSC) number 644 fits these bonnets.

Obtain these recommended materials locally when possible.

Lubricant, Stem and Packing:
Plasti-Lube No. 2 grease (Honeywell No. 311057, 2-oz. tube)
Solvent, Dirt and Grease:
Chlorothene or Vythene Typewriter cleaners (inhibited 1, 1, 1-trichloroethane)

The numbers in parentheses in these procedures are the key numbers in Figure 5.

DIAPHRAGM REPLACEMENT

Be sure stem retainer clip (17) is connected to stem button (2), then:

1. Raise thermostat setpoint to shut off control air to valve operator, disconnect air tubing from operator.
2. Slowly loosen all the screws (28) to release the tension. If this does not allow easy removal of the top, loosen screws (23) to release more tension.
3. Remove diaphragm (26) and cup (27). Save cup and discard diaphragm.
4. Check valve stem for corrosion, rebuild valve after Step 8, if corroded.
5. Position diaphragm in top so that:
   a. old style—screw holes are aligned.
   b. new style—bead is firmly seated.
6. Insert cup into diaphragm.
7. Place assembled top and diaphragm and cup on frame (21). Insert screws (28) and tighten.
8. Tighten screws (23) if loosened.
9. Reconnect tubing, restore branch line air from thermostat and go through operational check also checking for air leaks around diaphragm.

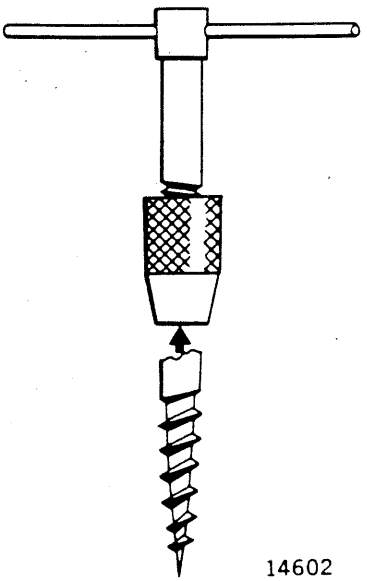


Fig. 4. Disc Removal Tool.

OPERATOR REPLACEMENT

1. Replace stem button (2) from stem retainer slide (17) (may need to pry slide).
2. Shut off air to valve operator and disconnect tubing.
3. Loosen the two setscrews (24) and remove operator.
4. Set new operator on valve bonnet (7).
5. Tighten set screws.
6. Reconnect tubing.
7. Align stem button and slot in stem retainer slide, apply air pressure to operator. Slide stem retainer into position to hold stem button.

REPACK VALVE

1. Release stem button (2) from stem retainer slide (17) (may need to pry slide).

2. Shut off air to valve operator and disconnect air tubing.

3. Loosen the two set screws (24) and remove operator.

4. Insert a nail or pin in hole in the stem (8A).

5. Backseat valve by engaging threads on disc holder (8C) with threads in bonnet (7). Pull up on nail and rotate stem counterclockwise until tight. This seals the valve for repacking.

> CAUTION
>
> Do not use pliers or similar tool on stem. These will damage the stem and the new packing.

6. Unscrew and remove stem button (2). Do not change position of setscrew (1). Remove nail.

7. Unscrew and remove packing nut (3).

8. Remove spring (6), follower (5) and three Teflon rings (4) from packing nut or bonnet.

9. Clean stem and packing nut with solvent.

10. Examine stem and if it is bent or deeply scored (will damage packing) repack and rebuild valve.

11. Assemble new spring (6) and follower (5). Put a small amount of Plasti-Lube No. 2 lubricant on the new packing rings. Carefully, one at a time, with the small diameter down, screw new rings over the stem threads. Damage by the threads may cause leakage or binding of the stem.

12. Replace packing nut. Packing nut must be seated with rings seated squarely and firmly inside. Do not overtighten.

13. Insert nail in stem and screw on stem button until seated on setscrew.

14. Rotate stem clockwise until stem moves freely up and down. If possible move stem up and down several times to assure free action.

15. Remove nail from hole and replace the operator.

16. Tighten setscrews (24). Reconnect tubing.

17. Align stem button and slot in stem retainer slide (17), apply air pressure to operator and reconnect stem button and slide.

18. Make operational check.

REPACK AND REBUILD VALVE

1. Release stem button (2) from stem retainer slide (17). Slide may need prying.

2. Shut off air to valve operator and disconnect tubing.

3. Loosen the two setscrews (24) and remove operator.

4. Using a nail or pin inserted into the hole in the stem to hold the stem, unscrew and remove the stem button (2). Do not change the position of the setscrew (1).

5. Unscrew and remove packing nut (3).

6. Remove spring (6), follower (5), and three Teflon rings (4) from packing nut or bonnet.

7. Unscrew and remove bonnet (7). The stem, disc and plug assembly will come with the bonnet. Take the bonnet off the stem.

8. Inspect the valve seat (12) in body (13 or 14). If damaged or worn, remove and replace using a deep well socket wrench.

9. Hold disc holder (8C) and unscrew plug (11) with a strap or padded pipe wrench.

10. Remove spring washer (10) (if present) and disc (9). If disc is swollen into disc holder proceed as follows:
    a. Drill two 1/8-inch holes into opposite sides of the disc until the drill bottoms on the disc holder.
    b. Using the disc removal tool previously described, alternately turn screw into one hole and then the other. The disc will lift out of the disc holder.

11. Clean any parts that are going to be reused. Assemble disc, spring washer (see step 12) and plug to stem and disc holder assembly.

12. The spring washer is used when the plug is recessed to accept the washer which acts as a lock washer. If the spring washer is not used, stake the plug threads at the bottom. The alternative to staking is to replace the old style plug with a new style recessed top, plug and spring washer.

13. Insert the stem (8) into the bonnet (7) and screw the bonnet onto the valve body.

14. Place the spring (6) and follower (5) on the stem. Put a small amount of Plasti-Lube No. 2 grease on the new packing rings. Carefully, one at a time, with the small diameter down, screw new rings over the stem threads. Damage by the threads may cause leakage or binding of the stem.

15. Replace packing nut. Packing nut must be seated with the rings seated squarely and firmly inside. Do not overtighten.

16. Screw on stem button until firmly seated on setscrew using a nail inserted into the stem hole to hold the stem. Do not change the position of setscrew. If setscrew position is changed make stem button adjustment at this point. (See Adjustments).

17. Replace operator and tighen setscrews (24). Reconnect tubing.

18. Align stem button and slot in stem retainer slide (17), apply air pressure to operator and reconnect stem button and slide.

19. Rebuild and repack any other valves in the zone where the water has been drained or the steam pressure removed.

20. Refill system or turn on steam pressure and run operational checks on all reworked valves.

ADJUSTMENTS

STEM BUTTON

1. Valve bonnet (7) must be tight.

2. With valve in closed position, adjust the stem button (2) until top of button is 2-25/32 inches (70 mm) above top of bonnet (Fig. 5).

3. Without moving stem button on stem threads—tighten setscrew down.

START POINT (older operator models only)

1. Adjust branch line pressure to desired setting.

2. Turn threaded ring (20) until stem (8B) begins to move downward from the open position.

3. Start point adjustment applies only to valves with threads on items (20) and (22).

PARTS AND ACCESSORIES

PARTS

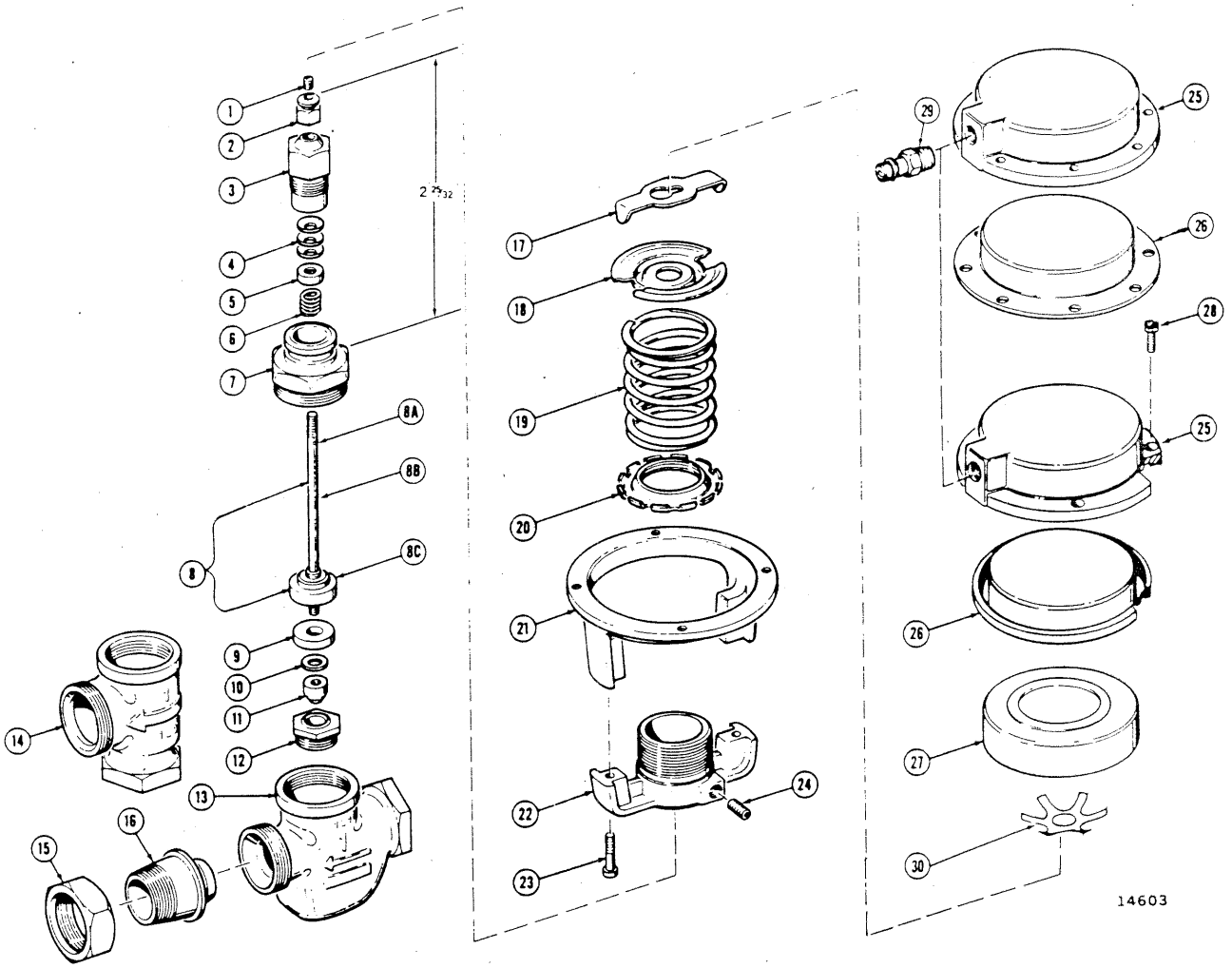


Fig. 5. VP512A Exploded View.

Key	Part No.	Description
1		*SETSCREW–1/4-28 x 1/4"–socket hd–oval pt
2	310503	BUTTON
3	313646	PACKING NUT
4	310623	RING–Teflon–(3)
5	310506	FOLLOWER
6	310498	SPRING
7	310555	BONNET–for 1/2 or 3/4" body
7	310588	BONNET–for 1" body
7	310565	BONNET–for 1-1/4" body
7	310589	BONNET–for 1-1/2" body
8	311093B	STEM AND DISC HOLDER ASSEMBLY–C_V .63, 1.0, 1.6, 2.5 or 4.0†
8	311094B	STEM AND DISC HOLDER ASSEMBLY–C_V 6.3 or 10.†
8	311095B	STEM AND DISC HOLDER ASSEMBLY–C_V 16.†
8	311096B	STEM AND DISC HOLDER ASSEMBLY–C_V 25.†
9	313094	DISC–C_V .63, 1.6, 2.5, or 4.0–35 to 200 F (2 to 93 C) Temp. Range
9	313102	DISC–C_V .63, 1.6, 2.5, or 4.0–115 to 275 F (46 to 135 C) Temp. Range
9	313095	DISC–C_V 6.3 or 10.0–35 to 200 F (2 to 93 C) Temp. Range
9	313103	DISC–C_V 6.3 or 10.0–115 to 275 F (46 to 135 C) Temp. Range
9	313096	DISC–C_V 16.0–35 to 200 F (2 to 93 C) Temp. Range
9	313104	DISC–C_V 16.0–115 to 275 F (46 to 135 C) Temp. Range
9	313097	DISC–C_V 25.0–35 to 200 F (2 to 93 C) Temp. Range
9	313105	DISC–C_V 25.0–115 to 275 F (46 to 135 C) Temp. Range
10	311099	SPRING–C_V .63, 1.0, 1.6, 2.5, or 4.0†
10	310554	SPRING–C_V 6.3 or 10.†
10	311098	SPRING–C_V 16.†
10	311100	SPRING–C_V 25.†
11	313077	PLUG, 1/2" body–C_V .63†
11	311181	PLUG, 1/2" body–C_V 1.0†
11	311182	PLUG, 1/2" body–C_V 1.6†
11	311183	PLUG, 1/2" or 3/4" body–C_V 2.5†
11	311184	PLUG, 3/4 or 1" body–C_V 4.0†
11	311185	PLUG, 3/4 or 1" body–C_V 6.3†
11	311186	PLUG, 1-1/4" body–C_V 10.†
11	311188	PLUG, 1-1/2" body–C_V 16.†
11	311189	PLUG, 1-1/2" body–C_V 25.†
12	310535	SEAT–for 1/2" body–C_V .63, 1.0, 1.6 or 2.5†
12	310536	SEAT–for 3/4" body–C_V 2.5†
12	310543	SEAT–for 3/4" body–C_V 4.0†
12	310890	SEAT–for 3/4" body–C_V 6.3†
12	310538	SEAT–for 1" body–C_V 4.0†
12	310537	SEAT–for 1" body–C_V 6.3†
12	311077	SEAT–for 1" body–C_V 10.†
12	310540	SEAT–for 1-1/4" body–C_V 6.3†
12	310539	SEAT–for 1-1/4" body–C_V 10.†
12	311078	SEAT–for 1-1/4"–body C_V 16.†
12	310541	SEAT–for 1-1/2" body–C_V 16.†
12	310542	SEAT–for 1-1/2" body–C_V 25.†
13/14		BODY ASSEMBLY††
15	313489	**NUT–1/2" (old)
15	313490	**NUT–3/4" (old)
15	313491	**NUT–1"–(old)
15	313492	**NUT–1-1/4"–(old)
15	313493	**NUT–1-1/2"–(old)
15	313051	NUT–1/2"–(current)
15	313052	NUT–3/4"–(current)
15	313053	NUT–1"–(current)
15	313054	NUT–1-1/4"–(current)
15	313055	NUT–1-1/2"–(current)
16	313484	**TAILPIECE–1/2"–(old)
16	313485	**TAILPIECE–3/4"–(old)
16	313486	**TAILPIECE–1"–(old)
16	313487	**TAILPIECE–1-1/4"–(old)
16	313488	**TAILPIECE–1-1/2"–(old)
16	313045	TAILPIECE–1/2"–(current)
16	313046	TAILPIECE–3/4"–(current)
16	313047	TAILPIECE–1"–(current)
16	313048	TAILPIECE–1-1/4"–(current)
16	313049	TAILPIECE–1-1/2"–(current)
17	310502-00767	STEM RETAINER SLIDE
18	310501-00605	PLATE
19	315890-00116	SPRING–Black–(old; Adj.-spring range, 3 to 8 or 6 to 11 lb., used with threaded base and threaded ring)
19	315590-00116	SPRING–Black with red stripe –3 to 8 lb. range (Non-adj.)
19	315591-00144	SPRING–White–6 to 11 lb. range (Non-adj.)
20	310665-00062	RING–NO THREADS–for actuator less start adj.
20	310507-00062	RING–THREADED–actuators with start adj.
21	313753	FRAME–(4 screw, no start point adj. marks)
21	313751	FRAME–(4 screw, start point adj. marking)
21		**FRAME–(8 screw, start point adj. marking)

Key	Part No.	Description
22	310582	BASE–NO THREADS–(no start point adjustment)
22	310500	BASE–THREADED–(for start point adjustment)
23		*SCREW–1/4-20 x 3/4"–socket hd–cup pt–(2)
23		*SCREW–1/4-20 x 3/4"–filister hd–(2)
24		*SETSCREW–1/4-28 x 3/8"–socket hd–cup point–(2)–Actuator Mounting
25		**TOP–(8 screw, old)–for flat edge diaphragms
25	312817	TOP–(4 screw, old and current) –for beaded diaphragms
26	310673	**DIAPHRAGM, Neoprene–Black–(Flat edge)
26	310668	**DIAPHRAGM, Silicone–White –(Flat edge)
26	312760	DIAPHRAGM, Neoprene–Black–(beaded edge)
26	313745	DIAPHRAGM, Silicone–White –(beaded edge)
27	309284	CUP
28		*SCREW–No. 8-32 x 1/2"–slotted hd with captive washer–(4)–Beaded diaphragm construction
28		*SCREW–No. 6-32 x 1/2"–slotted hd–(8)–Flat edge diaphragm construction
29	1590BT	AIR CONNECTION–if required–1/8" NPT to 1/4" tubing
29	1599BT	AIR CONNECTION–if required–1/8" NPT to 1/4" or 5/32" tubing
30	310664	STAR SPRING

Actuator Assembly (Includes Parts 17 through 30)

Actuator Assembly	Spring		Diaphragm		Start Point Adjustment	Diaphragm Edge		Top Screw Quantity
	Range	Color	Material	Color		Bead	Flat	
312817AA	3 to 8	Black	Neoprene	Black	No	X		4
312817AB	6 to 11	White	Neoprene	Black	No	X		4
(a) §	3 to 8	Black	Neoprene	Black	Yes	X		4
(b) §	6 to 11	Black	Neoprene	Black	Yes	X		4
(c) §	3 to 8	Black	Silicone	White	Yes	X		4
(d) §	6 to 11	Black	Silicone	White	Yes	X		4
(a) §	3 to 8	Black	Neoprene	Black	Yes		X	8
(b) §	6 to 11	Black	Neoprene	Black	Yes		X	8
(c) §	3 to 8	Black	Silicone	White	Yes		X	8
(d) §	6 to 11	Black	Silicone	White	Yes		X	8

*Standard Hardware item, obtain locally.

**Components of obsolete assemblies available for field replacement.

†The C_V (capacity index) and valve size can be found on the valve body.

§Obsolete operator assemblies. For replacement use: (a) 312817AA, (b) 312817AB, (c) 312817AA change diaphragm to 313745, (d) 312817AB change diaphragm to 313745.

††Body assemblies are no longer available. When replacement of a valve body is necessary, order complete VP512A assembly.

KITS

To aid in having the necessary parts available for servicing a valve the following kits are available:

Kit Type	Part Number	Description (Figure 5)†
Repack	14003294-001	Includes items (4), (5) and (6).
Repack and Rebuild	14002863-001	For 3/4-inch valves, 6.3 C_V; 1 and 1-1/4 inch valves, 6.3 and 10.0 C_V. Includes items (4), (5), (6), (8) and (9).
Repack and Rebuild	14002864-001	For 1/2 and 3/4-inch valves, 0.63 thru 4.0 C_V; 1-inch valves, 4.0 C_V. Includes itmes (4), (5), (6), (8) and (9).

†The C_V (capacity index) and valve size can be found on the valve body.