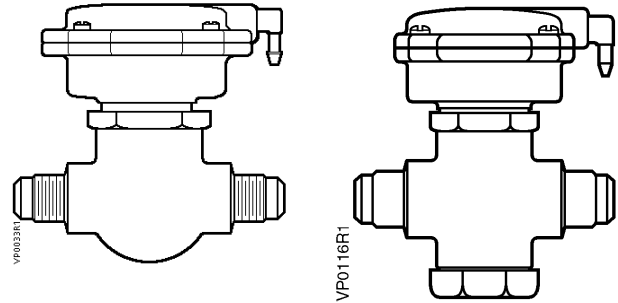


Powers™ Controls

Powermite Two-Way Flared Valves Normally Open/Normally Closed



Description

The VP 656 normally open and normally closed flared valves are pneumatically operated valves designed to control the flow of both water and steam.

Features

- Enclosed actuator housing to protect the diaphragm, spring, etc.
- Small size allows installation in restricted space
- Replaceable soft disc provides tight shut-off actuator can be rotated to facilitate air connection
- Stainless steel valve stem to reduce friction and corrosion

Application

The VP 656 flared valves are recommended for control of hot or chilled water and steam for convectors, fan coil units, radiation, reheat coils and similar terminal unit applications. The dual seating packed construction allow its use in systems having relatively high pressures.

Typical uses are sites where efficient economical control is desired. The small overall size lends itself to installation within a cabinet enclosure where available space is limited.

Product Numbers

Table 1.

Action	Valve Size	Cv (Kvs)	Product Number
Normally Open	1/2-inch (15 mm)	0.9 (0.77)	656-0004
	1/2-inch (15 mm)	2.1 (1.8)	656-0002
Normally Closed	1/2-inch (15 mm)	2.1 (1.8)	656-0012

Specifications

Line size	1/2-inch (15 mm)
Capacity	See Tables 2 through 5.
Body style	Globe-flared
Action	Normally Closed (NC) Normally Open (NO)

Specifications, Con't

	Stem travel	1/4-inch (6.3 mm)
	Valve body rating	ANSI 250. See Table 6.
Material	Body and seat	Bronze
	Stem	Stainless steel
	Packing	EP rubber quad ring
Operating	Controlled medium	Water, steam, ethylene glycol solution
	Maximum medium temperature	250°F (121°C)
	Maximum medium inlet pressure	
	Water	See Table 6.
	Steam	15 psig (103 kPa)
	Maximum recommended differential pressure for modulating service	
	Water	20 psig (138 kPa)
	Steam	15 psig (103 kPa)
	Close-off	
Normally Closed	See Figure 1.	
Normally Open	See Figure 1.	
	Flow characteristic	Modified equal percentage
Actuator	Nominal spring range	
	NC	10 to 15 psi (69 to 103 kPa)
	NO	3 to 8 psi (21 to 55 kPa)
	Diaphragm	
	Effective area	3.4 inch ² (22 cm ²)
	Ambient temperature range	30 to 160°F (-1 to 71°C)
	Maximum air supply to the diaphragm	30 psig (207 kPa)
Material	Silicone rubber	
Miscellaneous	Dimensions	See Figures 2 and 3.
	Weight	2.2 lb (1kg)
Service Kits	Diaphragm replacement kit (package of 5)	656-736
	Repack kit (for 6 valves)	656-601
	Rebuild/repack kit	
	NO	656-761
	NC models 2 and 3	656-014
	NC discontinued model 1	656-763
	Shut off disc kit (package of 10)	
	NO	656-740
	NC	656-800
	Replacement top NO only	
Cv 0.9	656-830	
Cv 2.1	656-599	

Table 2. Maximum Water Capacity - U.S. Gallons per Minute.

Valve Size in inches	Pressure Differential - psi															
	Cv/1	2	3	4	5	6	8	10	12	14	15	16	17	18	19	20
1/2	0.9	1.3	1.6	1.78	2	2.2	2.5	2.8	3.1	3.4	3.5	3.6	3.7	3.8	3.9	4.0
	2.1	3	3.6	4.2	4.7	5.1	5.9	6.6	7.3	7.9	8.1	8.4	8.7	8.9	9.2	9.4

Table 3. Maximum Water Capacity - Cubic Meters per Hour (m3/h).

Valve Size in mm	Pressure Differential - kPa														
	1	10	20	30	40	50	60	80	Kvs/ 100	150	200	300	400	500	
15	0.08	0.24	0.34	0.42	0.49	0.54	0.60	0.69	0.77	0.94	1.09	1.33	2.56	5.86	
	0.18	0.57	0.80	0.98	1.13	1.27	1.39	1.60	1.80	2.19	2.53	3.10	3.58	4.0	

Table 4. Maximum Steam Capacity - Pounds per Hour.

Valve Size in inches	Inlet Pressure - psig															
	2		5				10				15					
	Pressure Differential - psi															
	1	2	1	2	3	4	5	2	4	6	8	10	6	9	12	15
1/2 (Cv 0.9)	11	15	12	16	20	22	25	18	25	30	34	37	25	40	45	49
1/2 (Cv 2.1)	25	35	27	38	46	52	58	43	59	71	80	87	57	94	105	113

Table 5. Steam Capacity - Kilograms per Hour.

Valve Size in mm	Inlet Pressure - kPa				
	50		100		
	Pressure Differential - kPa				
	10	25	10	20	50
15 (Kvs 0.77)	4.3	6.7	5.4	7.7	12.1
15 (Kvs 1.80)	9	14	13	18	28

Table 6. Body Temperature-Pressure Rating.

Valve Body	Temperature		Pressure psig (kPa)
	°F	°C	ANSI Class 250
Bronze	-20 to +150	(-30 to 66)	400 (2758)
	+200	(93)	385 (2655)
	+250	(121)	365 (2586)

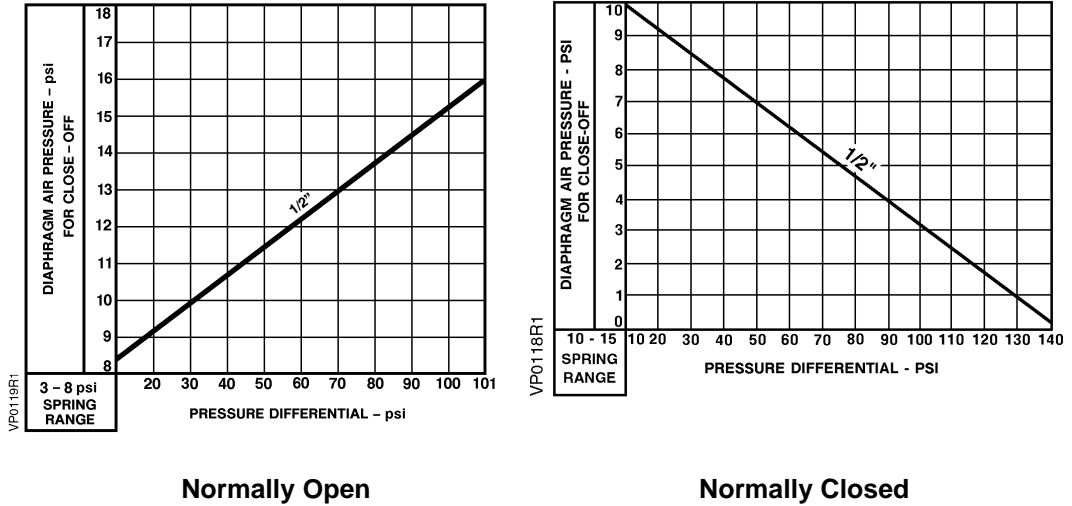


Figure 1. Nominal Close-off Ratings.

Operation

The actuator spring provides the necessary force to hold the stem in the raised or normal position.

An increase in control pressure overcomes the spring pressure and moves the stem downward. In a normally closed valve, this increases the flow of fluid through the valve. In a normally open valve, an increase in pressure decreases the flow of fluid through the valve.

With the loss of control pressure, the spring returns the valve to its normal position.

Sizing

The sizing of a valve is important for correct system operation. An undersized valve will not have sufficient capacity at maximum load. An oversized valve can initiate cycling, and the seat and throttling plug can be damaged because of the restricted opening. Correct sizing of the control valve for *actual expected conditions* is essential for good control.

Some variables that must be determined are:

- The medium to be controlled: water, etc.
- The maximum inlet temperature and pressure of the medium at the valve.
- The pressure differential that will exist across the valve under maximum load demand.
- The maximum capacity the valve must deliver.
- The maximum line pressure differential the valve actuator must close against.
- See *Application Bulletin (AB)-1 Control Valve Selection and Sizing (155-285)* for further recommendations.

See Tables 2 through 5 for valve capacities.

Installation

In concealed installations, allow 2 inches (50 mm) from the top of the actuator to remove the upper housing for valve servicing.

Install all valves so that the flow is directed under the valve seat. Flow direction arrows are cast on the valve body.

Never use the valve housing as a lever arm to tighten the body when taking up on a thread.

The preferred installation position is upright. Install the valve in any position except upside down.

Rotate the valve top to allow piping the control air from a convenient position.

Install hand valves on the supply and return piping to allow for servicing.

Dimensions

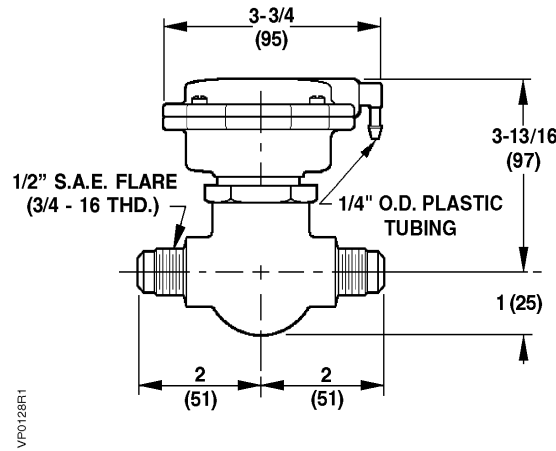


Figure 2. Normally Open.

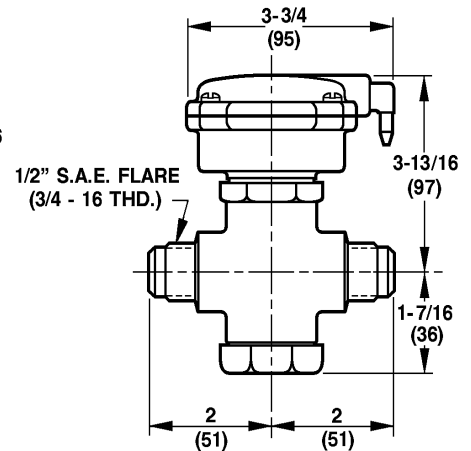


Figure 3. Normally Closed.

Table 7. Troubleshooting.

Complaint	Problem	Recommended Correction	Complaint	Problem	Recommended Correction
Valve Noise	Excessive fluid velocity in piping or excessive pressure drop	Reduce pressure drop or change valve size	Inadequate Close-off	Insufficient control air pressure	Raise control air pressure
	Improper direction flow	Re-pipe valve for flow as stamped on valve body		Excessive pressure drop across valve	Reduce system differential or increase control air pressure
	Flashing because of low system pressure or excessive fluid temperature	Basic system problem cannot be corrected within valve		Foreign material in valve	Flush system or clean out foreign matter
Fluid leaks	Damaged valve or worn packing	Replace valve or packing		Damaged or worn valve disc or diaphragm	Replace disc or diaphragm

Table 8. Valve Assembly Parts and Service Kits.

See Figures 4 and 5.

Item	Description	Normally Open		Normally Closed		Material
		Kit Item Number		Kit Item Number	Q'ty	
		Cv 0.9	Cv 2.1			
1	E-ring	Items 29 and 31 Kits			1	Phos. Bronze
2	Washer	Item 31 Kit			1	Brass
3	Spring	—	—	—	1	Steel
4	Housing screw	Items 28 and 31 Kits			4	Steel
5	Lower housing	—	—	—	1	Aluminum
6	Valve stem	Item 31 Kit			1	Stainless Steel
7	Upper quad ring retainer	Items 29 and 31 Kits			1	Brass
8	Large retaining ring	Items 29 and 31 Kits			1	Steel
9	Retaining ring	Items 29 and 31 Kits			1	Stainless Steel
10	Bonnet	—	—	—	1	Brass
11	Stem bearing	—	—	—	1	Oilite
12	Disc holder	Item 31 Kit			1	Brass
13	Shut-off disc	Items 30 and 31 Kits			1	EP Rubber
14	Throttling nut	Item 31 Kit			1	Brass
15	Washer NC only	—	—	Item 31 Kit	1	Brass
16	Retaining nut NC only	—	—	Item 31 Kit	1	Brass
17	Upper housing	—	—	—	1	Aluminum
18	Piston plate	—	—	—	1	Brass
19	Diaphragm	Item 28 Kit			1	Silicone Rubber
20	Piston cup	—	—	—	1	Brass
21	Stem packing quad ring	—	—	Item 31 Kit	2	EP
22	Lower quad ring retainer	—	—	—	1	Brass
23	Spring	—	—	—	1	Phos Bronze
24	Valve body and seat	—	—	—	1	Bronze
25	O-ring NO	Items 30 and 31 Kits		—	1	EP Rubber
	O-ring NC	—	—	Items 30 and 31 Kits	2	
26	Valve Cap NC only	—	—	—	1	Brass
27	Washer NC only	—	—	Item 31 Kit		Plated steel
28	Diaphragm kit	656-736		656-736	—	—
29	Repack kit	656-601		656-601	—	—
30	Shut-off disc kit	656-740		657-800	—	—
31	Rebuild/repack kit	656-761		656-014	—	—
—	Replacement top	656-830	656-599	N/A	—	—

Parts of the Valve Assembly

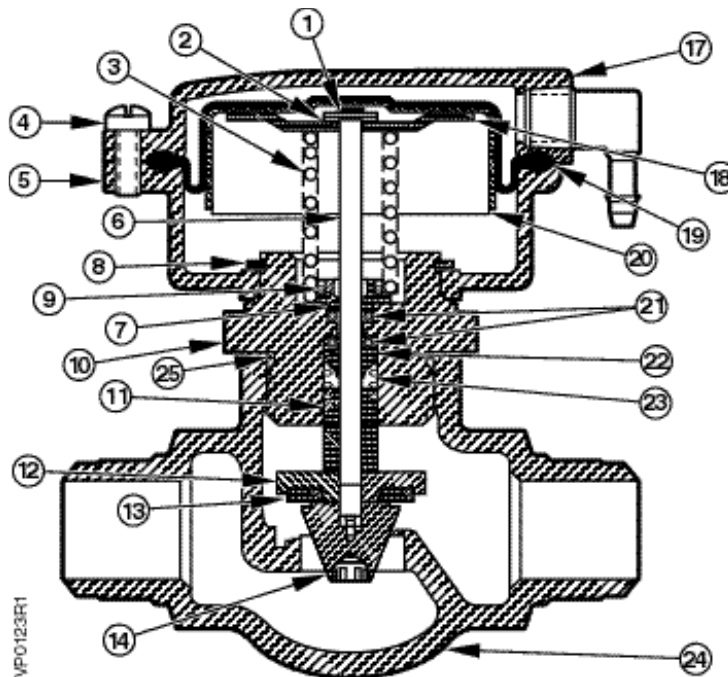


Figure 4. Normally Open. See Table 8.

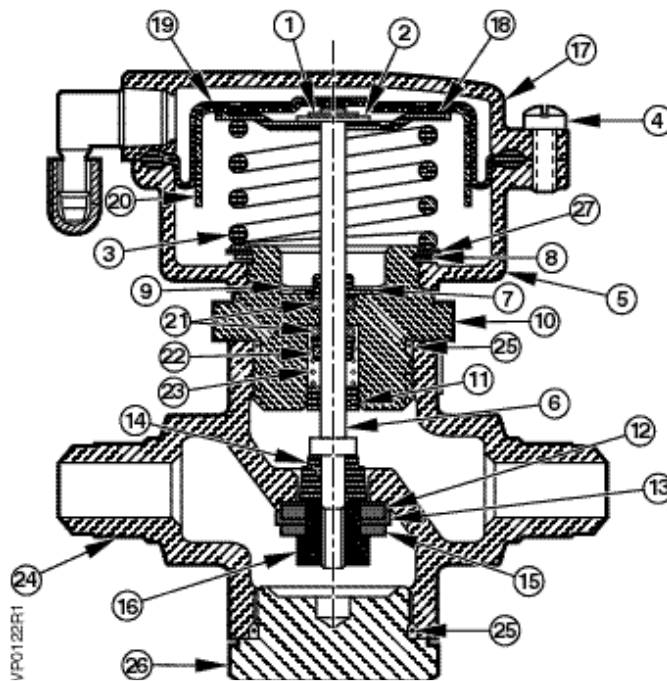


Figure 5. Normally Closed. See Table 8.

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