SIEMENS

Technical Instructions
Document No. 155-310P25
VP 658-5
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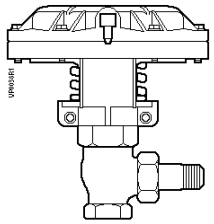
Powers® Controls

Powertop Two-Way Valves Normally Open



ANGLE UNION OUTLET

Description

The VP 658 normally open valves are pneumatically operated valves designed to control the flow of both water and steam.

Features

- Stainless steel valve stem for smooth operation and durability
- Large diaphragm area for control accuracy and tight close-off
- Equal percentage plugs and long stroke for controllability
- Removable actuator for ease of servicing

Application

The VP 658 valves are recommended for control of hot or chilled water and steam for terminal units such as unit ventilators, reheat coils, fan coil units, induction units, and duct coils.

They are particularly suited to the minimum profile and low space requirements of schools, hospitals, office buildings and factories.

Product Numbers

Table 1. Product Numbers.

Valve Size Inch (mm)	Spring Range psi (kPa)	Cv (Kvs)	Product Number
1.0 (25)	2 to 6 (12 to 41)	10 (8.6)	658-0012
1.25 (32)		16 (13.7)	658-0014

Warning/Caution Notations

WARNING:	⚠	Personal injury/loss of life may occur if you do not perform a procedure as specified.
CAUTION:	⚠	Equipment damage may occur if you do not perform a procedure as specified.

Specifications

	Line sizes	Inches (mm) 1.0 (25) 1.25 (32)
	Capacity	See Table 2 through Table 5
	Body style	Angle Union Outlet
	Body connection	Angle Female × Union Male
	Action	Normally Open (NO)
	Stem travel	.50-inch (15 mm)
	Valve body rating	ANSI 250. See Table 6.
Material	Body and seat	Bronze
	Stem	Stainless steel
	Packing	EP rubber
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 Open	See Figure 1.
	Flow characteristic	Equal percentage
Actuator	Nominal spring range	2 to 6 psi (12 to 41 kPa)
	Diaphragm	
	Effective area	11-inch^2 (71 cm^2)
	Ambient temperature range	35°F to 140°F (2°C to 60°C)
	Maximum air supply to the diaphragm	30 psig (207 kPa)
	Material	Silicone rubber
Miscellaneous	Dimensions	See Figure 4.
	Weight	3 lb (1.4 kg)
Service Kits	Diaphragm Replacement Kit (package of 5)	658-166
	Stem Repacking Kit (for 10 valves)	658-167
	Actuator assembly	658-067

Service Kits

Valve body assembly, Normally Open:

Cv (Kvs)	Part Number
10 (8.6)	658-319
16 (13.7)	658-321

Complete top replacement, Normally Open,
2 to 6 psi (12 to 41 kPa) only:

Valve	Top Assembly
658-0012	658-072
658-0014	658-074

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

Valve Size Inches	Pressure Differential - psi															
	Cv\1	2	3	4	5	6	8	10	15	20	25	30	40	50	60	75
1.0	10	14	17	20	22	25	28	32	39	45	51	55	63	71	78	87
1.25	16	23	28	32	36	40	45	51	62	72	81	88	101	114	125	139

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
25	0.9	2.7	3.8	4.7	5.4	6.1	6.7	7.7	8.6	10.5	12.2	14.9	17.2	19.2
32	1.4	4.4	6.2	7.6	8.7	9.8	10.7	12.3	13.7	16.9	19.5	23.9	27.6	30.9

Table 4. Maximum Steam Capacity - Pounds per Hour.

Valve Size in Inches	Inlet Pressure - psig																
		2		5					10					15			
	Pressure Differential - psi																
	Cv/1	1	2	1	2	3	4	5	2	4	6	8	10	6	9	12	15
1.0	10	120	170	130	180	220	250	280	210	280	340	380	420	380	450	500	550
1.25	16	190	270	210	290	350	400	440	330	460	550	600	670	600	720	810	870

Table 5. Steam Capacity - Kilograms per Hour.

Valve Size in mm	Inlet Pressure - kPa					
		50		100		
	Pressure Differential – kPa					
	Kvs	10	25	10	20	50
25	8.6	43	68	60	85	135
32	13.7	68.8	109	97	137	216

Table 6. Body Temperature-Pressure Rating.

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

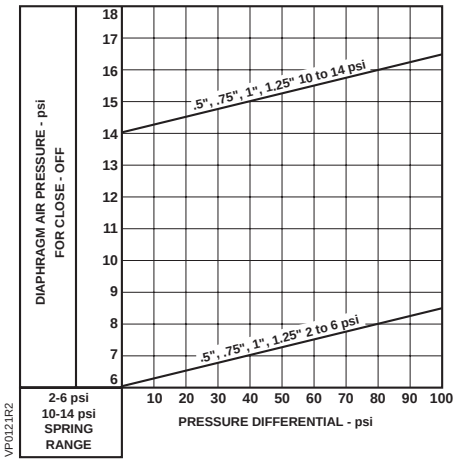


Figure 1. Nominal Close-off Ratings.

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. An increase in pressure decreases the flow of fluid though 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 Table 2 through Table 5 for valve capacities.

Installation

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

In concealed installations, allow three inches (75 mm) from the top of the actuator to remove the upper housing for valve servicing.

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

Install the valve so that the flow follows the direction arrow cast on the valve body.

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

Service

Diaphragm replacement

Instructions for replacement are included in the kit.

Stem packing

Instructions for repacking the valve stem are included in the kit.

Valve disc replacement

Instructions for replacing the valve disc are included in the kit.

Actuator replacement

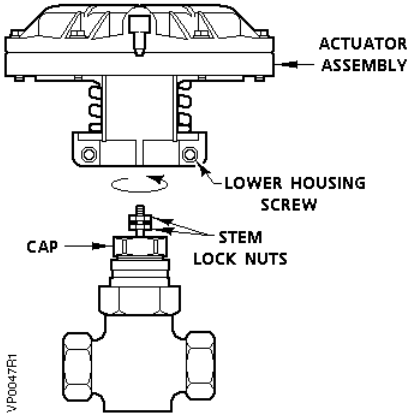
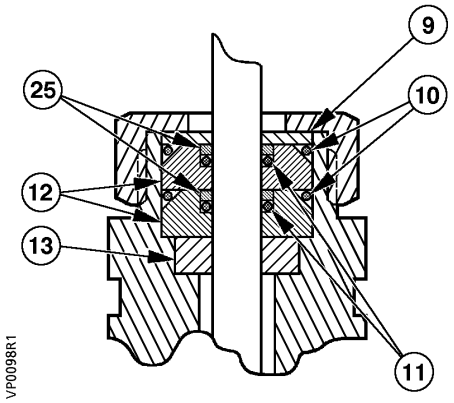


Figure 2. Actuator Replacement.

1. Loosen the two lower housing screws that clamp it to the bonnet.
2. Loosen the stem lock nuts using two 7/16-inch open-end wrenches.
3. Unscrew the actuator assembly from the stem as shown in Figure 2.
4. Push the stem all the way down before installing the new actuator assembly. There must be at least 1/16-inch (2 mm) clearance between the lower stem lock nut and the valve cap.
5. Pull the stem back up and install the new actuator assembly.
6. Screw the stem into the actuator piston plate and tighten the lock nuts with a wrench.
7. Tighten the lower housing screws. Do not over-tighten these screws.

Parts of the Valve Assembly



Insert Detail

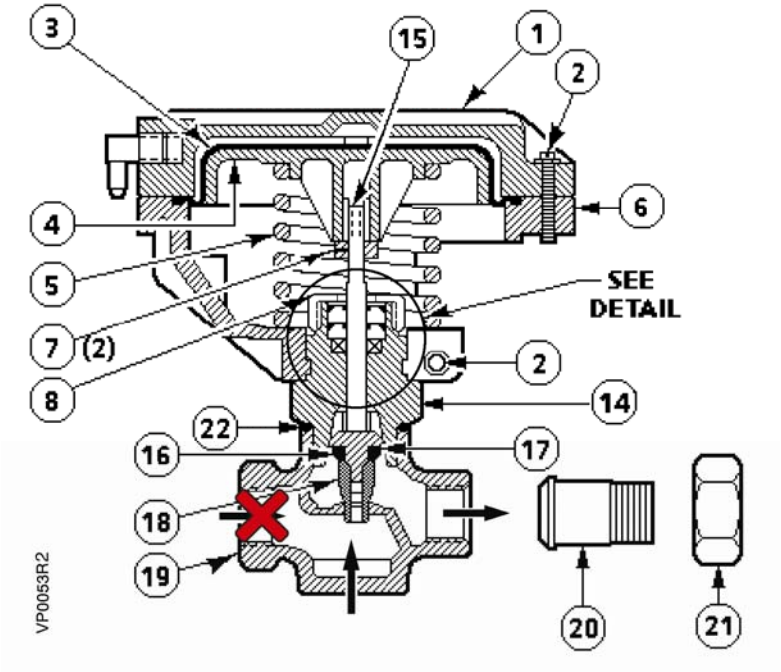


Figure 3. Angle Union Outlet, Normally Open.

Table 7. Valve Assembly Parts and Service Kits. (See Figure 3.)

Item	Description	Qty	Normally Open		Material
			10	16	
1	Actuator housing-upper	1	Item 28 Kit		Nylon
2	Thread forming screw	8	Items 26 and 28 Kits		Steel
3	Diaphragm	1			EP rubber
4	Piston plate	1	Item 28 Kit		Aluminum
5	Actuator compression spring	1			Cadmium plated steel
6	Actuator housing-lower	1			Nylon
7	Stem lock nut	2	—	—	Steel
8	Cap	1	—	—	Brass
9	Packing washer	1	Item 27 Kit		Copper
10	Stem packing large o-ring	2			EP rubber
11	Stem packing small o-ring	2			EP rubber
12	O-ring retainer	2			Brass
13	Packing ring	1			Teflon®
14	Bonnet	1	—	—	Brass
15	Stem	1	—	—	Stainless Steel
16	Disc holder	1	—	—	Phos. Bronze
17	Shut-off disc	1	—	—	EP rubber
18	Throttle plug	1	—	—	Brass
19	Valve body and seat	1	—	—	Stainless Steel
20	Tail piece, Angle Union Outlet only	1	413-003	657-121	Brass or Bronze
21	Union Nut, Union Outlet only	1	657-100	609-004	Brass or Bronze
22	O-ring		Items 25 or 26 Kits		EP Rubber
25	Back-up ring	2	Item 27 Kit		Teflon
26	Diaphragm Kit	—	658-166		—
27	Stem Repacking Kit	—	658-167		—
28	Actuator assembly 2 to 6 psi (12 to 41 kPa)	—	658-067		—
—	Valve body assembly	—	658-319	658-321	—
—	Replacement tops	—	658-072	658-074	

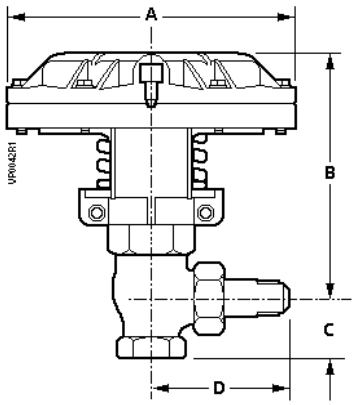


Figure 4. Angle Union Outlet, Normally Open Dimensions.

Table 8. Dimensions in Inches (Millimeters).

Valve Body	Valve Size Inch (mm)	A	B	C	D
Angle Union Outlet	1.00 (25)	5.50 (140)	4.94 (125)	1.75 (44)	3.13 (79)
	1.25 (32)	5.50 (140)	5.50 (140)	2.00 (51)	4.38 (111)