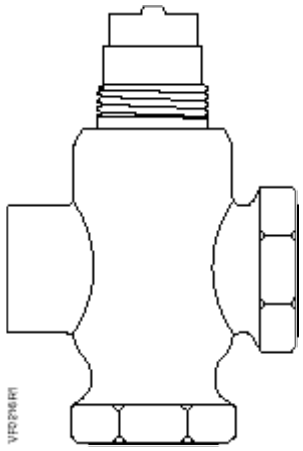
SIEMENS

Technical Instructions
Document No. 155-199P25
VF 599-8
October 1, 2024

Powermite 599 Series

MZ Series Zone Control Three-way Valves



Description

The Powermite 599 Series ANSI Class 250 MZ Series three-way valves are designed to work the SSB MZ Series actuator with a 7/32-inch (5.5 mm) stroke.

Features

Direct coupled universal bonnet

ANSI Leakage Class IV (0.01% of Cv)

Application

A typical application for the Powermite three-way valve is the mixing of hot or chilled water for convectors, fan coil units, unit conditioners, radiation, reheat coils, and similar terminal units requiring an actuator that delivers a minimum of 45 pounds force (200 N).

Product Numbers

Table 1. Product Numbers.

Flow Rate		Line Size		Product
Cv	(Kvs)	inch	(mm)	Number
0.4	(0.34)	1/2	(15)	599-01132
0.63	(0.54)	1/2	(15)	599-01133
1	(0.85)	1/2	(15)	599-01134
1.6	(1.37)	1/2	(15)	599-01135
2.5	(2.15)	1/2	(15)	599-01136
4	(3.44)	1/2	(15)	599-01137
6.3	(5.43)	3/4	(20)	599-01138
10	(8.6)	1	(25)	599-01139

Ordering a Valve Plus Actuator Assembly

To order a complete valve plus actuator assembly from the factory, combine the actuator prefix code with the suffix of the valve assembly product number. See *Technical Bulletin (TB) 252* (155-307P25) for selection procedure and ordering codes.

Valve assemblies can be ordered using the numbers in Table 1.

Specifications

	Line size	1/2 to 1 inch (15 to 25 mm)
	Capacity	See Tables 3 and 4 and Figure 1
	Body style	Globe
	Seat style	Metal-to-metal
	Action	Three-way mixing
	Valve body rating	ANSI Class 250; See Table 2
	Stem travel (Stroke)	7/32-inch (5.5 mm)
Material	Body	UNS CA844 bronze or forged brass C37700
	Body trim	Brass
	Stem	Stainless steel ASTM A582 Type 303
	Packing	Ethylene propylene O-ring
Operating	Controlled medium	Water, glycol solutions to 50%
	Medium temperature range	35°F to 250°F (2°C to 120°C)
	Maximum inlet pressure	See Table 2
	Maximum recommended differential pressure for modulating service	25 psi (173 kPa)
	Rangeability	
	Cv <1	>50:1
	Cv >1	>100:1
	Close-off pressures	See Table 5 and Figure 2
	Close-off ratings	According to ANSI/FCI 70-2
	Leakage rate	Class IV (0.01% of Cv)
	Flow characteristics	Linear
Miscellaneous	Canadian Registration Numbers	0C24303.5
	Mounting location	NEMA 1 (interior only)
	Dimensions	See Tables 6 and 7 and Figures 4 and 5
	Valve Weight	See Table 6

Service Kit

Protective black knob to cover the bonnet and threads 	4 268 8895 0

Table 2. Body Temperature-Pressure Rating.

Valve Body	Temperature		Pressure psig (kPa)
	F°	C°	ANSI Class 250
Bronze or Forged Brass	-20 to +150	(-30 to 66)	400 (2758)
	+200	(93)	385 (2655)
	+250	(121)	365 (2586)
	+300	(149)	335 (2300)
	+350	(177)	300 (2068)

Table 3. Maximum Water Capacity - U.S. Gallons per Minute.

Valve Size in inches	Pressure Differential - psi															
	Cv\1	2	3	4	5	6	8	10	15	20	25	30	40	50	60	75
1/2	0.4	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.5	1.8	2.0	2.2	2.5	2.8	3.1	3.5
	0.63	0.9	1.1	1.3	1.4	1.5	1.8	2.0	2.4	2.8	3.2	3.5	4.0	4.5	4.9	5.5
	1.0	1.4	1.7	2.0	2.2	2.5	2.8	3.2	3.9	4.5	5.0	5.5	6.3	7.1	7.8	8.7
	1.6	2.3	2.8	3.2	3.6	3.9	4.5	5.1	6.2	7.2	8.0	8.8	10.1	11.3	12.4	13.9
	2.5	3.5	4.3	5.0	5.6	6.1	7.1	7.9	9.7	11.2	12.5	13.7	15.8	17.7	19.4	22
	4	5.7	7	8.0	8.9	10	11.3	12.6	15.5	17.9	20.0	21.9	25	28	31	35
3/4	6.3	8.9	10.9	12.6	14.1	15.4	17.8	20	24	28	32	35	40	45	49	55
1	10	14.1	17.3	20	22	24	28	32	39	45	50	55	63	71	77	87

Table 4. Maximum Water Capacity - Cubic Meters per Hour (m^3/hr).

Valve Size in mm	Pressure Differential - kPa													
	1	10	20	30	40	50	60	80	Kvs/ 100	150	200	300	400	500
15	0.03	0.11	0.15	0.19	0.22	0.24	0.26	0.30	0.34	0.42	0.48	0.59	0.68	0.76
	0.05	0.17	0.24	0.30	0.34	0.38	0.42	0.48	0.54	0.66	0.76	0.94	1.08	1.21
	0.09	0.27	0.38	0.47	0.54	0.60	0.66	0.76	0.85	1.0	1.2	1.5	1.7	1.9
	0.14	0.43	0.61	0.75	0.87	0.97	1.06	1.23	1.37	1.7	1.9	2.4	2.7	3.1
	0.21	0.68	0.96	1.17	1.35	1.51	1.66	1.91	2.15	2.6	3.0	3.7	4.3	4.8
	0.34	1.1	1.5	1.9	2.2	2.4	2.7	3.1	3.4	4.2	4.9	6.0	6.9	7.7
20	0.54	1.7	2.4	3.0	3.4	3.8	4.2	4.9	5.4	6.7	7.7	9.4	10.9	12.1
25	0.86	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

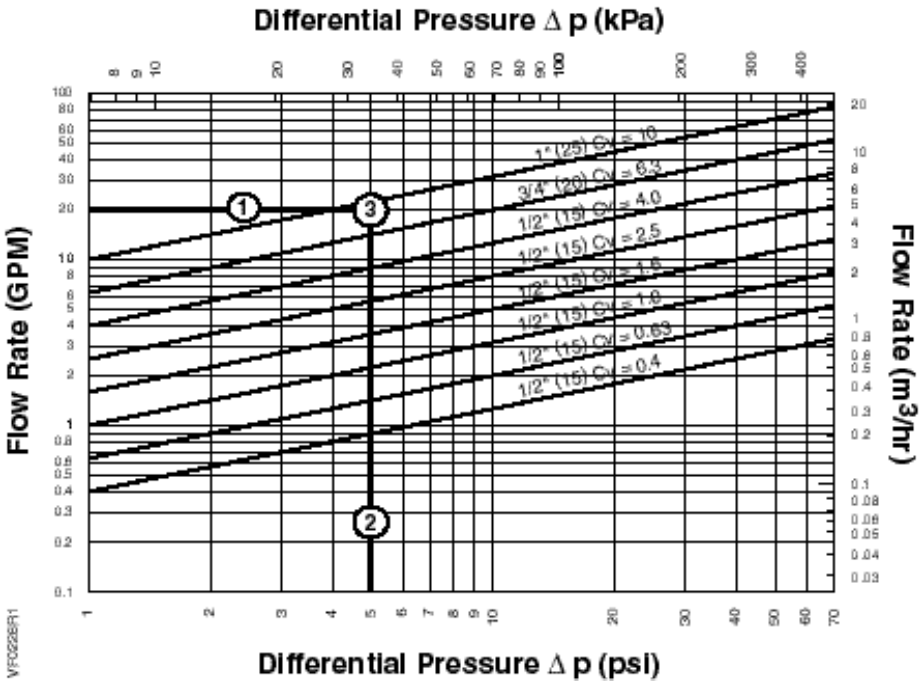


Figure 1. Water Capacity Graph.

Selection Example

Select a valve given:

See Figure 1.

① Required flow = 20 gpm.
② Desired pressure drop = 5 psi.
③ Choose a 1-inch (25 mm) valve, Cv 10.

Table 5. Close-off Pressures.

Action	Valve Size Inches (mm)	SSB Actuator psi (kPa)
NC Upper port	1/2", 0.4< Cv <1.6 (15 mm, 0.34< Kvs <1.37)	70 (483)
	1/2", 2.5< Cv <4 (15 mm, 2.15< Kvs <3.44)	40 (276)
	3/4" and 1" (20 mm and 25 mm)	30 (207)
NO Bottom port	1/2", 0.4< Cv <1.6 (15 mm, 0.34< Kvs <1.37)	25 (172)
	1/2", 2.5< Cv <4 (15 mm, 2.15< Kvs <3.44)	15 (103)
	3/4" and 1" (20 mm and 25 mm)	10 (69)

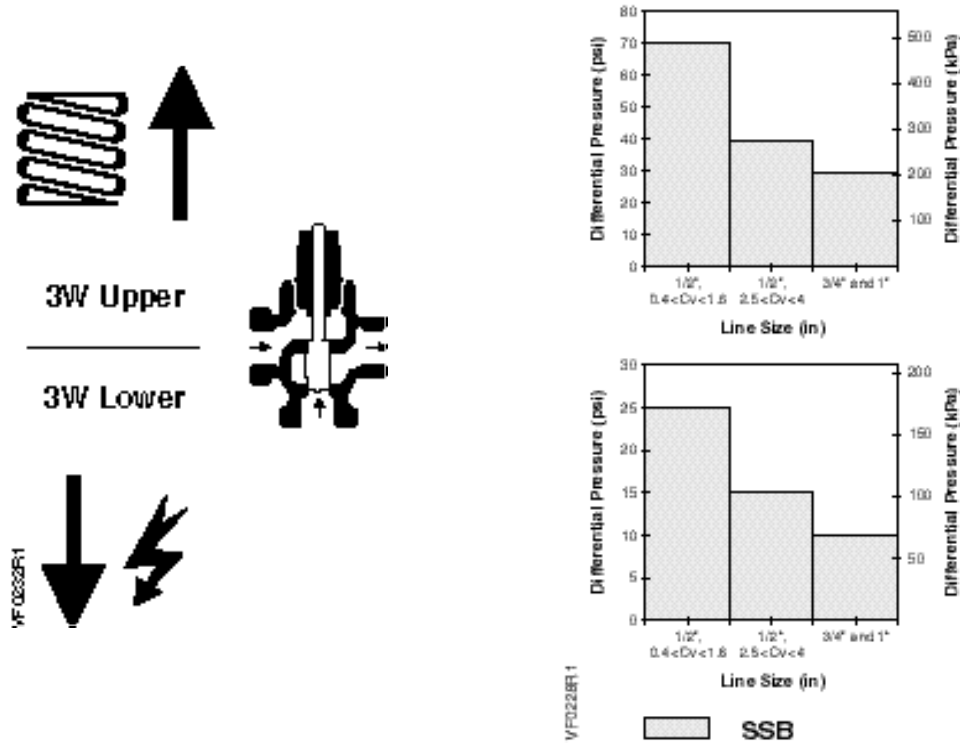


Figure 2. Close-off Pressures.

Operation

As the valve stem moves downward, the flow through the NO port decreases and the flow through the NC port increases. As the valve stem moves upward, the flow through the NO port increases and the flow through the NC port decreases.

In the event of power failure, a fail-safe actuator returns the valve to its normal position. Fail-in-place actuators will hold the last commanded position. See the Technical Instructions of the various actuators for additional information.

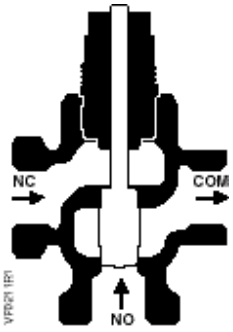


Figure 3.

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 considered essential for good control.

The following variables must be determined:

- 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.

Sizing, Continued

- 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 3 and 4 for valve capacities.

Mounting and Installation

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

For best performance, install the valve assembly with the actuator above the valve body. The valve and actuator can be installed in any position between vertical and horizontal. It is not recommended to install the valve assembly so that the actuator is below horizontal or up side down.

Allow sufficient space for servicing the valve and actuator. See Table 6 for valve body dimensions. See Figure 5 and Table 7 for dimensions of the service envelope recommended around the actuator.

NOTE: Instructions for field mounting an actuator, wiring diagrams, and start-up are covered in the Technical Instructions and Installation Instructions for each actuator.

Service

Replace the valve if inoperable.

Dimensions

See Table 6 for valve body dimensions. The letters in Figure 5 refer to the valve centerline to top of actuator, the actuator width, and service envelope dimensions in Table 7.

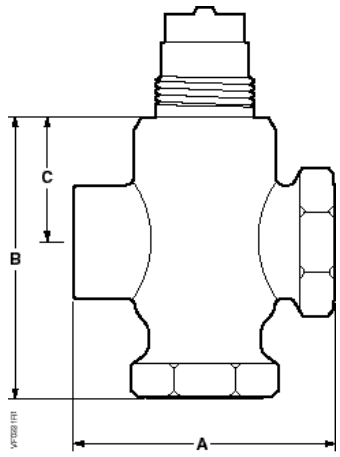


Figure 4. Three-way Valve.

Table 6. Three-way Valve Dimensions.

Valve Size inch (mm)	A	B	C	Weight lb (kg)
1/2 (15)	2-3/4 (70)	2-15/16 (74)	1-5/16 (33)	1.10 (0.5)
3/4 (20)	3-1/4 (83)	3-9/16 (90)	1-5/16 (33)	1.44 (.65)
1 (25)	3-7/8 (98)	3-15/16 (99)	1-9/16 (39)	2.20 (1.0)

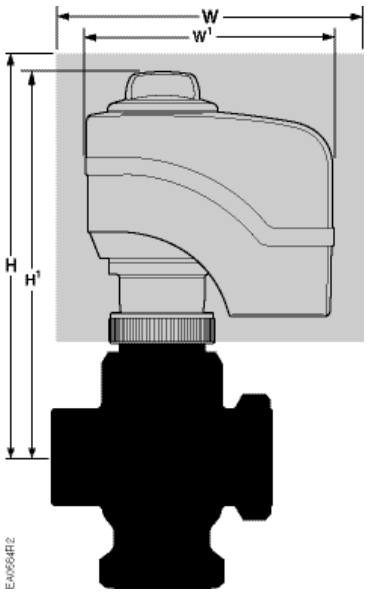


Figure 5.

Table 7. Dimensions of the Actuator and Recommended Service Envelope. Dimensions in Inches (Millimeters).

Actuator	Actuator Prefix Code	Valve line Size	Center line to Top of Actuator, H1	Service Height H	Actual width of the Actuator W1	Service Width W
SSB131.09U SSB161.05U	254 255	1/2 (15)	4-7/8 (124)	13-1/8 (330)	3-1/4 (83)	11-1/4 (282)
		3/4 (20)	4-7/8 (124)	13-1/8 (330)	3-1/4 (83)	11-1/4 (282)
		1 (25)	5-1/8 (130)	13-3/8 (335)	3-1/4 (83)	11-1/4 (282)

Parts Of the Valve

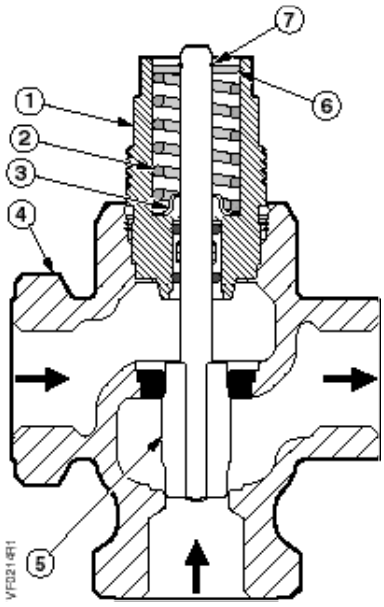


Table 8. Three-way Bronze/Forged Brass Valves.

Item	Part Name	Part No.	Q'ty	Material
1	Bonnet Ass'y	—	1	—
2	Spring	—	1	Stainless steel
3	Wiper	—	1	Nylon
4	Valve Body	—	1	Bronze or Forged Brass
5	Stem and Plug Assembly	—	1	Stainless steel or brass
6	Upper guide disc	—	1	Brass
7	Retaining ring	—	1	Stainless steel

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