Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

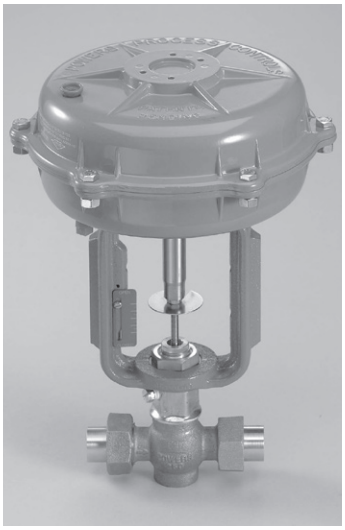
Approval _____ Representative _____

VE Heavy Duty

Bronze Globe Control Valves

FLOWRITE II®

The rugged Powers Type VE single seat bronze body valve is primarily used for steam and water modulating applications where precision low flow is required. Additionally, the modified equal percent characteristic provides fine throttling action at low valve plug travel. Stainless steel trim is standard.



Single Seat Bronze Body/Reduced Trim

- ½" Union Ends
- ANSI Class 250 Body Rating
- ANSI Class III Close off
- Stainless Steel Trim
- Modified Equal Percent Flow Characteristic
- Reduced Trim Sizes
- 46" Pneumatic Diaphragm Field Reversible Actuators
- Stainless Steel Hardware
- NAMUR Standard Yoke for Accessories

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

NOTICE

Inquire with governing authorities for local installation requirements

POWERS™

A WATTS Brand

Dimensional Information

(For other sizes consult factory)

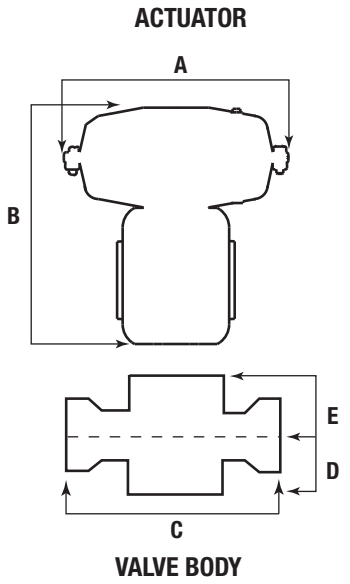
Pneumatic Actuators

ACTUATOR*	A	B	LBS.
46"	10"	10-3/8"	14

Valve Body

SIZE	C	D	E	LBS.
1/2"	5-5/8"	1-13/16"	2-7/16"	4

*See Actuator Select Tables on page 5.



Application

- **Body Material and Rating.** Refer to Body Temperature/ Pressure Ratings table to insure your application fits in the acceptable operating range. Also determine that the valve body material is compatible with your media.
- **Trim Material.** Stainless steel.
- **Flow Coefficient (CV Rating).** Cv to be determined by a specifying Engineer or calculated data. Select a valve size that most closely matches the calculated Cv from the Flowing ΔP, Close Off ΔP, and Cv Ratings table.
- **Flowing Pressure Drop (ΔP).** To avoid cavitation and its accompanying trim damage, the following operating ΔP limits should be observed.

Body Temperature/Pressure Ratings

ANSI Standard Ratings – Bronze Bodies

Temperature (°F)	Class 250 Lb. (psig)
–20 to 150	400
200	385
250	365
300	335
350	300
400	250

- **Liquid Service.** ΔP less than the quantity (0.66 x inlet pressure) + 10. Additionally, flowing ΔP should not exceed 100psi.
- **Steam Service.** ΔP less than the quantity (0.5 x inlet pressure) + 7.35. Additionally, flowing ΔP should not exceed 100psi.
- **Actuator Selection.** The actuator must have enough force to close off against line pressure or maximum ΔP. The 3–15 and1–17 columns in the Close Off ΔP and Cv Ratings table apply to valves with control signals coming directly from I/P transducers. The 0–30 column applies to valves using Accritem® type pneumatic controllers or valves equipped with a positioner or 0–30 PSI I/P transducer.

Type VE CLOSE OFF ΔP AND CV RATINGS

VALVE SIZE	CV RATING	PLUG TRAVEL	ACTUATOR CODES	MAXIMUM ΔP IN PSI AT CLOSE OFF					
				FAIL CLOSED			FAIL OPEN		
				SIGNAL TO ACTUATOR			SIGNAL TO ACTUATOR		
			PNEUMATIC	PNEUMATIC			PNEUMATIC		
			PNEUMATIC ACTUATOR	3–15 PSI	1–17 PSI	0–30 PSI	3–15 PSI	1–17 PSI	0–30 PSI
1/2	0.25	1/4	46 / 4C	200	200	200	200	200	200
A-port				200	200	200	200	200	200
1/2	0.5	1/4	46 / 4C	200	200	200	200	200	200
B-port				200	200	200	200	200	200
1/2	1	1/4	46 / 4C	200	200	200	200	200	200
C-port				200	200	200	200	200	200
1/2	2	1/4	46 / 4C	200	200	200	200	200	200
D-port				200	200	200	200	200	200

NOTE: A 200 psi ΔP limit is imposed for trim life considerations.

Sizing reference

STEAM TABLE

Steam Pressure PSIG	Temp. °F	Temp. °C	Sensible Heat BTU/ lb.	Latent Heat BTU/lb.	Total Heat BTU/ lb.
0	212	100	180	971	1151
10	239	115	207	952	1159
25	266	130	236	934	1170
50	297	147	267	912	1179
75	320	160	290	896	1186
100	338	170	309	881	1190
125	353	178	325	868	1193
150	365	185	339	858	1197
200	387	197	362	838	1200
250	406	208	381	821	1202
300	422	217	399	805	1204
400	448	231	438	778	1216
500	470	243	453	752	1205
600	489	254	475	729	1204

RECTANGULAR TANK CAPACITY IN GALLONS

$$\text{Gallons} = \frac{\text{Height x Width x Length (inches)}}{230}$$

or

$$\text{Gallons} = \text{H x W x L(ft.) x 7.5}$$

CIRCULAR TANK STORAGE CAPACITY IN GALLONS

$$\text{Storage} = 6D^2 \times L \text{ (Gallons)}$$

Where: D = tank diameter in Feet
L = length in Feet

Load Sizing Calculations

Heating Water with Steam

Quick Method

$$\text{Lbs. /hr.} = \frac{\text{GPM}}{2} \times \Delta T$$

Precise Method

$$\text{Lbs. / hr.} = \frac{\text{GPM} \times 500 \times \Delta T}{h_{f_g}}$$

Heating or Cooling Water with Water

$$\text{GPM}_1 = \text{GPM}_2 \times \frac{\text{°F water}_2 \text{ temp rise or drop}}{\text{°F water}_1 \text{ temp rise or drop}}$$

Heating or Cooling Water

$$\text{GPM} = \frac{\text{BTU/hr.}}{\text{(°F water temp. rise or drop) x 500}}$$

Heating Oil with Steam

$$\text{Lbs. /hr.} = \frac{\text{GPM}}{4} \times \text{(°F oil temp. rise)}$$

Heating Air with Water

$$\text{GPM} = 2.16 \times \frac{\text{CFM x (°F air temp. rise)}}{\text{1000 x (°F water temp drop or rise)}}$$

Heating Liquids with Steam

$$\text{Lbs. / hr.} = \frac{\text{GPM} \times 60 \times \text{CP} \times \text{W}}{h_{f_g}} \times \Delta T$$

Heating Liquids in Steam Jacketed Kettles

$$\text{Lbs. / hr.} = \frac{\text{GPM} \times \text{Cp} \times \text{S} \times 8.33}{h_{f_g} \times t} \times \text{DT}$$

General Liquid Heating

$$\text{Lbs. / hr.} = \frac{\text{W} \times \text{Cp}}{h_{f_g} \times t} \times \Delta T$$

Heating Air with Steam

$$\text{Lbs. / hr.} = \frac{\text{CFM}}{900} \times \Delta T$$

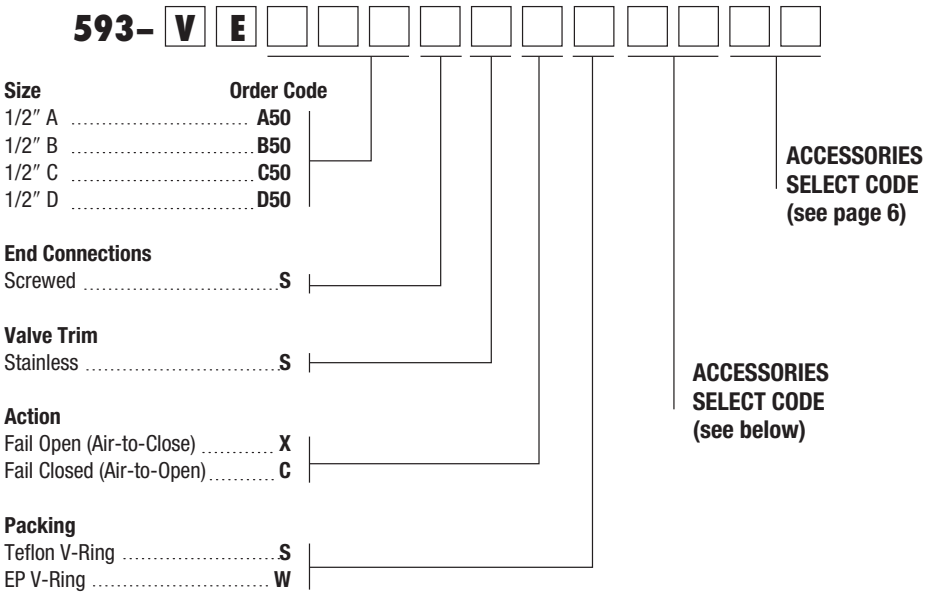
Glossary of Terms

- **t** = Time in Hours
- **Cp** = Specific Heat of Liquid
- **S** = Specific Gravity of Fluid
- **W** = Weight in Lbs.
- **ΔT** = Temperature rise of fall in °F
- **h_{f_g}** = Latent Heat of Steam

Conversion Factors

- **1 lb. Steam/Hr.** = 1000 BTU/Hr.
- **1 Cubic Meter** = 265 U.S. Gallons
- **1 Cubic Foot Water** = 62.4 lbs.
- **1 PSI** = 2.04 inches of Mercury
- **1 PSI** = 2.3 feet of Water
- **1 PSI** = 27.7 inches of Water
- **1 U.S. Gallon Water** = 231 Cubic inches
- **1 U.S. Gallon Water** = 8.33 lbs.

Ordering Information



Actuator Select code

CODE	PNEUMATIC DIAPHRAGM ACTUATORS
46	46 Sq. In., 1" Max Valve Stroke with Standard Springs, adjustable start w/ 7 ~ 12 lb. Fixed span.
4C	46 Sq. In., 1" Max Valve Stroke with Extreme Cycle Springs, adjustable start w/ 7~ 12 lb. Fixed span.

Actuator compatibility

1/2" 46" Diaphragm

Accessories Select code

BELLOFRAM 1000 I/P'S

Code	Description
IS	3–15 psi
TS	1–17 psi
US	3–27 psi

CONTROL/AIR TYPE 900X I/P

Code	Description
ES	0–30 psi

UTILITY POSITIONER AND I/P

Code	Description
BS	4–20 mA

UTILITY POSITIONER

Code	Description
PS	3–15 psi
RS	3–9 psi
SS	9–15 psi

NO ACCESSORIES

Code	Description
0S	No accessories

I/P Transducers

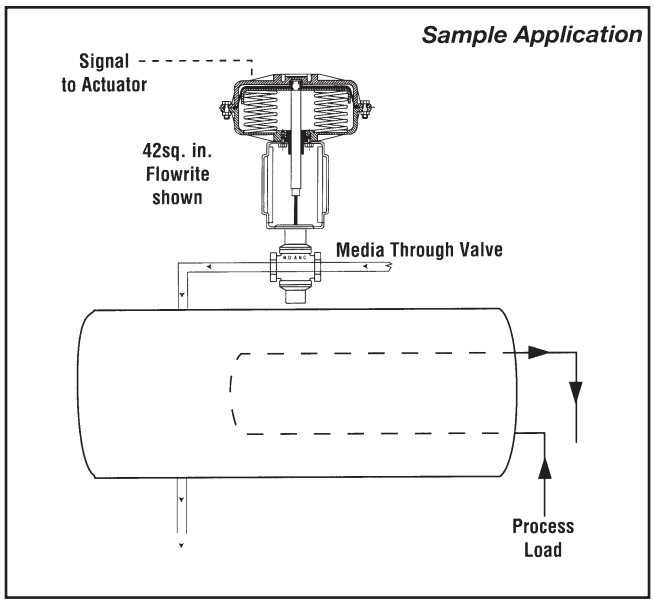
The "standard" 3–15 psi signal was originally designed as a transmission signal, not a valve actuation signal. Unbalanced control valves have their operational limits lowered when forced to operate with this 3–15 psi signal. The Fluid Controls Institute (in Standard 87-2) has recommended that a 1–17 psi air signal range be used when directly actuating a control valve without a positioner. Powers concurs with this recommendation, and therefore, offers a 1–17 psi I/P transducer and a 0–30 psi I/P transducer for maximum close-off. 3–15 psi I/P transducers should be used in conjunction with positioners.

Positioners

Positioners are used for one or more of the following reasons:

1) To split range valves.
2) To eliminate unwanted valve movement caused by line pressure variations
3) To minimize the effects of "stick-slip"
4) To speed response time and/or
5) To increase close-off rating when I/Ps are used.

Calculation/Sketch Area



Considerations: _____

_____

_____

_____

Medium: _____

Capacity: _____

Inlet Pressures: _____

Pressure Drop: _____

Temp.: (Packing): _____

Fail Safe: _____

FLOWRITE II®

For more information on FLOWRITE II® or other quality Powers products,
visit us at our website www.watts.com.

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