Penn Separator Corp.

PENN SEPARATOR CORP.

P.O. Box 340
Brookville, PA 15825

Series PS Temperature Actuated Modulating Water Valves

6-1-96

Application

The modulating valves regulate the flow of water to maintain a desired temperature. PS valves OPEN on a temperature increase at the bulb.

The PS series temperature valve are specifically designed for use on blowdown separator after coolers. Valves are factory set to 135 degrees Fahrenheit to maintain discharge temperatures at drain of 140 degrees Fahrenheit. For other water temperature control applications contact your Pennsylvania Separator Representative.

Temperature actuated three-way diverting valves are available for special applications. Write to Customer Service for additional information.

For use with liquids other than water, write to Customer Service.

All Series PS water regulating valves are designed for use only as operating devices. Where system closure, improper flow or loss of pressure due to valve failure can result in personal injury and/or loss of property, a separate pressure relief or safety shutoff valve, as applicable, must be added by the user.

Features

- No close fitting sliding parts in water passages.

- Range spring does not come in contact with the cooling water.

- Easy manual flushing, if required.

- Valve design minimizes chatter and water hammer.

- Free movement of all parts provides smooth temperature modulation.

- Adjustment not affected by water pressure variations.

- Withstands high hydraulic shock without damage.

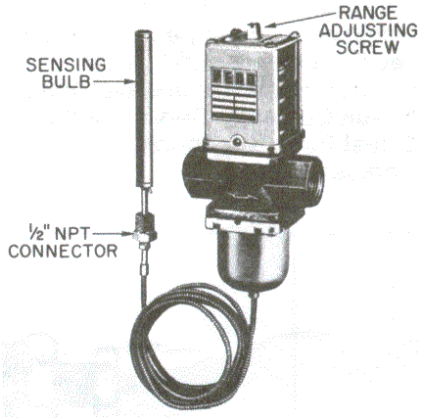


Fig. 1 --- PS Temperature Actuated Water Valve.

General Description

A pressure-balanced design, employing synthetic rubber sealing diaphragms correctly proportioned to the valve port area, balances valves against both gradual and sudden water pressure changes, seals water away from range spring and guides and provides protection against high water surge pressures.

Range spring and sliding parts are not submerged in water where they would be subject to sedimentation and corrosion. Only five metal parts, made of corrosion resistant material, come in contact with the water . . . valve disc holder, disc stud, valve seat, valve stem, and body. (See Fig. 2.)

Note: To provide satisfactory operation, always install valve with bellows down and spring cage up. Capillary end of temperature bulb should always be higher than plugged-end of bulb, or if horizontal, the word TOP should be at the top or uppermost surface of bulb.

Specifications

Product	**PS**	Modulating Water Valves
Water Supply Pressure		150 PSIG (1034 kPa) Maximum– 60 PSIG Working Pres.
Water Supply Temperature		160 F (71 C) Maximum
Material	**Body**	3/8", 1/2", and 3/4" Sizes - Cast Brass, 1" through 2 1/2" Sizes - Cast Iron with Corrosion Resistant Finish, Naval Bronze Available, if Required
	Valve Disc	Buna-N
	Disc Holder	Commercial Valves - Brass Naval Bronze Available - Monel
	Valve Seat	Commercial Valves - Aluminum Bronze Naval Bronze Available - Nickel Silver
	Diaphragms	Nylon Reinforced Buna-N
Set Point Adjustment		Square Adjustment Shaft, Use a Standard Refrigeration Service Valve Wrench
Mounting		Vertical with Temperature Element Down

Temperature Elements

Standard temperature elements are furnished with 6” (1.8 m) capillary. Optional capillary lengths are available on quantity orders, lengths 2’ (.6 m), 4’ (1.2 m), 10’ (3 m) and longer in increments of 5’ (1.5 m) at extra cost. Temperature bulbs and ranges currently available are listed in Temperature Ranges and Bulb Dimension Chart. Finned air immersion type temperature bulbs, special elements and special temperature ranges are available. Consult Customer Service or the nearest Penn Separator Representative.

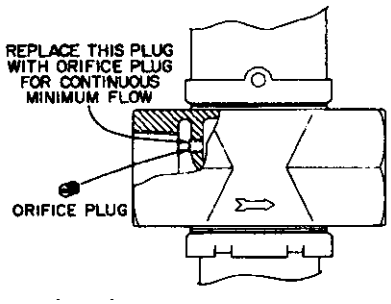


Fig. 3 --- Stock temperature valve.

Optional Constructions

Internal Bypass

A drilled hole is provided in valves which are actuated by temperature of water passing through the valve.

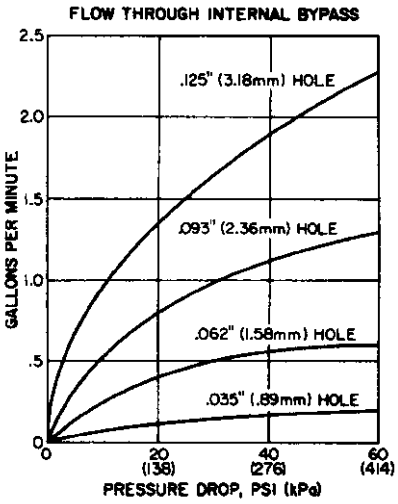


Fig. 4 --- Internal Bypass chart.

Bulb Dimensions
Style 4 Bulb

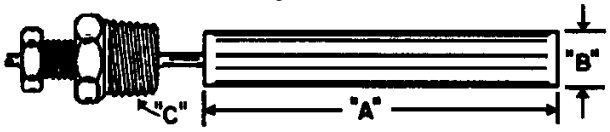


Table 2

Valve Size	“A”	“B”	“C” Thread*
1/2”	3 1/4”	11/16”	1/2” NPT
3/4”	3 1/4”	11/16”	1/2” NPT
1”	6”	11/16”	1/2” NPT
1 1/4”	6”	11/16”	1/2” NPT
1 1/2”	6”	11/16”	1/2” NPT
2”	10”	11/16”	1/2” NPT
2 1/2”	*	*	1/2” NPT

* Not available at this time.

Hole in valve body provides continuous bypass flow permitting temperature actuated bulb to sense temperature change. Eliminates requirement for special bypass line. Specify internal bypass hole size required. Bypass hole sizes are: .035” (.89 mm), .062” (1.58 mm), .093” (2.36 mm), or .125 “ (3.18 mm). (See Fig. 4)

Stainless Steel bulb

Models with stainless bulb, support tube, and closed tank fittings are available at extra cost on special orders.

Disc Holder, Valve Seat and Extension Sleeve

Available in monel on commercial Valves at additional cost.

Manual Flushing

Models with stainless steel bulb, support tube, and closed tank fittings are available at extra cost on special orders.

Repairs And Replacement

Field repairs must not be made except for replacement of the sensing element, internal parts, and the rubber diaphragms. For a replacement parts kit, contact the nearest Penn Separator Wholesaler. Replacement part kit numbers are shown in Forms 996-57 and 996-58

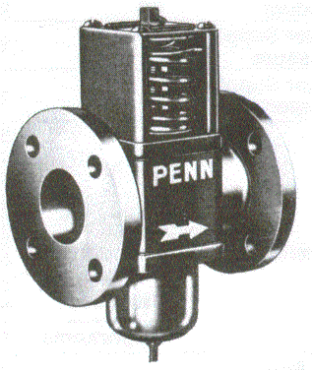


Fig. 7 --- A.S.M.E. flanged type water valve (four flange bolt holes).

Stock Catalog Valves

Catalog Number	Pipe Size NPT	Range F (Opening Point)	Bulb Size	Bypass Orifice Diameter	Maximum Bulb Temperature (ºF)	Shipping Wt. Lb. (kg)
P.S. 050-3.25- 135	1/2”	115 - 180	11/16” x 3 1/4”	.062”	200	4.6 (2.1)
P.S. 075-3.25- 135	3/4”	115 - 180	11/16” x 3 1/4”	.062”	200	5.6 (2.5)
P.S. 100-6.00- 135	1”	115 - 180	11/16” x 6”	.062”	200	10.0 (4.5)
P.S. 125-6.00- 135	1 1/4”	115 - 180	11/16” x 6”	.093”	200	11.8 (5.4)
P.S. 150-6.00- 135	1 1/2”*	115 - 180	11/16” x 6”	.093”	200	17.5 (7.9)
P.S. 200-10.00- 13	2”*	115 - 180	11/16” x 10”	.093”	200	26.0 (11.8)
P.S. 250-10.00- 13	2 1/2”*	115 - 180	**	.125”	200	32.0 (14.5)

Al stock valves supplied with 6” armored capillary and 1/2” NPT closed tank connectors.

* A.S.M.E. Flange

** Not available as of 6-1-96 to be advised.

To Select Water Valve Size

Refer to Flow Chart for selection of valves. Carefully follow steps as outlined below.

1. Determine the maximum water flow required and draw a horizontal line across upper half of Flow Chart through this flow.

2. Determine the temperature rise above the valve opening point.

   a. Valve closing point is the highest temperature at which it is desired to have no flow through the valve.

   b. Valve opening point will be about 5 degrees Fahrenheit (2.8 degrees Celsius) above the valve closing point.

   c. Determine the temperature the valve is to maintain

   d. Subtract the temperature opening point from the operating temperature. This gives the temperature rise.

3. Draw horizontal line across lower half of Flow Chart through this value.

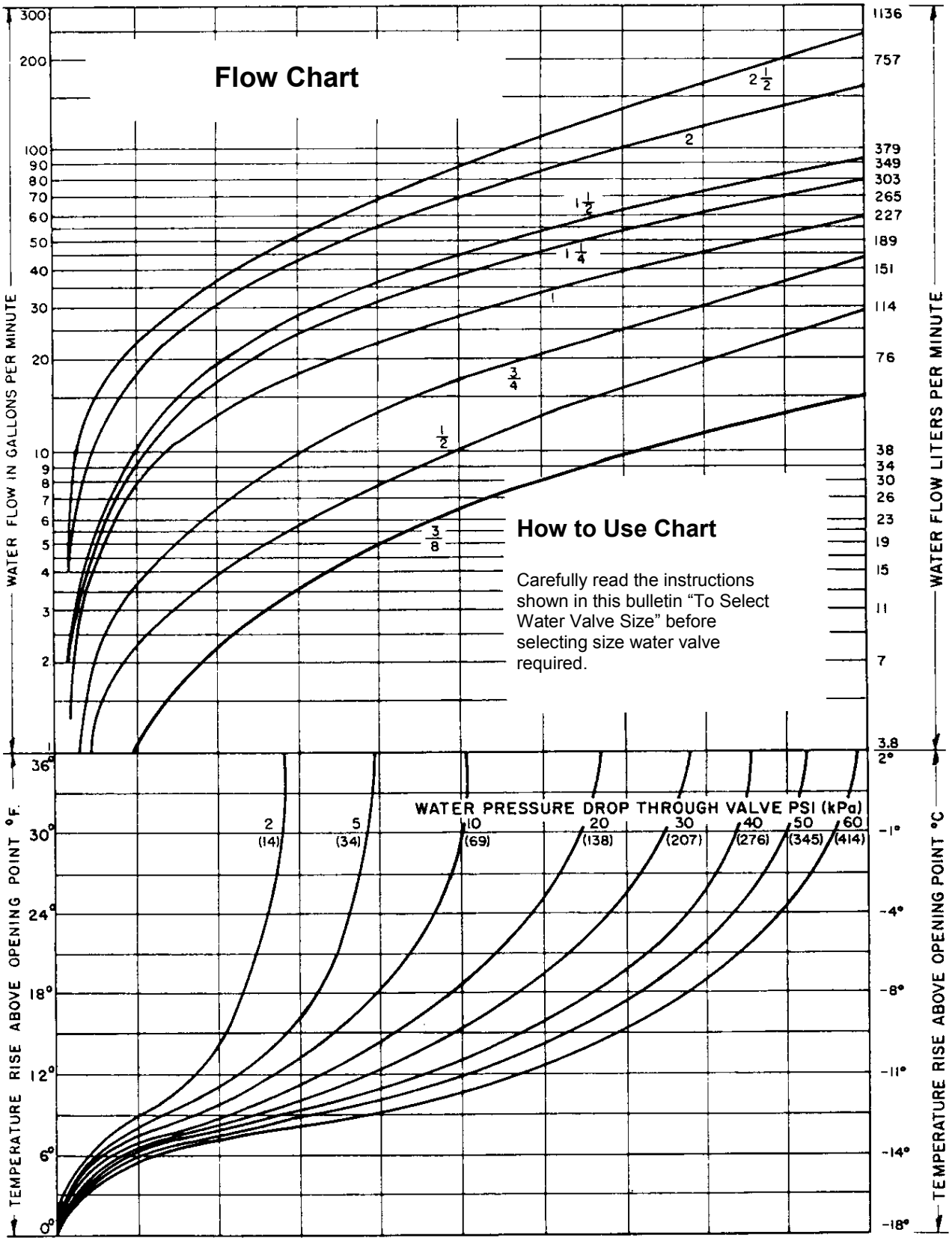
4. Determine the allowable pressure drop through the valve -- this is the pressure actually available to force liquid through the valve.

5. On lower halve of curve, mark point on drawn-in horizontal temperature line at pressure determined in Step 4. Interpolate between curves, or pick curve for nearest lower pressure drop for which curve is drawin (this gives a reserve maximum load capacity).

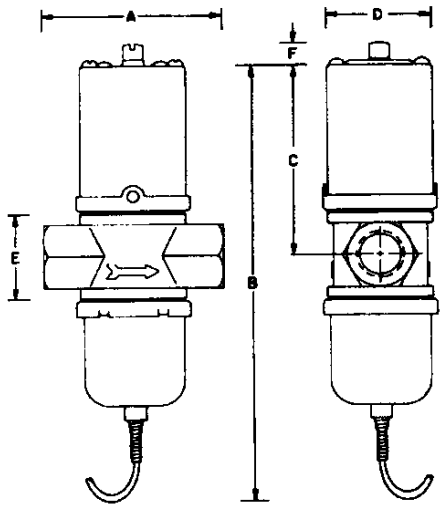
6. From this point draw line vertically upward until it intersects drawn-in horizontal water flow line in upper half of Flow chart.

7. If intersection falls on a valve size curve this is the valve size.

8. If intersection falls between two curves the required valve size is the larger of the two.


Flow Chart
How to Use Chart
Carefully read the instructions shown in this bulletin "To Select Water Valve Size" before selecting size water valve required.
WATER FLOW IN GALLONS PER MINUTE
WATER FLOW LITERS PER MINUTE
TEMPERATURE RISE ABOVE OPENING POINT °F.
TEMPERATURE RISE ABOVE OPENING POINT °C
WATER PRESSURE DROP THROUGH VALVE PSI (kPa)
2 (14)
5 (34)
10 (69)
20 (138)
30 (207)
40 (276)
50 (345)
60 (414)
2½
2
1½
1¼
1
¾
½
⅜

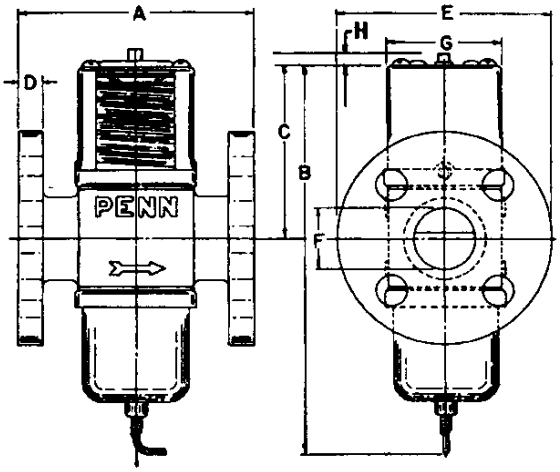
Roughing-In Dimensions
Threaded Type
(Cast Iron or Bronze Body)



Valve Size	Dimensions in Inches					
	A	B	C	D	E	F
3/8”	2-7/8	6-11/32	3-1/8	1-1/2	15/16	13/32
1/2”	3-1/8 (3-15/64)*	7	3-3/8	1-27/32	1-1/8	13/32
3/4”	3-3/8 (3-39/64)*	7-29/64	3-13/16	2-1/32	1-3/8	13/32
1”	4-27/32 (4-57/64)*	10-13/64	5-31/64	2-5/8	2	1/2
1-1/4”	4-55/64 (4-7/8)*	10-37/64	5-43/64	2-5/8	2-3/8	1/2

* NOTE: Figures in () are for Maritime Values.
All other dimensions remain the same.

Flange Type
(Cast Iron . . . A.S.M.E. Flange Specs.)



Valve Size	Dimensions in Inches							
	A	B	C	D	E	F	G	H
1-1/2”	5-5/16	10-37/64	5-43/64	9/16	5	1-7/8 Dia.	2-5/8	1/2
2”	6-5/8	12-33/64	6-15/32	5/8	6	2-1/4 Dia.	3-1/2	1/2
2-1/2”	6-3/4	12-33/64	6-15/32	3/4	7	2-3/4 Dia.	3-1/2	1/2

Flange Specifications

Valve Size	No. of Holes	Hole Size	Bolt Circle
1-1/2”	4	5/8”	3-7/8”
2”	4	3/4”	4-3/4”
2-1/2”	4	3/4”	5-1/2”