THE JOHN WOOD COMPANY

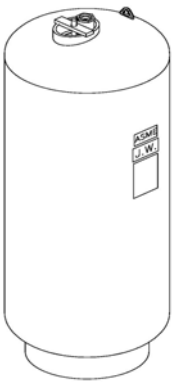
SUBMITTAL

Form 620.1

Job Name:		
Job No:	JWC Representative:	
Tag No.:	Submitted By:	Date:
Engineer:	Approved By:	Date:
Contractor:	Order No.:	Date:

JAER Series, Type IV

☑ ASME Expansion Tanks
☑ Replaceable Bladder Type
☑ Not For Potable Water



APPLICATION

- JAER Series pre-charged bladder type expansion tanks are designed to absorb the expansion forces of heating or cooling system water to maintain the proper system pressurization.
- By holding the system water in the replaceable bladder, the JAER Series tanks eliminate problems such as tank corrosion and water-logging.

DESIGN PRESSURE AND TEMPERATURE

- Maximum design pressure:
  JAER-23-601 to 607: 150 PSI (1035 kPa)
  JAER-23-608 to 610: 125 PSI (862 kPa)
- Maximum design temperature: 240°F (115°C)

SPECIFICATIONS

- Designed and built in accordance with the ASME Code Section VIII, Division I
- Installation: vertical or horizontal
- Shell: carbon steel with exterior gray primer finish
- System connection: top-mounted with Carbon Steel wetted parts
- Replaceable bladder: high quality butyl rubber
- Full acceptance design
- Air charge valve: ¼" Schrader charging valve top- mounted with protective guard
- Air pre-charge range: 12 PSI minimum / 80 PSI maximum
- Standard factory pre-charge: 12 PSI

TYPICAL DESIGN SPECIFICATION

Furnish and install as shown on plans John Wood Model No. JAER-23-_____ (____ gallon / ____ liter) ASME pre-charged vertical / horizontal steel expansion tank with replaceable heavy-duty butyl rubber bladder. The tank shall have a top-mounted ___" NPT system connection and a charging valve connection (Schrader valve) with full guard to facilitate on-site charging of the tank to meet system requirements. The tank shall be fitted with lifting rings and a base designed for vertical installation or saddles for horizontal installation. The tank must be designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code Section VIII, Division I, with a stamped MAWP of _____PSI (_____ kPa) and a maximum design temperature of 240°F (115°C).

ASME Bladder-type Expansion Tanks
JAER Series, Type IV

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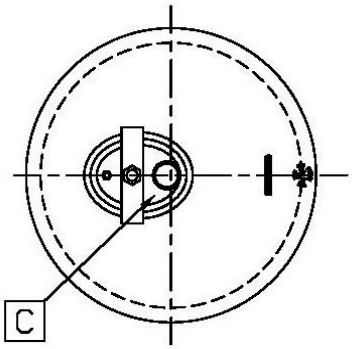

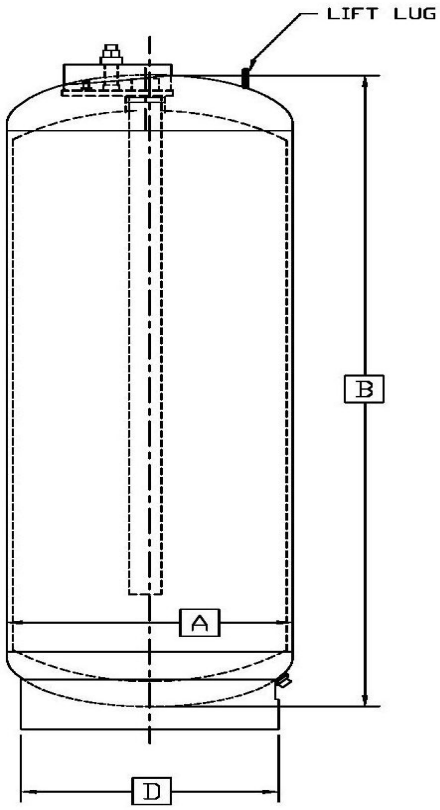

OPTIONS	
X	California Sight Glass
X	Seismic Clips

MODEL NUMBER	MAWP	TANK VOLUME		A DIAMETER		B HEIGHT		C SYS CONN	D BASE DIAMETER		SHIPPING WEIGHT	
	PSIG	GAL	L	IN	MM	IN	MM	INCH (NPT)	IN	MM	LBS	KG
JAER-23-601	150	10	40	12	305	22	559	1	8⅝	219	50	23
JAER-23-602	150	15	60	12	305	33½	851	1	8⅝	219	65	29
JAER-23-603	150	24	90	12	305	52	1321	1	8⅝	219	90	41
JAER-23-604	150	30	110	14	356	48	1219	1	8⅝	219	90	41
JAER-23-605	150	35	130	14	356	55½	1410	1	8⅝	219	100	45
JAER-23-606	150	40	150	14	356	63	1600	1	8⅝	219	115	52
JAER-23-607	150	60	230	16	406	72⅜	1838	1½	11½	292	155	70
JAER-23-608	125	80	300	20	508	63¼	1607	1½	18	457	175	79
JAER-23-668	125	105	400	24	610	56	1422	1½	18	457	209	95
JAER-23-609	125	120	450	24	610	66	1676	1½	18	457	226	103
JAER-23-610	125	135	511	24	610	72	1829	1½	18	457	255	116

THE JOHN WOOD COMPANY
AN ALCO INDUSTRIES COMPANY
98 Highland Avenue, Oaks, PA 19456-1052
Tel: 610-666-1220 • 800-537-5581
Fax: 610-666-0193

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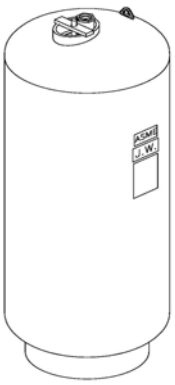

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ASME Bladder-type Expansion Tanks
JAER Series, Type IV

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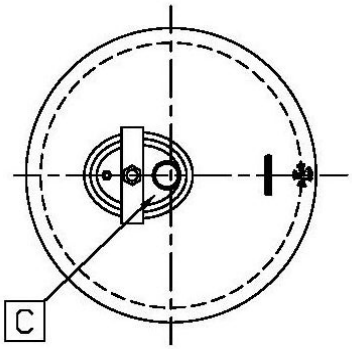

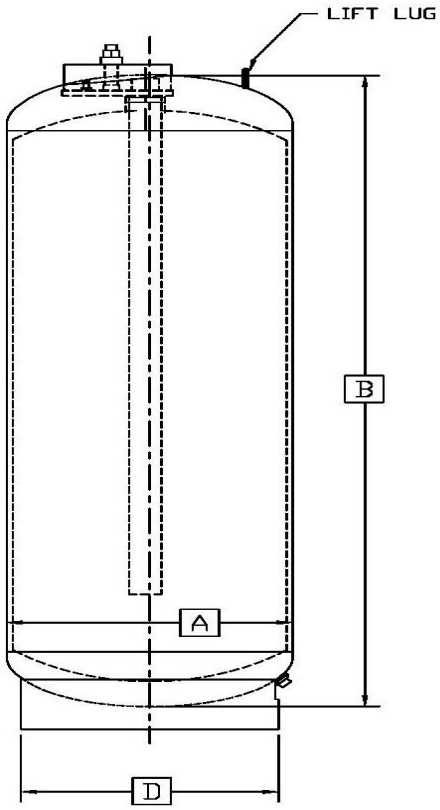

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Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

KUNKLE

Non-code Bronze Liquid Relief Valves

Features

- **Both inlet and outlet connections are cast integral with body** to permit easy inspection and servicing without disconnecting piping.
- **Beveled seats lapped** for optimum performance.
- **SS spring** for optimum corrosion resistance.

Model Descriptions

Model 19: All bronze, equipped with handwheel for easy adjustment within spring ranges.

Model 19M: Same as Model 19 except SS trim (seat and disc). (Available 2 1/2-inch and 3-inch only). For higher pressure settings or severe applications.

Model 20: All bronze, with pressure-tight cap. Suitable for maximum back pressure of 50 psig.

Model 20M: Same as Model 20 except SS trim (available in 2 1/2-inch and 3-inch only) (seat and disc). For higher pressure settings or severe applications. Maximum back pressure of 50 psig.

Model 20P: Same as Model 20 except with packed lift lever. Suitable for maximum back pressure of 50 psig.

Model 20MP: Same as Model 20M except with packed lift lever. Maximum back pressure of 50 psig.

Model 200A: Special non-chattering design. Recommended for light oils and continuous by-pass or pressure regulation. UL listed for light oil service. Available 3/4-inch through 1 1/2-inch sizes. Female NPT connections only.

Model 200H: Same as Model 20. UL listed for use with fuel oils. Available 3/4-inch through 2-inch sizes.

Applications

- Non-code liquid relief.
- Overpressure relief and protection of pumps, tanks, lines and hydraulic systems.
- Pressure regulation.
- Continuous by-pass relief.

Model 20

Options

- Available with optional female NPT inlet or flanged inlet and outlet connections.
- Male x Female NPT connections standard. (Variation 01)
- Female x Female NPT connections available. (Variation 02)
- 150# Flange x 150# Flange (Variation 03)
- 300# Flange x 150# Flange (Variation 04)
- **Model 20-D only**
  Variation 05: 50 to 150 psig spring range
  Variation 06: 100 to 300 psig

Pressure and Temperature Limits

Models 19, 20:
1 to 300 psig
-60° to 406°F

Models 19M, 20M:
1 to 500 psig
-60° to 406°F

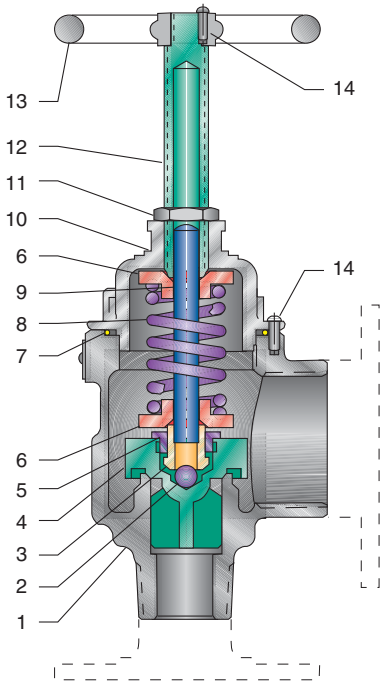
Models 200A, 200H:
10 to 200 psig
-60° to 406°F

tyco / Flow Control

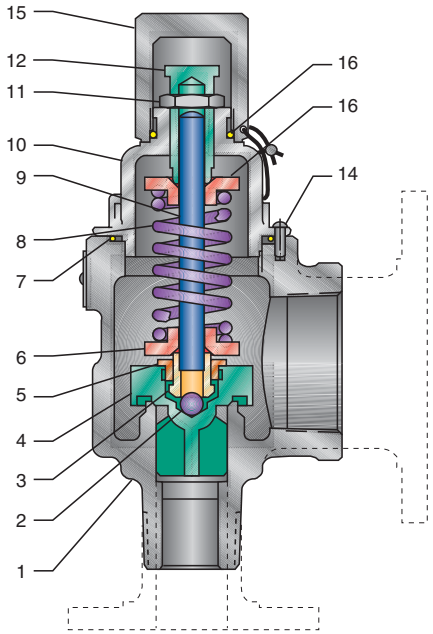
Total Flow Control Solutions™

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Parts and Materials



Models 19, 19M



Models 20, 20M, 200H

Parts and Materials - Models 19, 19M, 20, 20M, 200A and 200H

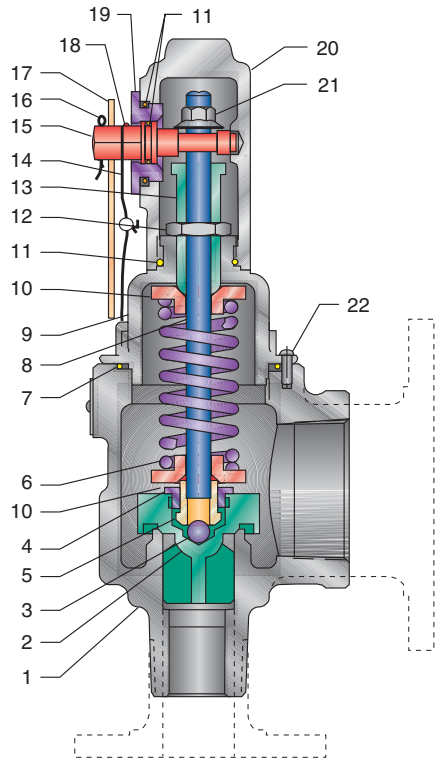
No.	Part Name	19, 19M	20, 20M, 20P, 20MP, 200A, 200H
1	Body	Bronze B62[3]	Bronze B62
2	Ball	SS A756-440	SS A756-440
3	Stem Retainer	Brass B16	Brass B16
4	Disc	Bronze B584 Alloy 84400[1,4]	Bronze B584 Alloy 84400[1]
5	Retainer Locknut	Brass B16	Brass B16
6	Spring Step[2]	Brass B16	Brass B16
7	O-ring	Teflon®	Teflon®
8	Spring[2]	SS 316 or 17-7	SS 316 or 17-7
9	Stem	Brass B16	Brass B16
10	Bonnet	Bronze B584 Alloy 84400	Bronze B584 Alloy 84400
11	Jam Nut	Steel A108 Zinc Plated	Brass B16
12	Compression Screw	Brass B16	Brass B16
13	Handwheel	Iron A126 Zinc Plated[5]	N/A
14	Drive Screw[6]	SS Commercial	SS Commercial
15	Cap	N/A	Brass B16
16	O-ring	N/A	BUNA-N

Notes

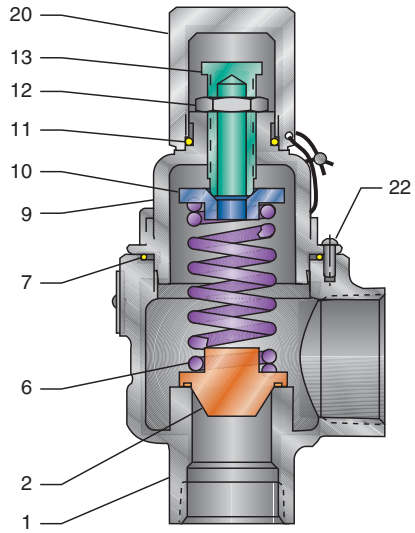
1. Brass, B283, Alloy 485, for 1/2-, 3/4-, and 1-inch.
2. All springs will be SS.
3. Model 19M supplied with bronze body and SS seat insert.
4. Model 19M is SS.
5. Bronze B584 Alloy 84400 for 1/2-, 3/4-, 1 1/4-inch.
6. Not used on bonnet for 2 1/2- and 3-inch.
7. Teflon® is a registered trademark of E.I. du Pont de Nemours Company.

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Parts and Materials



Models 20P, 20MP With Lever



Parts and Materials - Models 20P, 20MP, 200A and 200H

No.	Part Name	20P, 20MP	200A
1	Body[1]	Bronze B62[2]	Bronze B62
2	Disc	Bronze B584 Alloy 84400[3,4]	Brass B16
3	Ball	SS A156-440	N/A
4	Stem Retainer	Brass B16	N/A
5	Retainer Locknut	Brass B16	N/A
6	Spring	SS 316 or 17-7	SS 316 or 17-7
7	Body O-ring	Teflon®	Teflon®
8	Stem	Brass B16	N/A
9	Bonnet	Bronze B584 Alloy 84400	Bronze B584 Alloy 84400
10	Spring Step	Brass B16	Brass B16
11	O-ring	BUNA-N	BUNA-N
12	Jam Nut	Brass B16	Brass B16
13	Compression Screw	Brass B16	Brass B16
14	Seal - Wire	Lead and Wire	N/A
15	Lift Cam	SS A743-316	N/A
16	Cotter Pin	Steel	N/A
17	Lever	Steel A108 Zinc Plated	N/A
18	Drive Screw	SS Commercial	N/A
19	Retainer Cam	Brass B16	N/A
20	Cap	Bronze B584 Alloy 84400	Brass B16
21	Lift Nut	Steel A108	N/A
22	Drive Screw	SS Commercial	SS Commercial

Notes

1. Flanged connections optional.
2. Model 20MP has bronze body with SS seat insert.
3. Brass, B283, Alloy 485 for 1/2-, 3/4-, 1-inch.
4. Model 20MP is SS.

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Liquid Relief Valves

Specifications

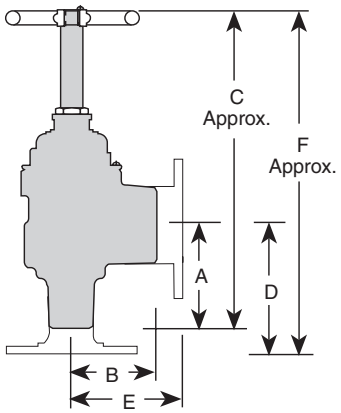
Size Inlet/Outlet NPT, (in)	Min/Max Set Pressure, (psig[1]) 19, 20, 20P	200A, 200H	19M, 20M, 20MP	Min/Max Temp. (°F)	Approximate Wt., (lb)
1/2[2]	1/300	—	—	-60/406	2 1/4
3/4	1/300	1/200	—	-60/406	2 1/4
1	1/300	1/200	—	-60/406	3 1/2
1 1/4	1/300	1/200	—	-60/406	5
1 1/2	1/300	1/200	—	-60/406	6 1/4
2	1/300	1/200	—	-60/406	11
2 1/2	1/300	—	1/500	-60/406	16
3	1/300	—	1/500	-60/406	25

Dimensions

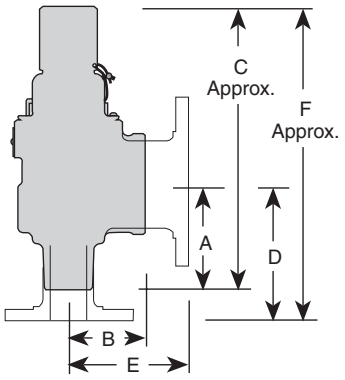
Valve Model	Threaded A	B	C	150/300 Flange D	E	F
1/2-inch Size						
19	2	1 5/8	6 1/8	3 5/16	3 5/16	7 3/8
20	2	1 5/8	5 7/8	3 5/16	3 5/16	7 1/4
20P	2	1 5/8	7 3/8	N/A	N/A	N/A
3/4-inch Size						
19	2	1 5/8	6 1/8	3 5/16	3 5/16	7 3/8
20	2	1 5/8	5 7/8	3 5/16	3 5/16	7 1/4
20P	2	1 5/8	7 3/8	3 5/16	3 5/16	8 3/4
200A	2	1 5/8	5 7/8	N/A	N/A	N/A
200H	1 15/16	1 5/8	5 7/8	3 5/16	3 5/16	7 3/8
1-inch Size						
19	2 1/4	1 7/8	7 1/8	3 7/16	3 7/16	8 1/4
20	2 1/4	1 7/8	6 3/4	3 7/16	3 7/16	7 7/8
20P	2 1/4	1 7/8	8 3/4	3 7/16	3 7/16	9 1/2
200A	2 1/4	1 7/8	6 3/4	N/A	N/A	N/A
200H	2 1/4	1 7/8	6 11/16	3 7/16	3 7/16	8

Notes

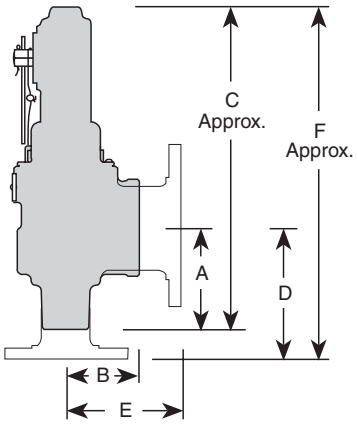
1. All flanges rated per ANSI B16.24.
2. Standard with 3/4-inch outlet - 1/2-inch outlet optional.



Models 19, 19M



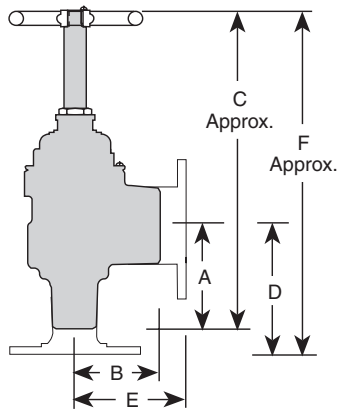
Models 20, 20M, 200A, 200H



Models 20P, 20MP

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Liquid Relief Valves



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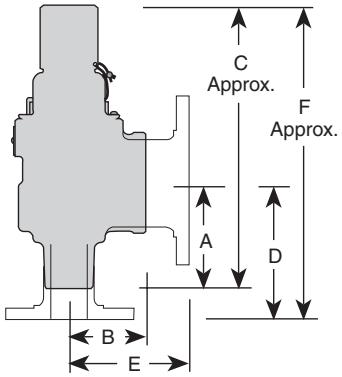

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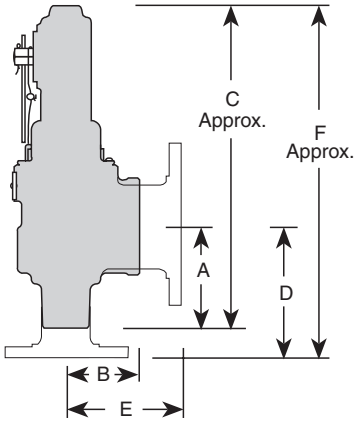


Models 20P, 20MP

Dimensions, inches

Valve Model	Threaded			150/300 Flange		
	A	B	C	D	E	F
1 1/4-inch Size						
19	2 5/8	2 1/16	8 1/8	3 11/16	3 11/16	9 1/8
20	2 5/8	2 1/16	8 1/8	3 11/16	3 11/16	8 3/8
20P	2 5/8	2 1/16	9	3 11/16	3 11/16	10
200A	2 5/8	2 1/16	7 3/8	N/A	N/A	N/A
200H	2 5/8	2 1/16	7 3/8	3 11/16	3 11/16	8 5/8
1 1/2-inch Size						
19	2 11/16	2 1/8	8 5/8	4 1/8	4 1/8	10 1/8
20	2 11/16	2 1/8	8 5/8	4 1/8	4 1/8	9 1/4
20P	2 11/16	2 1/8	9 1/4	4 1/8	4 1/8	10 3/4
200A	2 11/16	2 1/8	7 7/8	N/A	N/A	N/A
200H	2 11/16	2 1/8	7 7/8	4 1/8	4 1/8	9 1/2
2-inch Size						
19	3 1/2	2 11/16	10 5/8	4 1/4	4 1/4	11 1/4
20	3 1/2	2 11/16	10 5/8	4 1/4	4 1/4	10 5/8
20P	3 1/2	2 11/16	12 1/2	4 1/4	4 1/4	13 1/8
200H	3 1/2	2 11/16	9 15/16	4 1/2	4 1/4	10 15/16
2 1/2-inch Size						
19	3 7/8	3	11 1/8	4 3/4	4 3/4	12
19M	3 7/8	3	11 1/8	4 3/4	4 3/4	12 1/4
20	3 7/8	3	10	4 3/4	4 3/4	13 5/16
20M	3 7/8	3	10	4 3/4	4 3/4	13 9/16
20P	3 7/8	3	12 1/2	4 3/4	4 3/4	15 3/4
20MP	3 7/8	3	12 1/2	54 3/4	4 3/4	16 1/16
3-inch Size						
19	4 5/8	3 7/8	12 1/4	5	5	12 5/8
19M	4 5/8	3 7/8	12 1/4	5	5	13 1/8
20	4 5/8	3 7/8	12 1/4	5	5	14 3/4
20M	4 5/8	3 7/8	12 1/4	5	5	15 1/8
20P	4 5/8	3 7/8	14 3/8	5	5	16 7/8
20MP	4 5/8	3 7/8	14 3/8	5	5	17 1/4

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Models 19, 19M, 20, 20M, 20MP, 20P and 200H Capacities Liquid Relief Valves

Non-code Liquid Capacity - 25% Accumulation (GPM)

Set Pressure	Valve Inlet and Outlet Size							
(psig)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
1	1	2	4	6	10	19	31	45
5	2	5	8	14	22	42	68	100
10	3	7	11	20	31	59	97	141
20	4	9	16	28	43	84	137	200
30	5	11	20	34	53	102	168	244
40	6	13	23	39	61	118	193	282
50	7	15	25	44	68	132	216	315
60	7	16	28	48	75	145	237	346
70	8	17	30	52	81	156	256	373
80	8	19	32	55	87	167	274	399
90	9	20	34	59	92	177	290	423
100	9	21	36	62	97	187	306	446
110	10	22	37	65	102	196	321	468
120	10	23	39	68	106	205	335	489
130	11	24	41	71	110	213	349	509
140	11	25	42	73	115	221	362	528
150	11	25	44	76	119	229	375	546
160	12	26	45	78	123	236	387	564
170	12	27	47	81	126	244	399	582
180	13	28	48	83	130	251	410	599
190	13	29	49	86	134	258	422	615
200	13	29	50	88	137	264	433	631
210	14	30	52	90	140	271	443	646
220	14	31	53	92	144	277	454	662
230	14	32	54	94	147	284	464	677
240	14	32	55	96	150	290	474	691

Note

1. Liquid Overpressure Factors

   To determine capacities at other than 25% overpressure/accumulation, multiply capacity shown by:

   10% Acc. = 0.6
   15% Acc. = 0.8
   20% Acc. = 0.9

Models 19, 19M, 20, 20M, 20MP, 20P and 200H Capacities Liquid Relief Valves

Non-code Liquid Capacity - 25% Accumulation (GPM)

Set Pressure	Valve Inlet and Outlet Size							
(psig)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
250	15	33	56	98	153	296	484	705
260	15	34	58	100	156	301	493	719
270	15	34	59	102	159	307	503	733
280	16	35	60	104	162	313	512	746
290	16	35	61	106	165	318	521	760
300	16	36	62	107	168	323	530	773
310	—	—	—	—	—	—	539	785
320	—	—	—	—	—	—	547	798
330	—	—	—	—	—	—	556	810
340	—	—	—	—	—	—	564	823
350	—	—	—	—	—	—	572	835
360	—	—	—	—	—	—	580	846
370	—	—	—	—	—	—	588	858
380	—	—	—	—	—	—	596	870
390	—	—	—	—	—	—	604	881
400	—	—	—	—	—	—	612	892
410	—	—	—	—	—	—	619	903
420	—	—	—	—	—	—	627	914
430	—	—	—	—	—	—	634	925
440	—	—	—	—	—	—	642	936
450	—	—	—	—	—	—	649	946
460	—	—	—	—	—	—	656	957
470	—	—	—	—	—	—	663	967
480	—	—	—	—	—	—	670	977
490	—	—	—	—	—	—	677	987
500	—	—	—	—	—	—	684	998

Note

1. Liquid Overpressure Factors

   To determine capacities at other than 25% overpressure/accumulation, multiply capacity shown by:

   10% Acc. = 0.6
   15% Acc. = 0.8
   20% Acc. = 0.9

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

200A Inlet Capacities at 25%, 50% 75% and 100% Accumulation (GPM)

Model 200A "D" - 3/4"

	Overpressure			
psi	25%	50%	75%	100%
5	1.2	1.9	2.7	3.7
10	1.2	2.0	2.8	4.4
15	1.3	2.0	2.9	4.7
20	1.5	2.2	3.0	5.2
25	1.5	2.2	3.0	6.0
30	1.5	2.2	3.1	6.5
35	1.5	2.5	3.3	7.4
40	1.7	2.6	3.5	8.5
45	1.9	2.8	3.6	9.6
50	2.0	3.0	3.8	11.0
55	2.2	3.2	4.0	12.2
60	2.3	3.4	4.2	13.5
65	2.4	3.5	4.4	14.8
70	2.5	3.7	4.5	16.0
75	2.6	4.0	4.7	17.1
80	2.8	4.2	5.0	18.2
85	2.9	4.4	5.1	19.3
90	3.0	4.6	5.4	20.2
95	3.1	4.7	5.5	21.0
100	3.1	4.8	5.7	21.4
105	3.3	5.0	6.0	21.5
110	3.4	5.1	6.1	21.4
115	3.4	5.3	6.2	21.0
120	3.5	5.5	6.4	20.5
125	3.5	5.6	6.5	20.2
130	3.5	5.8	6.7	19.8
135	3.7	6.0	6.9	20.0
140	3.7	6.1	7.0	20.2
145	3.8	6.2	7.0	20.8
150	3.8	6.3	7.2	21.5
155	4.0	6.5	7.4	22.0
160	4.0	6.5	7.5	22.9
165	4.0	6.5	7.6	23.7
170	4.0	6.6	7.8	24.6
175	4.1	6.8	8.2	25.5
180	4.2	6.9	8.5	26.8
185	4.3	6.9	9.0	28.5
190	4.4	7.0	10.0	30.5
195	4.4	7.0	11.5	33.5
200	4.5	7.0	12.9	36.2

Model 200A "E" - 1"

	Overpressure			
psi	25%	50%	75%	100%
5	0.7	1.0	1.3	2.5
10	1.1	1.5	2.0	4.2
15	1.5	2.0	2.7	5.9
20	1.7	2.5	3.5	7.5
25	2.0	2.9	4.1	9.5
30	2.2	3.2	4.6	11.0
35	2.5	3.6	5.0	12.9
40	2.6	4.0	5.5	14.5
45	2.8	4.2	5.8	16.5
50	2.9	4.5	6.0	18.4
55	3.0	4.8	6.4	20.1
60	3.2	5.0	6.6	22.0
65	3.4	5.2	6.8	24.0
70	3.5	5.5	7.1	26.0
75	3.5	5.7	7.3	27.8
80	3.6	6.1	7.5	29.5
85	3.8	6.4	7.7	31.0
90	3.9	6.7	8.1	32.7
95	4.0	6.9	8.2	34.2
100	4.1	7.0	8.5	35.5
105	4.3	7.2	8.7	37.0
110	4.4	7.4	9.0	38.0
115	4.5	7.5	9.1	39.0
120	4.5	7.6	9.2	39.8
125	4.7	7.7	9.5	40.2
130	4.8	7.8	9.6	40.5
135	4.8	8.0	9.7	40.5
140	4.9	8.0	9.8	40.1
145	5.0	8.4	10.0	39.5
150	5.0	8.5	10.0	38.3
155	5.0	8.5	10.2	37.2
160	5.1	8.7	10.4	36.0
165	5.2	9.0	10.5	34.8
170	5.4	9.2	10.8	33.7
175	5.5	9.4	10.9	33.0
180	5.5	9.5	11.0	33.0
185	5.5	9.5	11.2	34.2
190	5.4	9.5	11.3	37.5
195	5.2	9.5	11.5	43.5
200	5.0	9.5	11.6	48.8

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

200A Inlet Capacities at 25%, 50% 75% and 100% Accumulation (GPM)

Model 200A "F" - 1 1/4"

	Overpressure			
psi	25%	50%	75%	100%
5	1.0	4.0	5.0	7.0
10	2.5	7.0	7.0	13.5
15	4.0	10.0	12.5	20.0
20	5.0	14.0	16.5	27.5
25	7.5	18.0	21.5	35.0
30	8.0	20.2	25.0	41.5
35	9.5	25.5	29.5	48.5
40	10.0	27.0	33.5	54.5
45	11.0	28.2	38.0	60.0
50	11.8	30.0	42.5	66.5
55	12.5	31.5	47.5	73.0
60	13.0	33.0	52.0	79.0
65	14.0	34.5	56.5	85.5
70	14.8	36.0	61.0	92.0
75	15.5	37.7	65.5	97.5
80	16.2	39.0	69.5	102.7
85	17.0	40.0	73.0	108.0
90	18.0	41.0	76.0	112.0
95	18.5	42.0	78.0	115.5
100	17.5	42.0	78.5	116.7
105	16.5	41.0	77.5	115.7
110	15.5	39.5	74.5	113.0
115	14.5	37.5	70.5	108.5
120	13.5	35.0	66.0	103.5
125	12.5	33.7	62.7	99.8
130	11.5	33.0	60.0	98.0
135	10.5	33.5	60.5	99.0
140	11.8	35.0	63.0	103.0
145	13.0	37.5	66.5	109.0
150	14.5	40.0	71.0	116.0
155	16.0	43.5	76.0	123.7
160	17.2	47.0	81.5	132.0
165	18.8	50.5	87.0	140.0
170	20.0	54.0	92.5	148.0
175	21.5	57.8	97.5	155.5
180	23.0	61.0	102.0	160.5
185	24.0	63.5	105.0	163.0
190	25.0	65.5	106.0	160.0
195	26.2	67.5	106.5	153.5
200	27.5	69.0	106.8	147.5

Model 200A "G" - 1 1/2"

	Overpressure			
psi	25%	50%	75%	100%
5	1.5	2.2	4.5	8.5
10	2.0	3.2	8.7	18.0
15	2.8	4.3	13.0	27.9
20	3.4	5.3	17.0	37.0
25	3.8	6.2	20.8	44.5
30	4.0	6.8	24.0	51.8
35	4.5	7.5	27.0	57.7
40	5.0	8.0	30.0	62.5
45	5.0	8.3	32.5	67.5
50	5.5	8.5	35.0	72.0
55	5.7	8.9	37.7	76.5
60	6.0	9.5	40.0	80.5
65	6.5	9.5	42.5	84.5
70	6.5	9.7	45.0	88.3
75	6.7	9.8	47.0	91.7
80	6.7	10.0	49.0	94.7
85	6.8	10.0	51.0	97.5
90	7.0	10.3	53.0	99.5
95	7.2	10.5	54.0	100.6
100	7.2	11.0	55.0	100.3
105	7.5	11.0	54.0	97.5
110	7.5	11.3	53.0	93.0
115	7.5	11.7	51.0	87.0
120	7.5	11.8	49.0	80.5
125	7.7	12.0	47.5	75.5
130	7.9	12.0	46.8	73.0
135	8.0	12.2	47.2	73.5
140	8.0	12.2	48.7	77.0
145	8.0	12.4	50.7	83.0
150	8.0	12.4	53.0	90.0
155	8.0	12.4	56.0	98.0
160	8.0	12.4	59.0	106.5
165	8.0	12.5	62.3	115.7
170	8.0	12.7	65.5	124.5
175	8.0	13.0	69.0	133.5
180	8.5	14.0	73.0	140.5
185	9.0	15.8	77.0	146.0
190	10.0	19.0	82.5	150.0
195	11.8	23.5	89.0	152.2
200	13.5	27.7	95.5	154.7

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Model Number/Order Guide

Model Number Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Example	0	0	1	9	—	F	0	1	—	M	G	0	0	7	5

Model

0019	019M
0020	020M
020P	20MP
200A	200H

Inlet Size

C - 1/2-inch	G - 1 1/2-inch
D - 3/4-inch	H - 2-inch
E - 1-inch	J - 2 1/2-inch
F - 1 1/4-inch	K - 3-inch

Variation

See chart below.

Design Revision

Indicates non-interchangeable revision. Dash (-) if original design.

Spring Material

G - 316 SS

Set Pressure

0005 - 5 psig
0025 - 25 psig
0300 - 300 psig

Model - Orifice	Variation	1/2" Male x 3/4" Female 01	1/2" Male x 1/2" Female 02	1/2" Female x 3/4" Female 03	1/2" Female x 1/2" Female 04	1/2" 150 Flg x 1/2" 150 Flg 05	1/2" 300 Flg x 1/2" 150 Flg 06	Male x Female 01	Female x Female (200A) 01	Female x Female 02	150 Flg x 150 Flg 03	300 Flg x 150 Flg (200H) 03	300 Flg x 150 Flg 04	150 Flg x 150 Flg (200H) 04
19-C, 20-C, 20P-C	1/2" x 1/2" (3/4")	X	X	X	X	X	X							
19-D, 20-D, 20P-D	3/4" x 3/4"							X		X	X		X	
200A-D	3/4" x 3/4"								X					
200H-D	3/4" x 3/4"							X		X		X		X
9-E, 20-E, 20P-E	1" x 1"							X		X	X		X	
200A-E	1" x 1"								X					
200H-E	1" x 1"							X		X		X		X
19-F, 20-F, 20P-F	1 1/4" x 1 1/4"							X		X	X		X	
200A-F	1 1/4" x 1 1/4"								X					
200H-F	1 1/4" x 1 1/4"							X		X		X		X
19-G, 20-G, 20P-G	1 1/2" x 1 1/2"							X		X	X		X	
200A-G	1 1/2" x 1 1/2"								X					
200H-G	1 1/2" x 1 1/2"							X		X		X		X
19-H, 20-H, 20P-H	2" x 2"							X		X	X		X	
200H-H	2" x 2"							X		X		X		X
19-J, 19M-J, 20J, 20P-J, 20M-J, 20MP-J	2 1/2" x 2 1/2"							X		X	X		X	
19-K, 19M-K, 20-K, 20P-K, 20M-K, 20MP-K	3" x 3"							X		X	X		X	

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Models 19, 19M, 20, 20M, 20P, 20MP, 200A and 200H

Facility Phone: 828-669-3700

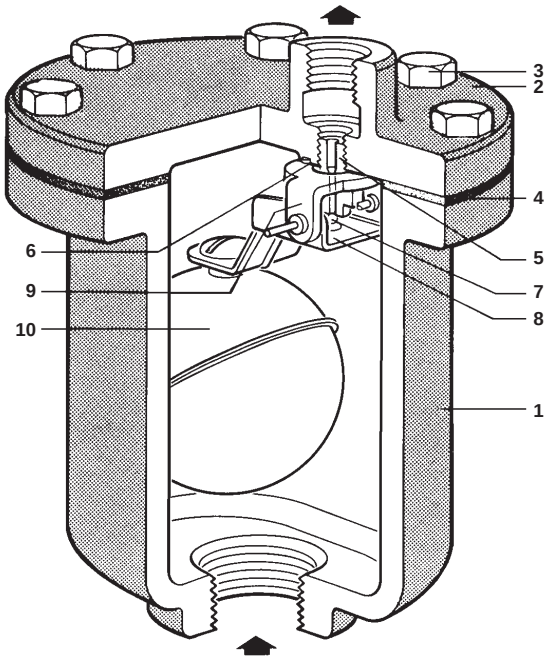
Tyco Valves & Controls

www.kunklevalve.com

Air Eliminators
13WS, 13WHS

13WS and 13WHS Air Eliminators improve the circulation of pressurized liquids by eliminating air and other non-condensible gases which may collect at high points in the system. The EPDM valve head ensures tight shut-off.

Model ➪	13WS	13WHS
PMO	150 psig	300 psig
Sizes	3/4" x 3/8", 1" x 3/8"	3/4" x 3/8"
Connections	NPT	
Construction	Cast Iron Body Stainless Steel internals w/ EPDM valve head	
Options	Brass Body; Stainless Steel Body	



Limiting Operating Conditions

Max. Operating Pressure (PMO) 13WS: 150 psig *(10 barg)*
13WHS: 300 psig *(21 barg)*

Max. Operating Temperature 13WS & 13WHS: 338˚F *(170˚C)*

Pressure Shell Design Conditions

PMA Max. allowable pressure	13WS:	150 psig/0-353˚F	*10 barg/0-178˚C*
	13WHS:	300 psig/0-317˚F	*21 barg/0-158˚C*
TMA Max. allowable temperature	13WS:	450˚F/0-125 psig	*232˚C/0-9 barg*
	13WHS:	450˚F/0-250 psig	*232˚C/0-17 barg*

Construction Materials

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
	Optional 13WS	Brass	ASTM B62
		Stainless Steel	Type 304
2	Cover	Cast Iron	ASTM A126 CL B
	Optional 13WS	Brass	ASTM B62
		Stainless Steel	Type 304
3	Cover Bolts	Steel	ASTM A449
4	Cover Gasket	Graphite	
5	Valve Seat	Stainless Steel	Type 303
6	Seat Gasket	Stainless Steel	Type 304
7	Valve Head	EPDM	
8	Float Arm	Stainless Steel	Type 304
9	Bracket	Stainless Steel	Type 301
10	Float	Stainless Steel	Type 304

Typical Applications

Air vents can be used on both hot and cold liquid services. Typical applications are cold water lines, suction lines to pumps, mixing tanks, condensate return lines, cooling water lines on air compressors, and water storage tanks.

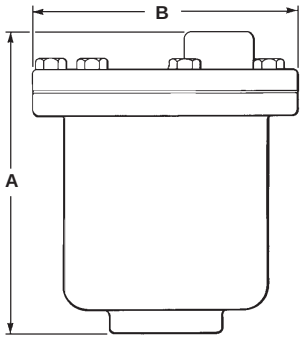
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.
In the interests of development and improvement of the product, we reserve the right to change the specification.

Air Eliminators
13WS, 13WHS

Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psia at 60˚F. For dm^3/s multiply by .4719.

		Inlet Pressure							
Type	psi *bar*	25 *1.7*	50 *3.4*	75 *5.2*	100 *6.9*	150 *10.3*	200 *13.8*	250 *17.2*	300 *20.7*
13WS		1.6	2.7	3.7	4.8	6.9	–	–	–
13WHS		1.1	1.8	2.5	3.2	4.6	6.0	7.4	8.8



Dimensions (nominal) in inches and millimeters

Size		A	B	Weight
3/4"	**13WS**	**5.1**	**4.4**	**4.75 lb**
		129	*111*	*2.2 kg*
1"	**13WS**	**5.1**	**4.4**	**4.75 lb**
		129	*111*	*2.2 kg*
3/4"	**13WHS**	**6.0**	**4.75**	**5.0 lb**
		152	*121*	*2.3 kg*

Installation

An air vent is required at all high points of a liquid system, on terminal equipment and wherever air can collect. The air vent must be installed vertically above the pipe or equipment with the inlet at the bottom. The inlet piping should be the same size as the body piping connection, and a full-port isolating valve should be installed to permit servicing. The discharge must be piped to drain or other safe place to prevent damage if the air vent should malfunction.

Maintenance

This product can be maintained without disturbing the inlet piping connection. Complete isolation is required before any servicing is performed.

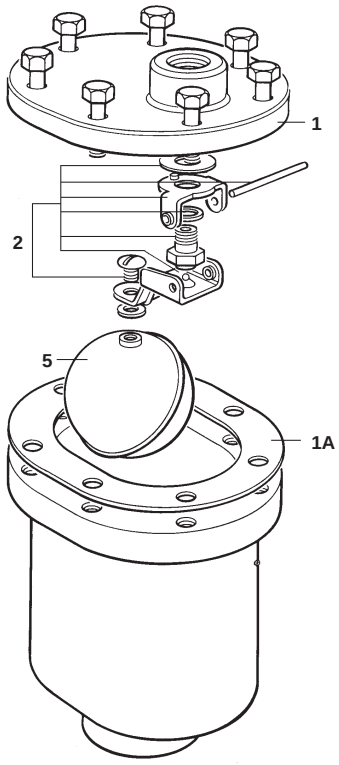
The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat and operating mechanism. Worn or damaged parts should be replaced using a complete valve mechanism assembly and new cover gasket.

Complete installation and maintenance instructions are given in IMI 4.006, which accompanies the product.

Sample Specification

Automatic Air Eliminators shall be mounted at high points to provide for immediate removal of contained air or other non-condensible gases in liquid piping systems. They shall be of the float type design, having cast iron (brass or stainless steel) bodies with threaded connections. Valve head shall be of EPDM material to provide positive shut-off. All other internals to be stainless steel. Air vent shall have minimum venting capacity of 4.8 SCFM at 100 psig. Spirax Sarco model 13WS for 150 psig service and model 13WHS for 300 psig service.

Spare Parts

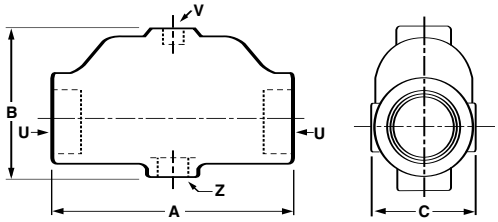


Cover w/Gasket	1
Gasket Kit (set of 3)	1A
Valve Mechanism Kit	2
Float Kit	5

Spirax Sarco, Inc., 1150 Northpoint Blvd, Blythewood, SC 29016 Telephone: (803) 714-2000 FAX (803) 714-2222

Air Elimination Equipment
1” to 3” Air Purgers (Non-ASME)

125 PSIG Working Pressure



Dimensions/Specifications for 443-448

Model Number	Size Ins.	“A” Dimension Ins.	“A” Dimension mm	“B” Dimension Ins.	“B” Dimension mm	“C” Dimension Ins.	“C” Dimension mm	“U” Tappings (NPT) Ins.	“V” Tappings (NPT) Ins.	“Z” Tappings (NPT) Ins.	Ship. Wt. Lbs.	Ship. Wt. kg.
443	1	6	152	4	102	2½	64	1	⅛	½	4	1.8
444	1¼	6	152	4	102	2½	64	1¼	⅛	½	5	2.3
445	1½	8	203	5	127	3½	89	1½	⅛	½	9	4.0
446	2	8	203	5	127	3½	89	2	½	½	10	4.5
447	2½	10	254	6	152	5	127	2½	¾	½	19	8.6
448	3	10	254	6	152	5	127	3	¾	½	20	9.0

Specifications

Description	Standard Construction
Working Pressure	125 PSIG (8.8 bar)
Materials of Construction	Cast Iron

All dimensions and weights are approximate.

Job Name_____

Location _____

_____

_____

Engineer _____

Contractor _____

Contractor P.O. No._____

Sales Representative _____

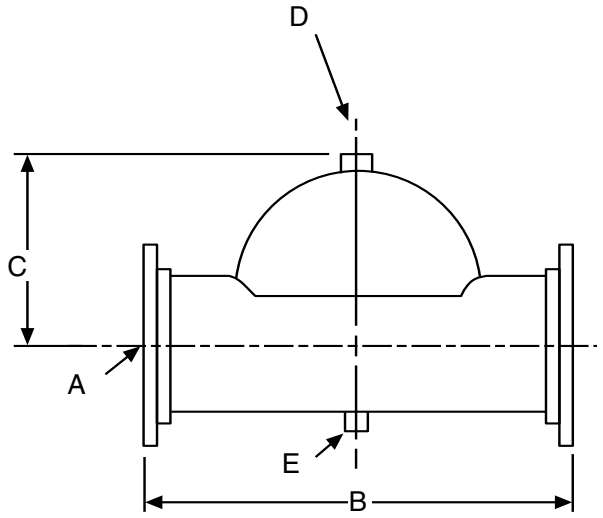
Model No. Ordered _____

Submittal data sheets can ONLY be ordered as a "Submittal Data Sheet Pack", using MC# 4400. They are not available to order on an individual basis, however each data sheet is available on the Amtrol Web Site and can be downloaded and printed for use as needed.

Air Elimination Equipment

4” to 18” Air Purgers (Non-ASME)

125 PSIG Working Pressure



Dimensions/Specifications

Model Number	“A” Dimension*		“B” Dimension		“C” Dimension		“D” Dimension (Vent Tapping) (NPT) Ins.	“E” Dimension (Drain Tapping) (NPT) Ins.	Weight	
	Ins.	mm	Ins.	mm	Ins.	mm			Lbs.	kg
449	4	102	12	305	5	127	¾	½	56	25
461	5	127	20	508	7½	191	1¼	1½	60	27
462	6	152	24	610	8½	216	1¼	1½	65	29
463	8	203	32	813	11¼	286	1¼	1½	113	51
464	10	254	40	1016	14	356	1¼	1½	174	79
465	12	305	48	1219	16¾	425	1¼	1½	330	150
466	14	356	56	1422	19⅜	492	1¼	1½	500	227
467	16	406	48	1219	20	508	1¼	1½	331	150
468	18	457	72	1829	23½	597	1¼	1½	573	260

*150 Lb. ASA Flanges

Maximum Operating Conditions

Description	Standard Construction
449	125 PSIG (8.8 bar)
461-468	150 PSIG (10.5 bar)

NOTE: Models 467 & 468 have Butt Weld Ends.

Materials of Construction

Description	Standard Construction
No. 449	Cast Iron
No. 461-468	Steel

All dimensions and weights are approximate.

Job Name_____

Location _____

_____

_____

Engineer _____

Contractor _____

Contractor P.O. No._____

Sales Representative _____

Model No. Ordered _____

Submittal data sheets can ONLY be ordered as a "Submittal Data Sheet Pack", using MC# 4400. They are not available to order on an individual basis, however each data sheet is available on the Amtrol Web Site and can be downloaded and printed for use as needed.

For Commercial and Institutional Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

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

Approval _____ Representative _____

Series 77F-DI-125, 77F-DI-FDA-125

Flanged, Wye Pattern, Cast Iron Strainers

Sizes: 2" – 12" (50 – 300mm)

Series 77F-DI-125, 77F-DI-FDA-125 Flanged, Wye Pattern, Cast Iron Strainers feature 304 stainless steel perforated screens, a cast iron flanged retainer cap and a drain/blow-off connection furnished with a closure plug. Model 77F-DI-FDA-125 also features a double coated, heat fused epoxy coating on the interior and exterior for FDA approved sanitary applications.

77F-DI-FDA-125

Features

- Flanges conform to American Cast Iron Flange Standard, Class 125 (ANSI B16.1) and MIL-S 16293 Type II
- Cast iron body
- 304 Stainless steel perforated screens
- Cast iron flanged retainer cap with gasket tapped for closure plug
- Drain/Blow-off connection furnished with closure plug
- 77F-DI-FDA-125 model comes with heat fused FDA approved epoxy coating (interior and exterior)

Models

77F-DI-125 — 2" – 12" (50 – 300mm) with flanged connections for water and steam service

77F-DI-FDA-125 — 2" – 12" (50 – 300mm) with flanged connections and double coated, heat fused FDA approved epoxy coating (interior and exterior) for water service only

Specifications (77F-DI-125)

A flanged, wye pattern, cast iron strainer to be installed as indicated on the plans. The strainer must have flanges that conform to American Cast Iron Flange Standard, Class 125, 304 stainless steel perforated screens and a drain/blow-off connection furnished with a closure plug. Pressure rating no less than 200psi (13.8 bars) WOG non-shock and 125psi (8.6 bars) WSP. Strainer shall be a Watts Regulator Company Series 77F-DI-125.

Pressure – Temperature

Maximum Operating Pressure:
200psi (13.8 bars) WOG, non-shock, @ 210° F (99° C)
125psi (8.6 bars) WSP @ 353° F (178° C)

Standard Screens

2" – 5" (50 – 125mm): 1/16" perforation
6" – 8" (150 – 200mm): 1/8" perforation
10" – 12" (250 – 300mm): 3/16" perforation

Screen Options

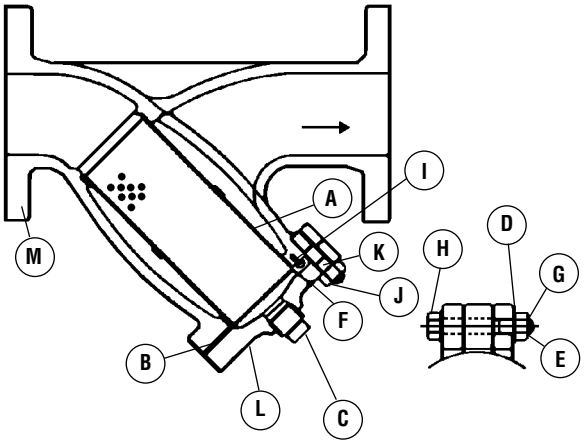
Wire Mesh Liners: 304 stainless steel (#20, #40, #60, #80, #100)
Perforated Screens: 304 stainless steel (3/64", 1/16", 1/8", 3/16")

Specifications (77F-DI-FDA-125)

A flanged, wye pattern, cast iron strainer with a double coated, heat fused, FDA approved epoxy coating on the interior and exterior surfaces for FDA sanitary applications. Flanges to conform to ANSI B16.1 Class 125, 304 stainless steel perforated screens, and a drain/blow-off connection furnished with a closure plug. Pressure rating no less than 200psi (13.8 bars) CWP. Strainer shall be Watts Regulator Company Series 77F-DI-FDA-125.

WATTS® REGULATOR

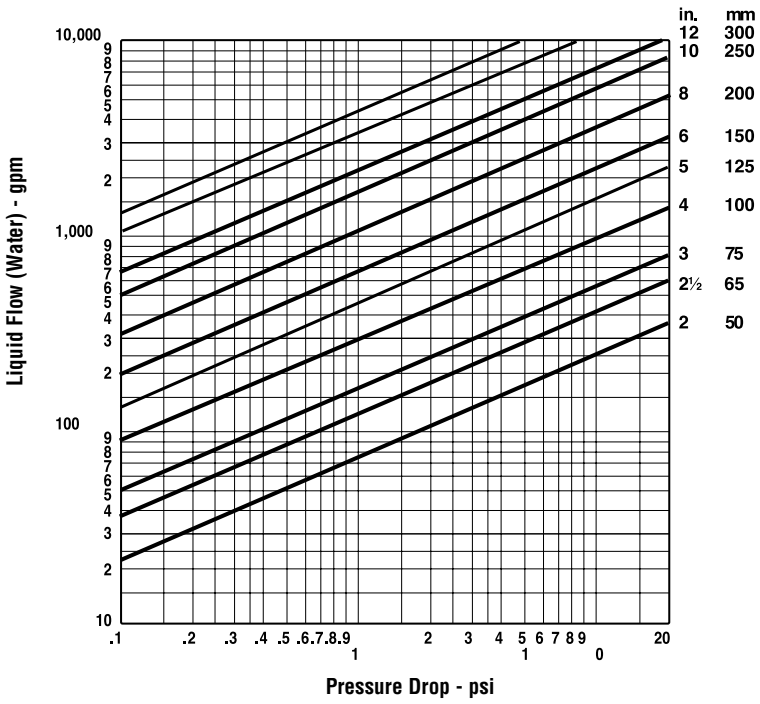
Materials

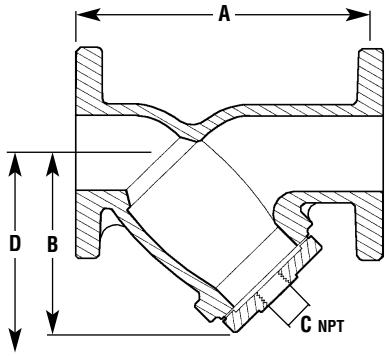


A.	Screen	AISI 304SS
B.	Cover Gasket	Non-Asbestos
C.	Plug	*ASTM A47
D.	Washer	ASTM A6
E.	Cotter Pin	ASTM A112
F.	Plate	*ASTM A6
G.	Bolt Nut	ASTM A6
H.	Bolt	ASTM A6
I.	Set Screw	ASTM B16
J.	Cover Bolt Nut	ASTM A6
K.	Cover Bolt	ASTM A6
L.	Cover	*ASTM A-126 Cl.B
M.	Body	*ASTM A-126 Cl.B

Note:* 77F-DI-FDA component parts epoxy coated internally and externally.

Flow/Pressure Drop Chart





Dimensions – Weights

SIZE (DN)		DIMENSIONS									WEIGHT	
		A		B		C(NPT)		D*		Screen Area		
in.	*mm*	*In.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*sq.in.*	*lbs.*	*kgs.*
2	50	7⅞	200	5¼	133	½	13	7	178	36	18	8
2½	65	10	254	6½	165	1	25	9¾	248	56	28	13
3	75	10⅛	257	7	178	1	25	10	254	75	34	15
4	100	12⅛	308	8¼	210	1½	38	12	305	121	60	27
5	125	15⅝	397	11¼	286	2	51	17	432	210	95	43
6	150	18½	470	13½	343	2	51	20	508	278	133	60
8	200	21⅝	551	15½	394	2	51	22¾	578	387	247	112
10	250	26	660	18½	470	2	51	28	711	577	370	168
12	300	29⅞	759	21¾	552	2	51	30	762	795	579	262

* D dimension is minimum clearance for screen removal.

P/N 3.0" 77F-DI-125

WATTS® REGULATOR

ISO 9001 CERTIFIED

USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.wattsreg.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscanada.ca

For HVAC, Irrigation, OEM, Commercial and Institutional Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

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

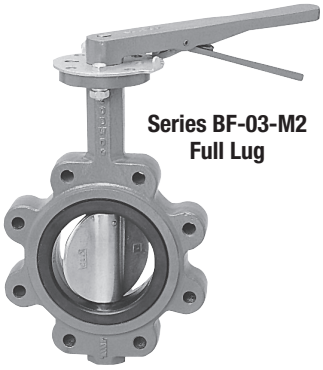
Approval _____ Representative _____

LEAD FREE*

Butterfly Valves

Series BF-03-M2 Full Lug and BF-04-M2 Wafer

Sizes: 2" – 12" (50 – 300mm) 200psi (13.8 bars) 14" – 24" (350 – 600mm) 150psi (10.3 bars)



Watts Series BF resilient seated butterfly valve is available in sizes 2" – 24" (50 – 600mm) in wafer or lug body design. Wafer body design features lifting lugs while lug body design features dead-end service. Incorporating a 200psi (13.8 bar) pressure rating for 2" – 12" (50 – 300mm) and a 150psi (10.3 bar) pressure rating 14" – 24" (350 – 600mm), the BF series butterfly is standardly constructed of a ductile iron body with a choice of either ductile iron, aluminum bronze, or 316 stainless steel discs and 416 stainless steel or 316 stainless steel shaft. A phenolic-backed seat (2"-12", 50-300mm) or aluminum-backed seat (14" – 24", 350-600mm) prevents the seat from collapsing or dislodging. Standard seat materials available include EPDM, Buna-N and Viton. The BF Series mounting pad is designed to ISO 5211 standard to accommodate lever handles, gear operators, or actuation.

The Watts Series BF butterfly valves are designed and manufactured for use with ANSI 125 or 150 Class flanges and comply with API 609 and MSS-SP 67 standards to meet the stringent requirements of HVAC, Irrigation, OEM, Commercial, Institutional, and Industrial applications.

Features

- **Body** – Available in Full Lug (BF-03-M2) and Wafer (BF-04-M2) styles designed for use between ANSI 125 and 150 flanges. Face-to-face dimensions comply with API 609 and MSS-SP-67. All valves are designed to accommodate 2" of insulation. The mounting pad is designed to ISO 5211 standard. The body material is ASTM A-536 ductile iron.
- **Disc** – Disc edge is machined and polished 360 degrees to assure leak-tight shutoff while minimizing operating torque. Positive, disc-to-shaft connection is provided by stainless steel precision taper pins. Discs are available in ductile iron, aluminum bronze, or 316 stainless steel.
- **Seat** – Phenolic or aluminum backed, non-collapsible, resilient seat is mechanically secured to provide dead-end service to the full pressure rating in lug style valves. Full 360 degrees sealing isolates the body components from the media and provides the primary shaft seal. Seats are available in EPDM, Buna-N, and Viton.
- **Shaft** – One-piece shaft delivers positive disc-to-seat location with maximum strength. 416SS is standard shaft with ductile iron and aluminum bronze disc. 316SS shaft is standard with 316SS disc models.

  Three shaft bushings provide shaft support for proper alignment and minimal shaft deflection. Bi-directional shaft seals prevent external contamination of the stem area and provide backup for the primary shaft seal formed by the disc/seat interface.
- **Handle** – ISO 5211 top work design allows for standard 10 position handle 2" – 6" (50 – 150mm) and manual, worm gear operators for 8" – 24" (200 – 600mm) sizes. An infinite positioning locking handle is an available option on 2" – 12" (50 – 300mm) valves. The posi-lok handle provides an infinite position stop, a memory stop, and a pad-locking device in the fully closed position.

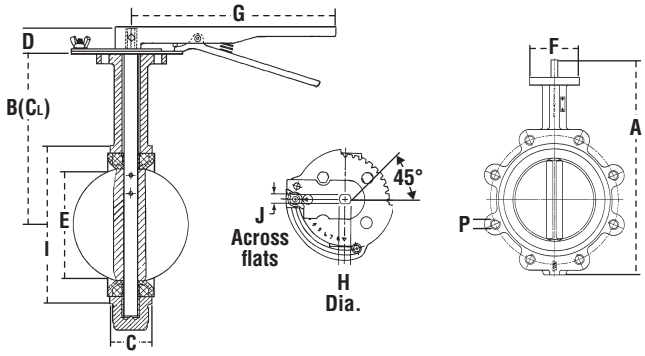
***The wetted surface of this product contacted by consumable water contains less than one quarter of one percent (0.25%) of lead by weight.**

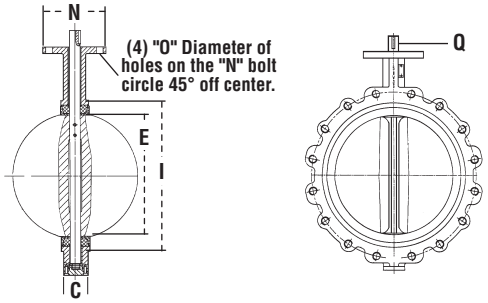
WATTS®

P/N 2.0" BF03-11115

Dimensions

2" through 24"





Size	A		B		C		D		E		F		G		H		I		J	
in.	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*
2	10¾	273	6⅜	161	1⅝	42	1¼	32	2⅛	54	3 1/16	77	10½	267	½	13	3¾	95	⅜	9
2½	11⅝	295	6⅞	175	1¾	45	1¼	32	2½	64	3 1/16	77	10½	267	½	13	4¼	108	⅜	9
3	12⅛	308	7⅛	181	1¾	45	1¼	32	3⅛	79	3 1/16	77	10½	267	½	13	4¾	120	⅜	9
4	13⅜	346	7⅞	200	2	52	1¼	32	4⅛	105	3⅝	92	10½	267	⅝	16	6 1/16	154	7/16	11
5	14⅜	372	8⅜	213	2 1/16	56	1¼	32	4⅞	124	3⅝	92	10½	267	¾	19	7⅛	181	½	13
6	15⅝	397	8⅞	226	2 1/16	56	1¼	32	6⅛	156	3⅝	92	10½	267	¾	19	8 3/16	208	½	13
8	18⅞	479	10¼	260	2⅜	60	1¼	32	8	202	5	125	14	356	⅞	22	10¼	260	⅝	16
10	21¼	540	11½	292	2⅜	66	1¾	45	9⅞	251	5	125	14	356	1⅛	29	12⅜	320	13/16	21
12	24⅝	626	13¼	337	3	76	1¾	45	11⅞	301	6	150	14	356	1¼	32	14¾	375	–	–
14	26¾	679	14½	368	3	76	1¾	45	13⅛	333	6	150	–	–	1¼	32	15 15/16	405	–	–
16	30	762	15¾	400	3⅜	87	2	50	15⅜	391	6⅞	175	–	–	1 5/16	33	18½	470	–	–
18	31½	800	16⅝	422	4⅛	105	2	50	17⅜	442	6⅞	175	–	–	1½	38	20 1/16	525	–	–
20	35 5/16	897	18⅞	480	5⅛	130	2⅛	53	19⅜	493	8¼	210	–	–	1⅝	41	22¼	565	–	–
24	42⅛	1088	22⅛	562	6	152	2¼	58	23⅜	594	8¼	210	–	–	2	50	27 5/16	693	–	–

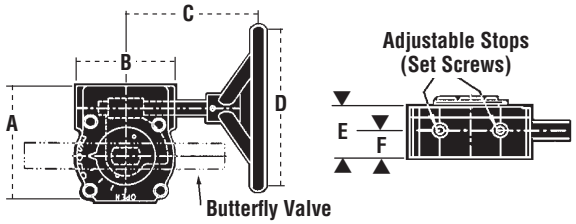
Size	TOP PLATE DRILLING				TAPPED LUG DATA				KEY WAY		WEIGHT lbs. †	
	N		O		BOLT CIRCLE		NO.	BOLT	Q			
in.	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*Holes*	*P*	*in.*	*mm*	*88*	*87*
2	2	50	¼	7	4¼	121	4	5/8"-11UNC x 1⅝"	–	–	8	6
2½	2	50	¼	7	5½	140	4	5/8"-11UNC x 1¾"	–	–	10	7
3	2	50	¼	7	6	150	4	5/8"-11UNC x 1¾"	–	–	10	7
4	2¾	70	⅜	10	7½	191	8	⅝"-11UNC x 2"	–	–	17	12
5	2¾	70	⅜	10	8½	216	8	¾"-10UNC x 2 3/16"	–	–	25	16
6	2¾	70	⅜	10	9½	241	8	¾"-10UNC x 2 3/16"	–	–	27	20
8	4	102	½	13	11¾	298	8	¾"-10UNC x 2⅜"	–	–	40	29
10	4	102	½	13	14¼	362	12	⅞"-9UNC x 2⅝"	–	–	63	48
12	5	125	½	13	17	432	12	⅞"-9UNC x 3"	¼ x 1¼	6 x 32	107	78
14	5	125	½	13	18¾	476	12	1"-8UNC x 3"	¼ x 1¼	6 x 32	156	99
16	5½	140	1 1/16	18	21¼	540	16	1"-8UNC x 3⅜"	5/16 x 1 13/16	8x46	203	140
18	5½	140	1 1/16	18	22¾	578	16	1⅛"-7UNC x 4⅛"	⅜ x 1 9/16	10x40	269	188
20	5½	165	⅞	22	25	635	20	1⅛"-7UNC x 5⅛"	⅜ x 1 9/16	10x40	392	248
24	5½	165	⅞	22	29½	750	20	1¼"-7UNC x 6"	½ x 2⅜	13x60	593	450

†Weights are for valves with ductile iron or aluminum bronze discs. 2" – 12" have levers; 14" – 24" have bare shafts. Refer to Watts F-CDBF for gear operator weights.

Size	C_V RATING (Full Open) C_V Rating
in.	C_v
2	135
2½	220
3	302
4	600
5	1,022
6	1,579
8	3,136
10	5,340
12	8,250
14	11,917
16	16,388
18	21,705
20	27,908
24	43,116

Size	SEATING TORQUE Buna-N, EPDM Normal Conditions	
in.	*Wet lbs.*	*Dry lbs.*
2	134	214
2½	190	289
3	250	387
4	390	644
5	600	959
6	907	1,542
8	1,697	2,919
10	2,500	4,857
12	3,300	7,071
14	3,500	7,305
16	5,500	10,027
18	8,200	13,437
20	10,000	17,925
24	18,680	28,020

GEAR DIMENSIONS: STD. WEATHERPROOF W/ HANDWHEEL								
Valve Size	Depth	Width	CL to HW	HW. Dia.	Height	CL to MT Pad	Turns Open/ Close	Unit Weight
in.	A	B	C	D	E	F		*lbs.*
2, 2½, 3	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
4	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
5, 6	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0
8	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
10	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5
12, 14	7.8	6.4	9.5	12.0	3.0	2.0	12.5	33.0
16	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
18	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
20	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5
24	12.6	9.1	15.0	24.0	4.5	2.0	20.0	80.0



Materials

Body: ASTM A-536 Ductile Iron.

Bushing: Duralon(3): Teflon® - Dacron inner liner bonded to fiberglass - epoxy resin outer shell 2"-12" (50-300mm), Bronze 14"-24" (350-600mm)

Stem O-rings: Buna-N

Disc: ASTM A-395 Ductile Iron / Electroless Nickel Plated
ASTM A-148 Aluminum Bronze
ASTM A-351 316 Stainless Steel

Shaft: 416 Stainless Steel
316 Stainless Steel on 316SS Disc Models

Seat: EPDM: +5°F to 248°F (-15°C to +120°C)
Buna-N: +14°F to 176°F (-10°C to +80°C)
Viton: -4°F to 302°F (-20°C to +150°C)

Note: Do not use EPDM when hydrocarbons are present.

How to Order Watts Series BF-M2

14 BF 03 121 1G M2

Size: 2" thru 24"

Series: 03: Full Lug, 04; Wafer

Body: 1: Ductile Iron

Disc:
1: Ductile Iron
2: Aluminum Bronze
3: 316 Stainless Steel*

Shaft:
1: 416 Stainless Steel
316SS on stainless steel disc models*

Seat:
1: EPDM 3: Viton
2: Buna-N

Operator:
0: No handle - 2" thru 24"
G: Gear Operator - 2" thru 24"
5: Standard handle (10-position only) - 2" thru 12"
P: Positioning / Locking Kit with handle - 2" thru 12"

M2 = Series

WATTS®

A Watts Water Technologies Company

U.S. GREEN BUILDING COUNCIL MEMBER

ISO 9001-2000 CERTIFIED

USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.watts.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscanada.ca

Pump Data Sheet - AURORA PUMPS

Company: Boulden Energy Systems

Name:

Date: 6/4/2013

AURORA® Pentair Water

Pump:

Size: 1.5x2x9B

Type: 340 1 STG ENDSUC
Synch speed: 1800 rpm

Speed: 1750 rpm
Dia: 8.9375 in

Curve: PC116277

Impeller:

Specific Speeds:

Ns: 670
Nss: 5578

Dimensions:

Suction: 2 in
Discharge: 1.5 in

Pump Limits:

Temperature: 300 °F
Pressure: 175 psi g
Sphere size: 0.438 in

Power: ---
Eye area: ---

Search Criteria:

Flow: 110 US gpm

Head: 85 ft

Fluid:

Water
Density: 62.25 lb/ft³
Viscosity: 1.105 cP

Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

NPSHa: ---

Motor:

Standard: NEMA
Enclosure: TEFC

Size: 5 hp
Speed: 1800
Frame: 184T

Sizing criteria: Design Point

---- Data Point ----

Flow:	110 US gpm
Head:	85.8 ft
Eff:	62%
Power:	3.81 hp
NPSHr:	4.68 ft

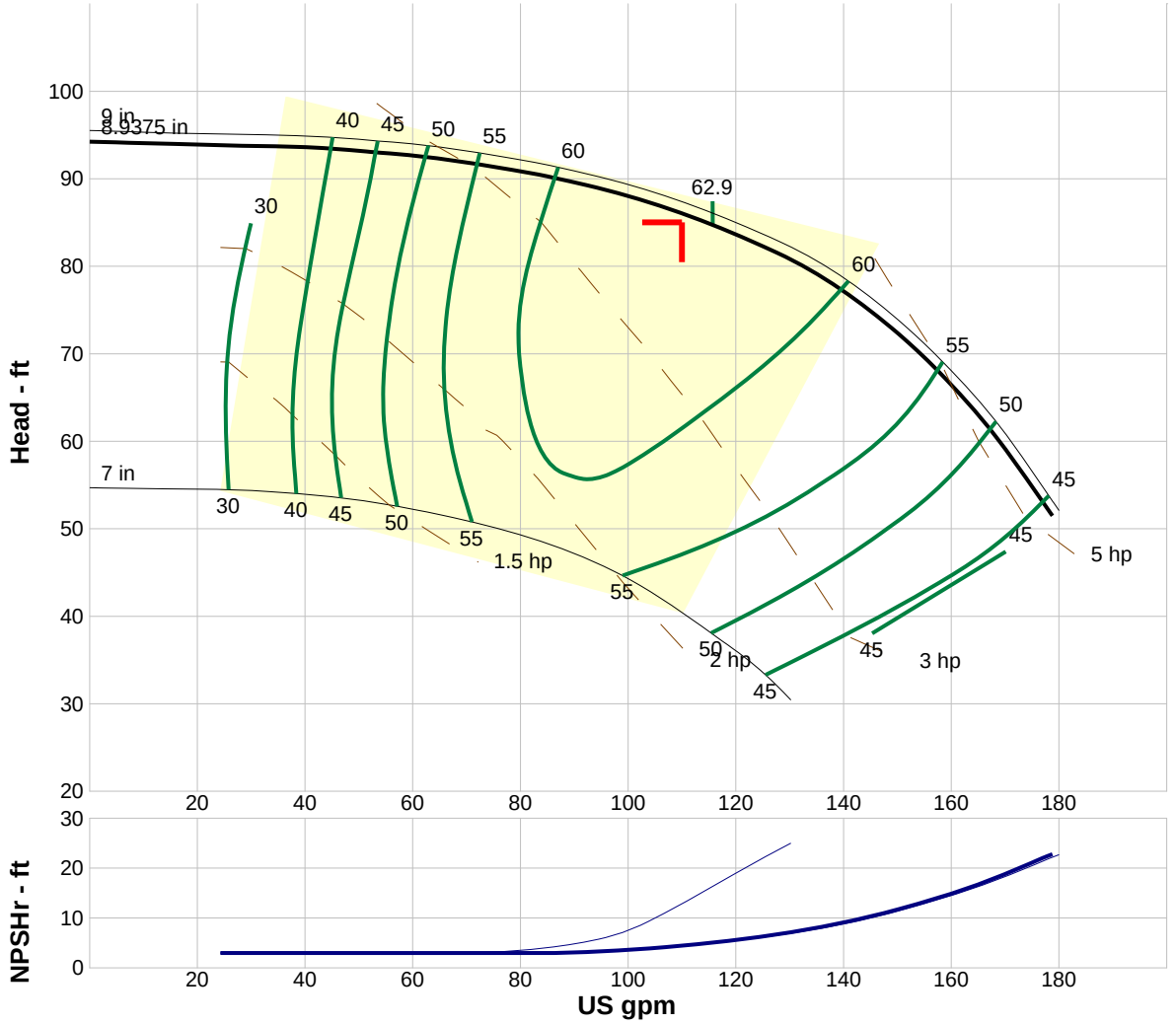
---- Design Curve ----

Shutoff head:	94.2 ft
Shutoff dP:	40.7 psi
Min flow:	---
BEP:	63% @ 116 US gpm

NOL power:
5.27 hp @ 177 US gpm

-- Max Curve --

Max power:
5.37 hp @ 178 US gpm



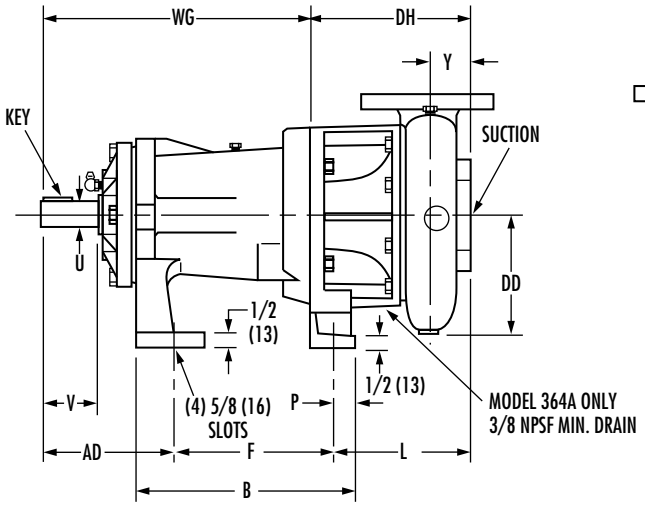
Performance Evaluation:

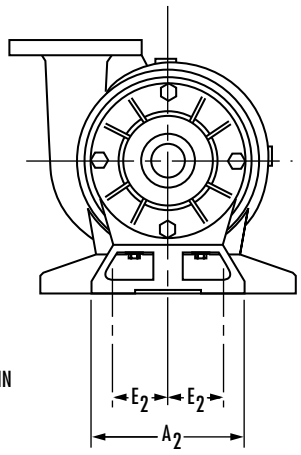
Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
132	1750	79.7	61	4.35	7.77
110	1750	85.8	62	3.81	4.68
88	1750	89.8	60	3.31	3.12
66	1750	92.2	52	2.96	3
44	1750	93.5	39	2.64	3

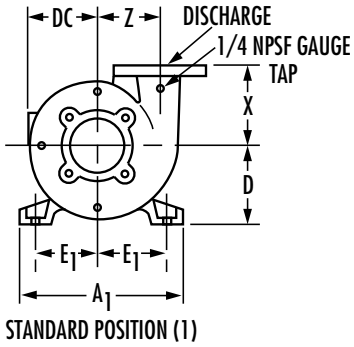
AURORA MODEL 344A & 364A PUMPS

7″ - 9″

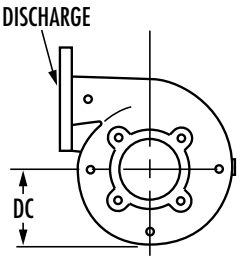
Supersedes Section 340/360 Page 206
Dated JANUARY 2003







STANDARD POSITION (1)



POSITION (4)

FRAME	D CASE BORE 7	D CASE BORE 9‡
1	5-1/4 (133)	5-1/4 (133)
2	6-1/4 (158)	7 (177)
3	N/A	7 (177)

‡ 9″ BORE MODEL 344A NO.1. POWER FRAME D = 6-1/4″

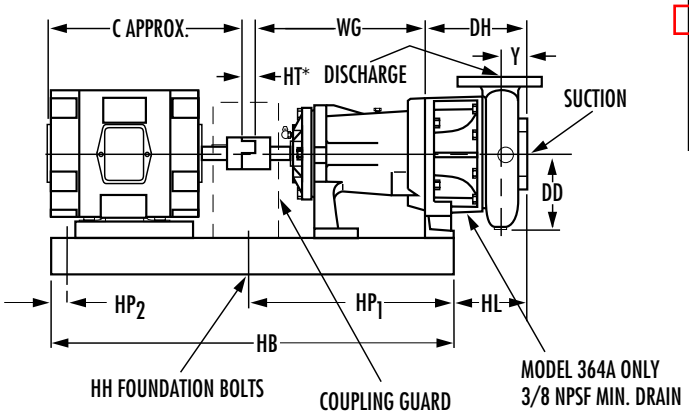
FRAME	A_1	A_2	344A B	364A B	E_1	E_2	344A F	364A F	P	U	V	AD	WG	KEY
1	10-3/4 (273)	7-3/8 (187)	8-1/16 (205)	9-5/16 (237)	4-1/8 (105)	2 5/8 (67)	5-13/16 (148)	7-1/16 (179)	1-5/16 (33)	7/8 (22)	2-1/8 (54)	5 1/8 (130)	10-5/16 (262)	3/16 SQ X 1-3/8 LG
2	13-1/4 (337)	7 (178)	10-25/32 (274)	12 (305)	5-1/8 (130)	2 1/2 (64)	7-13/32 (188)	8-21/32 (220)	3/4 (19)	1-1/8 (29)	3-1/8 (79)	7-11/16 (195)	13-13/16 (351)	1/4 SQ X 1-3/4 LG
3	13-1/4 (337)	7 (178)	10-25/32 (274)	12 (305)	5-1/8 (130)	2 1/2 (64)	7-13/32 (188)	8-21/32 (220)	3/4 (19)	1-1/8 (29)	3-1/8 (79)	7-11/16 (195)	13-13/16 (351)	1/4 SQ X 1-3/4 LG

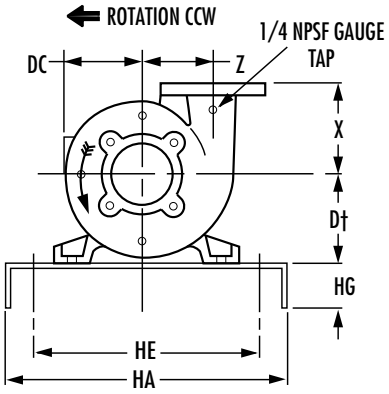
PUMP SIZE DISCHARGE	PUMP SIZE SUCTION	CASE BORE	X	Y	Z	DC	DD	344 DH FRAME 1	344 DH FRAME 2 & 3	364 DH FRAME 1	364 DH FRAME 2 & 3	344A L FRAME 1	344A L FRAME 2 & 3	364A L FRAME 1	364A L FRAME 2 & 3
PUMPS WITH THREADED CONNECTIONS															
1-1/4	1-1/2	7	5-1/4 (133)	2-7/16 (62)	4-3/16 (106)	4-15/16 (125)	5-3/16 (132)	7-3/16 (183)	N/A	10-1/4 (260)	N/A	7-9/16 (192)	N/A	9-3/8 (238)	N/A
1-1/4	1-1/2	9	6-5/8 (168)	2-9/16 (65)	5-3/8 (137)	6-3/16 (157)	6-3/8 (162)	7-1/4 (184)	N/A	10-5/16 (262)	N/A	7-5/8 (194)	N/A	9-7/16 (240)	N/A
1-1/2	2	7	5-3/8 (137)	2-1/2 (64)	4-5/16 (110)	5-1/8 (130)	5-3/8 (137)	7-5/16 (186)	N/A	10-3/8 (264)	N/A	7-11/16 (195)	N/A	9-1/2 (241)	N/A
1-1/2	2	9	6-3/4 (171)	2-5/8 (67)	5-1/2 (140)	6-5/16 (160)	6-9/16 (167)	7-3/8 (187)	8-3/8 (213)	10-7/16 (265)	11-1/4 (286)	7-3/4 (197)	7-1/8 (181)	9-9/16 (243)	8-3/4 (222)
PUMPS-WITH-ANSI-125-LB.-FLANGED-CONNECTIONS															
2	2-1/2	7	5-5/8 (143)	1-7/8 (48)	4-9/16 (116)	5-3/8 (137)	5-13/16 (148)	6-13/16 (173)	7-13/16 (198)	9-7/8 (251)	10-11/16 (271)	6-3/16 (157)	6-9/16 (167)	8 (203)	8-3/16 (208)
2	2-1/2	9	7 (178)	1-7/8 (48)	5-11/16 (144)	6-1/2 (165)	6-7/8 (175)	6-3/4 (171)	7-3/4 (197)	9-13/16 (249)	10-5/8 (270)	6-1/8 (156)	6-1/8 (156)	7-15/16 (202)	8-1/8 (206)
2-1/2	3	7	5-7/8 (149)	2 (51)	4-13/16 (122)	5-13/16 (148)	6-1/4 (159)	7-1/16 (179)	8-1/16 (205)	10-1/8 (257)	10-15/16 (278)	6-7/16 (164)	6-13/16 (173)	8-1/4 (210)	8-7/16 (214)
2-1/2	3	9	7-1/4 (184)	2 (51)	5-15/16 (151)	6-3/4 (171)	7-1/4 (184)	7 (178)	8 (203)	N/A	10-7/8 (276)	6-3/8 (162)	6-3/4 (171)	N/A	8-3/8 (213)
3	4	9	7-1/2 (191)	2-1/8 (54)	6-1/8 (156)	6-7/8 (175)	7-7/16 (189)	7-1/4 (184)	8-1/4 (210)	N/A	11-1/8 (283)	6-5/8 (168)	7 (178)	N/A	8-5/8 (219)
4	4	7	6-1/2 (165)	2-1/2 (64)	5-1/2 (140)	6-7/16 (164)	7-5/16 (186)	7-15/16 (202)	8-15/16 (227)	11 (279)	11-13/16 (300)	7-5/16 (186)	7-11/16 (195)	9-1/8 (232)	9-5/16 (237)
4	5	9A	7-1/4 (184)	3-1/8 (79)	5-3/4 (146)	6-11/16 (170)	7-3/8 (187)	N/A	9-3/8 (238)	N/A	12-1/4 (311)	N/A	8-1/8 (206)	N/A	9-3/4 (248)
4	5	9B	7-3/4 (197)	2-5/8 (67)	6-5/8 (168)	8-1/16 (205)	8-11/16 (221)	N/A	9 (229)	N/A	11-7/8 (302)	N/A	7-3/4 (197)	N/A	9-3/8 (238)
6	6	9	8-1/4 (210)	2-3/4 (70)	7 (178)	8 (203)	9 (229)	N/A	9-1/4 (235)	N/A	12-1/8 (308)	N/A	8 (203)	N/A	9-5/8 (244)

NOTES:
1. All dimensions in inches and (mm).
2. Dimensions may vary ± 1/4 (6).
3. Not for construction purposes unless certified.
4. N/A = Not Applicable.
5. Check discharge position, casing dimensions which exceed dimension "D" may require pads for the pump and/or motor.

AURORA®
Pentair Pump Group

AURORA MODEL 344A & 364A PUMPS
ON STEEL BASES





STANDARD POSITION (1)

BASE	SIZE	HA	HB	HE	HG	HH QTY	HH SIZE	HP_1	HP_2
1	12 X 30	12	30	9	3	2	5/8	15	–
2	17 X 34	17	34	15	3	4	5/8	1-1/4	1-1/4
3	18 X 38	18	38	16	4	4	5/8	1-1/4	1-1/4
4	18 X 42	18	42	16	4	4	5/8	1-1/4	1-1/4
5	18 X 44	18	44	15	4	4	5/8	1	1
6	18 X 48	18	48	15	4	4	5/8	1	1
7	22 X 60	22	60	19	4	4	5/8	1	1

NOTE: WHEN TWO "D" DIMENSIONS ARE INDICATED ALWAYS USE THE LARGER FIGURE.		POWER FRAME	1	2	340 3	360 3
		WG	10-5/16	13-13/16	13-13/16	13-13/16
D	340 CASE BORE	7	5-1/4	6-1/4	–	–
		9	6-1/4	7	7	7
		11	–	7	7	7
		12	–	7	7	7
	360 CASE BORE	7	5-1/4	6-1/4	–	–
		9	5-1/4	7	7	7
		11	–	7	7	7
		12	–	7	7	7

MOTOR FRAME	C APPROX	D	BASE NUMBER			
56	12		1	N/A	N/A	N/A
143T	12		1	N/A	N/A	N/A
145T	13		1	3	N/A	N/A
182T	13		1	3	N/A	N/A
184T	14		1	3	N/A	N/A
213T	16	5-1/4	2	3	N/A	3
215T	18	5-1/4	2	3	N/A	3
254T	21	6-1/4	3	4	4	4
256T	23	6-1/4	N/A	4	4	4
284T	24	7	N/A	5	5	5
284TS	22	7	N/A	5	5	5
286T	25	7	N/A	5	5	5
286TS	24	7	N/A	5	5	5
324T	26	8	N/A	6	6	6
324TS	25	8	N/A	6	6	6
326T	28	8	N/A	6	6	6
326TS	26	8	N/A	6	6	6
364T	29	9	N/A	6	6	6
364TS	27	9	N/A	6	6	6
365TS	28	9	N/A	6	6	6
404TS	30	10	N/A	7	7	7

PUMPS WITH THREADED CONNECTIONS																	
PUMP SIZE								344A DH		364A DH		344A HL			364A HL		
DISCH	SUCT	CASE BORE	X	Y	Z	DC	DD	FRAME 1	FRAME 2 & 3	FRAME 1	FRAME 2 & 3	FRAME 1	FRAME 2	FRAME 3	FRAME 1	FRAME 2	FRAME 3
1-1/4	1-1/2	7	5-1/4	2-7/16	4-3/16	4-15/16	5-3/16	7-3/16	N/A	10-1/4	N/A	4-11/16	N/A	N/A	6-1/2	N/A	N/A
1-1/4	1-1/2	9	6-5/8	2-9/16	5-3/8	6-3/16	6-3/8	7-1/4	N/A	10-5/16	N/A	4-3/4	N/A	N/A	6-9/16	N/A	N/A
1-1/2	2	7	5-3/8	2-1/2	4-5/16	5-1/8	5-3/8	7-5/16	N/A	10-3/8	N/A	4-13/16	N/A	N/A	6-5/8	N/A	N/A
1-1/2	2	9	6-3/4	2-5/8	5-1/2	6-5/16	6-9/16	7-3/8	8-3/8	10-7/16	11-1/4	4-7/8	6-3/8	N/A	6-11/16	8	N/A
1-1/2	2	11	9	2-13/16	6-1/8	7-1/16	7-1/4	N/A	8-9/16	N/A	11-7/16	N/A	6-1/2	N/A	N/A	8-1/8	N/A
1-1/2	2	12	7-3/4	2-3/4	7-1/16	8	8-1/4	N/A	8-5/8	N/A	11-1/2	N/A	6-5/8	N/A	N/A	8-1/4	8-1/4
PUMPS WITH ANSI 125 LB FLANGED CONNECTIONS																	
2	2-1/2	7	5-5/8	1-7/8	4-9/16	5-3/8	5-13/16	6-13/16	7-13/16	9-7/8	10-11/16	4-5/16	5-13/16	N/A	6-1/8	7-7/16	N/A
2	2-1/2	9	7	1-7/8	5-11/16	6-1/2	6-7/8	6-3/4	7-3/4	9-13/16	10-5/8	4-1/4	N/A	5-3/4	6-1/16	N/A	7-3/8
2	2-1/2	12	8	1-7/8	7-3/16	8-3/16	8-1/2	N/A	7-7/8	N/A	10-3/4	N/A	5-7/8	N/A	N/A	7-1/2	N/A
2	3	11	8	2-3/8	6-1/2	7	7-3/8	N/A	8 1/2	N/A	11-3/8	N/A	6-3/16	N/A	N/A	7-13/16	N/A
2-1/2	3	7	5-7/8	2	4-13/16	5-13/16	6-1/4	7-1/16	8-1/16	10-1/8	10-15/16	4-9/16	6-1/16	N/A	6-3/8	7-11/16	N/A
2-1/2	3	9	7-1/4	2	5-15/16	6-3/4	7-1/4	7	8	N/A	10-7/8	4-1/2	N/A	6	N/A	7-5/8	7-5/8
2-1/2	3	12	8-1/4	2	7-3/8	8-3/8	8-3/4	N/A	8-1/8	N/A	11	N/A	6-1/8	N/A	N/A	7-3/4	7-3/4
3	4	9	7-1/2	2-1/8	6-1/8	6-7/8	7-7/16	7-1/4	8-1/4	N/A	11-1/8	4-3/4	6-1/4	6-1/4	N/A	7-7/8	7-7/8
3	4	11	9	2-3/4	7	7-9/16	8-3/16	N/A	9-3/16	N/A	12-1/16	N/A	6-13/16	N/A	N/A	8-7/16	N/A
3	4	12	8-1/2	2-1/8	7-9/16	8-7/16	8-15/16	N/A	8-3/8	N/A	11-1/4	N/A	6-3/8	6-3/8	N/A	8	8
4	4	7	6-1/2	2-1/2	5-1/2	6-7/16	7-5/16	7-15/16	8-15/16	11	11-13/16	5-7/16	6-15/16	N/A	7-1/4	8-9/16	N/A
4	5	9A	7-1/4	3-1/8	5-3/4	6-11/16	7-3/8	N/A	9-3/8	N/A	12-1/4	N/A	7-3/8	7-3/8	N/A	9	9
4	5	9B	7-3/4	2-5/8	6-5/8	8-1/16	8-11/16	N/A	9	N/A	11-7/8	N/A	7	N/A	N/A	8-5/8	N/A
4	5	11	9	3	7-1/4	7-15/16	8-11/16	N/A	9-5/8	N/A	12-1/2	N/A	7-1/4	N/A	N/A	8-7/8	N/A
4	5	12	8-3/4	2-5/8	7-15/16	8-7/8	9-9/16	N/A	9-1/8	N/A	12	N/A	7-1/8	7-1/8	N/A	8-3/4	8-3/4
5	6	11	9	3-1/8	8-1/16	8-11/16	10-1/8	N/A	10-1/8	N/A	13	N/A	7-3/4	7-3/4	N/A	9-3/8	9-3/8
5	6	12	9	2-7/8	8-5/16	9-1/4	10-1/8	N/A	9-5/8	N/A	12-1/2	N/A	7-5/8	7-5/8	N/A	9-1/4	9-1/4
6	6	9	8-1/4	2-3/4	7	8	9	N/A	9-1/4	N/A	12-1/8	N/A	7-1/4	N/A	N/A	8-7/8	N/A
6	6	11	9-1/4	3-1/8	8-11/16	9-11/16	10-13/16	N/A	10-1/8	N/A	13	N/A	8-1/8	8-1/8	N/A	9-3/4	9-3/4
6	6	12	9-1/4	3-1/8	8-11/16	9-11/16	10-13/16	N/A	10-1/8	N/A	13	N/A	N/A	8-1/8	N/A	N/A	9-3/4

NOTES:
1. All dimensions in inches.
2. Dimensions may vary ± 1/4.
3. Not for construction purposes unless certified.
4. N/A = not applicable.
5. Check discharge position. Casing dimensions which exceed dimension "D" may require pads for the pump and/or motor.
6. Conduit box is shown in approximate location. Dimensions are not specified as they vary with each motor manufacturer

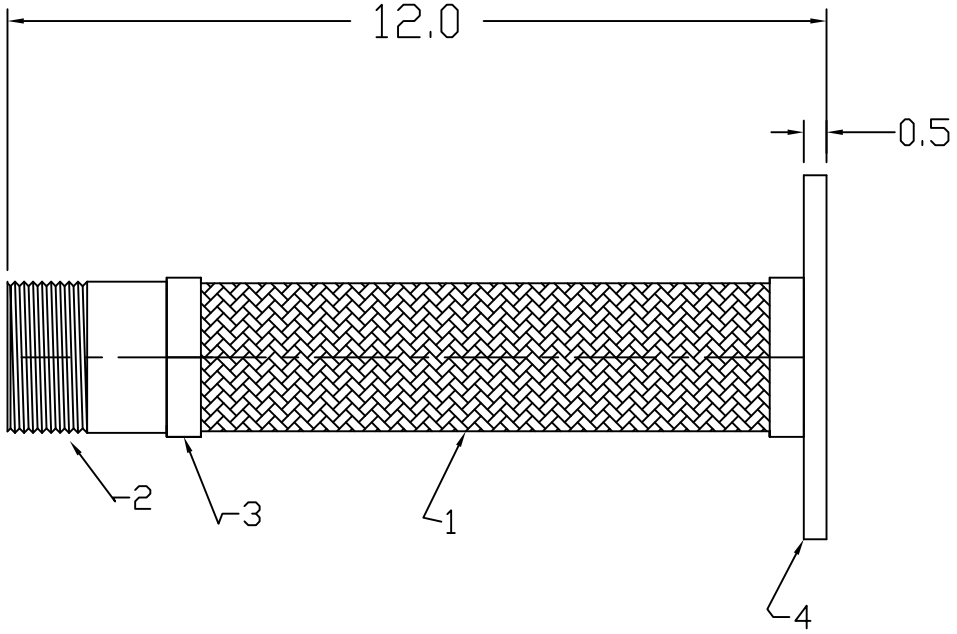
* Dim "HT" may vary 1/8" TO 1".

† D Dimension of 5 x 6 x 11, 5 x 6 x 12, 6 x 6 x 11 and 6 x 6 x 12 pump with 213T thru 326T motor is 8".

AURORA®
Pentair Pump Group

ALL DIMENSIONS IN INCHES

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



GENERAL NOTES:

A. DESIGN:
PRESSURE = 100 PSIG
TEMPERATURE = 250°F

B. ALL WELDING SHALL BE IN ACCORDANCE WITH:
ASME SECTION IX

APPROVED BY:.....

DATE:.....PO#:.....

L/T CIRCUIT
PUMP BRAID - SUCTION.
QUANTITY: 1.

GENERAL NOTES:
A. ALL WELDING T.I.G. METHOD IN ACCORDANCE WITH:
ASME SECTION IX.
B. PRESSURE TEST ASSEBLIES TO 50 PSIG AFTER FABRICATION

ITEM	QTY	DESCRIPTION	MATERIAL
5	1	2.0" O.D. TUBE, .065" WALL	C.S.
4	1	2.0"x3.0"-125/150# x 1/2" REDUCING FLANGE.	A 36
3	1	BRAID SLEEVE	A 240 T304
2	1	PIPE FITTING, 2.0" SCH. 40 MALE NPT.	A 234 GR. WPB
1	1	2.0" I.D. x SINGLE BRAIDED HOSE	A 240 T304

BILL OF MATERIAL

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE :

.XXX ± .010"
.XX ± .030"
.X ± .060"
ANGLES ± 1/2°

FRACTIONS: ± 1/8"

EXPANSION JOINT OAL: ± 1/8"

CUST: BOULDEN ENERGY
JOB#

DME INCORPORATED
14001 MARQUARDT AVE, SANTA FE SPRINGS , CA 90670
TEL: (562) 921 - 0464
FAX: (562) 802 - 7489

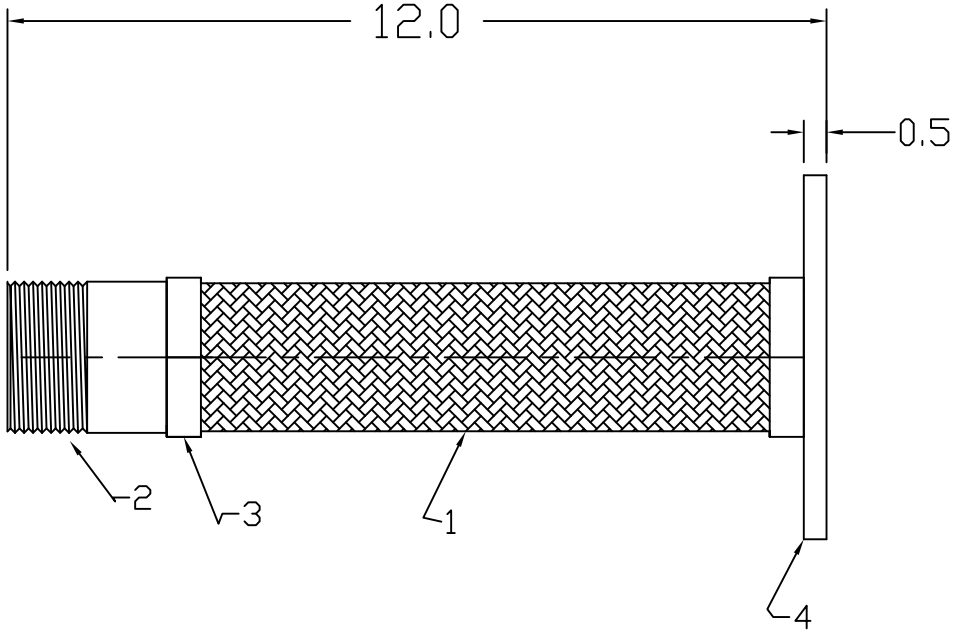
MNPT x T304 S/S HOSE x ASA FLANGE

DESIGN: DJM		SIZE	DWG NO.		REV
APPROVED BY: DJM		SCALE NONE	DATE 9-4-01	SHEET	
DWG: P.K.	9-4-01				

MAXX

ALL DIMENSIONS IN INCHES

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



GENERAL NOTES:

A. DESIGN:
PRESSURE = 100 PSIG
TEMPERATURE = 250°F

B. ALL WELDING SHALL BE IN ACCORDANCE WITH:
ASME SECTION IX

APPROVED BY:.....

DATE:.....PO#:.....

L/T CIRCUIT
PUMP BRAID - DISCHARGE.
QUANTITY: 1.

GENERAL NOTES:
A. ALL WELDING T.I.G. METHOD IN ACCORDANCE WITH:
ASME SECTION IX.
B. PRESSURE TEST ASSEBLIES TO 50 PSIG AFTER FABRICATION

ITEM	QTY	DESCRIPTION	MATERIAL
5	1	2.0" O.D. TUBE, .065" WALL	C.S.
4	1	2.0"x3.0"-125/150# x 1/2" REDUCING FLANGE.	A 36
3	1	BRAID SLEEVE	A 240 T304
2	1	PIPE FITTING, 1.5" SCH. 40 MALE NPT.	A 234 GR. WPB
1	1	2.0" I.D. x SINGLE BRAIDED HOSE	A 240 T304

BILL OF MATERIAL

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE :

.XXX ± .010"
.XX ± .030"
.X ± .060"
ANGLES ± 1/2°

FRACTIONS: ± 1/8"

EXPANSION JOINT OAL: ± 1/8"

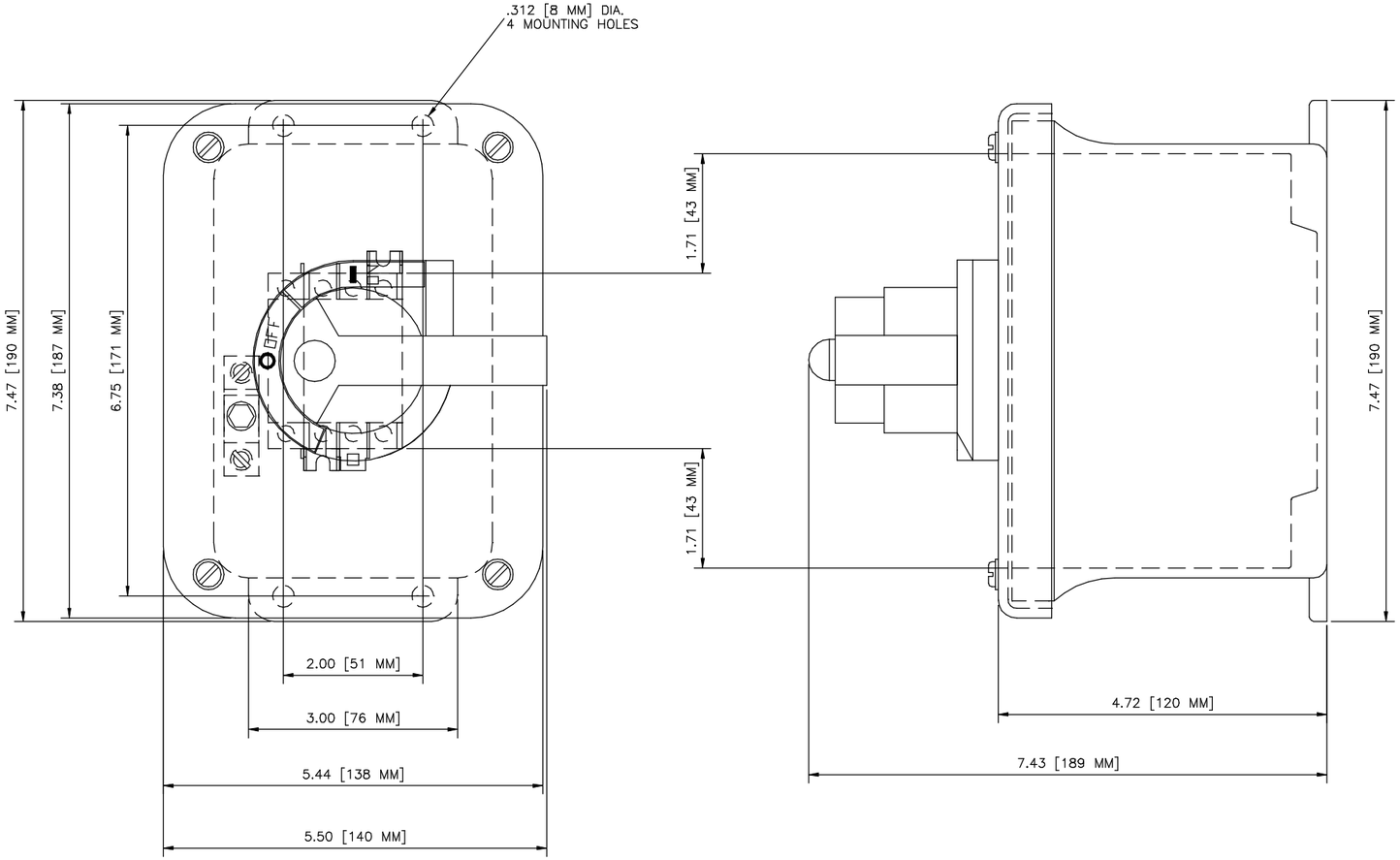
CUST: BOULDEN ENERGY
JOB#

DME INCORPORATED
14001 MARQUARDT AVE, SANTA FE SPRINGS , CA 90670
TEL: (562) 921 - 0464
FAX: (562) 802 - 7489

MNPT x T304 S/S HOSE x ASA FLANGE

DESIGN: DJM		SIZE	DWG NO.		REV
APPROVED BY: DJM		SCALE NONE	DATE 9-4-01	SHEET	
DWG: P.K.	9-4-01				

MAXX



PUMP MOTOR DISCONNECT SWITCH.
P/N ER53025UX - 16 AMP DISCONNECT.
NEMA-4X FIBERGLASS ENCLOSURE.

NOTE:
1. WIRE RANGE OF SWITCH LUGS IS #6–#10 COPPER.
   WIRE RANGE OF GROUND LUGS IS #2–#14 COPPER OR ALUMINUM.

REVISION DS0468

IT.

FILENAME 95–1551.DWG

FEDERAL ID NUMBER

PRODUCT CODE | REVISION NEW

DRAWN BY WARREN SIPE DATE 6/8/01

APPD. D.R. BENDER DATE 6/8/01

APPD. DATE

DSPEC (PROJECT NO.) | SCALE 1=1

C.O.

CUTLER–HAMMER
CLEVELAND, TENNESSEE

TITLE DIMENSION SHEET ROTARY SWITCH 16–25 AMP TYPE 4X NON–METALLIC

TYPE

SIZE D | DWG. NO. 95–1551 | SHEET NO. 1 OF 1

DIMDFM
REV. 12/22/98

Model 2012 & 2013

Three-Way Thermostatic Valve (T Style)

2012-1	1 1/2” NPT
2012	2” NPT
2012J24	1 1/2” SAE O-ring
2012J32	2” SAE O-ring
2012M	2” NPT with Manual Override
F2012	2” Flange
F2012M	2” Flange with Manual Override

With Bulkhead Mounting Provisions

2013-1	1 1/2” NPT
2013	2” NPT
2013J24	1 1/2” SAE O-ring
2013J32	2” SAE O-ring
2013M	2” NPT with Manual Override

Fluid Power Energy (FPE) Thermostatic Valves utilize the principle of expanding wax, which in the semi-liquid state undergoes large expansion rates within a relatively narrow temperature range. The self-contained element activates a stainless steel sleeve, which directs flow. All FPE Thermostatic Valves are factory set at predetermined temperatures: no further adjustments are necessary. A wide range of temperatures are available for water and oil temperature control applications.

When used in a diverting application, on start-up the total fluid flow is routed back to the main system. As fluid temperature rises to the control range, some fluid is diverted to the cooling system. As fluid temperature continues to increase, more flow is diverted. When the thermostat is in a fully stroked condition, all fluid flow is directed to the cooling system. FPE Thermostatic Valves may also be used in a mixing application.

In a mixing application, hot fluid enters the “B” port and colder fluid enters the “C” port. The flows mix and the thermostat adjusts to reach the desired temperature, exiting the “A” port.

Standard FPE thermostatic valve housings are made from aluminum and grey iron castings, however, ductile iron, bronze, steel and stainless steel housings are available.

Optional features: High over temperature element, plated element, manual override.

Features

- Designed for Hydraulic Power Units
- Optional Mounting Rails
- Wide Range of Temperatures
- Self-Contained
- Replaceable Element
- Non Adjustable
- Rugged Construction
- Tamper-Proof
- Compact Operate in Any Position
- Extra Heavy Casting

FLUID POWER ENERGY, INC.

W229 N591 Foster Court • Waukesha, WI 53186

262•548•6220 Fax 262•548•6239

www.fpevalves.com

ISO 9001-2000

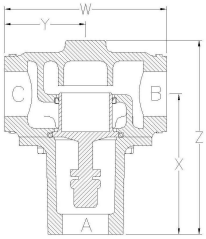
MADE IN U. S. A.

Model 2012 & 2013

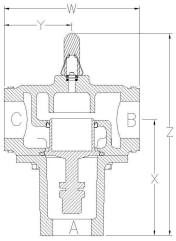
MODEL NUMBER	BODY MATERIAL (*)	NOMINAL PIPE SIZE	PRINCIPAL DIMENSIONS (UNITS in. & (mm)) "X"	"Y"	"W"	"Z"	MAX WIDTH IN THE OTHER PLANE	FLANGE DRILLING NO. OF HOLES	DIA. OF HOLES	BOLT CIRCLE	NO. OF ELEMENTS	APPROX. SHIPPING WEIGHT	NOTES OR NUMBERED ENDNOTES
*2012-1	A, B, D, S, SS	1 1/2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	
*2012	A, B, D, S, SS	2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	
*2012J24	A, B, D, S, SS	SAE 24 1 1/2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	
*2012J32	A, B, D, S, SS	SAE 32 2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	
*2012M	A, B, D, S, SS	2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/8 (212.73)	5 3/4 (146.05)	N/A	N/A	N/A	1	A&D=22#, B=28# S & SS=25#	Manual Override
*F2012	A, B, D	2" 125# FF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	9 (228.60)	6 (152.40)	4	3/4 (19.05)	4 3/4 (120.65)	1	A=24#, B=26# D=20#	
	S, SS	2" 150# RF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	9 (228.60)	6 (152.40)	4	3/4 (19.05)	4 3/4 (120.65)	1	S & SS=24#	
*F2012M	A, B, D	2" 125# FF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	11 (279.40)	6 (152.40)	4	3/4 (19.05)	4 3/4 (120.65)	1	A=24#, B=26# D=20#	Manual Override
	S, SS	2" 150# RF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	11 (279.40)	6 (152.40)	4	3/4 (19.05)	4 3/4 (120.65)	1	S & SS=24#	Manual Override
*F2012X	S, SS	2" 300# RF FLANGE	6 (152.40)	4 7/16 (112.71)	8 7/8 (225.43)	9 7/16 (239.71)	6 1/2 (165.10)	8	3/4 (19.05)	5 (127.00)	1	S & SS=24#	
*2013-1	A, B, D, S, SS	1 1/2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs
*2013	A, B, D, S, SS	2" NPT	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs
*2013J24	A, B, D, S, SS	SAE 24 1 1/2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs
*2013J32	A, B, D, S, SS	SAE 32 2"	6 (152.40)	3 1/2 (88.90)	7 (177.80)	8 3/4 (222.25)	6 1/2 (165.10)	N/A	N/A	N/A	1	A&D=25#, B=30# S & SS=27#	Mounting Ribs

* (Replace * with body material type; A=Cast Iron, B=Bronze, D=Ductile, S=Steel, SS=Stainless Steel)

PRESSURE RATINGS	
MATERIAL	PSI
A, B	150
D	250
S, SS	500
SF, SSF	275
SFX, SSFX	720



*2012, *2012J



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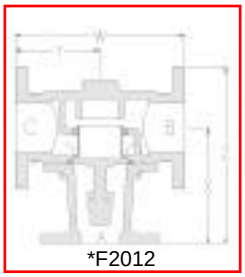

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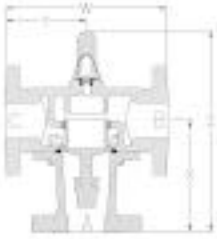

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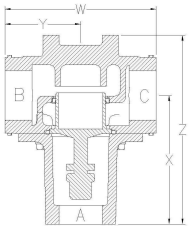

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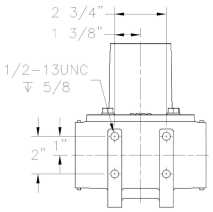
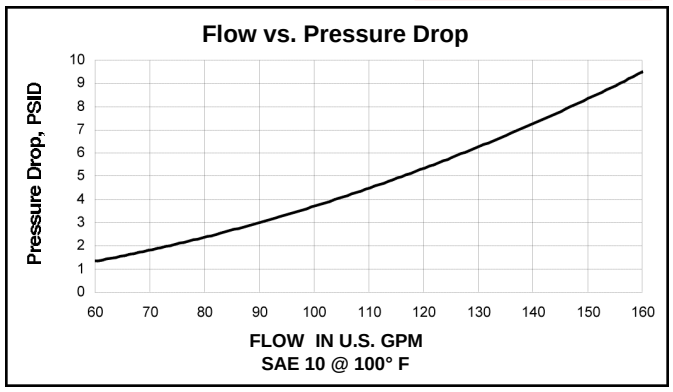


2013 Mounting Holes



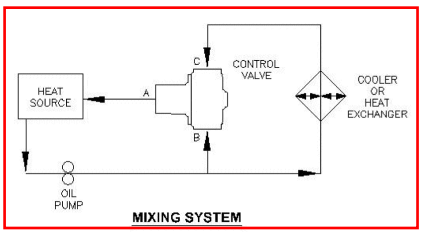
Recommended Pressure Drop is 2 to 7 PSI

PART #	DESCRIPTION
*2012	VALVE BODY (*See table for material)
*2013	VALVE BODY W/MOUNTING HOLES
*2020	VALVE COVER (*See table for material)
2071	LIP SEAL
2050-Temp	THERMOSTAT (Temp to follow dash)
1604	HEX BOLT
1605	LOCK WASHER
1570**	O-RING (Standard material is Buna-N)
1590	NAMEPLATE
FPE Model 2000 Replacement Kit** *(Includes the following:)*	
1570**	O-RING (Standard material is Buna-N)
2071	LIP SEAL
2050-Temp	THERMOSTAT (Temp to follow dash)

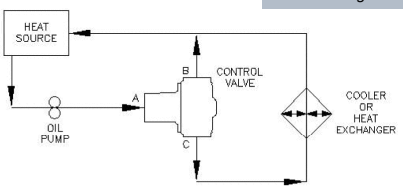
(For Viton® (V) or Neoprene (E) O-Ring material, replace ** with V or E)

Viton® is a registered trademark of Dupont Dow Elastomers

APPLICATION CHARTS



MIXING SYSTEM



DIVERTING SYSTEM

FPE MODEL AF2012-140
L/T CIRCUIT MIXING VALVE

FLUID POWER ENERGY, INC.

W229 N591 Foster Court • Waukesha, WI 53186

262•548•6220 Fax 262•548•6239

www.fpevalves.com

To Order

Specify Model Number, nominal temperature desired, and housing material. For Model coding information, visit our website or consult your factory representative.

Model 2510

Three-Way Thermostatic Valve (T Style)

2510	2 1/2” Flange
2510M	2 1/2” Flange with Manual Override

Fluid Power Energy (FPE) Thermostatic Valves utilize the principle of expanding wax, which in the semi-liquid state undergoes large expansion rates within a relatively narrow temperature range. The self-contained element activates a stainless steel sleeve, which directs flow. All FPE Thermostatic Valves are factory set at predetermined temperatures: no further adjustments are necessary. A wide range of temperatures are available for water and oil temperature control applications.

When used in a diverting application, on start-up the total fluid flow is routed back to the main system. As fluid temperature rises to the control range, some fluid is diverted to the cooling system. As fluid temperature continues to increase, more flow is diverted. When the thermostat is in a fully stroked condition, all fluid flow is directed to the cooling system. FPE Thermostatic Valves may also be used in a mixing application.

In a mixing application, hot fluid enters the “B” port and colder fluid enters the “C” port. The flows mix and the thermostat adjusts to reach the desired temperature, exiting the “A” port.

Standard FPE thermostatic valve housings are made from aluminum and grey iron castings, however, ductile iron, bronze, steel and stainless steel housings are available.

Available Connections: 125# FF Flange, 150# RF Flange, 300# RF Flange, Navy and Metric Flanges.

Optional features: Manual Override, High Over Temp element, Plated element. Other options available upon request.

Features

- Wide Range of Temperatures
- Heavy Duty
- Self-Contained
- Replaceable Element
- Non-Adjustable
- Rugged Construction
- Tamper-Proof
- Operate in Any Position
- Compact
- Available for Refrigeration Service

FLUID POWER ENERGY, INC.

W229 N591 Foster Court • Waukesha, WI 53186

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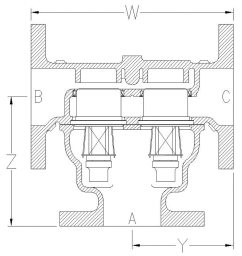
ISO 9001-2000

MADE IN U. S. A.

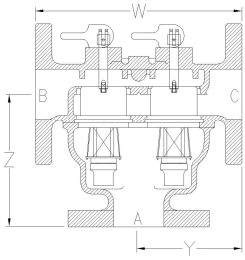
Model 2510

MODEL NUMBER	BODY MATERIAL (*)	NOMINAL PIPE SIZE	PRINCIPAL DIMENSIONS (UNITS in. & (mm)) "X"	"Y"	"W"	"Z"	MAX WIDTH IN THE OTHER PLANE	FLANGE DRILLING NO. OF HOLES	DIA. OF HOLES	BOLT CIRCLE	NO. OF ELEMENTS	APPROX. SHIPPING WEIGHT	NOTES OR NUMBERED ENDNOTES
*2510	A, B, D	2 1/2" 125# FF FLANGE	N/A	5 (127.00)	10 (254.00)	6 1/2 (165.10)	8 (203.20)	4	3/4 (19.05)	5 1/2 (139.70)	2	A=47#, B=54# D=47#	
	S, SS	2 1/2" 150# RF FLANGE	N/A	5 3/16 (131.76)	10 3/8 (263.53)	6 5/8 (168.28)	8 (203.20)	4	3/4 (19.05)	5 1/2 (139.70)	2	S & SS=51#	
*2510M	A, B, D	2 1/2" 125# FF FLANGE	N/A	5 (127.00)	10 (254.00)	6 1/2 (165.10)	8 (203.20)	4	3/4 (19.05)	5 1/2 (139.70)	2	A=48#, B=55# D=48#	Manual Override
	S, SS	2 1/2" 150# RF FLANGE	N/A	5 3/16 (131.76)	10 3/8 (263.53)	6 5/8 (168.28)	8 (203.20)	4	3/4 (19.05)	5 1/2 (139.70)	2	S & SS=52#	
*2510X	S, SS	2 1/2" 300# RF FLANGE	N/A	5 3/16 (131.76)	10 3/8 (263.53)	6 5/8 (168.28)	8 (203.20)	8	7/8 (22.23)	5 7/8 (149.23)	2	S & SS=59#	
*2510XM	S, SS	2 1/2" 300# RF FLANGE	N/A	5 3/16 (131.76)	10 3/8 (263.53)	6 5/8 (168.28)	8 (203.20)	8	7/8 (22.23)	5 7/8 (149.23)	2	S & SS=60#	Manual Override

* (Replace * with body material type; A=Cast Iron, B=Bronze, D=Ductile, S=Steel, SS=Stainless Steel)

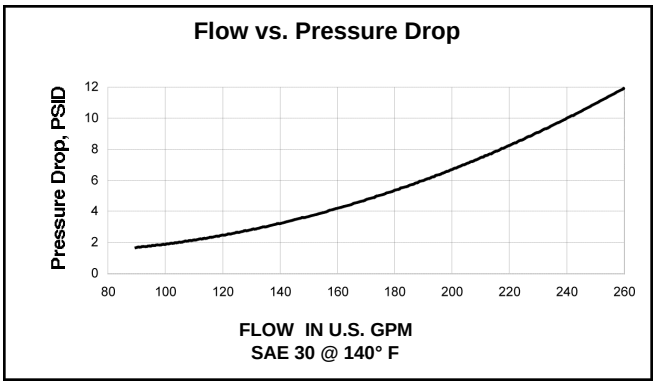


*2510, *2510X



*2510M, *2510XM

PRESSURE RATINGS	
MATERIAL	PSI
A, B, D	125
S, SS	275
SX, SSX	720



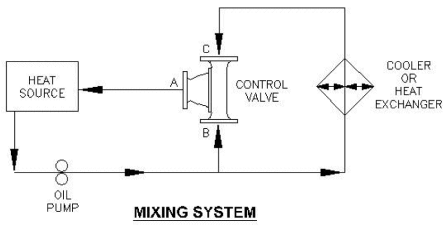
Recommended Pressure Drop is 2 to 7 PSI

PART #	DESCRIPTION
*2510	VALVE BODY (*See table for material)
*2520	VALVE COVER (*See table for material)
2071	LIP SEAL
3080-C	GASKET
2050-Temp	THERMOSTAT (Temp to follow dash)
1604	HEX BOLT
1605	LOCK WASHER
1590	NAMEPLATE

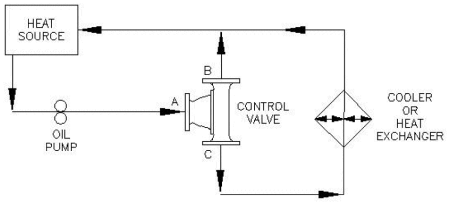
FPE Model 2500 Replacement Kit (*Includes the following:*)	
3080-C	GASKET
(2) 2071	LIP SEAL
(2) 2050-Temp	THERMOSTAT (Temp to folllow dash)

FPE MODEL A2510-155
H/T CIRCUIT MIXING VALVE

APPLICATION CHARTS



MIXING SYSTEM



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To Order

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