Fluid Cooling Shell & Tube B / SB Series

Performance Notes

- Young Touchstone thermal interchange
- Competitively priced
- 1/4" or 3/8" tubes available
- Water to water applications
- Sea water applications
- NPT, SAE O-Ring, SAE flange, or BSPP shell side connections available
- End bonnets removable for servicing
- Mounting feet included (may be rotated in 90° increments)

Options
90/10 copper nickel cooling tubes, bronze end bonnets for sea water service and zinc anodes

Ratings

Maximum Operating Pressure - Shell Side
250 PSI

Maximum Operating Pressure - Tube Side
150 PSI

Maximum Operating Temperature
350°F

Materials

Tubes Copper

Hubs & Tubesheets Steel or brass

Shell Steel or brass

Baffles Brass

End Bonnets Cast iron

Mounting Brackets Steel

Gaskets Nitrile rubber/cellulose fiber

Nameplate Aluminum foil

How to Order

[ ] – [ ][ ][ ][ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ]

Model Series
SB
SBF
B
BS
BM
BF
BFM

Model Size Selected

Baffle Spacing
A - 1.125
B - 2.25
C - 4.5
D - 9.0

Tube Diameter Code
4 - 1/4"
6 - 3/8"

Tubeside Passes
0 - One Pass
T - Two Pass
F - Four Pass

Shell Material
Blank - Steel
BR - Brass

Cooling Tube Material
Blank - Copper
CN - CuNi

End Bonnet Material
Blank - Cast Iron
B - Bronze

Zinc Anodes
Blank - None
Z - Zinc

ADD FOR B SERIES MODELS ONLY:
BR-CN-B-Z is to be used for all seawater/dirty water applications.

Steel Hub
SB = NPT Shell Side, NPT Tube Side
SBF = SAE Flange (with UNC threads) Shell Side connections; NPT Tube Side connections

Brass Hub
B = NPT Shell Side connections; NPT Tube Side connections
BS = SAE O-Ring Shell Side connections; NPT Tube Side connections
BM = BSPP Shell Side connections; BSPP Tube Side connections
BF = SAE Flange (with UNC threads) Shell Side connections; NPT Tube Side connections
BFM = SAE Flange (with Metric threads) Shell Side connections; BSPP Tube Side connections

SAE flanges available on some models. Consult factory for details.

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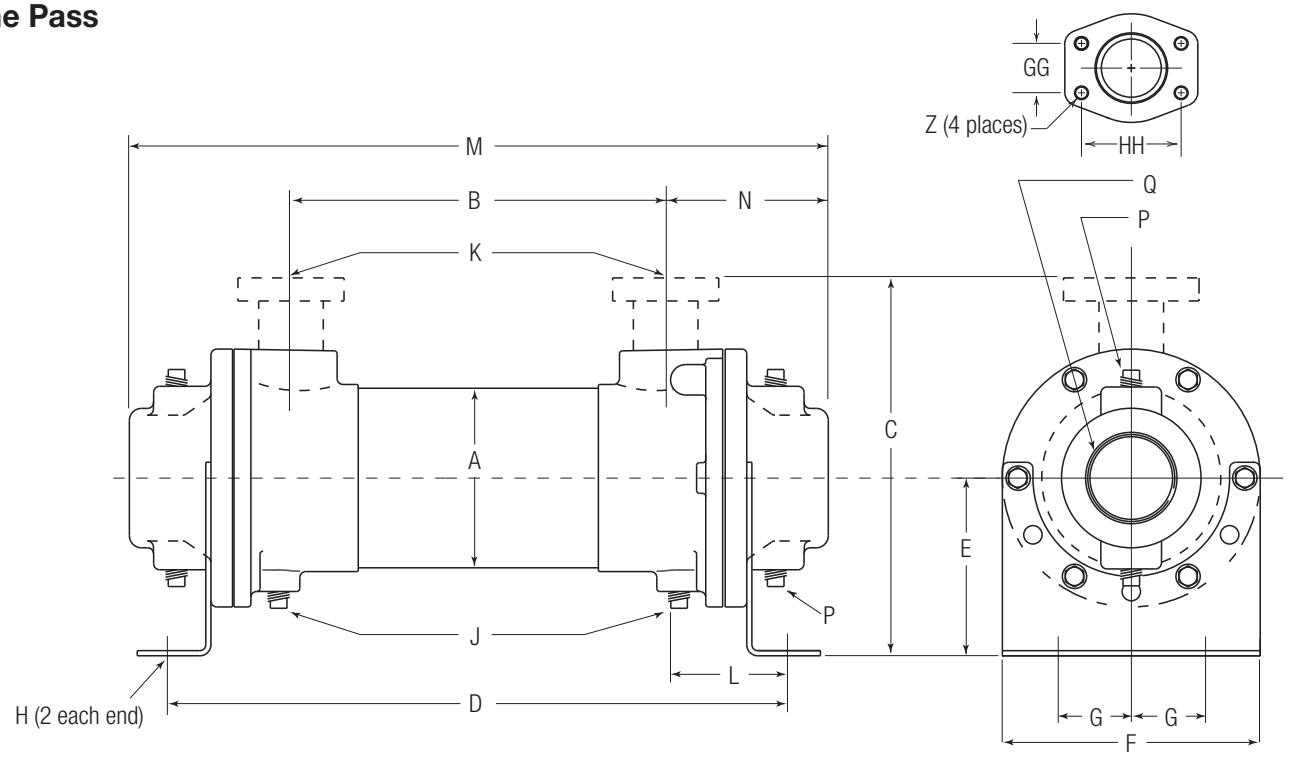
Dimensions

One Pass



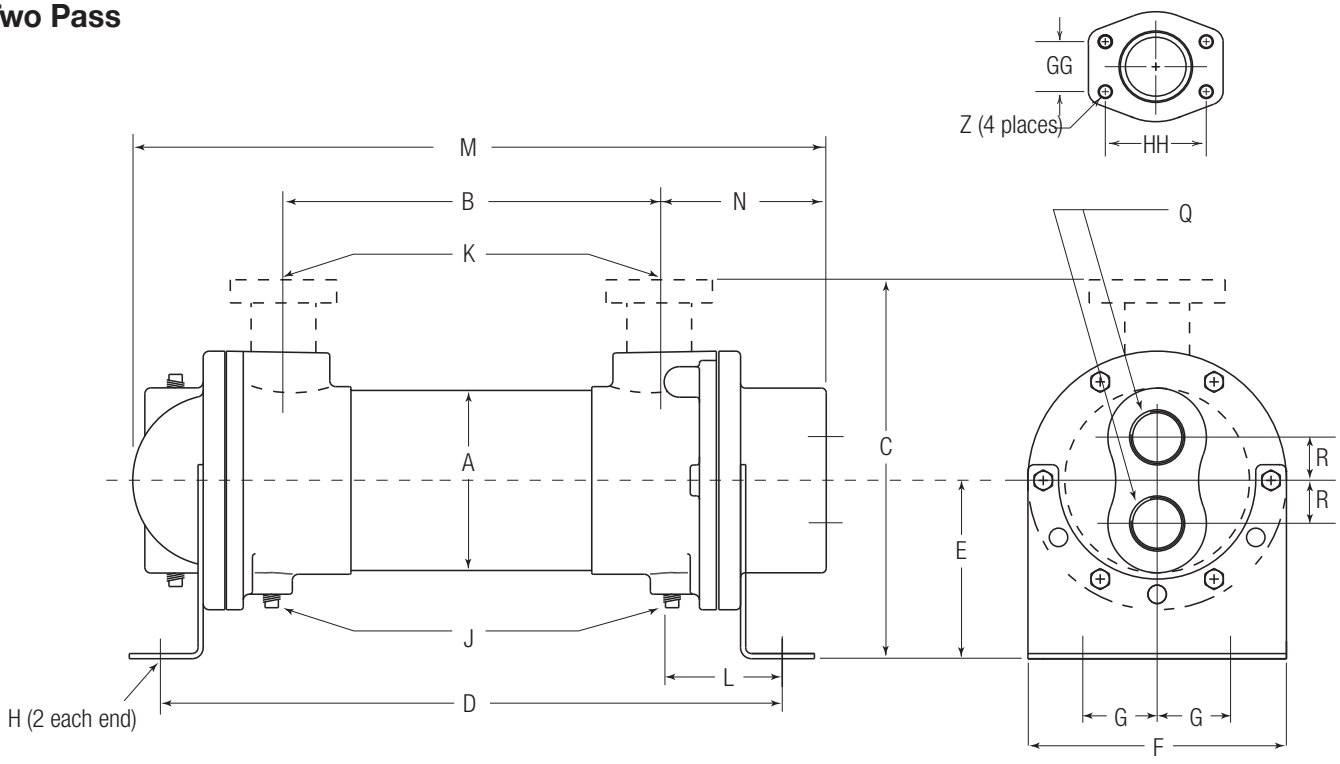
Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06	1/2-13 UNC	M-12
3	2.44	4.19	5/8-11 UNC	M-16

			C								K						
Model	A	B	NPT/BSPP SAE O-Ring	SAE Flange	D	E	F	G	H	J NPT	NPT/BSPP Flange	SAE O-Ring	L	M	N	P NPT	Q NPT
B-401	2.125	7.62	3.50	—	11.01	1.94	2.62	.88	.41 Dia.	—	*.50	#8, ¾-16 UNF-2B	1.72	11.24	1.81	—	1.00
B-402	2.125	16.62	3.50	—	20.01	1.94	2.62	.88	.41 Dia.	—	*.50		1.72	20.24	1.81	—	1.00
B-701	3.656	7.00	6.25	C/F	12.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00	#16 1⅝-12 UNF-2B	2.69	13.64	3.24	(4) .38	1.50
B-702	3.656	16.00	6.25	C/F	21.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00		2.69	22.64	3.24	(4) .38	1.50
B-703	3.656	25.00	6.25	C/F	30.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00		2.69	31.64	3.24	(4) .38	1.50
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50	#24 1⅞-12 UN-2B	3.06	23.60	4.05	(4) .38	2.00
B-1003	5.125	24.50	7.38	8.46	30.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50		3.06	32.60	4.05	(4) .38	2.00
B-1004	5.125	33.50	7.38	8.46	39.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50		3.06	41.60	4.05	(4) .38	2.00
B-1202	6.125	14.62	8.81	10.50	21.50	4.75	7.50	2.50	.44 x .88	(6) .38	2.00	#32 2½-12 UN-2B	3.44	24.38	4.88	(4) .50	3.00
B-1203	6.125	23.50	8.81	10.50	30.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	33.25	4.88	(4) .50	3.00
B-1204	6.125	32.38	8.81	10.50	39.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	42.12	4.88	(4) .50	3.00
B-1205	6.125	41.38	8.81	10.50	48.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	51.12	4.88	(4) .50	3.00
B-1206	6.125	50.50	8.81	10.50	57.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	60.25	4.88	(4) .50	3.00
B-1207	6.125	59.50	8.81	10.50	66.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	69.25	4.88	(4) .50	3.00
B-1208	6.125	38.38	8.81	10.50	75.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	78.12	4.88	(4) .50	3.00
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	26.62	6.52	(4) .50	4.00
B-1603	8.00	22.60	12.13	15.61	31.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	35.62	6.52	(4) .50	4.00
B-1604	8.00	31.60	12.13	15.61	40.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	44.62	6.52	(4) .50	4.00
B-1605	8.00	40.60	12.13	15.61	49.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	53.62	6.52	(4) .50	4.00
B-1606	8.00	49.60	12.13	15.61	58.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	62.62	6.52	(4) .50	4.00
B-1607	8.00	58.60	12.13	15.61	67.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	71.62	6.52	(4) .50	4.00
B-1608	8.00	67.60	12.13	15.61	76.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	80.62	6.52	(4) .50	4.00
B-1609	8.00	76.60	12.13	15.61	85.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	89.62	6.52	(4) .50	4.00
B-1610	8.00	85.60	12.13	15.61	94.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	98.62	6.52	(4) .50	4.00

**B-401 and B-402 SAE Flange not available. NOTE: We reserve the right to make reasonable design changes without notice. Consult factory. All dimensions are inches.*

Dimensions

Two Pass



Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06	1/2-13 UNC	M-12
3	2.44	4.19	5/8-11 UNC	M-16

			C								K							
Model	A	B	NPT/BSPP SAE O-Ring	SAE Flange	D	E	F	G	H	J NPT	NPT/BSPP Flange	SAE O-Ring	L	M	N	P NPT	Q NPT	R
B-701	3.656	7.00	6.25	C/F	12.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00	#16 1⅝-12 UNF-2B	2.69	13.28	3.30	(2) .38	1.00	.88
B-702	3.656	16.00	6.25	C/F	21.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00		2.69	22.28	3.30	(2) .38	1.00	.88
B-703	3.656	25.00	6.25	C/F	30.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00		2.69	31.28	3.30	(2) .38	1.00	.88
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50	#24 1⅞-12 UN-2B	3.06	23.29	3.80	(2) .38	1.50	1.19
B-1003	5.125	24.50	7.38	8.46	30.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50		3.06	32.29	3.80	(2) .38	1.50	1.19
B-1004	5.125	33.50	7.38	8.46	39.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50		3.06	41.29	3.80	(2) .38	1.50	1.19
B-1202	6.125	14.62	8.81	10.50	21.50	4.75	7.50	2.50	.44 x .88	(6) .38	2.00	#32 2½-12 UN-2B	3.44	23.94	4.56	(2) .50	2.00	1.44
B-1203	6.125	23.50	8.81	10.50	30.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	32.81	4.56	(2) .50	2.00	1.44
B-1204	6.125	32.38	8.81	10.50	39.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	41.69	4.56	(2) .50	2.00	1.44
B-1205	6.125	41.38	8.81	10.50	48.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	50.69	4.56	(2) .50	2.00	1.44
B-1206	6.125	50.50	8.81	10.50	57.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	59.81	4.56	(2) .50	2.00	1.44
B-1207	6.125	59.50	8.81	10.50	66.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	68.81	4.56	(2) .50	2.00	1.44
B-1208	6.125	68.38	8.81	10.50	75.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	77.69	4.56	(2) .50	2.00	1.44
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	25.10	6.08	(2) .50	2.50	1.88
B-1603	8.00	22.60	12.13	15.61	31.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	34.10	6.08	(2) .50	2.50	1.88
B-1604	8.00	31.60	12.13	15.61	40.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	43.10	6.08	(2) .50	2.50	1.88
B-1605	8.00	40.60	12.13	15.61	49.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	52.10	6.08	(2) .50	2.50	1.88
B-1606	8.00	49.60	12.13	15.61	58.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	61.10	6.08	(2) .50	2.50	1.88
B-1607	8.00	58.60	12.13	15.61	67.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	70.10	6.08	(2) .50	2.50	1.88
B-1608	8.00	67.60	12.13	15.61	76.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	79.10	6.08	(2) .50	2.50	1.88
B-1609	8.00	76.60	12.13	15.61	85.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	88.10	6.08	(2) .50	2.05	1.88
B-1610	8.00	85.60	12.13	15.61	94.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	97.10	6.08	(2) .50	2.50	1.88

NOTE: We reserve the right to make reasonable design changes without notice. Consult factory. All dimensions are inches.

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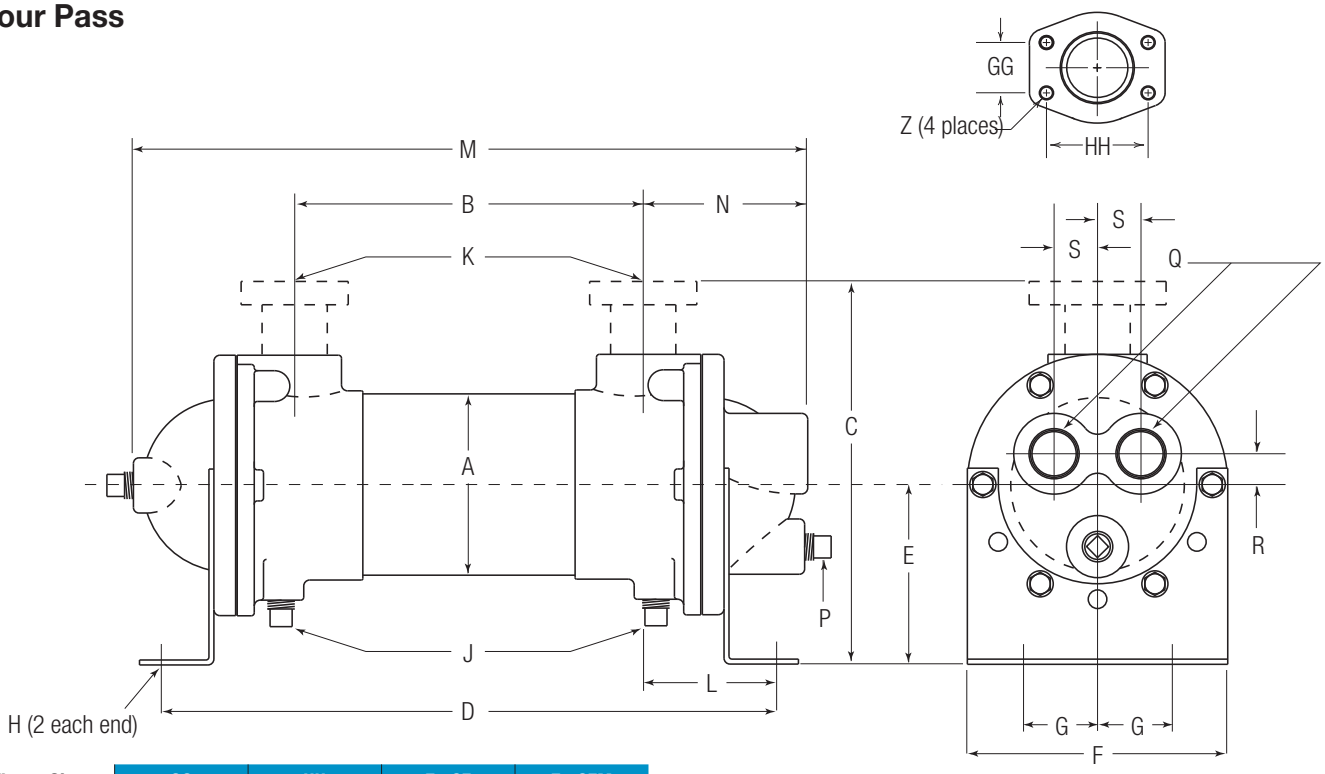
Dimensions

Four Pass



Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06	1/2-13 UNC	M-12
3	2.44	4.19	5/8-11 UNC	M-16

			C								K							
Model	A	B	NPT/BSPP SAE O-Ring	SAE Flange	D	E	F	G	H	J NPT	NPT/BSPP Flange	SAE O-Ring	L	M	N	P NPT	Q NPT	R	S
B-701	3.656	7.00	6.25	C/F	12.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00	#16 1⅝-12 UNF-2B	2.69	13.57	3.32	(3) .38	.75	.62	.88
B-702	3.656	16.00	6.25	C/F	21.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00		2.69	22.57	3.32	(3) .38	.75	.62	.88
B-703	3.656	25.00	6.25	C/F	30.01	3.62	5.25	1.50	.44 x 1.00	(2) .38	1.00		2.69	31.57	3.32	(3) .38	.75	.62	.88
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50	#24 1⅞-12 UN-2B	3.06	23.57	4.12	(3) .38	1.00	.75	1.34
B-1003	5.125	24.50	7.38	8.46	30.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50		3.06	32.57	4.12	(3) .38	1.00	.75	1.34
B-1004	5.125	33.50	7.38	8.46	39.71	4.00	6.75	2.00	.44 x 1.00	(6) .38	1.50		3.06	41.57	4.12	(3) .38	1.00	.75	1.34
B-1202	6.125	14.62	8.81	10.50	21.50	4.75	7.50	2.50	.44 x .88	(6) .38	2.00	#32 2½-12 UN-2B	3.44	24.44	4.90	(2) .38	1.50	1.06	1.40
B-1203	6.125	23.50	8.81	10.50	30.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	33.31	4.90	(2) .38	1.50	1.06	1.40
B-1204	6.125	32.38	8.81	10.50	39.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	42.19	4.90	(2) .38	1.50	1.06	1.40
B-1205	6.125	41.88	8.81	10.50	48.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	51.19	4.90	(1) .50	1.50	1.06	1.40
B-1206	6.125	50.50	8.81	10.50	57.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	60.31	4.90	(1) .50	1.50	1.06	1.40
B-1207	6.125	59.50	8.81	10.50	66.38	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	69.31	4.90	(1) .50	1.50	1.06	1.40
B-1208	6.125	38.38	8.81	10.50	75.25	4.75	7.50	2.50	.44 x .88	(6) .38	2.00		3.44	78.19	4.90	(1) .50	1.50	1.06	1.40
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	26.72	6.48	(3) .50	2.00	1.88	1.88
B-1603	8.00	22.60	12.13	15.61	31.88	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	35.72	6.48	(3) .50	2.00	1.88	1.88
B-1604	8.00	31.60	12.13	15.61	40.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	44.72	6.48	(3) .50	2.00	1.88	1.88
B-1605	8.00	40.60	12.13	15.61	49.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	53.72	6.48	(3) .50	2.00	1.88	1.88
B-1606	8.00	49.60	12.13	15.61	58.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	62.72	6.48	(3) .50	2.00	1.88	1.88
B-1607	8.00	58.60	12.13	15.61	67.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	71.72	6.48	(3) .50	2.00	1.88	1.88
B-1608	8.00	67.60	12.13	15.61	76.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	80.72	6.48	(3) .50	2.00	1.88	1.88
B-1609	8.00	76.60	12.13	15.61	85.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	89.72	6.48	(3) .50	2.00	1.88	1.88
B-1610	8.00	85.60	12.13	15.61	94.38	6.50	8.62	3.50	.44 x 1.00	(6) .38	3.00	—	4.39	98.72	6.48	(3) .50	2.00	1.88	1.88

NOTE: We reserve the right to make reasonable design changes without notice. Consult factory. All dimensions are inches.

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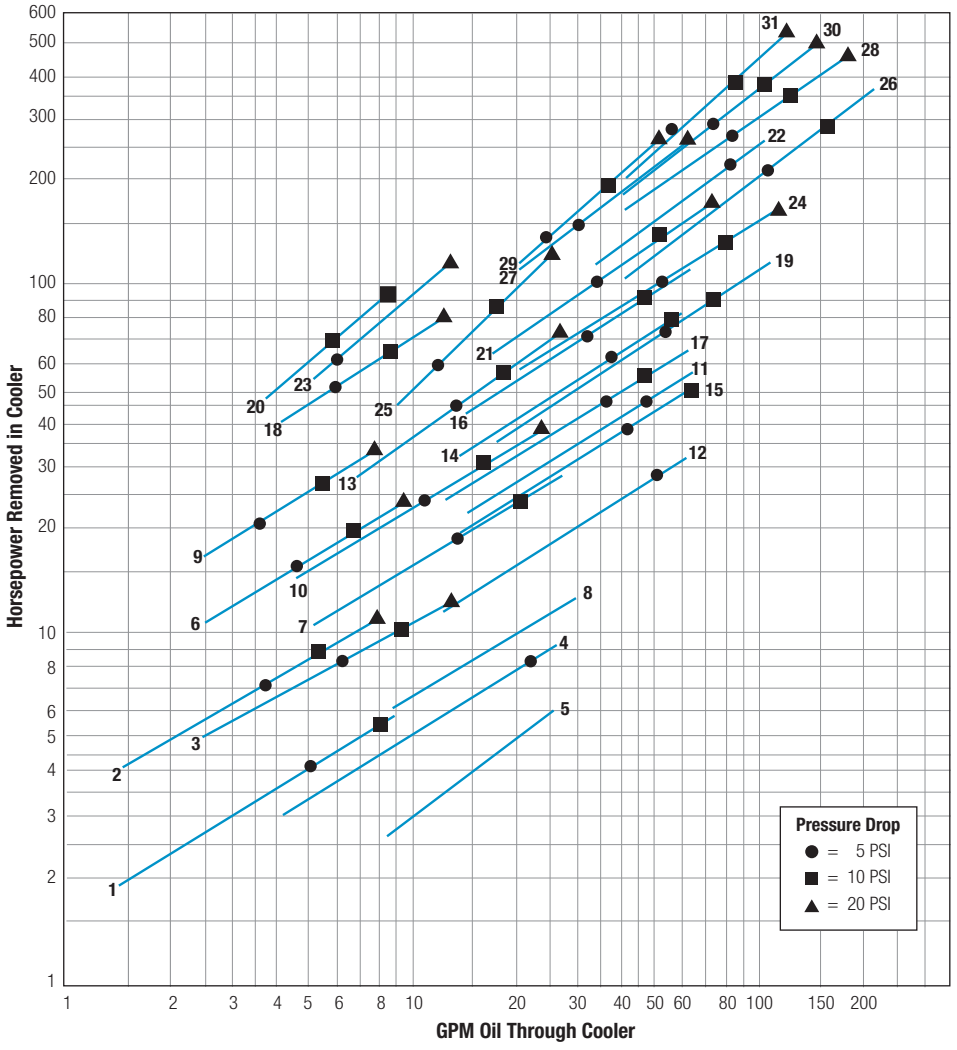
Performance Curves



Curve Number	Model	Shipping Weight (LBS)
1	B-401-A4-0	7
2	B-402-A4-0	10
3	B-701-A4-T	23
4	B-701-B6-F	23
5	B-701-C6-T	23
6	B-702-A4-T	28
7	B-702-B4-F	28
8	B-702-C6-T	28
9	B-703-A4-T	35
10	B-703-B4-F	35
11	B-1002-C4-T	49
12	B-1002-C6-T	49
13	B-1003-B4-F	65
14	B-1003-C4-T	65
15	B-1003-C6-T	65
16	B-1004-C4-T	72
17	B-1004-C6-T	72
18	B-1202-A4-F	72
19	B-1202-C4-F	72
20	B-1204-A4-F	110
21	B-1204-C4-F	110
22	B-1206-D4-F	160
23	B-1602-A4-F	145
24	B-1602-C4-F	145
25	B-1604-B4-F	195
26	B-1604-D4-F	195
27	B-1606-C4-F	259
28	B-1606-D4-F	259
29	B-1608-C4-F	310
30	B-1608-D4-F	310
31	B-1610-D4-F	400

Shipping weights are approximate.

Maximum Flow Rates

Example Model No.

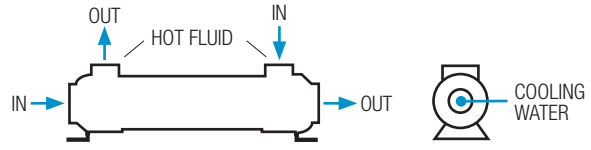
B - 1003 - C4 - F

Unit Size	Shell Side (GPM)		Baffle Spacing		Tube Side (GPM)		
	A	B	C	D	0	T	F
400	9.6	—	—	—	25	—	—
700	17	29	29	—	61	31	15
1000	24	48	69	69	146	73	37
1200	29	57	115	115	224	112	56
1600	37	74	149	253	363	181	91

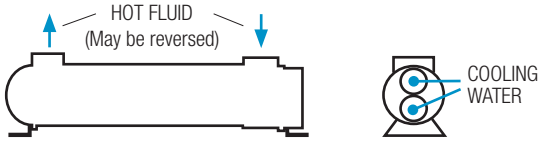
Caution: *Incorrect installation can cause this product to fail prematurely, causing the shell side and tube side fluids to intermix.*

Piping Diagram

One Pass



Two and Four Pass



Specific applications may have different piping arrangements. Contact factory for assistance.

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Selection Procedure

Performance Curves are based on 100SSU oil leaving the cooler 40°F higher than the water temperature used for cooling. This is also referred to as a 40°F approach temperature. Curves are based on a 2:1 oil to water flow ratio. Curves are 1:1.

STEP 1 **Determine the Heat Load.** This will vary with different systems, but typically coolers are sized to remove 25 to 50% of the input nameplate horsepower. (Example: 100 HP Power Unit x .33 = 33 HP Heat load.)
If BTU/HR is known: $HP = \frac{BTU/HR}{2545}$

STEP 2 **Determine Approach Temperature.** Desired oil leaving cooler °F – Water Inlet temp. °F = Actual Approach (Max. reservoir temp.)

STEP 3 **Determine Curve Horsepower Heat Load.** Enter the information from above:
Horsepower heat load x $\frac{40}{\text{Actual Approach}}$ x Viscosity Correction A = Curve Horsepower

STEP 4 **Enter curves** at oil flow through cooler and curve horsepower. Any curve above the intersecting point will work.

STEP 5 **Determine Oil Pressure Drop from Curves:**
● = 5 PSI ■ = 10 PSI ▲ = 20 PSI Multiply pressure drop from curve by correction factor B found on oil viscosity correction curve.

Oil Temperature

Oil coolers can be selected using entering or leaving oil temperatures.

Typical operating temperature ranges are:

Hydraulic Oil	110°F - 130°F
Hydrostatic Drive Oil	130°F - 180°F
Bearing Lube Oil	120°F - 160°F
Lube Oil Circuits	110°F - 130°F

Desired Reservoir Temperature

Return Line Cooling: Desired temperature is the oil temperature leaving the cooler. This will be the same temperature that will be found in the reservoir.

Off-Line Recirculation Cooling Loop: Desired temperature is the oil temperature *entering* the cooler. In this case, the oil temperature change must be determined so that the actual oil leaving temperature can be found. Calculate the oil temperature change (Oil △T) with this formula:

Oil △T = (BTUs/HR) / (GPM Oil Flow x 210).

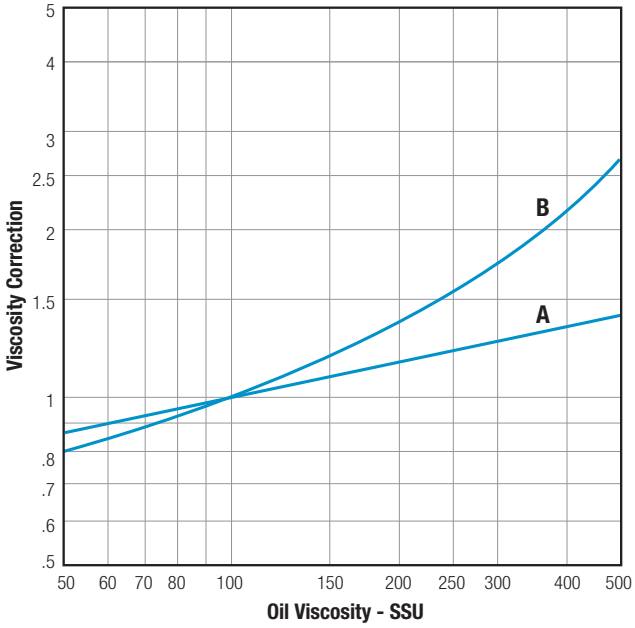
To calculate the oil leaving temperature from the cooler, use this formula:

Oil Leaving Temp. = Oil Entering Temp – Oil △T.

This formula may also be used in any application where the only temperature available is the entering oil temperature.

Oil Pressure Drop: Most systems can tolerate a pressure drop through the heat exchanger of 20 to 30 PSI. Excessive pressure drop should be avoided. Care should be taken to limit pressure drop to 5 PSI or less for case drain applications where high back pressure may damage the pump shaft seals.

Viscosity Correction



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