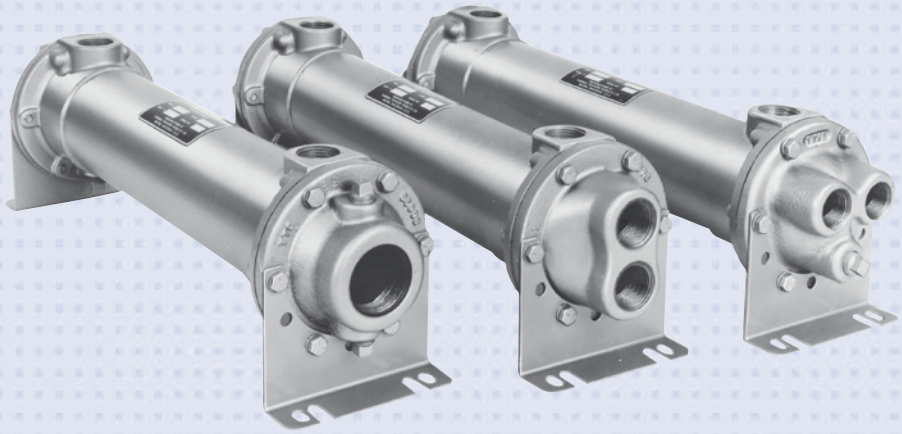
COPPER & STEEL CONSTRUCTION

Features

- **Young Touchstone Interchange**
- **Optional Non-Ferrous Construction**
- **Competitively Priced**
- **1/4" or 3/8" Tubes Standard**
- **Water to Water Applications**
- **Sea Water Applications**
- Optional 90/10 Copper Nickel Cooling Tubes and Bronze End Bonnets for Sea Water Service
- 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)



Ratings

Maximum Shell Pressure 250 psi
Maximum Tube Side Pressure 150 psi
Maximum 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

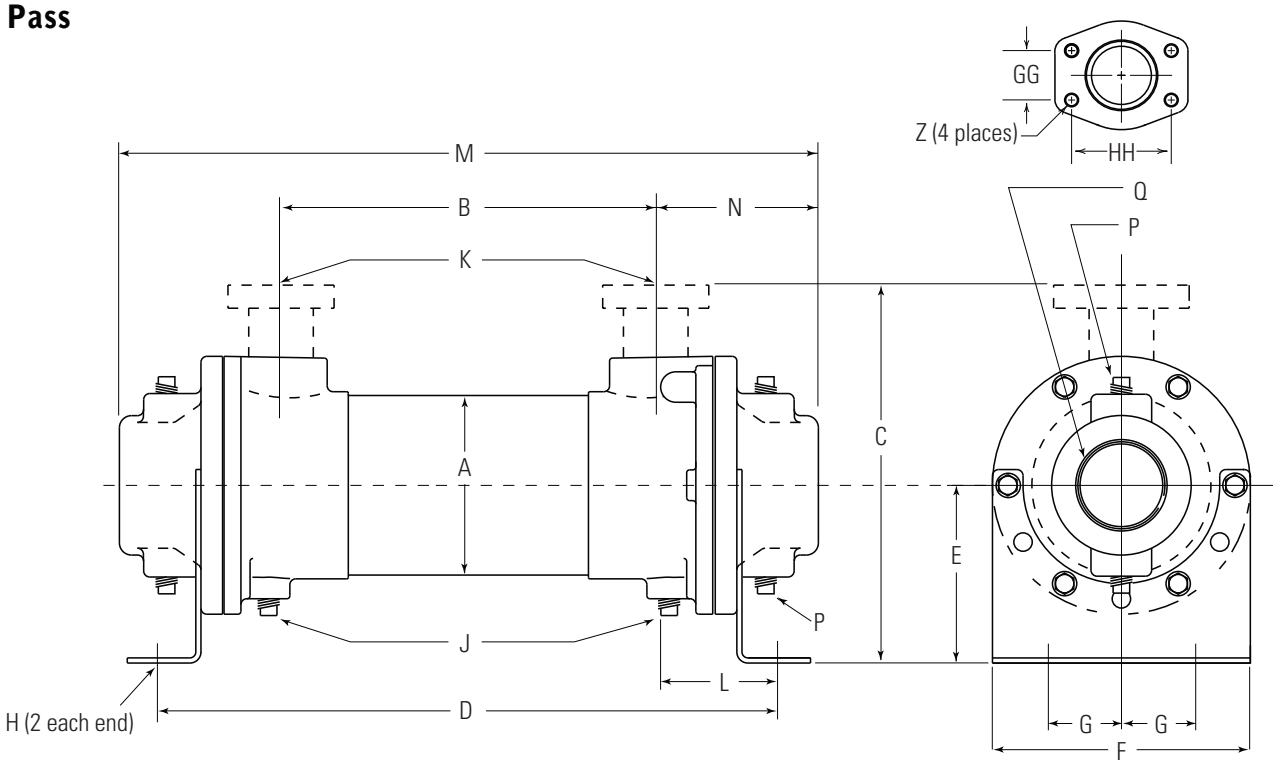
ADD FOR B SERIES MODELS ONLY:
BR-CN-B-Z is to be used for all seawater/dirty water applications.

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.

Dimensions

One Pass



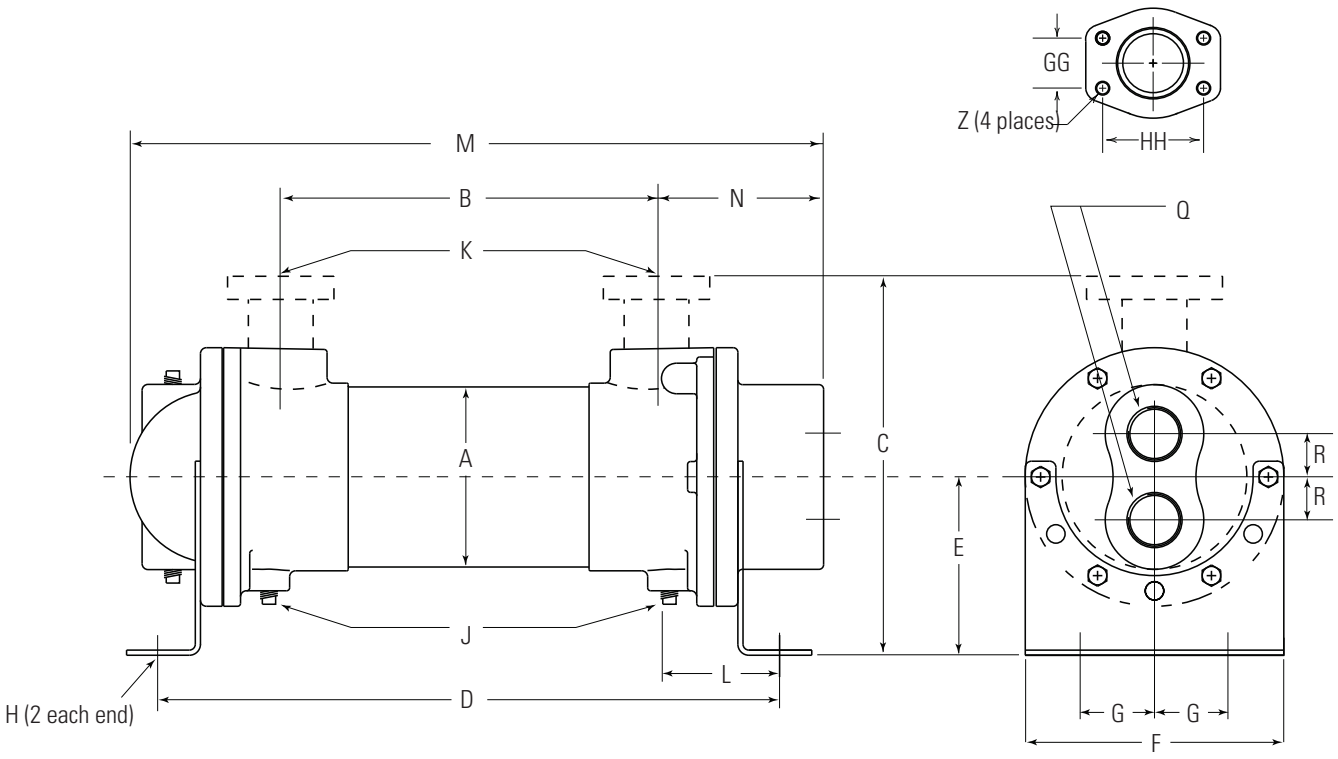
Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06		
3	2.44	4.19	5/8-11 UNC	M-16

MODEL	A	B	C		D	E	F	G	H	J	K		L	M	N	P	Q
			NPT/BSPP SAE O-RING	SAE FLANGE						NPT	NPT/BSPP FLANGE	SAE O-RING				NPT	NPT
B-401	2.125	7.62	3.50	—	11.01	1.94	2.62	.88	.41 Dia.	—	*.50	#8, 3/4-16 UNF-2B	1.72	11.24	1.81	—	1.00
B-402		16.62			20.01									20.24			
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, $1^{5}/_{16}$-12 UNF-2B	2.69	13.64	3.24	(4) .38	1.50
B-702		16.00			21.01									22.64			
B-703		25.00			30.01									31.64			
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00			1.50	#24, $1^{7}/_{8}$-12 UN-2B	3.06	23.60	4.05		2.00
B-1003		24.50			30.71									32.60			
B-1004		33.50			39.71									41.60			
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, $2^{1}/_{2}$-12 UN-2B	3.44	24.38	4.88	(4) .50	3.00
B-1203		23.50			30.38									33.25			
B-1204		32.38			39.25									42.12			
B-1205		41.38			48.25									51.12			
B-1206		50.50			57.38									60.25			
B-1207		59.50			66.38									69.25			
B-1208		68.38			75.25									78.12			
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00		3.00	—	4.39	26.62	6.52		4.00
B-1603		22.60			31.38									35.62			
B-1604		31.60			40.38									44.62			
B-1605		40.60			49.38									53.62			
B-1606		49.60			58.38									62.62			
B-1607		58.60			67.38									71.62			
B-1608		67.60			76.38									80.62			
B-1609		76.60			85.38									89.62			
B-1610		85.60			94.38									98.62			

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



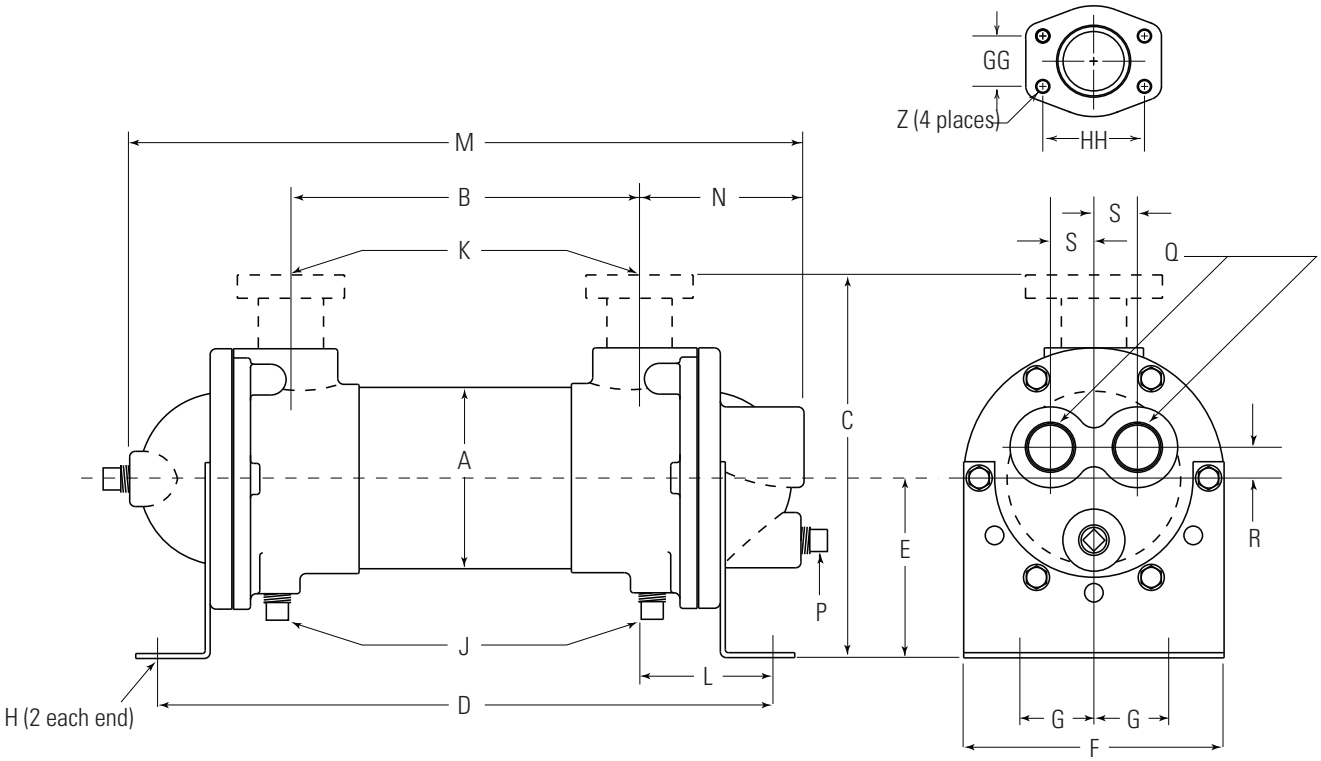
Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06		
3	2.44	4.19	5/8-11 UNC	M-16

MODEL	A	B	C		D	E	F	G	H	J	K		L	M	N	P	Q	R
			NPT/BSPP SAE O-RING	SAE FLANGE						NPT	NPT/BSPP FLANGE	SAE O-RING				NPT	NPT	
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, $1^{5}/_{16}$-12 UNF-2B	2.69	13.28	3.30	(2) .38	1.00	.88
B-702		16.00			21.01									22.28				
B-703		25.00			30.01									31.28				
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00			1.50	#24, $1^{7}/_{8}$-12 UN-2B	3.06	23.29	3.80		1.50	1.19
B-1003		24.50			30.71									32.29				
B-1004		33.50			39.71									41.29				
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, $2^{1}/_{2}$-12 UN-2B	3.44	23.94	4.56	(2) .50	2.00	1.44
B-1203		23.50			30.38									32.81				
B-1204		32.38			39.25									41.69				
B-1205		41.38			48.25									50.69				
B-1206		50.50			57.38									59.81				
B-1207		59.50			66.38									68.81				
B-1208		68.38			75.25									77.69				
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00		3.00	—	4.39	25.10	6.08		2.50	1.88
B-1603		22.60			31.38									34.10				
B-1604		31.60			40.38									43.10				
B-1605		40.60			49.38									52.10				
B-1606		49.60			58.38									61.10				
B-1607		58.60			67.38									70.10				
B-1608		67.60			76.38									79.10				
B-1609		76.60			85.38									88.10				
B-1610		85.60			94.38									97.10				

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

Dimensions

Four Pass

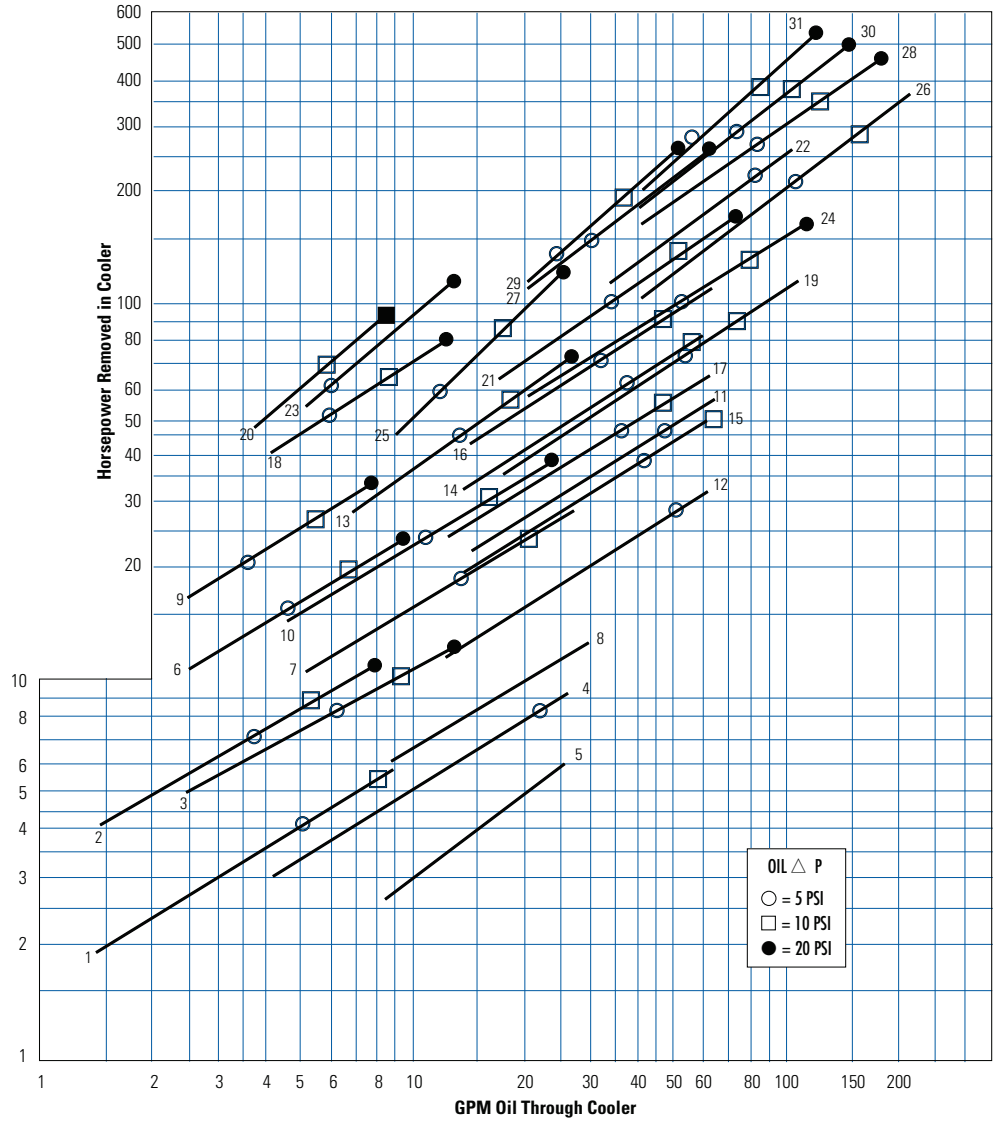


Flange Size	GG	HH	Z - CF	Z - CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06		
3	2.44	4.19	5/8-11 UNC	M-16

MODEL	A	B	C		D	E	F	G	H	J	K		L	M	N	P	Q	R	S
			NPT/BSPP SAE O-RING	SAE FLANGE						NPT	NPT/BSPP FLANGE	SAE O-RING				NPT	NPT		
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, $1^{5}/_{16}$-12 UNF-2B	2.69	13.57	3.32	(3) .38	.75	.62	.88
B-702		16.00			21.01									22.57					
B-703		25.00			30.01									31.57					
B-1002	5.125	15.50	7.38	8.46	21.71	4.00	6.75	2.00			1.50	#24, $1^{7}/_{8}$-12 UN-2B	3.06	23.57	4.12		1.00	.75	1.34
B-1003		24.50			30.71									32.57					
B-1004		33.50			39.71									41.57					
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, $2^{1}/_{2}$-12 UN-2B	3.44	24.44	4.90	(2) .38 (1) .50	1.50	1.06	1.40
B-1203		23.50			30.38									33.31					
B-1204		32.38			39.25									42.19					
B-1205		41.38			48.25									51.19					
B-1206		50.50			57.38									60.31					
B-1207		59.50			66.38									69.31					
B-1208		68.38			75.25									78.19					
B-1602	8.00	13.60	12.13	15.61	22.38	6.50	8.62	3.50	.44 x 1.00		3.00	—	4.39	26.72	6.48	(3) .50	2.00	1.38	1.88
B-1603		22.60			31.38									35.72					
B-1604		31.60			40.38									44.72					
B-1605		40.60			49.38									53.72					
B-1606		49.60			58.38									62.72					
B-1607		58.60			67.38									71.72					
B-1608		67.60			76.38									80.72					
B-1609		76.60			85.38									89.72					
B-1610		85.60			94.38									98.72					

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

Performance Curves



Model	Ship Wt. (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.

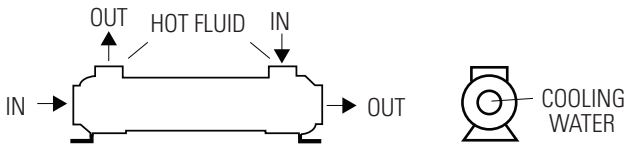
B - 1003 - C4 - F

Unit Size	Shell Side (GPM) A	B	Baffle Spacing C	D	Tube Side (GPM) O	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

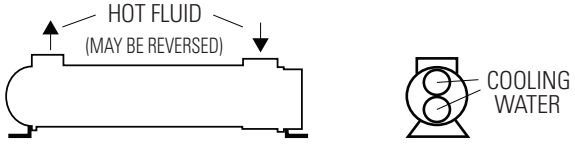
Caution: *Incorrect installation can cause this product to fail prematurely, causing the shell side and tube side fluids to intermix.*

Piping Hook-up

One Pass



Two and Four Pass



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

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.

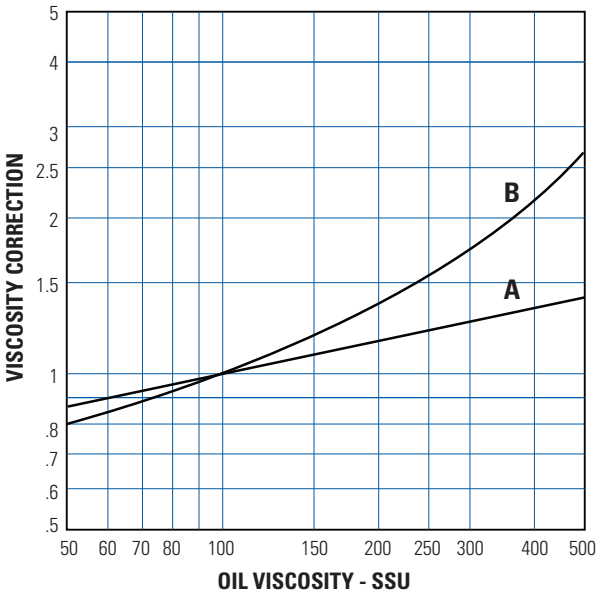
Step 1 **Determine the Heat Load.** This will vary with different systems, but typically coolers are sized to remove 25 to 50% of the input nameplate horsepower. (Example: 100 HP Power Unit x .33 = 33 HP Heat load.)
If BTU/Hr. is known: $HP = \frac{BTU/Hr}{2545}$

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 = (BTU's/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.