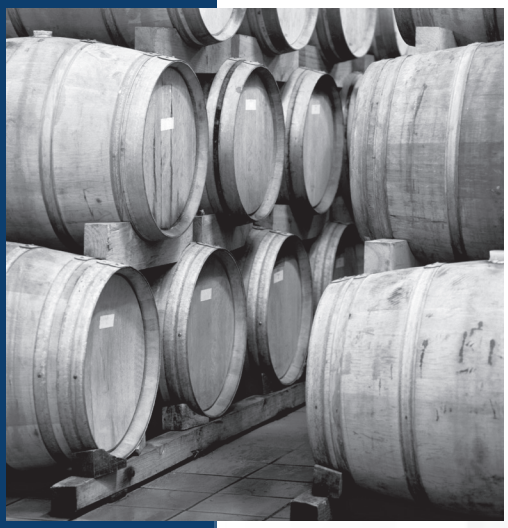

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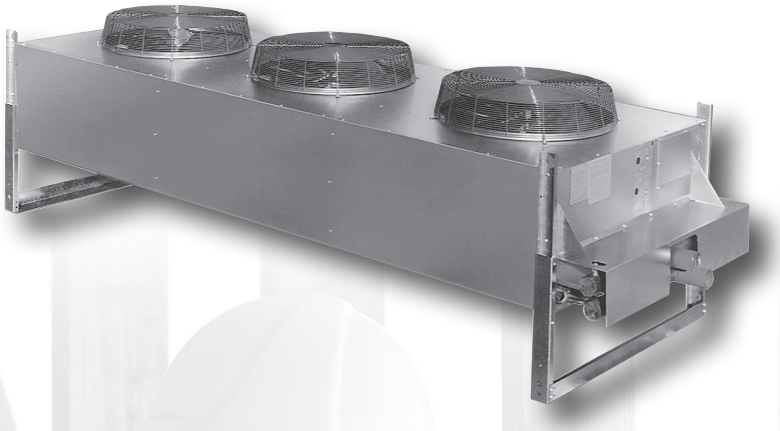

Direct Drive Fluid Coolers

Technical Guide

Models WGS and HFS

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Overview

Our engineers have carefully selected and matched components to provide excelled performance, long service life, and a wide range of performance selections. Specifically engineered for outdoor installations, the WGS and HFT fluid coolers are constructed of aluminum and heavy gauge galvanized steel to resist corrosion in all climates.

Fluid coolers are available in a wide range of sizes. Each model is available with several circuit options to ensure the exact fluid cooler for your requirements. Our fluid coolers are designed to reduce the cost of time required for installation. Each unit is completely assembled and tested at the factory. All motor leads are wired to a junction box providing a single point for field wiring.

Direct-Drive Design Features

- Cabinets are heavy-duty construction and designed for outdoor applications; tube sheets and all structural members are fabricated from galvanized steel
- Cabinet panels are fabricated from heavy-gauge aluminum for an attractive appearance and corrosion protection
- Coils are fabricated with corrugated aluminum fins with staggered copper tubes for optimum heat transfer; all units are pressure-tested, dehydrated and pressurized prior to shipment
- Alternate coil constructions are available — copper fins, Pro-Kote™ fins and coated coils
- HFT models incorporate the Floating Tube™ coil design that reduces the possibility of tube sheet leaks
- WGS models available in either horizontal or vertical air flow; HFT models available in vertical air flow only

The Floating Tube™ Coil Design
Dramatically Reduces Tube Sheet Leaks

- Fully baffled fan sections provide structural strength and prevent fan wind-milling in the off cycle
- Energy efficient fan motors with direct-drive fans available at 1140 RPM; fan motors have thermal overload protection and permanently lubricated ball bearings
- WGS models are available in 208-230 V single-phase, 208-230/460 dual-voltage, three-phase or 575 V three-phase motors; HFT models are available in 208-230/460 dual voltage, three-phase or 575 V three-phase motors
- Statically and dynamically balanced fan blades are aluminum and riveted to painted steel spider and hubs
- Fan guards are PVC coated steel for optimum corrosion protection
- All fan motor leads are wired to a weatherproof electrical enclosure for single-point field wiring
- Fan cycling controls are available that cycle all fans in response to HFT only; WGS fan cycling is ambient air
- All controls are factory mounted and wired; control circuit voltage is 230 V standard, 24 and 115 V controls are also available
- A wide selection of circuit options maximizes performance at minimal cost
- Sizes available from 10 GPM through 500 GPM
- Units are UL listed for US and Canada

Selection Procedure

Selection Formulas

Design Capacity = GPM x (Entering Fluid Temperature - Leaving Fluid Temperature) x Fluid Constant, Table 1

Average Fluid Temperature = (Entering Fluid Temperature + Leaving Fluid Temperature)/2

Initial Temperature Difference, ITD = Entering Fluid Temperature - Entering Air Temperature

Base Capacity = Design Capacity/(1,000 x ITD x Capacity Correction, Table 2 x Altitude Correction Factor, Table 3)

Pressure Drop, Fluid = Pressure Drop, Catalog x Correction Factor, Table 4

Given Conditions	
Direct Drive	120˚F Leaving Fluid Temperature
50 GPM	100˚ F Entering Air Temperature
20% Ethylene glycol solution	20 feet maximum fluid pressure drop
130˚ F Entering Fluid Temperature	1,000 feet altitude

Solution

1. Calculate design capacity. From Table 1, select the fluid constant for 20% of 484.

   Design Capacity = 50 x (130-120) x 484
   Design Capacity = 242,000 BTUH

2. Calculate average fluid temperature

   = (130 +120)/2
   = 125˚ F

3. Calculate the initial temperature difference, ITD

   ITD = 130 - 100

   ITD = 30˚ F

4. Calculate Base capacity. From Table 2, for a 20% solution and an average fluid temperature of 125˚ F, interpolate to obtain a correction factor of 1.035. From Table 3, obtain an attitude correction factor at 1000 feet of 0.98.

   Base Capacity = 242,000/(1,000 x 30 x 1.035 x 0.98)

   Base Capacity = 7.95 MBH / ˚TD

Correction Factors

5. Select the model and circuiting required. From the capacity tables, locate the GPM you desire and read down until you find a base capacity equal to or greater than your calculated base capacity. Read horizontally to the left to obtain the model and circuiting (Feeds) for your application.

   The selection is a WGS 16, with 32 feeds, with a base capacity of 8.34 MBH/1˚ T.D. and a fluid loss of 15.1 feet of water.

6. Calculate the pressure drop of the fluid. From Table 4, using 20% glycol solution and a 125˚ F average fluid temperature, interpolate to get a correction factor of 0.86.

   Actual Fluid Loss = 15.1 x 0.86

   Actual Fluid Loss = 13.0 feet of water

Table 1. Fluid Constraints

Percent Glycol	Fluid Constant
0	500
10	493
20	484
30	470
40	453
50	435

Table 2. Capacity Correction Factor

Percent Glycol	Average Fluid Temperature ˚F				
	50	70	90	110	130
0	0.97	1.01	1.03	1.05	1.07
10	0.96	1.00	1.02	1.04	1.06
20	0.94	0.98	1.00	1.02	1.04
30	0.92	0.96	0.98	1.00	1.02
40	0.90	0.94	0.96	0.98	1.00
50	0.87	0.91	0.94	0.96	0.98

Note: For average fluid temperature less than 50˚F or greater than 130˚F, consult the factory

Table 3. Altitude Correction Factor

Altitude (Feet)	Correction Factor
0	1.00
1,000	0.98
2,000	0.95
3,000	0.93
4,000	0.90
5,000	0.88
6,000	0.85
7,000	0.83

Table 4. Correction Factor for Fluid Loss

Percent Ethylene Glycol	Average Fluid Temperature ˚F				
	50	70	90	110	130
0	0.88	0.82	0.78	0.75	0.71
10	0.97	0.90	0.86	0.82	0.78
20	1.05	0.98	0.94	0.89	0.85
30	1.15	1.07	1.02	0.98	0.93
40	1.24	1.15	1.10	1.05	1.00
50	1.33	1.23	1.18	1.12	1.07

Capacity Ratings

Table 5. Capacity Ratings MBH / °TD, 40% Ethylene Glycol at 130°F Average Fluid Temperature

Model	Feeds	GPM															
		10		15		20		25		30		40		50		60	
		MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
WGS 049	8 12 16	2.36 2.23	14.0 4.7	2.71 2.58 2.47	28.7 9.7 4.5	2.80 2.70	16.1 7.5	2.95 2.85	24.0 11.2	2.97	15.5						
WGS 080	12 16 21 32	3.07	7.4	3.67 3.55	15.1 7.0	4.04 3.92 3.79	25.2 11.6 5.6	4.17 4.05	17.3 8.4	4.35 4.24 4.02	23.8 11.5 3.8	4.49 4.30	19.2 6.4	4.66 4.49	28.5 9.4	4.62	13.0
WGS 107	12 16 24	3.46	7.5	4.32 4.16	15.5 7.1	4.88 4.73 4.46	25.7 11.9 4.0	5.13 4.86	17.6 6.0	5.42 5.17	24.3 8.3	5.60	13.8	5.89	20.4	6.10	28.2
WGS 123	12 16 24	3.62	7.5	4.62 4.45	15.5 7.1	5.30 5.12 4.81	25.7 11.9 4.0	5.61 5.30	17.6 6.0	5.99 5.68	24.3 8.3	6.23	13.8	6.60	20.4	6.88	28.2
WGS 147	12 16 24	3.92	9.4	5.12 4.96	19.3 8.9	5.78 5.49	14.7 5.0	6.39 6.08	21.9 7.4	6.53	10.2	7.19	16.9	7.64	25.2		
WGS 165	12 21 32	4.17	12.4	5.57	25.4	7.27	9.2	8.44 6.57	13.7 4.4	9.43 7.09	18.9 6.1	7.84	10.2	8.34	15.1	8.70	20.9
WGS 211	16 24 48			5.93	12.3	7.22 6.93	20.5 6.8	7.90	10.2	8.68	14.0	9.83 8.97	23.3 3.7	9.78	5.5	10.41	7.5
WGS 225	24 48					6.99	6.8	7.98	10.2	8.78	14.0	9.96 9.25	23.3 3.7	10.14	5.5	10.82	7.5
WGS 248	21 32 64					7.65	12.9	8.81 8.44	19.1 6.1	9.73 9.33	26.3 8.4	10.66	14.0	11.58 10.63	20.8 3.3	12.25 11.33	28.7 4.5

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Table 6. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	GPM																			
		70		80		90		100		110		120		130		140		150		160	
		MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
WGS 211	48	10.89	9.9	11.29	12.6	11.61	15.5	11.88	18.6	12.12	22.1	12.31	25.7								
WGS 225	48	11.36	9.9	11.80	12.6	12.16	15.5	12.46	18.6	12.72	22.1	12.94	25.7								
WGS 248	64	11.88	6.0	12.33	7.5	12.69	9.3	12.98	11.2	13.24	13.3	13.46	15.5	13.64	17.8	13.81	20.3	13.95	23.0	14.08	25.7

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Table 7. Model WGS Connection Sizes, based on number of feeds

Feeds	Inlet/Outlet
8	1-1/8”
12	1-3/8”
16	1-3/8”
21	1-5/8”

Feeds	Inlet/Outlet
24	2-1/8”
32	2-1/8”
48	2-5/8”
64	2-5/8”

Specifications and Dimensions

Diagram 1. Model WGS Dimensions, 5 through 26 Tons with Vertical Air Flow

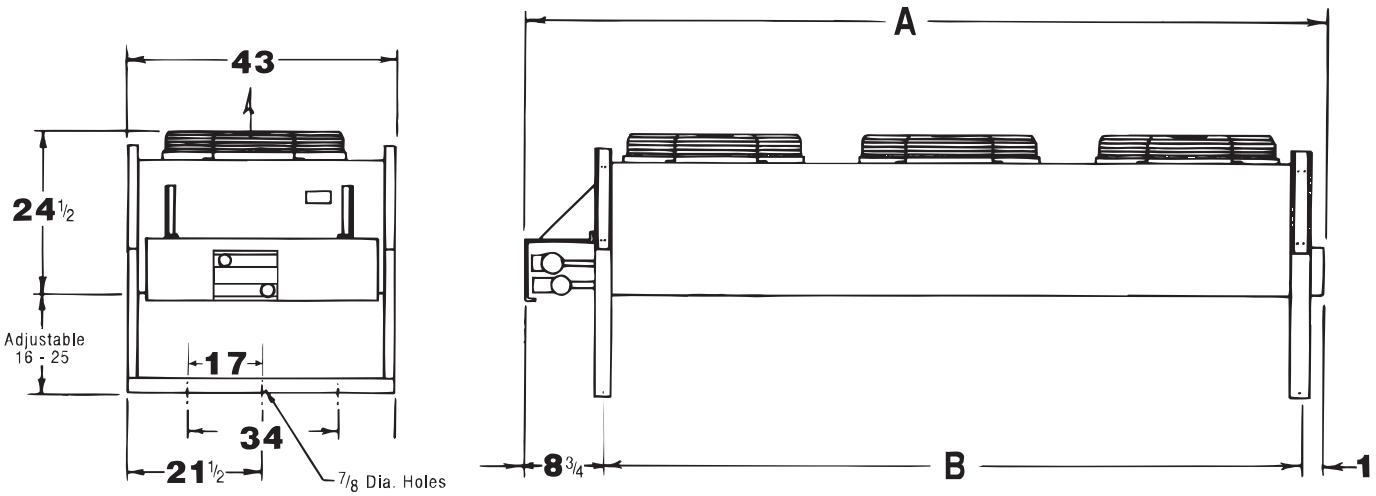


Diagram 2. Model WGS Dimensions, 5 through 26 Tons with Horizontal Air Flow

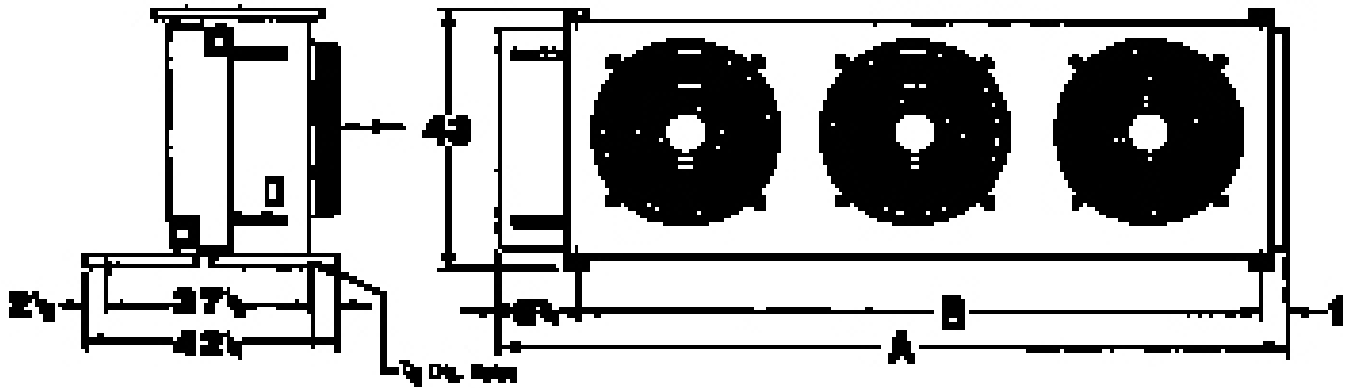


Table 8. Model WGS Specifications

Model	Dimensions (in.)		CFM	Fan		Motor Data				Approx. Net Wt. (lbs.)
	A	B		No.	Dia.	HP[1]	FLA[1]	HP[2]	FLA[2]	
WGS005	39-3/4	30	5,050	1	24	1/3	3.4	1/3	2.6/1.3	180
WGS008	49-3/4	40	6,450	1	26	1/2	3.9	1/3	2.6/1.3	260
WGS010	69-3/4	60	10,100	2	24	1/3	6.8	1/3	5.2/2.6	450
WGS012	69-3/4	60	12,400	2	26	1/2	7.8	1/3	5.2/2.6	470
WGS014	89-3/4	80	13,700	2	26	1/2	7.8	1/3	5.2/2.6	510
WGS016	89-3/4	80	12,900	2	26	1/2	7.8	1/3	5.2/2.6	530
WGS021	129-3/4	120	20,500	3	26	1/2	11.7	1/3	7.8/3.9	550
WGS023	129-3/4	120	19,900	3	26	1/2	11.7	1/3	7.8/3.9	580
WGS026	129-3/4	120	19,400	3	26	1/2	11.7	1/3	7.8/3.9	625

[1] Motor voltage 208-230/1/60; 1075 RPM
[2] Motor voltage 208-230-460/3/60; 1140 RPM

Capacity Ratings

Table 9. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	Fan Config.	GPM																	
			20		30		40		50		60		70		80		90		100	
			MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
HFS 113	14 28	1 x 2	6.4	3.2	8.04	6.5	9.18 8.08	10.8 1.5	10.01 8.9	16.1 2.3	10.64 9.55	22.2 3.1	10.07	4.1	10.51	5.2	10.87	6.4	11.18	7.8
HFS 133	14 21 42	1 x 2	7.01	4.8	8.85 8.39	9.9 3.2	10.1 9.60	16.5 5.3	10.99 10.49	24.4 7.9	11.17 10.06	10.8 1.5	11.7 10.62	14.2 2.0	12.13 11.08	18.0 2.6	12.48 11.47	22.2 3.1	11.8	3.8
HFS 149	14 21 42	1 x 2	7.42	4.8	9.56 9.02	9.9 3.2	11.04 10.45	16.5 5.3	12.1 11.51	24.4 7.9	12.32 10.99	10.8 1.5	12.95 11.64	14.2 2.0	13.47 12.19	18.0 2.6	13.89 12.65	22.2 3.1	13.05	3.8
HFS 175	18 28 56	1 x 2			10.2	6.6	11.88 11.2	11.0 3.2	13.08 12.38	16.3 4.7	13.98 13.29	22.5 6.5	14.66 13.99	29.5 8.6	14.55 13.16	10.8 1.5	15.01 13.67	13.4 1.9	15.39 14.1	16.1 2.3
HFS 199	14 21 42	1 x 3	8.19	7.0	10.99 10.54	14.3 4.6	13.04 12.52	23.8 7.7	14.02	11.4	15.19 13.83	15.8 2.3	16.13 14.76	20.7 3.0	16.90 15.54	26.2 3.7	16.19	4.6	16.76	5.6
HFS 223	14 21 42	1 x 3			11.62 11.15	14.3 4.6	14.03 13.43	23.8 7.7	15.21	11.4	16.61 14.99	15.8 2.3	17.74 16.09	20.7 3.0	18.66 17.01	26.2 3.7	17.79	4.6	18.46	5.6
HFS 226	18 28 56	2 x 2			11.24	6.6	13.63 12.8	11.0 3.2	15.54 14.6	16.3 4.7	17.08 16.08	22.5 6.5	18.35 17.31	29.5 8.6	18.35 16.17	10.8 1.5	19.24 17.04	13.4 1.9	20.01 17.81	16.1 2.3
HFS 247	18 28 56	1 x 3			11.92	9.5	14.49 13.85	15.9 4.6	16.45 15.73	23.5 6.9	17.22	9.5	18.41	12.4	19.37 17.69	15.8 2.3	20.18 18.51	19.4 2.8	20.85 19.22	23.4 3.3

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Capacity Ratings

Table 10. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	Fan Config.	GPM																	
			20		30		40		50		60		70		80		90		100	
			MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
HFS 266	28 42	2 x 2					14.03	4.8	16.06	7.2	17.70 16.78	9.9 3.2	19.06 18.10	13.0 4.2	20.19 19.21	16.5 5.3	21.15 20.16	20.3 6.5	21.97 20.99	24.4 7.9
HFS 265	14 21 42	1 x 4	8.71	9.2	12.20 11.86	18.4 6.1	14.50	10.1	16.62	15.0	18.32 16.85	20.7 3.0	19.71 18.18	27.1 3.9	19.30	4.9	20.27	6.1	21.10	7.3
HFS 298	28 42	2 x 2					14.84	4.8	17.18	7.2	19.12 18.05	9.9 3.2	20.73 19.60	13.0 4.2	22.09 20.92	16.5 5.3	23.24 22.05	20.3 6.5	24.22 23.03	24.4 7.9
HFS 297	21 42	1 x 4			12.34	6.1	15.34	10.1	17.80	15.0	19.81 18.12	20.7 3.0	21.47 19.68	27.2 3.9	21.01	4.9	22.15	6.1	23.14	7.4
HFS 330	36 56	2 x 2							17.77	4.8	19.84	6.6	21.55	8.7	22.99 21.71	11.0 3.2	24.21 22.90	13.5 3.9	25.25 23.94	16.3 4.7
HFS 331	18 28 56	1 x 4			12.88	12.5	16.23 15.71	20.7 6.1	18.31	9.0	20.44	12.4	22.21	16.3	23.68 21.80	20.7 3.0	24.91 23.00	25.5 3.7	24.04	4.4
HFS 350	36 56	2 x 2							18.21	4.8	20.41	6.6	22.24	8.7	23.78 22.41	11.0 3.2	25.08 23.68	13.5 3.9	26.19 24.78	16.3 4.7
HFS 351	18 28 56	1 x 4			13.04	12.5	16.53 16.01	20.7 6.1	18.76	9.0	21.04	12.4	22.93	16.3	24.50 22.50	20.7 3.0	25.82 23.78	25.5 3.7	24.88	4.4
HFS 377	21 42	1 x 5			12.97	7.5	16.52	12.5	19.56	18.5	22.14 20.53	25.6 3.7	22.54	4.9	24.28	6.1	25.80	7.6	27.13	9.1
HFS 401	18 28 56	1 x 5			13.20	15.4	16.90 16.51	25.6 7.5	19.53	11.1	22.08	15.4	24.23	20.2	26.06 24.27	25.6 3.7	25.76	4.5	27.06	5.5
HFS 398	28 42	2 x 3					16.38	7.0	19.38	10.4	21.97 21.09	14.3 4.6	24.18 23.21	18.8 6.1	26.08 25.04	23.8 7.7	27.73 26.64	29.4 9.5	28.05	11.4
HFS 428	28 42	2 x 3					16.69	7.0	19.89	10.4	22.67 21.76	14.3 4.6	25.07 24.04	18.8 6.1	27.16 26.03	23.8 7.7	28.97 27.78	29.4 9.5	29.32	11.4
HFS 448	28 42	2 x 3					16.93	7.0	20.29	10.4	23.23 22.30	14.3 4.6	25.81 24.73	18.8 6.1	28.05 26.86	23.8 7.7	30.01 28.74	29.4 9.5	30.41	11.4
HFS 443	18 28 56	1 x 5			13.40	15.4	17.39 17.03	2.56 7.5	20.38	11.1	23.27	15.4	25.75	20.2	27.87 25.84	25.6 3.7	27.55	4.5	29.04	5.5
HFS 481	28 56	1 x 6					17.22	8.9	20.70	13.3	23.74	18.3	26.38	24.1	26.92	4.4	28.78	5.4	30.43	6.5
HFS 496	36 56	2 x 3							20.73	6.9	23.84	9.5	26.58	12.5	28.97 27.70	15.9 4.6	31.07 29.70	19.5 5.7	32.91 31.46	23.5 6.9
HFS 583	28 56	1 x 6					17.59	8.9	21.37	13.3	24.76	18.3	27.76	24.1	28.48	4.4	30.61	5.4	32.50	6.5

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Capacity Ratings

Table 11. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	Fan Config.	GPM																	
			20		30		40		50		60		70		80		90		100	
			MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
HFS 532	28 42	2 x 4					17.42	9.2	21.10	13.6	24.41 23.71	18.7 6.1	27.35 26.51	24.6 8.0	29.01	10.1	31.24	12.4	33.23	15.0
HFS 596	28 42	2 x 4					17.74	9.2	21.70	13.6	25.35 24.67	18.7 6.1	28.68 27.83	24.6 8.0	30.68	10.1	33.26	12.4	35.60	15.0
HFS 660	36 56	2 x 4							21.96	9.0	25.77	12.5	29.27	16.4	32.45 31.41	20.7 6.1	35.34 34.14	25.6 7.5	37.94 36.61	30.8 9.0
HFS 700	36 56	2 x 4							22.13	9.0	26.06	12.5	29.71	16.4	33.07 32.02	20.7 6.1	36.12 34.90	25.6 7.5	37.52	9.0
HFS 754	42	2 x 5									25.94	7.5	29.62	9.9	33.03	12.5	36.20	15.4	39.11	18.5
HFS 804	36 56	2 x 5							22.33	11.2	26.41	15.4	30.24	20.2	33.81 33.03	25.6 7.5	36.17	9.2	39.06	11.1
HFS 842	36 56	2 x 5							22.45	11.2	26.64	15.4	30.62	20.2	34.62 33.61	25.6 7.5	36.92	9.2	40.00	11.1
HFS 888	56	2 x 5													34.06	7.5	37.53	9.2	40.76	11.1
HFS 964	56	2 x 6													34.44	8.9	38.03	11.0	41.39	13.3
HFS 986	56	2 x 6													34.86	8.9	38.61	11.0	42.15	13.3
HFS 998	56	2 x 6													35.17	8.9	39.05	11.0	42.74	13.3

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Capacity Ratings

Table 12. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	Fan Config.	GPM																	
			120		140		160		180		200		220		240		260		280	
			MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
HFS 113	28	1 x 2	11.69	10.7																
HFS 133	42	1 x 2	12.33	5.2	12.74	6.9	13.07	8.7	13.34	10.7										
HFS 149	42	1 x 2	13.68	5.2	14.17	6.9	14.57	8.7	14.89	10.7										
HFS 175	28 56	1 x 2	15.98 14.79	22.2 3.1	15.32	4.1	15.74	5.2	16.07	6.4	16.35	7.8	16.59	9.2	16.79	10.7				
HFS 199	42	1 x 3	17.67	7.7	18.39	10.1	18.96	12.8	19.40	15.7										
HFS 223	42	1 x 3	19.56	7.7	20.42	10.1	21.10	12.8	21.66	15.7										
HFS 247	56	1 x 3	20.36	4.6	21.24	6.1	21.95	7.7	22.52	9.5	22.99	11.4	23.39	13.5	23.74	15.7				
HFS 226	28 56	2 x 2	21.27 19.10	22.2 3.1	20.15	4.1	21.01	5.2	21.74	6.4	22.37	7.8	22.91	9.2	23.38	10.7				
HFS 266	42 84	2 x 2	22.34 20.12	10.8 1.5	23.40 21.24	14.2 2.0	24.26 22.16	18.0 2.6	24.96 22.93	22.2 3.1	23.59	3.8	24.16	4.5	24.66	5.2	25.10	6.0	25.49	6.9
HFS 265	42	1 x 4	22.45	10.1	23.53	13.3	24.39	16.9	25.09	20.8										
HFS 298	42 84	2 x 2	24.65 21.98	10.8 1.5	25.93 23.30	14.2 2.0	26.95 24.40	18.0 2.6	27.80 25.32	22.2 3.1	26.11	3.8	26.79	4.5	27.39	5.2	27.91	6.0	28.37	6.9
HFS 297	42	1 x 4	24.77	10.1	26.05	13.3	27.08	16.9	27.93	20.8										
HFS 330	36 56 112	2 x 2	26.92 25.63	22.5 6.5	28.21 26.96	29.5 8.6	28.03 25.43	10.8 1.5	28.90 26.38	13.4 1.9	29.62 27.20	16.1 2.3	30.23 27.90	19.1 2.7	30.75 28.51	22.2 3.1	29.04	3.6	29.51	4.1
HFS 331	56	1 x 4	25.75	6.1	27.08	8.0	28.15	10.1	29.02	12.5	29.75	15.0	30.36	17.8	30.89	20.8				
HFS 350	36 56 112	2 x 2	27.98 26.59	22.5 6.5	29.34 28.00	29.5 8.6	29.13 26.34	10.8 1.5	30.05 27.36	13.4 1.9	30.81 28.22	16.1 2.3	31.45 28.96	19.1 2.7	32.00 29.60	22.2 3.1	30.17	3.6	30.67	4.1
HFS 351	56	1 x 4	26.70	6.1	28.12	8.0	29.25	10.1	30.17	12.5	30.94	15.0	31.58	17.8	32.13	20.8				

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Capacity Ratings

Table 13. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	Fan Config.	GPM																	
			120		140		160		180		200		220		240		260		280	
			MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
HFS 377	42	1 x 5	29.34	12.6	31.09	16.5	32.52	20.9	33.69	25.8										
HFS 401	56	1 x 5	29.21	7.6	30.92	9.9	32.30	12.6	33.44	15.5	34.39	18.7	35.20	22.1	35.89	25.8				
HFS 398	42 84	2 x 3	30.40 27.66	15.8 2.3	32.27 29.52	20.7 3.0	33.81 31.08	26.2 3.7	32.39	4.6	33.52	5.6	34.50	6.6	35.36	7.7	36.12	8.8	36.79	10.1
HFS 428	42 84	2 x 3	31.91 28.91	15.8 2.3	33.98 30.94	20.7 3.0	35.67 32.65	26.2 3.7	34.09	4.6	35.34	5.6	36.42	6.6	37.36	7.7	38.19	8.8	38.94	10.1
HFS 443	56	1 x 5	31.52	7.6	33.49	9.9	35.06	12.6	36.36	15.5	37.43	18.7	38.34	22.1	39.12	25.8				
HFS 448	42 84	2 x 3	33.21 29.98	15.8 2.3	35.47 32.17	20.7 3.0	37.31 34.02	26.2 3.7	35.58	4.6	36.93	5.6	38.10	6.6	39.12	7.7	40.03	8.8	40.83	10.1
HFS 481	56	1 x 6	33.19	9.0	35.40	11.9	37.20	15.0	38.69	18.5	39.95	22.3	41.02	26.4						
HFS 496	56 112	2 x 3	34.43	9.5	36.81	12.4	38.75 35.39	15.8 2.3	40.35 37.03	19.4 2.8	41.70 38.43	23.4 3.3	42.84 39.65	27.7 4.0	40.72	4.6	41.65	5.3	42.48	6.1
HFS 583	56	1 x 6	35.68	9.0	38.23	11.9	40.31	15.0	42.02	18.5	43.45	22.3	44.66	26.4						
HFS 532	42 84	2 x 4	36.64 33.71	20.7 3.0	39.42 36.37	27.1 3.9	38.62	4.9	40.54	6.1	42.20	7.3	43.64	8.7	44.92	10.1	46.05	11.7	47.06	13.3
HFS 596	42 84	2 x 4	39.62 36.24	20.7 3.0	42.95 39.36	27.1 3.9	42.02	4.9	44.30	6.1	46.28	7.3	48.01	8.7	49.54	10.1	50.89	11.7	52.10	13.3
HFS 660	56 112	2 x 4	40.89	12.4	44.42	16.3	47.35 43.59	20.7 3.0	49.82 46.00	25.5 3.7	48.08	4.4	49.90	5.2	51.50	6.1	52.91	7.0	54.16	8.0
HFS 700	56 112	2 x 4	42.08	12.4	45.85	16.3	49.00 44.99	20.7 3.0	51.64 47.55	25.5 3.7	49.77	4.4	51.70	5.2	53.40	6.1	54.90	7.0	56.24	8.0
HFS 754	42 84	2 x 5	44.27 41.05	25.6 3.7	45.08	4.9	48.56	6.1	51.59	7.6	54.25	9.1	56.59	10.8	58.66	12.6	60.51	14.5	62.17	16.5
HFS 804	56 112	2 x 5	44.16	15.4	48.47	20.2	52.13 48.54	25.6 3.7	51.52	4.5	54.13	5.5	56.42	6.5	58.44	7.6	60.25	8.7	61.86	9.9
HFS 842	56 112	2 x 5	45.46	15.4	50.11	20.2	54.07 50.23	25.6 3.7	53.44	4.5	56.25	5.5	58.72	6.5	60.91	7.6	62.85	8.7	64.59	9.9
HFS 888	56 112	2 x 5	46.55	15.4	51.50	20.2	55.74 51.69	25.6 3.7	55.11	4.5	58.10	5.5	60.74	6.5	63.07	7.6	65.14	8.7	66.99	9.9
HFS 964	56 112	2 x 6	47.47	18.3	52.75	24.1	53.83	4.4	57.57	5.4	60.86	6.5	63.78	7.8	66.37	9.0	68.70	10.4	70.79	11.9
HFS 986	56 112	2 x 6	48.61	18.3	54.26	24.1	55.52	4.4	59.53	5.4	63.08	6.5	66.23	7.8	69.04	9.0	71.56	10.4	73.82	11.9
HFS 998	56 112	2 x 6	49.52	18.3	55.52	24.1	56.95	4.4	61.21	5.4	64.99	6.5	68.36	7.8	71.36	9.0	74.04	10.4	76.46	11.9

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Capacity Ratings

Table 14. Capacity Ratings MBH / ˚TD, 40% Ethylene Glycol at 130˚F Average Fluid Temperature

Model	Feeds	Fan Config.	GPM									
			300		350		400		450		500	
			MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*	MBH	PD*
HFS266	84	2 x 2	25.83	7.8	26.56	10.2						
HFS298	84	2 x 2	28.78	7.8	29.65	10.2						
HFS330	112	2 x 2	29.94	4.7	30.82	6.1	31.50	7.8	32.06	9.6	32.53	11.5
HFS350	112	2 x 2	31.11	4.7	32.03	6.1	32.75	7.8	33.33	9.6	33.80	11.5
HFS398	84	2 x 3	37.40	11.4	38.66	15.0						
HFS428	84	2 x 3	39.60	11.4	40.99	15.0						
HFS448	84	2 x 3	41.55	11.4	43.06	15.0						
HFS496	112	2 x 3	43.22	6.9	44.77	9.0	45.98	11.4	46.97	14.0	47.77	16.9
HFS532	84	2 x 4	47.96	15.0	49.87	19.8						
HFS596	84	2 x 4	53.18	15.0	55.46	19.8						
HFS660	112	2 x 4	55.29	9.0	57.63	11.9	59.50	15.0	61.00	18.5	62.24	22.3
HFS700	112	2 x 4	57.43	9.0	59.92	11.9	61.87	15.0	63.45	18.5	64.74	22.3
HFS754	84	2 x 5	63.67	18.7	66.82	24.5						
HFS804	112	2 x 5	63.30	11.2	66.36	14.8	68.80	18.7	70.78	23.0	72.42	27.7
HFS842	112	2 x 5	66.15	11.2	69.43	14.8	72.04	18.7	74.16	23.0	75.91	27.7
HFS888	112	2 x 5	68.65	11.2	72.14	14.8	74.90	18.7	77.12	23.0	78.96	27.7
HFS964	112	2 x 6	72.69	13.4	76.69	17.6	79.90	22.3	82.52	27.5	84.70	33.1
HFS986	112	2 x 6	75.87	13.4	80.18	17.6	83.63	22.3	86.45	27.5	88.78	33.1
HFS998	112	2 x 6	78.64	13.4	83.24	17.6	86.90	22.3	89.87	27.5	92.33	33.1

* PD is glycol fluid loss in feet of water at 130˚F fluid temperature

Table 15. Model HFS Connection Sizes, based on number of feeds

Single Row of Fans	
Feeds	Inlet/Outlet
14	2-1/8”
18	2-1/8”
21	2-5/8”
28	2-5/8”
42	3-1/8”
56	3-5/8”

Double Row of Fans	
Feeds	Inlet/Outlet
18	2 @ 2-1/8”
28	2 @ 2-1/8”
36	2 @ 2-1/8”
42	2 @ 2-5/8”
56	2 @ 2-5/8”
84	2 @ 3-1/8”
112	2 @ 3-5/8”

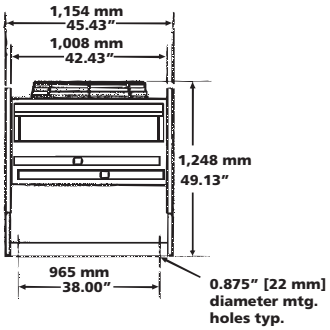
Dimensions

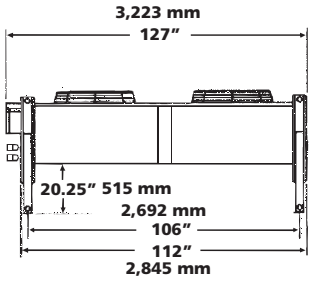
Diagram 3. Model HFS Dimensions

End Views

Side Views

Single Row





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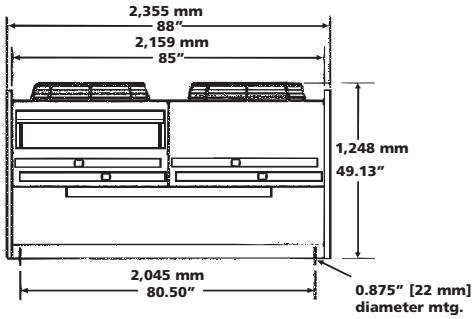
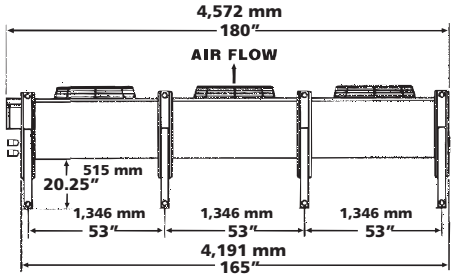
2 x 2

Double Row





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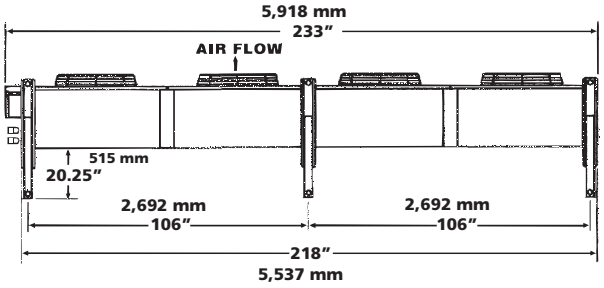

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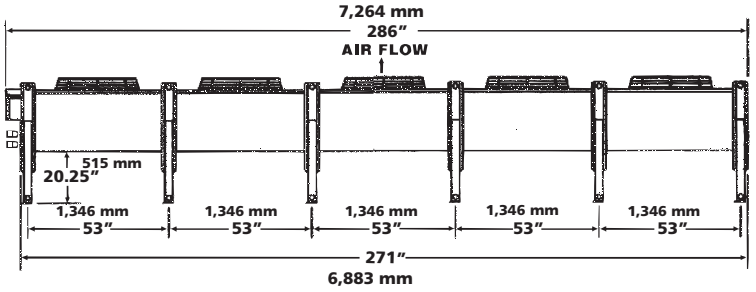

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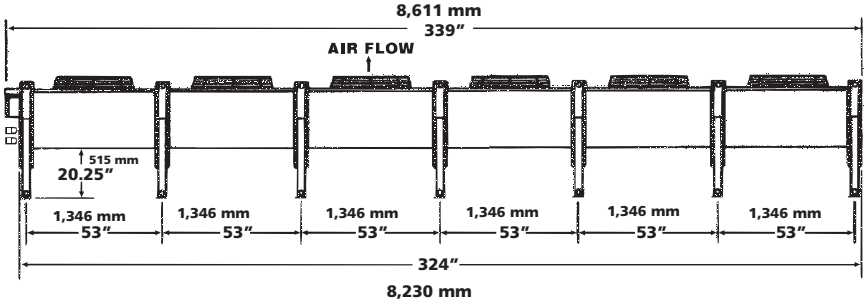

1 x 6
2 x 6

Specifications

Table 16. Model HFS Specifications

Model	Fan Data[1]		CFM	FLA[2]			Operating Charge (Gal.)	Approx. Net Wt.[†] (lbs.)
	Fan Config.	No. of Fans		208-230/3/60	575/3/60	460/3/60		
Single Row								
HFS113	1 x 2	2	19,780	14.0	5.6	7.0	6.6	720
HFS133	1 x 2	2	19,800	14.0	5.6	7.0	9.0	760
HFS149	1 x 2	2	19,110	14.0	5.6	7.0	9.0	780
HFS175	1 x 2	2	18,340	14.0	5.6	7.0	11.6	860
HFS199	1 x 3	3	29,700	21.0	8.4	10.5	12.8	1,170
HFS223	1 x 3	3	28,660	21.0	8.4	10.5	12.8	1,190
HFS247	1 x 3	3	28,070	21.0	8.4	10.5	16.4	1,220
HFS265	1 x 4	4	38,600	28.0	11.2	14.0	16.4	1,550
HFS297	1 x 4	4	37,250	28.0	11.2	14.0	16.4	1,590
HFS331	1 x 4	4	38,020	28.0	11.2	14.0	21.3	1,620
HFS351	1 x 4	4	35,710	28.0	11.2	14.0	21.3	1,730
HFS377	1 x 5	5	46,610	35.0	14.0	17.5	20.0	1,960
HFS401	1 x 5	5	46,200	35.0	14.0	17.5	26.1	1,960
HFS443	1 x 5	5	44,580	35.0	14.0	17.5	26.1	2,200
HFS481	1 x 6	6	55,400	42.0	16.8	21.0	31.0	2,350
HFS583	1 x 6	6	53,460	42.0	16.8	21.0	31.0	2,580
Double Row								
HFS226	2 x 2	4	39,570	28.0	11.2	14.0	13.3	1,560
HFS266	2 x 2	4	39,600	28.0	11.2	14.0	18.2	1,600
HFS298	2 x 2	4	38,210	28.0	11.2	14.0	18.2	1,650
HFS330	2 x 2	4	37,530	28.0	11.2	14.0	23.1	1,670
HFS350	2 x 2	4	36,770	28.0	11.2	14.0	23.1	1,780
HFS398	2 x 3	6	59,400	42.0	16.8	21.0	25.4	2,350
HFS428	2 x 3	6	58,510	42.0	16.8	21.0	25.4	2,400
HFS448	2 x 3	6	57,320	42.0	16.8	21.0	25.4	2,500
HFS496	2 x 3	6	56,240	42.0	16.8	21.0	32.8	2,560
HFS532	2 x 4	8	77,200	56.0	22.4	28.0	32.7	3,080
HFS596	2 x 4	8	74,500	56.0	22.4	28.0	32.7	3,140
HFS660	2 x 4	8	72,790	56.0	22.4	28.0	42.5	3,190
HFS700	2 x 4	8	71,310	56.0	22.4	28.0	42.5	3,450
HFS754	2 x 5	10	93,120	70.0	28.0	35.0	40.0	3,920
HFS804	2 x 5	10	92,400	70.0	28.0	35.0	52.1	3,930
HFS842	2 x 5	10	91,010	70.0	28.0	35.0	52.1	4,070
HFS888	2 x 5	10	89,170	70.0	28.0	35.0	52.1	4,300
HFS964	2 x 6	12	110,900	84.0	33.6	42.0	62.0	4,620
HFS986	2 x 6	12	109,240	84.0	33.6	42.0	62.0	4,800
HFS998	2 x 6	12	107,020	84.0	33.6	42.0	62.0	5,130

Notes:
[1]All fan blades are 30" diameter
[2]All motors are 1-1/2 HP, 208-230/460/3/60, 1140 RPM
[†]Does not include operating charge

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