



PRODUCT DESIGN GUIDE

Innoline® 50/50 Four Pipe System



Innoline® 50/50 Four Pipe System



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Category	Position	Option Digit and Description
Product Family	1	W = Whalen Riser Fan Coil
Unit Capacity	2, 3	20 = 200 CFM (0.5-ton) 30 = 300 CFM (0.75-ton) 40 = 400 CFM (1.0-ton) 60 = 600 CFM (1.5-ton) 80 = 800 CFM (2.0-ton) 10 = 1000 CFM (2.5-ton) 12 = 1200 CFM (3.0-ton) 16 = 1600 CFM (3.5-ton)
System Configuration	4, 5	1 = Heating Only 2 = 2-pipe Heating & Cooling 4 = 4-pipe Heating & Cooling 22 = 4-pipe 50/50
Fan Configuration	6	X = High Capacity Output F = Face & Bypass H = Humidifier E = Total Electric Heat EA = Auxiliary Electric Heat

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**Table 1: AHRI Performance Ratings 50% Capacity – ASHRAE / ANSI / AHRI / ISO Standard 13256-1**

Model	CFM	Fluid Velocity (FPS)	Cooling Capacity1			Heating Capacity2	
			EWT (°F)	TC (Btu/hr)	SC (Btu/hr)	EWT (°F)	TC (Btu/hr)
W3022	170	6.0	45	4958.9	4237.4	140	8363.1
W4022	200	6.0	45	5,834.0	4,985.2	140	9,838.9
W6022	300	6.0	45	8,249.5	6,227.5	140	14,976.6
W6022X	300	6.0	45	9,528.8	6,682.8	140	14,997.0
W8022	400	6.0	45	11,692.0	8,889.3	140	16,797.8
W10022	500	6.0	45	12,562.5	9,806.5	140	19,804.6
W12022	600	6.0	45	15,710.5	12,531.0	140	23,771.1
W16022	800	6.0	45	20,651.8	16,971.8	140	30,581.9

1 Rated in accordance with ARI Standard 440. Cooling capacities based on 80°F DB/67°F WB entering air, 45°F entering water, 10°F water temperature rise

AHRI Performance Ratings 100% Capacity – ASHRAE / ANSI / AHRI / ISO Standard 13256-1

Model	CFM	Fluid Velocity (FPS)	Cooling Capacity1			Heating Capacity2	
			EWT (°F)	TC (Btu/hr)	SC (Btu/hr)	EWT (°F)	TC (Btu/hr)
W3022	340	6.0	45	9917.8	8474.9	140	16726.1
W4022	400	6.0	45	11,668.0	9,970.4	140	19,677.8
W6022	600	6.0	45	16,499.0	12,455.0	140	29,953.2
W6022X	600	6.0	45	19,057.5	13,365.5	140	29,994.0
W8022	800	6.0	45	23,384.0	17,778.5	140	33,595.6
W10022	1000	6.0	45	22,612.5	17,651.7	140	35,648.3
W12022	1200	6.0	45	28,278.9	22,555.8	140	42,788.0
W16022	1600	6.0	45	37,173.2	30,549.2	140	55,047.4

1 Rated in accordance with ARI Standard 440. Cooling capacities based on 80°F DB/67°F WB entering air, 45°F entering water, 10°F water temperature rise



Features & Benefits

With The Whalen Company's Riser Fan Coil units, you can choose from multiple system configurations to meet your application.

2-pipe Fan Cycled The simplest of configurations, the 2-pipe fan cycle units have one (1) supply and one (1) return riser. The supply riser provides either cold or hot water to the unit depending on the time of year. When the occupied space needs heating or cooling, the fan cycles on and off to provide comfort conditioning to the occupied space.

2-pipe Heat Only Heat only units have one (1) supply and one (1) return riser with the supply riser providing only hot water to the unit. When the occupied space needs heating, the fan cycles on and off to provide comfort conditioning to the space. If cooling is required, the cooling cycle would be accomplished via a separate unit.

2-pipe Face & Bypass Units with the face & bypass configuration, include a bypass chamber and dampers to bypass the cooling coil and provide constant recirculation of air. When the occupied space needs heating or cooling, the bypass damper closes to provide comfort conditioning to the space.

2-pipe Auxiliary Electric For applications where a small amount of supplemental heat is required, an auxiliary electric heater is added. Built upon the face & bypass configuration, the electric heating element is installed in the bypass chamber. Dampers operate to bypass the cooling coil and provide supplemental heat. When the occupied space needs cooling, the heating element is disengaged and the bypass damper closes to provide comfort cooling to the space.

2-pipe Total Electric For applications where space heating is accomplished solely via an electric heating element, the heating element is sized based on the particular building requirement. Built upon the face & bypass configuration, the electric heating element is installed in the bypass chamber. Dampers operate to bypass the cooling coil and provide space heating. When the occupied space needs cooling, the heating element is disengaged and the bypass

damper closes to provide comfort cooling to the space.

4-pipe Heating & Cooling Four-pipe heating & cooling units have two (2) supply risers and two (2) return risers. This allows either hot or cold water to enter the unit at any given time. In applications where it is necessary to heat and cool different areas of a building at the same time, due to differences in internal heat loss or heat gains, the four-pipe riser fan coil unit is the best option.

Riser Fan Coil Options

Constant Torque EC Motor Are optional on size 400 and larger units; and provide the efficiency and operability of an ECM at a lower cost than a constant airflow ECM. Constant torque ECMS provide 5 available motor speed settings and will maintain a constant motor torque as external static pressure in the system increases. As the system static pressure increases, reduction in fan airflow with a constant torque ECM is minor.

PSC Are standard on all units. The supplied motor is available in single or 3-speed configurations.

Supply Air Grille Diffusers are constructed of aluminum with a mill finish or an optional painted finish, available in three variations: single deflection, double deflection, double deflection with opposed blade damper. Damper blades are positioned vertically and adjust easily for directing the unit discharge air.

Flush Mounted Return Air Panel Constructed of heavy gauge steel, lined with insulation to help attenuate sound from the compressor and fan assembly. Mechanical latching clips ensure the panel door stays closed during operation.

Painted Flush Mounted Return Air Panel Constructed of heavy gauge painted steel, lined with insulation to help attenuate sound from the compressor and fan assembly. Mechanical latching clips ensure the panel door stays closed during operation.

Unfused disconnect Units are available with an optional non-fused disconnect switch, located on the unit front behind the return air panel. The



disconnect switch is used to break power to the unit for safety and ease of service.

Circuit breaker Units are available with an optional circuit breaker (HACR breaker). The circuit breaker is used to break power to the unit for safety and ease of service.

T-stat extension Low voltage wire harness ranging from 5 to 20 foot ending with 9-Pin Molex quick connector. The extension can exit the cabinet on the top or either side.

Condensate overflow The controller is designed to sense when condensate water levels in the drain pan become excessively high. When high condensate water levels are detected during cooling or dehumidification mode, the unit is shut down to prevent additional condensation entering the drain pan.

Condensate pump The internal condensate pump allows the unit to be located virtually wherever desired. The internal condensate pump serves as an effective means for disposing of condensate generated during cooling operation. A condensate pump should be designed and installed at the unit to pump condensate to a building drain.

Vibration isolation pad Vibration isolator pads dampen vibration from the fan motor. The ½" thick neoprene isolation pads are attached to the bottom of the cabinet at the factory eliminating any additional field labor.

Hot Water Coil Available on 4-pipe units only, these coils are available to provide heating in a 4-pipe system configuration.

3-way valve Available on 4-pipe heating coils, these 1/2" valves are normally closed to the coil as standard and will isolate the coil during a loss of power. Normally open configurations are simply achieved by turning the valve around. Upon response to a signal from the controller, the valve will be either fully open allowing full flow to the coil or fully closed to the coil diverting full flow to the bypass line.

Automatic flow control Available on 4-pipe heating coils, the automatic flow control device includes a ball valve cast in the valve body and is located on the return water pipe. The flow control valve consists of a stainless steel/brass flow cartridge and a contoured orifice plate. As the pressure drop increases, the flow cartridge will move into the contoured orifice plate to decrease the flow. This flexing action provides a constant flow, independent of pressure (2-80 psi), makes it difficult to clog and resistant to cavitation damage. This valve sets flow through the coil without any action required by a system balancer.

Manual flow control A manual flow control valve, acts as both a flow setting device and a stop valve, taking the place of a ball valve. This valve allows water flow through the unit and can be set quickly and accurately.

O.A. motorized OA damper The control can be configured to operate as a ventilation damper in a 2-position ventilation mode to provide the minimum ventilation requirements during occupied periods. This control operation still utilizes the modulating damper actuator.

Filter Units come standard with a one-inch glass fiber throwaway filter. High efficiency MERV 7, and MERV 8 throw away filters as well as a washable aluminum mesh filter are also available as an option.

Air vents Optional air vents are available for installation in each riser to vent incidental air trapped within the riser. Air vents are available in various configurations including: manual, manual piped to drain, manual piped to drain with a ball valve, or automatic.

Turbulators Optional turbulators are installed in the coil riser to maintain proper velocity and performance in low flow applications.

EZ Clean drain guard Designed with proper maintenance in mind, the EZ Clean drain guard allows quick efficient cleaning of the unit drain pan by slipping the guard up the drain line for cleaning



and then returned after to minimize debris from clogging the unit drain pan.

Finished Cabinet Available for applications where drywall is not used to enclose the unit, finished cabinets, top skirts, & bottom skirts are avail-

able to conceal the unit piping and provide a finished appearance. Panels can be field painted to match the interior room color.

Table 2: Innoline® 50/50 Thermostats for Standalone Operation

			
Feature	Siemens RAB20.1U	SCI SC700V	SCI SC700LV
Mounting Style	Electrical Box	•	•
Drywall	•	•	•
Display	Backlit LCD		
Temperature & Setpoint			
Operating Mode			
Fan Status			
Remote Setback			
Operation	Non-programmable	•	•
Programmable			
Sensing	Local	Local or Remote	Local or Remote
Setpoint Range	50°F to 85°F	50°F to 90°F	50°F to 90°F
Changeover	Automatic	Automatic	Automatic
Operating Modes	System Settings	On - Off	On - Off
Fan Settings	Off - Lo - Med - Hi	Off - Lo - Med - Hi	Off - Lo - Med - Hi
Fan Speeds	3	3	3
Stages	Heating	1	1
Cooling	1	1	1
Voltage	Operating Voltage	24 - 120, 277 VAC	110 - 277 VAC
Application	System Type	2-pipe Fan Coil	4-pipe Fan Coil

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Physical Data Table

Table 3: Physical Data Table

Component	Models						
	W3022	W4022	W6022	W8022	W10022	W12022	W16022
Nominal Tonnage	0.75	1.00	1.50	2.00	2.50	3.00	4.00
COOLING PERFORMANCE							
Rated Airflow (CFM)	300	400	600	800	1000	1200	1600
Entering Air Temp DB / WB (°F)	80 / 67	80 / 67	80 / 67	80 / 67	80 / 67	80 / 67	80 / 67
Total Cooling (MBTUH)	11.05	13.00	19.04	27.20	29.34	33.91	46.73
Sensible Cooling (MBTUH)	7.74	9.10	13.32	20.96	23.04	26.31	34.75
Entering Water Temp (°F)	48.00	48.00	48.00	48.00	48.00	48.00	48.00
Water Velocity (FPS)	6	6	6	6	6	6	6
HEATING PERFORMANCE							
Heating Capacity (MBTUH)							
Entering Air Temp DB (°F)	70	70	70	70	70	70	70
Entering Water Temp (°F)	120	120	120	120	120	120	120
Water Velocity (FPS)	6	6	6	6	6	6	6
DIMENSIONS (inches)							
Width (in.)	24	24	28	32	32	36	36
Depth (in.)	14	14	14	14	14	16	16
Height (in.)	90	90	90	90	90	90	90
UNIT WEIGHT (lbs.)							
Operating	215	215	215	280	280	310	310
Shipping	215	215	215	280	280	310	310
WATER COIL DATA							
Configuration	4-pipe						
Circuiting	2 pass						
SUPPLY FAN DATA							
Quantity	2	2	2	2	2	2	2
Fan Size (D x W)	8 x 3	8 x 3	8 x 3	8 x 6	8 x 6	9 x 6	10 x 6
Fan type	Centrifugal						
Maximum E.S.P.							
PSC Motor	0.30	0.30	0.30	0.40	0.40	0.35	0.40
ECM Motor	NA	NA	NA	0.50	0.70	0.70	0.70
PSC MOTOR HP							
Voltage - 115/60/1	1/12	1/12	1/12	1/12	1/12	1/6	1/5
Voltage - 208-230/60/1	1/12	1/12	1/12	1/12	1/12	1/6	1/5
Voltage - 265/60/1	1/15	1/15	1/15	1/15	1/15	1/9	1/5
Type E - ECM MOTOR HP							
Voltage - 115/60/1	NA	NA	NA	1/2	1/2	1/2	1/2
Voltage - 208-230/60/1	NA	NA	NA	1/2	1/2	1/2	1/2
Voltage - 265/60/1	NA	NA	NA	1/2	1/2	1/2	1/2
RETURN AIR PANEL							
4-Pipe Fan Cycle (W x H)	Qty 1 - 18 x 28	Qty 1 - 18 x 28	Qty 1 - 18 x 28	Qty 1 - 26 x 28	Qty 1 - 26 x 28	Qty 1 - 36 x 28	Qty 1 - 36 x 28
4-Pipe Face & Bypass (W x H)	Qty 2 - 8 x 36	Qty 2 - 8 x 36	Qty 2 - 8 x 36	Qty 2 - 10 x 36	Qty 2 - 10 x 36	Qty 2 - 12 x 36	Qty 2 - 12 x 36
SUPPLY GRILLE							
Type 1 (W x H)	18 x 8	18 x 8	18 x 10	26 x 10	26 x 10	30 x 10	30 x 12
Type 2 (W x H)	18 x 4	18 x 4	18 x 5	26 x 5	26 x 5	30 x 5	30 x 6
Type 5 (W x H)	6 x 12	6 x 12	6 x 12	8 x 12	8 x 12	10 x 14	10 x 14
FILTERS							
4-Pipe Fan Cycle							
Width x Height x Thickness	17 x 27.5 x 0.5	17 x 27.5 x 0.5	17 x 27.5 x 0.5	25 x 27.5 x 0.5	25 x 27.5 x 0.5	29 x 27.5 x 0.5	29 x 27.5 x 0.5
Quantity	1	1	1	1	1	1	1
4-Pipe Face & Bypass							
Width x Height x Thickness	7 x 33.5 x 0.5	7 x 33.5 x 0.5	9 x 33.5 x 0.5	9 x 33.5 x 0.5	9 x 33.5 x 0.5	11 x 33.5 x 0.5	11 x 33.5 x 0.5
Quantity	2	2	2	2	2	2	2

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Table 4: Unit Voltage Limitations

Voltage	Minimum	Maximum
208/230-60-1	197	252
265-60-1	239	292

Table 5: Innoline® 50/50 Fan Coil Continuous Operating Limits

Mode	Entering Fluid °F	
	4-Pipe1	
	Min	Max
Cooling	42	50
Heating	85	160

1 If entering water temperature exceeds 140 °F, remote mounted thermostats are required.
Return water temperatures must be above 100 °F when changing from cooling to heating.

Table 6: Innoline® 50/50 Fan Coil Start-Up Operating Limits

Mode	Entering Fluid °F	
	4-Pipe1	
	Min	Max
Cooling	42	65
Heating	85	160

1 If entering water temperature exceeds 140 °F, remote mounted thermostats are required.
Return water temperatures must be above 100 °F when changing from cooling to heating.

Table 7: Innoline® 50/50 Outdoor Temperature Reset

Outdoor Air Temperature	Water Temperature
0°	140 °F
10°	130 °F
20°	120 °F
30°	110 °F
40°	100 °F
50°	90 °F
60°	80 °F

Standard Range Units:

Units are designed to start in an ambient of 50°F (10°C) with entering air at 50°F (10°C), with entering water at 50°F (10°C), with nominal air flow and water flow (3.0 GPM/Ton), for initial start-up in heating and cooling mode.

Note: This is not a normal or continuous operating condition. It is assumed that such start-up is for the purpose of bringing the building space up to occupancy temperature and operating for extended periods of time.

Environment

This equipment is designed for indoor installation only. Unconditioned locations such as attics, garages, etc., generally will not provide sufficient protection against extremes in temperature and/or humidity, and equipment performance, reliability, and service life may be adversely affected.

Power supply

A voltage variation of +/-10% of nameplate voltage is acceptable.

**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
300 (0.75)	42	10	5827.7	4525.4	5076.4	4322.8	4306.7	3909.0
		12	5529.3	4436.9	4809.2	4272.6	4068.1	3785.7
		14	5239.7	4341.0	4550.3	4197.3	3835.7	3650.7
		16	4958.9	4237.4	4299.7	4097.0	3609.5	3504.0
	43	10	5529.3	4436.9	4809.2	4272.6	4068.1	3785.7
		12	5239.7	4341.0	4550.3	4197.3	3835.7	3650.7
		14	4958.9	4237.4	4299.7	4097.0	3609.5	3504.0
		16	4686.8	4126.4	4057.5	3971.6	3389.5	3345.6
	44	10	5239.7	4341.0	4550.3	4197.3	3835.7	3650.7
		12	4958.9	4237.4	4299.7	4097.0	3609.5	3504.0
		14	4686.8	4126.4	4057.5	3971.6	3389.5	3345.6
		16	4423.5	4007.7	3823.5	3821.1	3175.6	3175.5
	45	10	4958.9	4237.4	4299.7	4097.0	3609.5	3504.0
		12	4686.8	4126.4	4057.5	3971.6	3389.5	3345.6
		14	4423.5	4007.7	3823.5	3821.1	3175.6	3175.6
		16	4169.0	3881.6	3597.9	3597.9	2967.9	2967.9
	46	10	4686.8	4126.4	4057.5	3971.6	3389.5	3345.6
		12	4423.5	4007.7	3823.5	3821.1	3175.6	3175.5
		14	4169.0	3881.6	3597.9	3597.9	2967.9	2967.9
		16	3923.2	3747.8	3380.6	3380.6	2766.3	2766.3
	47	10	4423.5	4007.7	3823.5	3821.1	3175.6	3175.5
		12	4169.0	3881.6	3597.9	3597.9	2967.9	2967.9
		14	3923.2	3747.8	3380.6	3380.6	2766.3	2766.3
		16	3686.2	3606.6	3171.6	3171.6	2571.0	2571.0
	48	10	4169.0	3881.6	3597.9	3597.9	2967.9	2967.9
		12	3923.2	3747.8	3380.6	3380.6	2766.3	2766.3
		14	3686.2	3606.6	3171.6	3171.6	2571.0	2571.0
		16	3457.9	3457.8	2971.0	2971.0	2381.8	2381.8

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
300 (0.75)	120	15	6626.2	5923.1	5229.0	4880.4	4531.7	4183.1
		20	6277.8	5574.6	4880.4	4531.7	4183.1	3821.1
		25	5929.3	5226.0	4531.7	4183.1	3821.1	3175.6
		30	5580.9	4877.4	4183.1	3821.1	3175.6	2967.9
	130	15	8019.8	7317.4	6623.5	6274.9	5926.2	5577.6
		20	7671.4	6968.8	6274.9	5926.2	5577.6	5271.0
		25	7323.0	6620.2	5926.2	5577.6	5271.0	4923.8
		30	6974.6	6271.7	5577.6	5271.0	4923.8	4626.0
	140	15	9413.5	8711.6	8018.0	7669.4	7320.8	6923.8
		20	9065.1	8363.1	7669.4	7320.8	6923.8	6623.5
		25	8716.7	8014.5	7320.8	6923.8	6623.5	6326.3
		30	8368.3	7665.9	6923.8	6623.5	6326.3	6029.0
	150	15	10807.2	10105.9	9412.5	9063.9	8715.3	8366.6
		20	10458.7	9757.3	9063.9	8715.3	8366.6	7961.9
		25	10110.3	9408.8	8715.3	8366.6	7961.9	7669.4
		30	9761.9	9060.2	8366.6	7961.9	7669.4	7320.8

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 100% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
300 (0.75)	42	10	11655.4	9050.8	10152.9	8645.6	8613.4	7818.0
		12	11058.7	8873.9	9618.4	8545.2	8136.3	7571.4
		14	10479.5	8681.9	9100.6	8394.7	7671.5	7301.4
		16	9917.8	8474.9	8599.5	8194.0	7219.1	7008.0
	43	10	11058.7	8873.9	9618.4	8545.2	8136.3	7571.4
		12	10479.5	8681.9	9100.6	8394.7	7671.5	7301.4
		14	9917.8	8474.9	8599.5	8194.0	7219.1	7008.0
		16	9373.7	8252.7	8114.9	7943.2	6779.0	6691.2
	44	10	10479.5	8681.9	9100.6	8394.7	7671.5	7301.4
		12	9917.8	8474.9	8599.5	8194.0	7219.1	7008.0
		14	9373.7	8252.7	8114.9	7943.2	6779.0	6691.2
		16	8847.0	8015.5	7647.0	7642.2	6351.2	6351.0
	45	10	9917.8	8474.9	8599.5	8194.0	7219.1	7008.0
		12	9373.7	8252.7	8114.9	7943.2	6779.0	6691.2
		14	8847.0	8015.5	7647.0	7642.2	6351.2	6351.2
		16	8338.0	7763.1	7195.8	7195.8	5935.8	5935.8
	46	10	9373.7	8252.7	8114.9	7943.2	6779.0	6691.2
		12	8847.0	8015.5	7647.0	7642.2	6351.2	6351.0
		14	8338.0	7763.1	7195.8	7195.8	5935.8	5935.8
		16	7846.4	7495.7	6761.2	6761.2	5532.7	5532.7
	47	10	8847.0	8015.5	7647.0	7642.2	6351.2	6351.0
		12	8338.0	7763.1	7195.8	7195.8	5935.8	5935.8
		14	7846.4	7495.7	6761.2	6761.2	5532.7	5532.7
		16	7372.4	7213.2	6343.2	6343.2	5141.9	5141.9
	48	10	8338.0	7763.1	7195.8	7195.8	5935.8	5935.8
		12	7846.4	7495.7	6761.2	6761.2	5532.7	5532.7
		14	7372.4	7213.2	6343.2	6343.2	5141.9	5141.9
		16	6915.9	6915.5	5941.9	5941.9	4763.5	4763.5

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
300 (0.75)	120	15	13252.4	11846.2	10458.0			
		20	12555.5	11149.1	9760.7			
		25	11858.7	10452.0	9063.5			
		30	11161.9	9754.9	8366.2			
	130	15	16039.7	14634.7	13247.0			
		20	15342.8	13937.6	12549.7			
		25	14646.0	13240.5	11852.5			
		30	13949.2	12543.4	11155.2			
	140	15	18827.0	17423.3	16036.0			
		20	18130.2	16726.1	15338.8			
		25	17433.3	16029.0	14641.5			
		30	16736.5	15331.9	13944.3			
	150	15	21614.3	20211.8	18825.0			
		20	20917.5	19514.6	18127.8			
		25	20220.7	18817.5	17430.5			
		30	19523.8	18120.4	16733.3			

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
400 (1.0)	42	10	6856.1	5324.0	5972.3	5085.7	5066.7	4598.8
		12	6505.1	5219.9	5657.9	5026.6	4786.0	4453.8
		14	6164.4	5107.0	5353.3	4938.1	4512.6	4294.9
		16	5834.0	4985.2	5058.5	4820.0	4246.5	4122.4
	43	10	6505.1	5219.9	5657.9	5026.6	4786.0	4453.8
		12	6164.4	5107.0	5353.3	4938.1	4512.6	4294.9
		14	5834.0	4985.2	5058.5	4820.0	4246.5	4122.4
		16	5513.9	4854.5	4773.5	4672.4	3987.6	3936.0
	44	10	6164.4	5107.0	5353.3	4938.1	4512.6	4294.9
		12	5834.0	4985.2	5058.5	4820.0	4246.5	4122.4
		14	5513.9	4854.5	4773.5	4672.4	3987.6	3936.0
		16	5204.1	4715.0	4498.3	4495.4	3736.0	3735.9
	45	10	5834.0	4985.2	5058.5	4820.0	4246.5	4122.4
		12	5513.9	4854.5	4773.5	4672.4	3987.6	3936.0
		14	5204.1	4715.0	4498.3	4495.4	3736.0	3736.0
		16	4904.7	4566.5	4232.8	4232.8	3491.6	3491.6
	46	10	5513.9	4854.5	4773.5	4672.4	3987.6	3936.0
		12	5204.1	4715.0	4498.3	4495.4	3736.0	3735.9
		14	4904.7	4566.5	4232.8	4232.8	3491.6	3491.6
		16	4615.5	4409.2	3977.2	3977.2	3254.5	3254.5
	47	10	5204.1	4715.0	4498.3	4495.4	3736.0	3735.9
		12	4904.7	4566.5	4232.8	4232.8	3491.6	3491.6
		14	4615.5	4409.2	3977.2	3977.2	3254.5	3254.5
		16	4336.7	4243.0	3731.3	3731.3	3024.7	3024.7
	48	10	4904.7	4566.5	4232.8	4232.8	3491.6	3491.6
		12	4615.5	4409.2	3977.2	3977.2	3254.5	3254.5
		14	4336.7	4243.0	3731.3	3731.3	3024.7	3024.7
		16	4068.2	4068.0	3495.2	3495.2	2802.1	2802.1

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
400 (1.0)	120	15	7795.5	6968.4	6151.8			
		20	7385.6	6558.3	5741.6			
		25	6975.7	6148.2	5331.5			
		30	6565.8	5738.2	4921.3			
	130	15	9435.1	8608.7	7792.3			
		20	9025.2	8198.6	7382.2			
		25	8615.3	7788.5	6972.1			
		30	8205.4	7378.5	6561.9			
	140	15	11074.7	10249.0	9433.0			
		20	10664.8	9838.9	9022.8			
		25	10254.9	9428.8	8612.7			
		30	9845.0	9018.8	8202.5			
	150	15	12714.3	11889.3	11073.6			
		20	12304.4	11479.2	10663.4			
		25	11894.5	11069.1	10253.3			
		30	11484.6	10659.1	9843.1			

Performance based on riser velocity of 6.0 F.P.S.

**Cooling Performance - 100% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
400 (1.0)	42	10	13712.2	10648.0	11944.6	10171.3	10133.4	9197.6
		12	13010.2	10439.9	11315.8	10053.2	9572.1	8907.5
		14	12328.8	10214.0	10706.6	9876.1	9025.3	8589.9
		16	11668.0	9970.4	10117.0	9640.0	8493.0	8244.7
	43	10	13010.2	10439.9	11315.8	10053.2	9572.1	8907.5
		12	12328.8	10214.0	10706.6	9876.1	9025.3	8589.9
		14	11668.0	9970.4	10117.0	9640.0	8493.0	8244.7
		16	11027.8	9709.1	9547.0	9344.9	7975.2	7872.0
	44	10	12328.8	10214.0	10706.6	9876.1	9025.3	8589.9
		12	11668.0	9970.4	10117.0	9640.0	8493.0	8244.7
		14	11027.8	9709.1	9547.0	9344.9	7975.2	7872.0
		16	10408.3	9429.9	8996.5	8990.8	7472.0	7471.8
	45	10	11668.0	9970.4	10117.0	9640.0	8493.0	8244.7
		12	11027.8	9709.1	9547.0	9344.9	7975.2	7872.0
		14	10408.3	9429.9	8996.5	8990.8	7472.0	7472.0
		16	9809.4	9133.1	8465.6	8465.6	6983.3	6983.3
	46	10	11027.8	9709.1	9547.0	9344.9	7975.2	7872.0
		12	10408.3	9429.9	8996.5	8990.8	7472.0	7471.8
		14	9809.4	9133.1	8465.6	8465.6	6983.3	6983.3
		16	9231.1	8818.5	7954.3	7954.3	6509.0	6509.0
	47	10	10408.3	9429.9	8996.5	8990.8	7472.0	7471.8
		12	9809.4	9133.1	8465.6	8465.6	6983.3	6983.3
		14	9231.1	8818.5	7954.3	7954.3	6509.0	6509.0
		16	8673.4	8486.1	7462.6	7462.6	6049.3	6049.3
	48	10	9809.4	9133.1	8465.6	8465.6	6983.3	6983.3
		12	9231.1	8818.5	7954.3	7954.3	6509.0	6509.0
		14	8673.4	8486.1	7462.6	7462.6	6049.3	6049.3
		16	8136.3	8135.9	6990.5	6990.5	5604.2	5604.2

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
400 (1.0)	120	15	15591.0	13936.8	12303.5			
		20	14771.2	13116.6	11483.2			
		25	13951.4	12296.5	10662.9			
		30	13131.6	11476.3	9842.6			
	130	15	18870.2	17217.4	15584.7			
		20	18050.4	16397.2	14764.4			
		25	17230.6	15577.1	13944.1			
		30	16410.8	14756.9	13123.8			
	140	15	22149.4	20498.0	18865.9			
		20	21329.6	19677.8	18045.6			
		25	20509.8	18857.7	17225.3			
		30	19690.0	18037.5	16405.0			
	150	15	25428.6	23778.6	22147.1			
		20	24608.8	22958.4	21326.8			
		25	23789.0	22138.3	20506.5			
		30	22969.2	21318.1	19686.2			

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
600 (1.5)	42	10	9688.0	6793.4	8407.3	6434.7	7150.8	5816.4
		12	9194.6	6597.3	7973.1	6273.5	6756.8	5708.2
		14	8715.1	6408.6	7550.7	6109.9	6372.6	5575.8
		16	8249.5	6227.5	7140.3	5944.0	5998.3	5419.0
	43	10	9194.6	6597.3	7973.1	6273.5	6756.8	5708.2
		12	8715.1	6408.6	7550.7	6109.9	6372.6	5575.8
		14	8249.5	6227.5	7140.3	5944.0	5998.3	5419.0
		16	7797.7	6053.9	6741.6	5775.7	5633.7	5238.0
	44	10	8715.1	6408.6	7550.7	6109.9	6372.6	5575.8
		12	8249.5	6227.5	7140.3	5944.0	5998.3	5419.0
		14	7797.7	6053.9	6741.6	5775.7	5633.7	5238.0
		16	7359.8	5887.9	6354.8	5605.1	5279.1	5032.6
	45	10	8249.5	6227.5	7140.3	5944.0	5998.3	5419.0
		12	7797.7	6053.9	6741.6	5775.7	5633.7	5238.0
		14	7359.8	5887.9	6354.8	5605.1	5279.1	5032.6
		16	6935.8	5729.4	5979.9	5432.1	4934.2	4803.0
	46	10	7797.7	6053.9	6741.6	5775.7	5633.7	5238.0
		12	7359.8	5887.9	6354.8	5605.1	5279.1	5032.6
		14	6935.8	5729.4	5979.9	5432.1	4934.2	4803.0
		16	6525.7	5578.4	5616.9	5256.9	4599.2	4549.1
	47	10	7359.8	5887.9	6354.8	5605.1	5279.1	5032.6
		12	6935.8	5729.4	5979.9	5432.1	4934.2	4803.0
		14	6525.7	5578.4	5616.9	5256.9	4599.2	4549.1
		16	6129.4	5435.0	5265.6	5079.2	4274.0	4270.8
	48	10	6935.8	5729.4	5979.9	5432.1	4934.2	4803.0
		12	6525.7	5578.4	5616.9	5256.9	4599.2	4549.1
		14	6129.4	5435.0	5265.6	5079.2	4274.0	4270.8
		16	5747.0	5299.1	4926.3	4899.3	3958.6	3958.6

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
600 (1.5)	120	15	11860.9	10608.3	9366.9			
		20	11236.7	9984.2	8742.7			
		25	10612.5	9360.2	8118.5			
		30	9988.4	8736.1	7494.3			
	130	15	14357.6	13104.5	11863.6			
		20	13733.4	12480.4	11239.4			
		25	13109.2	11856.4	10615.2			
		30	12485.1	11232.3	9991.1			
	140	15	16854.3	15600.7	14360.3			
		20	16230.1	14976.6	13736.1			
		25	15605.9	14352.6	13111.9			
		30	14981.8	13728.5	12487.8			
	150	15	19351.0	18096.9	16857.0			
		20	18726.8	17472.8	16232.8			
		25	18102.6	16848.8	15608.6			
		30	17478.5	16224.7	14984.5			

Performance based on riser velocity of 6.0 F.P.S.

**Cooling Performance - 100% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
600 (1.5)	42	10	19376.0	13586.9	16814.6	12869.5	14301.6	11632.8
		12	18389.3	13194.5	15946.2	12547.0	13513.5	11416.4
		14	17430.3	12817.2	15101.5	12219.8	12745.2	11151.5
		16	16499.0	12455.0	14280.5	11887.9	11996.5	10838.0
	43	10	18389.3	13194.5	15946.2	12547.0	13513.5	11416.4
		12	17430.3	12817.2	15101.5	12219.8	12745.2	11151.5
		14	16499.0	12455.0	14280.5	11887.9	11996.5	10838.0
		16	15595.5	12107.9	13483.2	11551.4	11267.5	10475.9
	44	10	17430.3	12817.2	15101.5	12219.8	12745.2	11151.5
		12	16499.0	12455.0	14280.5	11887.9	11996.5	10838.0
		14	15595.5	12107.9	13483.2	11551.4	11267.5	10475.9
		16	14719.7	11775.8	12709.7	11210.2	10558.1	10065.2
	45	10	16499.0	12455.0	14280.5	11887.9	11996.5	10838.0
		12	15595.5	12107.9	13483.2	11551.4	11267.5	10475.9
		14	14719.7	11775.8	12709.7	11210.2	10558.1	10065.2
		16	13871.6	11458.8	11959.8	10864.3	9868.4	9606.0
	46	10	15595.5	12107.9	13483.2	11551.4	11267.5	10475.9
		12	14719.7	11775.8	12709.7	11210.2	10558.1	10065.2
		14	13871.6	11458.8	11959.8	10864.3	9868.4	9606.0
		16	13051.3	11156.9	11233.7	10513.7	9198.4	9098.1
	47	10	14719.7	11775.8	12709.7	11210.2	10558.1	10065.2
		12	13871.6	11458.8	11959.8	10864.3	9868.4	9606.0
		14	13051.3	11156.9	11233.7	10513.7	9198.4	9098.1
		16	12258.8	10870.0	10531.3	10158.5	8548.0	8541.7
	48	10	13871.6	11458.8	11959.8	10864.3	9868.4	9606.0
		12	13051.3	11156.9	11233.7	10513.7	9198.4	9098.1
		14	12258.8	10870.0	10531.3	10158.5	8548.0	8541.7
		16	11493.9	10598.3	9852.6	9798.6	7917.3	7917.3

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
600 (1.5)	120	15	23721.8	21216.5	18733.8	17485.4		
		20	22473.4	19968.4	17485.4			
		25	21225.1	18720.3	16237.1			
		30	19976.7	17472.2	14988.7			
	130	15	28715.2	26208.9	23727.2			
		20	27466.8	24960.8	22478.8			
		25	26218.5	23712.7	21230.5			
		30	24970.1	22464.6	19982.1			
	140	15	33708.6	31201.3	28720.6			
		20	32460.2	29953.2	27472.2			
		25	31211.9	28705.1	26223.9			
		30	29963.5	27457.0	24975.5			
	150	15	38702.0	36193.7	33714.0			
		20	37453.6	34945.6	32465.6			
		25	36205.3	33697.5	31217.3			
		30	34956.9	32449.4	29968.9			

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
600X (1.5)	42	10	11077.1	7335.2	9637.1	6907.1	8164.4	6185.9
		12	10580.4	7117.7	9134.8	6696.4	7713.4	6018.5
		14	10064.3	6900.2	8647.0	6493.8	7274.1	5845.9
		16	9528.8	6682.8	8173.8	6299.5	6846.5	5668.0
	43	10	10580.4	7117.7	9134.8	6696.4	7713.4	6018.5
		12	10064.3	6900.2	8647.0	6493.8	7274.1	5845.9
		14	9528.8	6682.8	8173.8	6299.5	6846.5	5668.0
		16	8973.9	6465.3	7715.0	6113.4	6430.7	5484.7
	44	10	10064.3	6900.2	8647.0	6493.8	7274.1	5845.9
		12	9528.8	6682.8	8173.8	6299.5	6846.5	5668.0
		14	8973.9	6465.3	7715.0	6113.4	6430.7	5484.7
		16	8399.6	6247.9	7270.8	5935.6	6026.6	5296.2
	45	10	9528.8	6682.8	8173.8	6299.5	6846.5	5668.0
		12	8973.9	6465.3	7715.0	6113.4	6430.7	5484.7
		14	8399.6	6247.9	7270.8	5935.6	6026.6	5296.2
		16	7805.9	6030.6	6841.1	5766.0	5634.2	5102.3
	46	10	8973.9	6465.3	7715.0	6113.4	6430.7	5484.7
		12	8399.6	6247.9	7270.8	5935.6	6026.6	5296.2
		14	7805.9	6030.6	6841.1	5766.0	5634.2	5102.3
		16	7192.8	5813.2	6426.0	5604.6	5253.6	4903.2
	47	10	8399.6	6247.9	7270.8	5935.6	6026.6	5296.2
		12	7805.9	6030.6	6841.1	5766.0	5634.2	5102.3
		14	7192.8	5813.2	6426.0	5604.6	5253.6	4903.2
		16	6560.3	5596.0	6025.3	5451.5	4884.7	4698.7
	48	10	7805.9	6030.6	6841.1	5766.0	5634.2	5102.3
		12	7192.8	5813.2	6426.0	5604.6	5253.6	4903.2
		14	6560.3	5596.0	6025.3	5451.5	4884.7	4698.7
		16	5908.4	5378.7	5639.2	5306.6	4527.5	4489.0

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
600X (1.5)	120	15	11865.5	10627.3	9377.1			
		20	11240.0	10003.0	8751.5			
		25	10614.5	9378.8	8125.9			
		30	9989.0	8754.5	7500.3			
	130	15	14367.5	13124.3	11879.6			
		20	13742.0	12500.0	11254.0			
		25	13116.5	11875.8	10628.4			
		30	12491.0	11251.5	10002.8			
	140	15	16869.5	15621.3	14382.1			
		20	16244.0	14997.0	13756.5			
		25	15618.5	14372.8	13130.9			
		30	14993.0	13748.5	12505.3			
	150	15	19371.5	18118.3	16884.6			
		20	18746.0	17494.0	16259.0			
		25	18120.5	16869.8	15633.4			
		30	17495.0	16245.5	15007.8			

Performance based on riser velocity of 6.0 F.P.S.

**Cooling Performance - 100% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
600X (1.5)	42	10	22154.1	14670.4	19274.1	13814.3	16328.8	12371.7
		12	21160.7	14235.4	18269.5	13392.7	15426.7	12037.0
		14	20128.5	13800.4	17294.0	12987.6	14548.1	11691.8
		16	19057.5	13365.5	16347.5	12599.0	13693.0	11335.9
	43	10	21160.7	14235.4	18269.5	13392.7	15426.7	12037.0
		12	20128.5	13800.4	17294.0	12987.6	14548.1	11691.8
		14	19057.5	13365.5	16347.5	12599.0	13693.0	11335.9
		16	17947.7	12930.7	15430.0	12226.9	12861.3	10969.4
	44	10	20128.5	13800.4	17294.0	12987.6	14548.1	11691.8
		12	19057.5	13365.5	16347.5	12599.0	13693.0	11335.9
		14	17947.7	12930.7	15430.0	12226.9	12861.3	10969.4
		16	16799.1	12495.9	14541.6	11871.2	12053.1	10592.3
	45	10	19057.5	13365.5	16347.5	12599.0	13693.0	11335.9
		12	17947.7	12930.7	15430.0	12226.9	12861.3	10969.4
		14	16799.1	12495.9	14541.6	11871.2	12053.1	10592.3
		16	15611.7	12061.1	13682.3	11532.0	11268.4	10204.7
	46	10	17947.7	12930.7	15430.0	12226.9	12861.3	10969.4
		12	16799.1	12495.9	14541.6	11871.2	12053.1	10592.3
		14	15611.7	12061.1	13682.3	11532.0	11268.4	10204.7
		16	14385.5	11626.5	12851.9	11209.3	10507.1	9806.4
	47	10	16799.1	12495.9	14541.6	11871.2	12053.1	10592.3
		12	15611.7	12061.1	13682.3	11532.0	11268.4	10204.7
		14	14385.5	11626.5	12851.9	11209.3	10507.1	9806.4
		16	13120.5	11191.9	12050.7	10903.0	9769.4	9397.5
	48	10	15611.7	12061.1	13682.3	11532.0	11268.4	10204.7
		12	14385.5	11626.5	12851.9	11209.3	10507.1	9806.4
		14	13120.5	11191.9	12050.7	10903.0	9769.4	9397.5
		16	11816.7	10757.4	11278.4	10613.2	9055.0	8978.0

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
600X (1.5)	120	15	23731.0	21254.5	18754.3			
		20	22480.0	20006.0	17503.0			
		25	21229.0	18757.5	16251.8			
		30	19978.0	17509.0	15000.5			
	130	15	28735.0	26248.5	23759.3			
		20	27484.0	25000.0	22508.0			
		25	26233.0	23751.5	21256.8			
		30	24982.0	22503.0	20005.5			
	140	15	33739.0	31242.5	28764.3			
		20	32488.0	29994.0	27513.0			
		25	31237.0	28745.5	26261.8			
		30	29986.0	27497.0	25010.5			
	150	15	38743.0	36236.5	33769.3			
		20	37492.0	34988.0	32518.0			
		25	36241.0	33739.5	31266.8			
		30	34990.0	32491.0	30015.5			

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
800 (2.0)	42	10	13718.0	9683.5	11922.6	9218.5	10149.4	8260.6
		12	13024.0	9408.6	11294.7	8995.4	9581.0	8149.7
		14	12348.7	9143.9	10686.0	8761.3	9028.0	7992.5
		16	11692.0	8889.3	10096.8	8516.1	8490.3	7789.0
	43	10	13024.0	9408.6	11294.7	8995.4	9581.0	8149.7
		12	12348.7	9143.9	10686.0	8761.3	9028.0	7992.5
		14	11692.0	8889.3	10096.8	8516.1	8490.3	7789.0
		16	11053.9	8644.7	9526.8	8259.8	7967.9	7539.3
	44	10	12348.7	9143.9	10686.0	8761.3	9028.0	7992.5
		12	11692.0	8889.3	10096.8	8516.1	8490.3	7789.0
		14	11053.9	8644.7	9526.8	8259.8	7967.9	7539.3
		16	10434.5	8410.2	8976.1	7992.4	7460.8	7243.3
	45	10	11692.0	8889.3	10096.8	8516.1	8490.3	7789.0
		12	11053.9	8644.7	9526.8	8259.8	7967.9	7539.3
		14	10434.5	8410.2	8976.1	7992.4	7460.8	7243.3
		16	9833.7	8185.9	8444.8	7714.0	6969.1	6901.0
	46	10	11053.9	8644.7	9526.8	8259.8	7967.9	7539.3
		12	10434.5	8410.2	8976.1	7992.4	7460.8	7243.3
		14	9833.7	8185.9	8444.8	7714.0	6969.1	6901.0
		16	9251.5	7971.6	7932.8	7424.5	6492.7	6492.7
	47	10	10434.5	8410.2	8976.1	7992.4	7460.8	7243.3
		12	9833.7	8185.9	8444.8	7714.0	6969.1	6901.0
		14	9251.5	7971.6	7932.8	7424.5	6492.7	6492.7
		16	8687.9	7767.4	7440.2	7123.9	6031.7	6031.7
	48	10	9833.7	8185.9	8444.8	7714.0	6969.1	6901.0
		12	9251.5	7971.6	7932.8	7424.5	6492.7	6492.7
		14	8687.9	7767.4	7440.2	7123.9	6031.7	6031.7
		16	8143.0	7573.3	6966.8	6812.3	5585.9	5585.9

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
800 (2.0)	120	15	13295.0	11893.3	10499.5	9799.0	9799.0	9799.0
		20	12595.0	11192.6	9799.0	9098.5	9098.5	9098.5
		25	11895.0	10492.0	9098.5	8398.0	8398.0	8398.0
		30	11195.0	9791.3	8398.0	7714.0	7123.9	7123.9
	130	15	16095.0	14695.9	13301.5	12601.0	12601.0	12601.0
		20	15395.0	13995.2	12601.0	11900.5	11900.5	11900.5
		25	14695.0	13294.6	11900.5	11200.0	11200.0	11200.0
		30	13995.0	12593.9	11200.0	10402.0	10402.0	10402.0
	140	15	18895.0	17498.5	16103.5	15403.0	15403.0	15403.0
		20	18195.0	16797.8	15403.0	14702.5	14702.5	14702.5
		25	17495.0	16097.2	14702.5	14002.0	14002.0	14002.0
		30	16795.0	15396.5	14002.0	13301.5	13301.5	13301.5
	150	15	21695.0	20301.1	18905.5	18205.0	18205.0	18205.0
		20	20995.0	19600.4	18205.0	17504.5	17504.5	17504.5
		25	20295.0	18899.8	17504.5	16804.0	16804.0	16804.0
		30	19595.0	18199.1	16804.0	16103.5	16103.5	16103.5

Performance based on riser velocity of 6.0 F.P.S.

**Cooling Performance - 100% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
800 (2.0)	42	10	27435.9	19366.9	23845.2	18437.0	20298.8	16521.3
		12	26048.0	18817.3	22589.3	17990.8	19162.0	16299.4
		14	24697.4	18287.8	21372.1	17522.5	18055.9	15984.9
		16	23384.0	17778.5	20193.5	17032.1	16980.5	15578.0
	43	10	26048.0	18817.3	22589.3	17990.8	19162.0	16299.4
		12	24697.4	18287.8	21372.1	17522.5	18055.9	15984.9
		14	23384.0	17778.5	20193.5	17032.1	16980.5	15578.0
		16	22107.9	17289.4	19053.6	16519.5	15935.7	15078.5
	44	10	24697.4	18287.8	21372.1	17522.5	18055.9	15984.9
		12	23384.0	17778.5	20193.5	17032.1	16980.5	15578.0
		14	22107.9	17289.4	19053.6	16519.5	15935.7	15078.5
		16	20869.0	16820.5	17952.3	15984.8	14921.6	14486.6
	45	10	23384.0	17778.5	20193.5	17032.1	16980.5	15578.0
		12	22107.9	17289.4	19053.6	16519.5	15935.7	15078.5
		14	20869.0	16820.5	17952.3	15984.8	14921.6	14486.6
		16	19667.4	16371.7	16889.6	15428.0	13938.2	13802.1
	46	10	22107.9	17289.4	19053.6	16519.5	15935.7	15078.5
		12	20869.0	16820.5	17952.3	15984.8	14921.6	14486.6
		14	19667.4	16371.7	16889.6	15428.0	13938.2	13802.1
		16	18503.0	15943.1	15865.7	14849.0	12985.4	12985.4
	47	10	20869.0	16820.5	17952.3	15984.8	14921.6	14486.6
		12	19667.4	16371.7	16889.6	15428.0	13938.2	13802.1
		14	18503.0	15943.1	15865.7	14849.0	12985.4	12985.4
		16	17375.9	15534.7	14880.3	14247.9	12063.3	12063.3
	48	10	19667.4	16371.7	16889.6	15428.0	13938.2	13802.1
		12	18503.0	15943.1	15865.7	14849.0	12985.4	12985.4
		14	17375.9	15534.7	14880.3	14247.9	12063.3	12063.3
		16	16286.0	15146.5	13933.7	13624.6	11171.9	11171.9

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
800 (2.0)	120	15	26590.0	23786.5	20999.0			
		20	25190.0	22385.2	19598.0			
		25	23790.0	20983.9	18197.0			
		30	22390.0	19582.6	16796.0			
	130	15	32190.0	29391.7	26603.0			
		20	30790.0	27990.4	25202.0			
		25	29390.0	26589.1	23801.0			
		30	27990.0	25187.8	22400.0			
	140	15	37790.0	34996.9	32207.0			
		20	36390.0	33595.6	30806.0			
		25	34990.0	32194.3	29405.0			
		30	33590.0	30793.0	28004.0			
	150	15	43390.0	40602.1	37811.0			
		20	41990.0	39200.8	36410.0			
		25	40590.0	37799.5	35009.0			
		30	39190.0	36398.2	33608.0			

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
1000 (2.5)	42	10	14783.7	10664.4	12855.5	10123.8	10894.0	9083.2
		12	14018.2	10366.0	12165.8	9849.8	10292.0	8884.8
		14	13277.8	10080.0	11503.3	9589.2	9703.9	8664.8
		16	12562.5	9806.5	10868.0	9342.0	9129.5	8423.4
	43	10	14018.2	10366.0	12165.8	9849.8	10292.0	8884.8
		12	13277.8	10080.0	11503.3	9589.2	9703.9	8664.8
		14	12562.5	9806.5	10868.0	9342.0	9129.5	8423.4
		16	11872.4	9545.4	10259.9	9108.1	8568.9	8160.5
	44	10	13277.8	10080.0	11503.3	9589.2	9703.9	8664.8
		12	12562.5	9806.5	10868.0	9342.0	9129.5	8423.4
		14	11872.4	9545.4	10259.9	9108.1	8568.9	8160.5
		16	11207.4	9296.7	9679.0	8887.7	8022.2	7876.2
	45	10	12562.5	9806.5	10868.0	9342.0	9129.5	8423.4
		12	11872.4	9545.4	10259.9	9108.1	8568.9	8160.5
		14	11207.4	9296.7	9679.0	8887.7	8022.2	7876.2
		16	10567.5	9060.5	9125.3	8680.5	7489.2	7489.2
	46	10	11872.4	9545.4	10259.9	9108.1	8568.9	8160.5
		12	11207.4	9296.7	9679.0	8887.7	8022.2	7876.2
		14	10567.5	9060.5	9125.3	8680.5	7489.2	7489.2
		16	9952.8	8836.7	8598.7	8486.8	6970.1	6970.1
	47	10	11207.4	9296.7	9679.0	8887.7	8022.2	7876.2
		12	10567.5	9060.5	9125.3	8680.5	7489.2	7489.2
		14	9952.8	8836.7	8598.7	8486.8	6970.1	6970.1
		16	9363.2	8625.3	8099.4	8099.4	6464.7	6464.7
	48	10	10567.5	9060.5	9125.3	8680.5	7489.2	7489.2
		12	9952.8	8836.7	8598.7	8486.8	6970.1	6970.1
		14	9363.2	8625.3	8099.4	8099.4	6464.7	6464.7
		16	8798.7	8426.4	7627.3	7627.3	5973.1	5973.1

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
1000 (2.5)	120	15	15685.0	14031.0	12377.5			
		20	14861.4	13206.2	11551.6			
		25	14037.8	12381.4	10725.7			
		30	13214.2	11556.6	9899.8			
	130	15	18979.4	17330.2	15681.1			
		20	18155.8	16505.4	14855.2			
		25	17332.2	15680.6	14029.3			
		30	16508.6	14855.8	13203.4			
	140	15	22273.8	20629.4	18984.7			
		20	21450.2	19804.6	18158.8			
		25	20626.6	18979.8	17332.9			
		30	19803.0	18155.0	16507.0			
	150	15	25568.2	23928.6	22288.3			
		20	24744.6	23103.8	21462.4			
		25	23921.0	22279.0	20636.5			
		30	23097.4	21454.2	19810.6			

Performance based on riser velocity of 6.0 F.P.S.

**Cooling Performance - 100% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
1000 (2.5)	42	10	26610.7	19196.0	23139.8	18222.8	19609.2	16349.8
		12	25232.7	18658.9	21898.4	17729.7	18525.6	15992.6
		14	23900.0	18144.1	20705.9	17260.6	17466.9	15596.7
		16	22612.5	17651.7	19562.4	16815.6	16433.1	15162.1
	43	10	25232.7	18658.9	21898.4	17729.7	18525.6	15992.6
		12	23900.0	18144.1	20705.9	17260.6	17466.9	15596.7
		14	22612.5	17651.7	19562.4	16815.6	16433.1	15162.1
		16	21370.3	17181.7	18467.8	16394.7	15424.1	14688.9
	44	10	23900.0	18144.1	20705.9	17260.6	17466.9	15596.7
		12	22612.5	17651.7	19562.4	16815.6	16433.1	15162.1
		14	21370.3	17181.7	18467.8	16394.7	15424.1	14688.9
		16	20173.3	16734.1	17422.2	15997.8	14439.9	14177.1
	45	10	22612.5	17651.7	19562.4	16815.6	16433.1	15162.1
		12	21370.3	17181.7	18467.8	16394.7	15424.1	14688.9
		14	20173.3	16734.1	17422.2	15997.8	14439.9	14177.1
		16	19021.5	16308.8	16425.5	15625.0	13480.6	13480.6
	46	10	21370.3	17181.7	18467.8	16394.7	15424.1	14688.9
		12	20173.3	16734.1	17422.2	15997.8	14439.9	14177.1
		14	19021.5	16308.8	16425.5	15625.0	13480.6	13480.6
		16	17915.0	15906.0	15477.7	15276.2	12546.1	12546.1
	47	10	20173.3	16734.1	17422.2	15997.8	14439.9	14177.1
		12	19021.5	16308.8	16425.5	15625.0	13480.6	13480.6
		14	17915.0	15906.0	15477.7	15276.2	12546.1	12546.1
		16	16853.7	15525.5	14578.9	14578.9	11636.4	11636.4
	48	10	19021.5	16308.8	16425.5	15625.0	13480.6	13480.6
		12	17915.0	15906.0	15477.7	15276.2	12546.1	12546.1
		14	16853.7	15525.5	14578.9	14578.9	11636.4	11636.4
		16	15837.7	15167.4	13729.1	13729.1	10751.6	10751.6

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
1000 (2.5)	120	15	28233.0	25255.8	22279.5	20792.9	19306.3	17819.6
		20	26750.5	23771.2	20792.9	19306.3	17819.6	17819.6
		25	25268.0	22286.5	19306.3	17819.6	17819.6	17819.6
		30	23785.6	20801.9	17819.6	17819.6	17819.6	17819.6
	130	15	34162.9	31194.4	28226.0	26739.4	25252.7	23766.1
		20	32680.4	29709.7	26739.4	25252.7	23766.1	23766.1
		25	31198.0	28225.1	25252.7	23766.1	23766.1	23766.1
		30	29715.5	26740.4	23766.1	23766.1	23766.1	23766.1
	140	15	40092.8	37132.9	34172.5	32685.8	31199.2	29712.6
		20	38610.4	35648.3	32685.8	31199.2	30712.6	29712.6
		25	37127.9	34163.6	31199.2	30712.6	30712.6	30712.6
		30	35645.4	32679.0	30712.6	30712.6	30712.6	30712.6
	150	15	46022.8	43071.5	40118.9	38632.3	37145.7	35659.1
		20	44540.3	41586.8	38632.3	37145.7	37145.7	37145.7
		25	43057.8	40102.2	37145.7	37145.7	37145.7	37145.7
		30	41575.3	38617.6	37145.7	37145.7	37145.7	37145.7

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
1200 (3.0)	42	10	18432.2	13572.5	16057.4	12921.4	13779.0	11582.9
		12	17499.1	13211.5	15212.3	12589.0	13028.1	11380.0
		14	16591.8	12864.3	14395.6	12270.9	12295.5	11116.7
		16	15710.5	12531.0	13607.5	11967.0	11581.0	10793.0
	43	10	17499.1	13211.5	15212.3	12589.0	13028.1	11380.0
		12	16591.8	12864.3	14395.6	12270.9	12295.5	11116.7
		14	15710.5	12531.0	13607.5	11967.0	11581.0	10793.0
		16	14855.0	12211.5	12847.8	11677.3	10884.7	10408.9
	44	10	16591.8	12864.3	14395.6	12270.9	12295.5	11116.7
		12	15710.5	12531.0	13607.5	11967.0	11581.0	10793.0
		14	14855.0	12211.5	12847.8	11677.3	10884.7	10408.9
		16	14025.5	11905.9	12116.7	11401.9	10206.6	9964.4
	45	10	15710.5	12531.0	13607.5	11967.0	11581.0	10793.0
		12	14855.0	12211.5	12847.8	11677.3	10884.7	10408.9
		14	14025.5	11905.9	12116.7	11401.9	10206.6	9964.4
		16	13221.8	11614.1	11414.0	11140.7	9546.7	9459.5
	46	10	14855.0	12211.5	12847.8	11677.3	10884.7	10408.9
		12	14025.5	11905.9	12116.7	11401.9	10206.6	9964.4
		14	13221.8	11614.1	11414.0	11140.7	9546.7	9459.5
		16	12444.0	11336.2	10739.8	10739.8	8905.0	8894.2
	47	10	14025.5	11905.9	12116.7	11401.9	10206.6	9964.4
		12	13221.8	11614.1	11414.0	11140.7	9546.7	9459.5
		14	12444.0	11336.2	10739.8	10739.8	8905.0	8894.2
		16	11692.1	11072.1	10094.0	10094.0	8281.5	8268.6
	48	10	13221.8	11614.1	11414.0	11140.7	9546.7	9459.5
		12	12444.0	11336.2	10739.8	10739.8	8905.0	8894.2
		14	11692.1	11072.1	10094.0	10094.0	8281.5	8268.6
		16	10966.1	10821.9	9476.8	9476.8	7676.2	7582.5

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
1200 (3.0)	120	15	18813.6	16838.1	14836.9			
		20	17822.3	15847.7	13846.7			
		25	16831.0	14857.3	12856.5			
		30	15839.7	13866.9	11866.4			
	130	15	22778.9	20799.8	18797.6			
		20	21787.6	19809.4	17807.4			
		25	20796.3	18819.0	16817.2			
		30	19805.0	17828.6	15827.1			
	140	15	26744.2	24761.5	22758.3			
		20	25752.9	23771.1	21768.1			
		25	24761.6	22780.7	20777.9			
		30	23770.3	21790.3	19787.8			
	150	15	30709.5	28723.2	26719.0			
		20	29718.2	27732.8	25728.8			
		25	28726.9	26742.4	24738.6			
		30	27735.6	25752.0	23748.5			

Performance based on riser velocity of 6.0 F.P.S.

Cooling Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
1200 (3.0)	42	10	33178.0	24430.5	28903.3	23258.5	24802.2	20849.3
		12	31498.3	23780.7	27382.1	22660.2	23450.7	20484.0
		14	29865.3	23155.8	25912.2	22087.6	22131.9	20010.1
		16	28278.9	22555.8	24493.5	21540.6	20845.8	19427.4
	43	10	31498.3	23780.7	27382.1	22660.2	23450.7	20484.0
		12	29865.3	23155.8	25912.2	22087.6	22131.9	20010.1
		14	28278.9	22555.8	24493.5	21540.6	20845.8	19427.4
		16	26739.1	21980.7	23126.1	21019.2	19592.5	18736.0
	44	10	29865.3	23155.8	25912.2	22087.6	22131.9	20010.1
		12	28278.9	22555.8	24493.5	21540.6	20845.8	19427.4
		14	26739.1	21980.7	23126.1	21019.2	19592.5	18736.0
		16	25245.9	21430.6	21810.0	20523.4	18371.9	17935.9
	45	10	28278.9	22555.8	24493.5	21540.6	20845.8	19427.4
		12	26739.1	21980.7	23126.1	21019.2	19592.5	18736.0
		14	25245.9	21430.6	21810.0	20523.4	18371.9	17935.9
		16	23799.2	20905.4	20545.1	20053.3	17184.1	17027.1
	46	10	26739.1	21980.7	23126.1	21019.2	19592.5	18736.0
		12	25245.9	21430.6	21810.0	20523.4	18371.9	17935.9
		14	23799.2	20905.4	20545.1	20053.3	17184.1	17027.1
		16	22399.2	20405.1	19331.6	19331.6	16029.1	16009.6
	47	10	25245.9	21430.6	21810.0	20523.4	18371.9	17935.9
		12	23799.2	20905.4	20545.1	20053.3	17184.1	17027.1
		14	22399.2	20405.1	19331.6	19331.6	16029.1	16009.6
		16	21045.8	19929.8	18169.2	18169.2	14906.8	14883.4
	48	10	23799.2	20905.4	20545.1	20053.3	17184.1	17027.1
		12	22399.2	20405.1	19331.6	19331.6	16029.1	16009.6
		14	21045.8	19929.8	18169.2	18169.2	14906.8	14883.4
		16	19739.0	19479.4	17058.2	17058.2	13817.2	13648.4

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
1200 (3.0)	120	15	33864.5	30308.6	26706.4			
		20	32080.1	28525.9	24924.1			
		25	30295.8	26743.1	23141.7			
		30	28511.4	24960.3	21359.4			
	130	15	41002.1	37439.7	33835.6			
		20	39217.7	35656.9	32053.3			
		25	37433.3	33874.2	30271.0			
		30	35648.9	32091.4	28488.7			
	140	15	48139.6	44570.7	40964.9			
		20	46355.2	42788.0	39182.6			
		25	44570.8	41005.2	37400.3			
		30	42786.5	39222.5	35618.0			
	150	15	55277.1	51701.8	48094.2			
		20	53492.8	49919.0	46311.8			
		25	51708.4	48136.3	44529.5			
		30	49924.0	46353.5	42747.2			

Performance based on riser velocity of 6.0 F.P.S.

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**Cooling Performance - 50% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
1600 (4.0)	42	10	24285.7	18343.6	21048.8	17600.4	17919.3	15795.6
		12	23061.9	17874.7	19957.7	17343.8	16915.4	15401.9
		14	21850.6	17417.4	18898.1	17007.3	15941.3	14944.9
		16	20651.8	16971.8	17870.0	16591.0	14997.0	14424.5
	43	10	23061.9	17874.7	19957.7	17343.8	16915.4	15401.9
		12	21850.6	17417.4	18898.1	17007.3	15941.3	14944.9
		14	20651.8	16971.8	17870.0	16591.0	14997.0	14424.5
		16	19465.4	16537.7	16873.3	16094.7	14082.5	13840.7
	44	10	21850.6	17417.4	18898.1	17007.3	15941.3	14944.9
		12	20651.8	16971.8	17870.0	16591.0	14997.0	14424.5
		14	19465.4	16537.7	16873.3	16094.7	14082.5	13840.7
		16	18291.5	16115.2	15908.1	15518.6	13197.8	13193.5
	45	10	20651.8	16971.8	17870.0	16591.0	14997.0	14424.5
		12	19465.4	16537.7	16873.3	16094.7	14082.5	13840.7
		14	18291.5	16115.2	15908.1	15518.6	13197.8	13193.5
		16	17130.0	15704.3	14974.4	14862.5	12342.9	12342.9
	46	10	19465.4	16537.7	16873.3	16094.7	14082.5	13840.7
		12	18291.5	16115.2	15908.1	15518.6	13197.8	13193.5
		14	17130.0	15704.3	14974.4	14862.5	12342.9	12342.9
		16	15981.0	15304.9	14072.2	14072.2	11517.8	11517.8
	47	10	18291.5	16115.2	15908.1	15518.6	13197.8	13193.5
		12	17130.0	15704.3	14974.4	14862.5	12342.9	12342.9
		14	15981.0	15304.9	14072.2	14072.2	11517.8	11517.8
		16	14844.5	14844.5	13201.4	13201.4	10722.5	10722.5
	48	10	17130.0	15704.3	14974.4	14862.5	12342.9	12342.9
		12	15981.0	15304.9	14072.2	14072.2	11517.8	11517.8
		14	14844.5	14844.5	13201.4	13201.4	10722.5	10722.5
		16	13720.4	13720.4	12362.1	12362.1	9957.0	9957.0

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 50% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
1600 (4.0)	120	15	24232.5	21663.4	19131.4			
		20	22959.4	20389.3	17855.3			
		25	21686.3	19115.2	16579.2			
		30	20413.2	17841.2	15303.2			
	130	15	29324.9	26759.7	24235.7			
		20	28051.8	25485.6	22959.6			
		25	26778.7	24211.5	21683.5			
		30	25505.6	22937.5	20407.5			
	140	15	34417.3	31856.0	29340.0			
		20	33144.2	30581.9	28063.9			
		25	31871.1	29307.8	26787.8			
		30	30598.0	28033.8	25511.8			
	150	15	39509.7	36952.3	34444.3			
		20	38236.6	35678.2	33168.2			
		25	36963.5	34404.1	31892.1			
		30	35690.4	33130.1	30616.1			

Performance based on riser velocity of 6.0 F.P.S.

**Cooling Performance - 100% Capacity**

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Cooling Performance - 80°F / 67°F		Cooling Performance - 78°F / 65°F		Cooling Performance - 75°F / 63°F	
			Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity	Total Capacity	Sensible Capacity
1600 (4.0)	42	10	43714.2	33018.5	37887.9	31680.6	32254.7	28432.0
		12	41511.4	32174.5	35923.9	31218.8	30447.7	27723.5
		14	39331.1	31351.4	34016.6	30613.2	28694.3	26900.8
		16	37173.2	30549.2	32166.0	29863.8	26994.6	25964.1
	43	10	41511.4	32174.5	35923.9	31218.8	30447.7	27723.5
		12	39331.1	31351.4	34016.6	30613.2	28694.3	26900.8
		14	37173.2	30549.2	32166.0	29863.8	26994.6	25964.1
		16	35037.7	29767.8	30372.0	28970.5	25348.5	24913.3
	44	10	39331.1	31351.4	34016.6	30613.2	28694.3	26900.8
		12	37173.2	30549.2	32166.0	29863.8	26994.6	25964.1
		14	35037.7	29767.8	30372.0	28970.5	25348.5	24913.3
		16	32924.6	29007.3	28634.7	27933.5	23756.0	23748.4
	45	10	37173.2	30549.2	32166.0	29863.8	26994.6	25964.1
		12	35037.7	29767.8	30372.0	28970.5	25348.5	24913.3
		14	32924.6	29007.3	28634.7	27933.5	23756.0	23748.4
		16	30834.0	28267.7	26954.0	26752.6	22217.2	22217.2
	46	10	35037.7	29767.8	30372.0	28970.5	25348.5	24913.3
		12	32924.6	29007.3	28634.7	27933.5	23756.0	23748.4
		14	30834.0	28267.7	26954.0	26752.6	22217.2	22217.2
		16	28765.8	27548.9	25329.9	25329.9	20732.0	20732.0
	47	10	32924.6	29007.3	28634.7	27933.5	23756.0	23748.4
		12	30834.0	28267.7	26954.0	26752.6	22217.2	22217.2
		14	28765.8	27548.9	25329.9	25329.9	20732.0	20732.0
		16	26720.1	26720.1	23762.5	23762.5	19300.5	19300.5
	48	10	30834.0	28267.7	26954.0	26752.6	22217.2	22217.2
		12	28765.8	27548.9	25329.9	25329.9	20732.0	20732.0
		14	26720.1	26720.1	23762.5	23762.5	19300.5	19300.5
		16	24696.8	24696.8	22251.8	22251.8	17922.6	17922.6

Performance based on riser velocity of 6.0 F.P.S.

Heating Performance - 100% Capacity

Size (Tons)	EWT (°F)	Riser Delta T (°F)	Entering Air - 65°F		Entering Air - 70°F		Entering Air - 75°F	
			Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity	Total Capacity
1600 (4.0)	120	15	43618.5	38994.1	34436.5	32139.5	29842.6	27545.7
		20	41326.9	36700.7	32139.5	30840.3	28634.7	26437.8
		25	39035.3	34407.4	30840.3	29030.3	26732.5	24535.6
		30	36743.8	32114.1	28634.7	26437.8	24535.6	22338.4
	130	15	52784.8	48167.4	43624.2	41327.3	39030.3	36733.4
		20	50493.2	45874.1	41327.3	39030.3	36733.4	34535.6
		25	48201.7	43580.7	39030.3	36733.4	34535.6	32338.4
		30	45910.1	41287.4	36733.4	34535.6	32338.4	30138.4
	140	15	61951.1	57340.8	52812.0	50515.0	48218.1	45921.2
		20	59659.6	55047.4	50515.0	48218.1	45921.2	43721.2
		25	57368.0	52754.1	48218.1	45921.2	43721.2	41521.2
		30	55076.4	50460.8	45921.2	43721.2	41521.2	39321.2
	150	15	71117.5	66514.1	61999.7	59702.8	57405.8	55108.9
		20	68825.9	64220.8	59702.8	57405.8	55108.9	52908.9
		25	66534.3	61927.4	57405.8	55108.9	52908.9	50708.9
		30	64242.7	59634.1	55108.9	52908.9	50708.9	48508.9

Performance based on riser velocity of 6.0 F.P.S.

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**Table 8: W PSC Blower Performance Table - 50% Capacity**

Unit	Rated CFM	Min. CFM	Fan Option		CFM at External Static Pressure (in wg.)									
			Option	Speed	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.50
W3022	170	170	Standard PSC	HI	298	205	193	181	169	158	147			
				Med	265	189	176	164	152					
				Low	192	159	148							
W4022	200	170	Standard PSC	HI	351	241	227	213	199	186	173			
				Med	312	222	207	192	178					
				Low	225	187	174							
W6022	300	170	Standard PSC	HI	479	241	227	213	199	186	173			
				Med	358	222	207	192	178					
				Low	280	187	174							
W6022X	300	170	Standard PSC	HI	479	241	227	213	199	186	173			
				Med	358	222	207	192	178					
				Low	280	187	174							
W8022	400	150	Standard PSC	HI	626	362	343	326	309	303	291	285	264	
				Med	528	237	214	205	181	166				
				Low	358	175	158							
W10022	500	160	Standard PSC	HI	832	455	428	399	383	364	345	325	309	
				Med	652	362	343	326	309	303	291	285	264	
				Low	457	237	214	205	181	166				
W12022	600	250	Standard PSC	HI	981	580	556	531	507	483	460	436		
				Med	846	457	439	421	403	384	365	346		
				Low	558	320	302	286	272	260				
W16022	800	190	Standard PSC	HI	1171	683	659	636	613	591	568	546	524	
				Med	1019	395	375	357	340	324	310	296		
				Low	843	279	252	229	208	191				

Table 9: W PSC Blower Performance Table - 100% Capacity

Unit	Rated CFM	Min. CFM	Fan Option		CFM at External Static Pressure (in wg.)									
			Option	Speed	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.50
W3022	340	170	Standard PSC	HI	596	410	385	361	338	316	295			
				Med	530	377	352	327	303					
				Low	383	317	296							
W4022	400	170	Standard PSC	HI	701	482	453	425	398	372	347			
				Med	623	444	414	385	357					
				Low	451	373	348							
W6022	600	170	Standard PSC	HI	958	482	453	425	398	372	347			
				Med	717	444	414	385	357					
				Low	559	373	348							
W6022X	600	170	Standard PSC	HI	958	482	453	425	398	372	347			
				Med	717	444	414	385	357					
				Low	559	373	348							
W8022	800	150	Standard PSC	HI	1252	724	687	652	618	607	582	570	527	
				Med	1057	474	429	411	362	332				
				Low	717	349	315							
W10022	1000	160	Standard PSC	HI	1665	910	857	799	766	727	691	650	618	
				Med	1304	724	687	652	618	607	582	570	527	
				Low	915	474	429	411	362	332				
W12022	1200	250	Standard PSC	HI	1961	1160	1111	1062	1014	966	919	873		
				Med	1693	913	878	843	806	769	730	691		
				Low	1117	639	604	572	544	521				
W16022	1600	190	Standard PSC	HI	2342	1366	1319	1273	1227	1181	1136	1092	1047	
				Med	2038	789	751	715	681	649	619	592		
				Low	1686	558	505	458	417	381				

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**Table 10: W Blower EC Constant Torque Performance Table - 50% Capacity**

Unit	Rated CFM	Min. CFM	Fan Option		CFM at External Static Pressure (in wg.)												
			Option	Speed	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70
W3022	170	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W4022	200	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W6022	300	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W6022X	300	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W8022	400	190	EC Constant Torque	HI	447	426	406	387	369	352	335	319	303	289	275		
				MED	372	349	327	306	286	266	246	227	208				
				LO	291	264	237	213	192								
W10022	500	230	EC Constant Torque	HI	524	505	488	471	455	439	423	409	394	380	366	341	317
				MED	446	426	406	387	369	352	335	319	303	289	275		
				LO	346	322	299	277	256	235							
W12022	600	250	EC Constant Torque	HI	627	610	594	577	562	546	531	516	502	488	474	448	423
				MED	531	511	492	473	455	438	421	404	388	372	357		
				LO	415	392	369	348	327	307	288	269	252				
W16022	800	350	EC Constant Torque	HI	816	802	790	777	764	750	735	720	704	688	671	636	599
				MED	706	689	673	657	642	627	613	600	587	575	563		
				LO	531	511	492	473	455	438	421	404	388	372	357		

Table 11: W Blower EC Constant Torque Performance Table - 100% Capacity

Unit	Rated CFM	Min. CFM	Fan Option		CFM at External Static Pressure (in wg.)												
			Option	Speed	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70
W3022	340	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W4022	400	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W6022	600	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W6022X	600	NA	EC Constant Torque	HI	Not Available; See PSC Motor												
				MED													
				LO													
W8022	800	190	EC Constant Torque	HI	894	852	812	774	738	703	669	637	606	577	549		
				MED	744	698	655	613	571	531	492	454	417				
				LO	583	527	474	426	383								
W10022	1000	230	EC Constant Torque	HI	1047	1011	976	942	910	878	847	817	788	760	733	681	634
				MED	893	852	812	774	738	703	669	637	606	577	549		
				LO	691	644	598	554	512	470							
W12022	1200	250	EC Constant Torque	HI	1255	1220	1187	1155	1123	1093	1062	1033	1004	976	949	896	846
				MED	1062	1022	984	947	911	875	841	808	775	744	713		
				LO	830	783	739	695	654	614	576	539	504				
W16022	1600	350	EC Constant Torque	HI	1632	1605	1580	1554	1527	1499	1470	1440	1409	1376	1343	1272	1197
				MED	1412	1378	1345	1314	1284	1255	1227	1200	1174	1150	1127		
				LO	1062	1022	984	947	911	875	841	808	775	744	713		

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**Table 12: Innoline® 50/50 Electrical Data – Standard PSC Motor**

Size (Tons)	Supply Blower Motor			Single Point Power	
	Voltage	FLA	HP	MCA	MOPD
W3022	115/1/60	1.0	1/15	2.3	15
	265/1/60	0.5	1/12	1.1	15
W4022	115/1/60	1.0	1/15	2.3	15
	265/1/60	0.5	1/12	1.1	15
W5022	115/1/60	1.0	1/15	2.3	15
	265/1/60	0.5	1/12	1.1	15
W6022	115/1/60	1.0	1/15	2.3	15
	265/1/60	0.5	0.08	1.1	15
W4022X	115/1/60	1.0	1/15	2.3	15
	265/1/60	0.5	0.08	1.1	15
W5022X	115/1/60	1.0	1/15	2.3	15
	265/1/60	0.5	1/12	1.1	15
W6022X	115/1/60	1.0	1/15	2.3	15
	265/1/60	0.5	1/12	1.1	15
W8022	115/1/60	1.6	1/12	3.6	15
	265/1/60	0.7	0.11	1.6	15
W1022	115/1/60	1.6	1/12	3.6	15
	265/1/60	0.7	0.11	1.6	15
W12022	115/1/60	2.3	1/6	5.2	15
	265/1/60	0.9	1/6	2.0	15
W16022	115/1/60	3.0	1/5	6.8	15
	265/1/60	1.2	1/5	2.7	15

Table 13: Innoline® 50/50 Electrical Data – Constant Torque EC Motor

Size (Tons)	Supply Blower Motor			Single Point Power	
	Voltage	FLA	HP	MCA	MOPD
W3022	115/1/60	NA	NA	NA	NA
	265/1/60	NA	NA	NA	NA
W4022	115/1/60	NA	NA	NA	NA
	265/1/60	NA	NA	NA	NA
W5022	115/1/60	NA	NA	NA	NA
	265/1/60	NA	NA	NA	NA
W6022	115/1/60	NA	NA	NA	NA
	265/1/60	NA	NA	NA	NA
W4022X	115/1/60	NA	NA	NA	NA
	265/1/60	NA	NA	NA	NA
W5022X	115/1/60	NA	NA	NA	NA
	265/1/60	NA	NA	NA	NA
W6022X	115/1/60	NA	NA	NA	NA
	265/1/60	NA	NA	NA	NA
W8022	115/1/60	3.7	1/4	8.3	15
	265/1/60	2.2	1/4	5.0	15
W1022	115/1/60	3.7	1/4	8.3	15
	265/1/60	2.2	1/4	5.0	15
W12022	115/1/60	6.2	1/2	14.0	20
	265/1/60	3.2	1/2	7.2	15
W16022	115/1/60	6.2	1/2	14.0	20
	265/1/60	3.2	1/2	7.2	15

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Table 15: Additional Static Resistance

Size (Tons)	Model	Fan Speed	Filter ¹		
			MERV 4 (Fiberglass)	MERV 4 (Poly)	MERV 8
W3022 (0.75)	W_022	High	0.01	0.02	0.05
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.01	0.02	0.05
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.01	0.02	0.05
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.01	0.02	0.05
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
W4022 (1.0)	W_022	High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
		Low	0.00	0.01	0.02
		High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
		Low	0.00	0.01	0.02
		High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
		Low	0.00	0.01	0.02
		High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
W5022 (1.25)	W_022	Low	0.00	0.01	0.02
		High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
		Low	0.01	0.01	0.03
		High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
		Low	0.01	0.01	0.03
		High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
		Low	0.00	0.01	0.02
		High	0.01	0.01	0.03
W6022 (1.5)	W_022	Medium	0.01	0.01	0.03
		Low	0.00	0.01	0.02
		High	0.01	0.01	0.03
		Medium	0.01	0.01	0.03
		Low	0.00	0.01	0.02
		High	0.01	0.02	0.05
		Medium	0.01	0.01	0.03
		Low	0.00	0.00	0.02
		High	0.02	0.02	0.07
		Medium	0.01	0.02	0.05
		Low	0.01	0.01	0.03
W8022 (2.0)	W_022	High	0.02	0.03	0.08
		Medium	0.01	0.02	0.06
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.02	0.03	0.08
		Medium	0.01	0.02	0.06
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
W1022 (2.5)	W_022	High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.02	0.03	0.08
		Medium	0.01	0.02	0.06
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.02	0.03	0.08
		Medium	0.01	0.02	0.06
		Low	0.01	0.01	0.03
W12022 (3.0)	W_022	High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
W16022 (4.0)	W_022	High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03
		High	0.03	0.04	0.10
		Medium	0.01	0.01	0.04
		Low	0.01	0.01	0.03

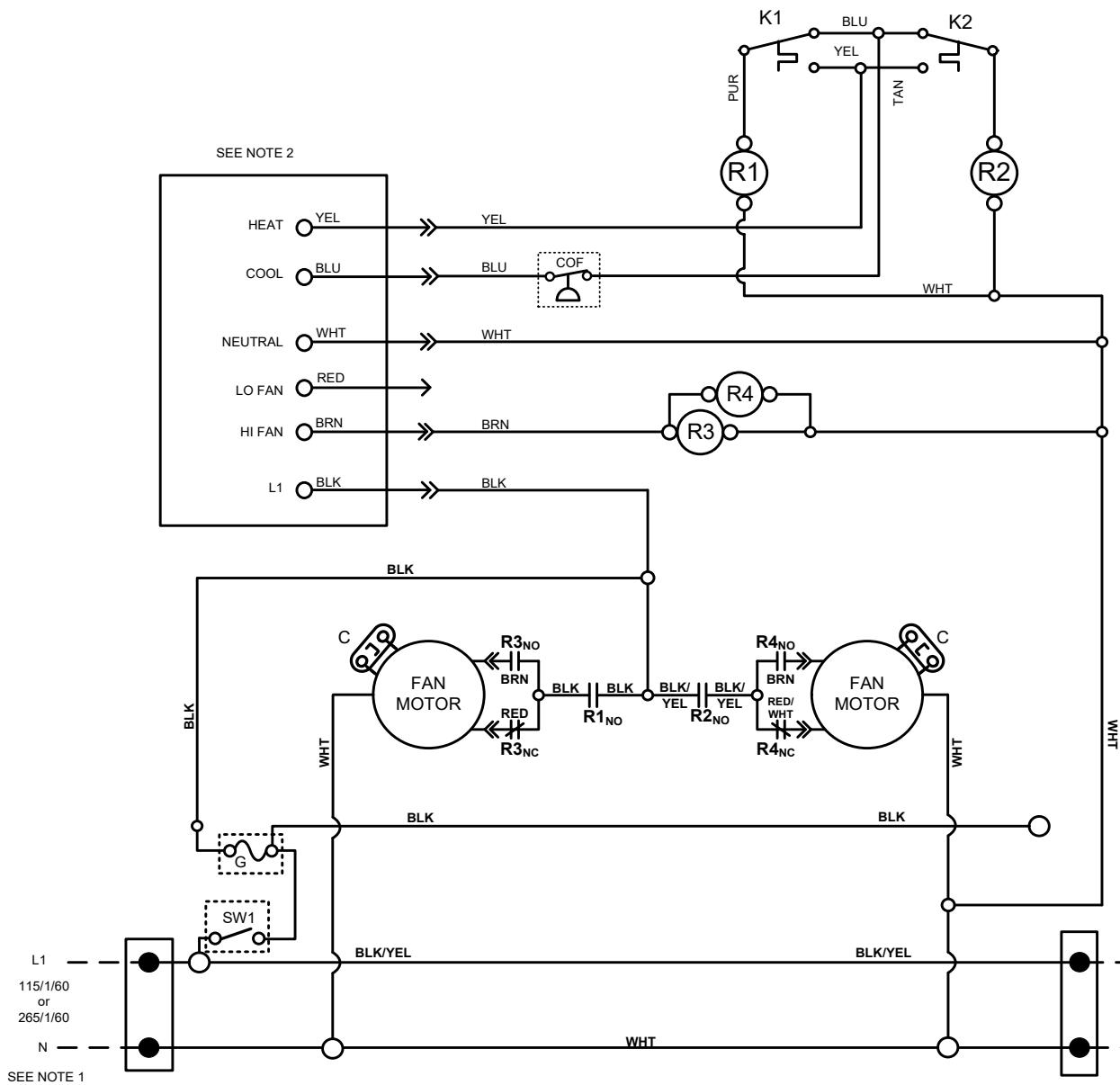
1 Deduct these values from the available external static pressure shown in the respective Blower Performance Tables.

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The Whalen Company

Wiring Diagrams: 4-Pipe Vertical Fan coil



LEGEND:

K1, K2 - CHANGEOVER AQUASTATS
 C - CAPACITOR
 R1 - LEFT SIDE FAN CYCLE RELAY
 R2 - RIGHT SIDE FAN CYCLE RELAY
 R3 - LEFT FAN SPEED RELAY
 R4 - RIGHT FAN SPEED RELAY
 SW1 - DISCONNECT SWITCH

→ - QUICK CONNECT PLUGS
 - - - INDICATES FIELD WIRING
 ----- INDICATES OPTIONAL WIRING/COMPONENT
 ○ - INDICATES FACTORY CONNECTION
 ● - INDICATES FIELD CONNECTION
 G - NON-RENEWABLE FUSE
 COF - CONDENSATE OVERFLOW SWITCH
 _____ -

NOTES:

1. Use copper conductors only.
2. Thermostat is field installed and may be remote mounted.

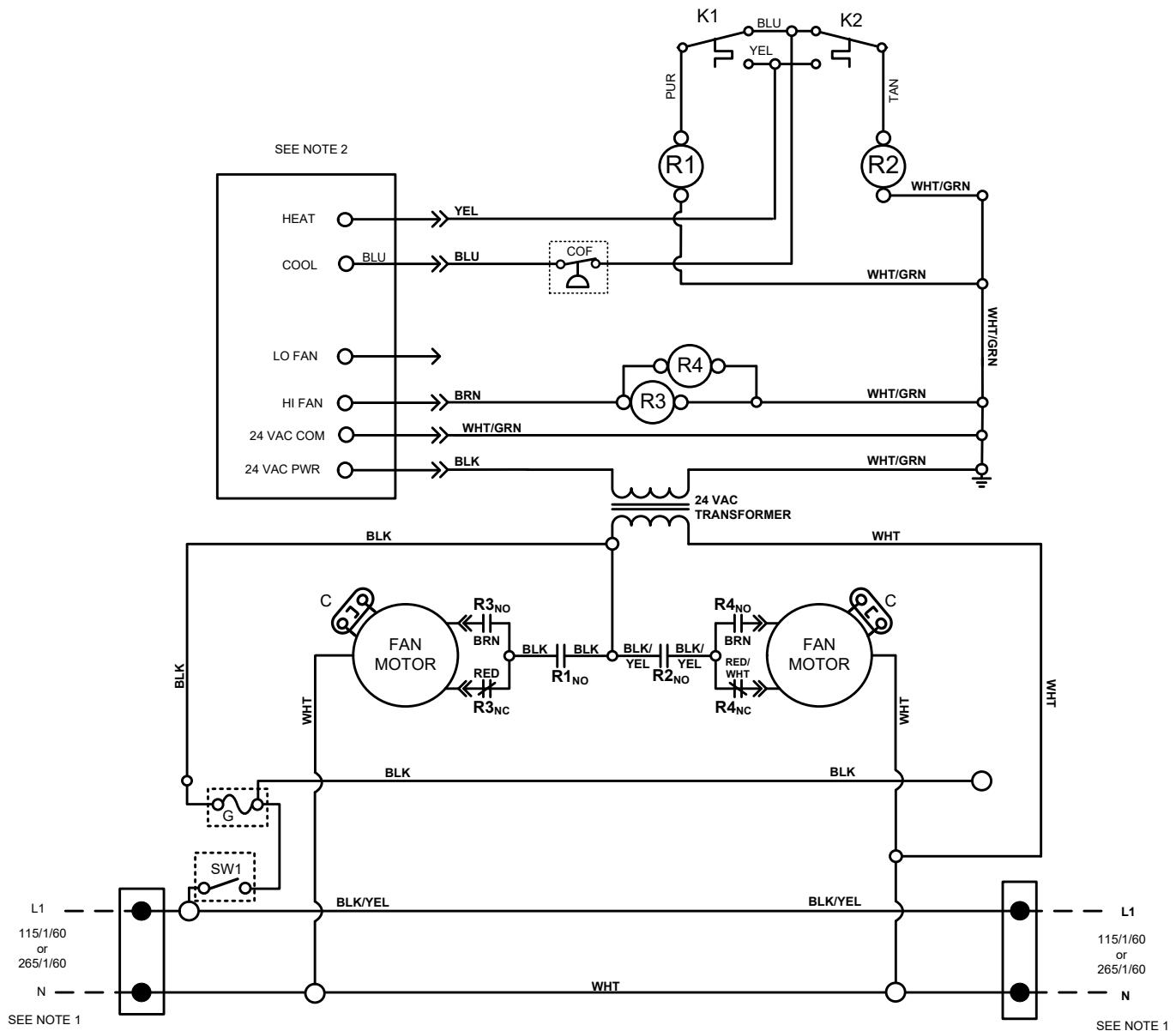
WARNING

LOCATION OF POWER WIRING
MAY BE TO EITHER SIDE OF
UNIT, BUT NOT BOTH.

15501-b.vsd

11 September, 2012

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LEGEND:

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- C - CAPACITOR
- R1 - LEFT SIDE FAN CYCLE RELAY
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- R3 - LEFT FAN SPEED RELAY
- R4 - RIGHT FAN SPEED RELAY
- SW1 - DISCONNECT SWITCH

- - QUICK CONNECT PLUGS
- - - - - INDICATES FIELD WIRING
- INDICATES OPTIONAL WIRING/COMPONENT
- - INDICATES FACTORY CONNECTION
- - INDICATES FIELD CONNECTION
- G - NON-RENEWABLE FUSE
- COF - CONDENSATE OVERFLOW SWITCH
- _____ - _____

NOTES:

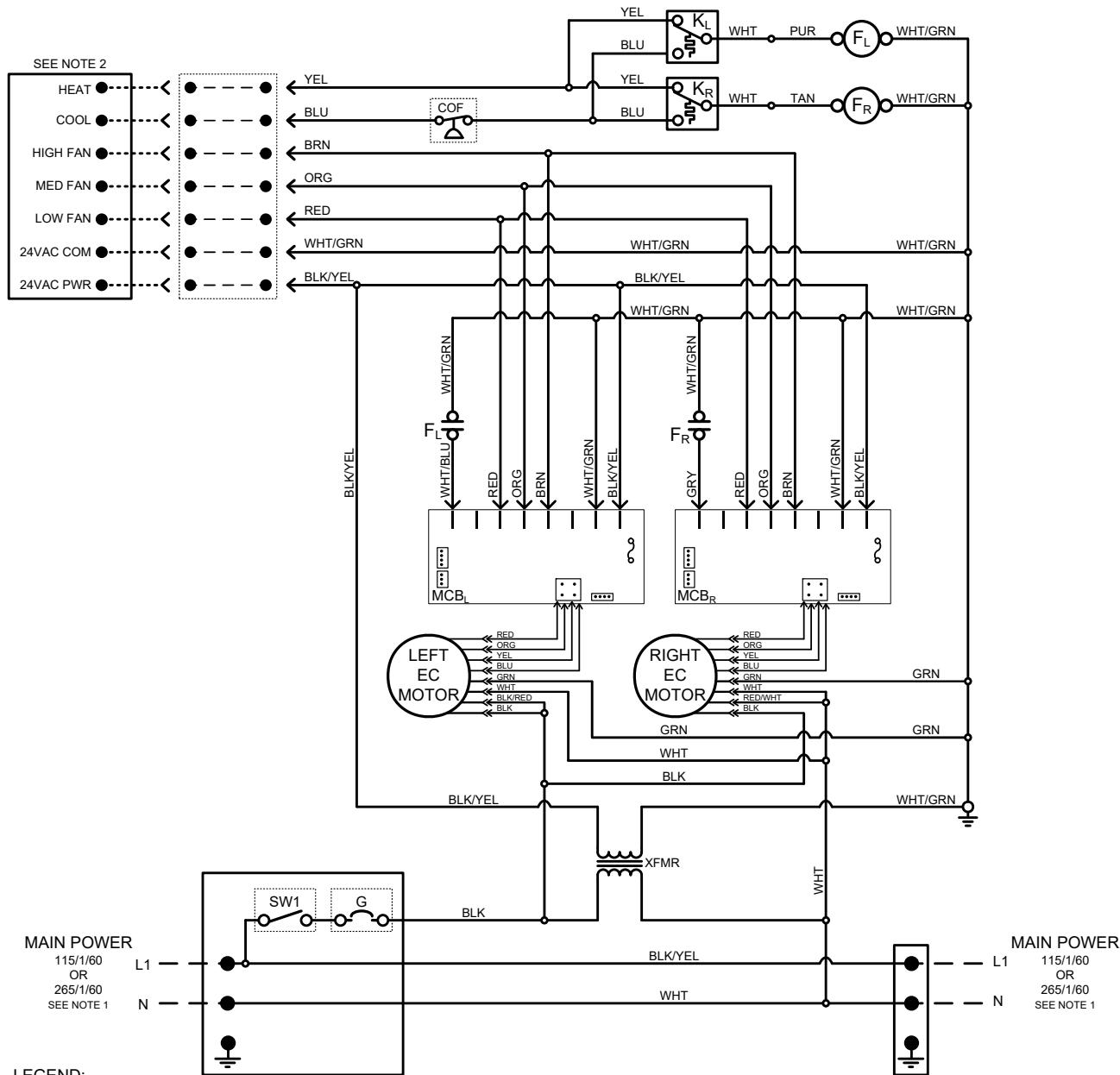
1. Use copper conductors only.
2. Thermostat is field installed and may be remote mounted.

WARNING
LOCATION OF POWER WIRING
MAY BE TO EITHER SIDE OF
UNIT, BUT NOT BOTH.

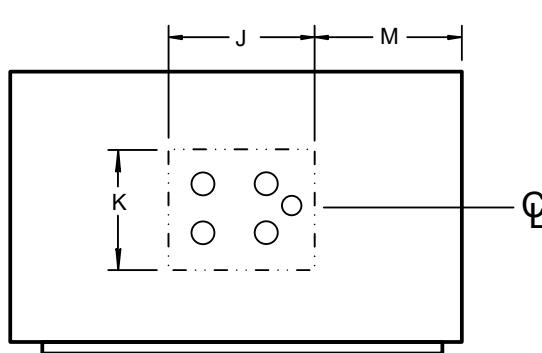


The Whalen Company

Wiring Diagrams: 4-Pipe Vertical Fan Coil with Constant Torque ECM Motors

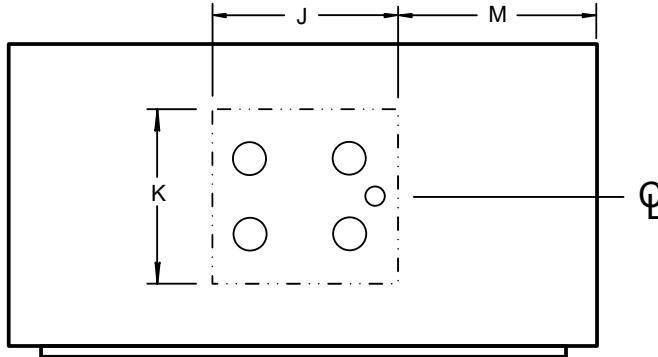


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UNIT FRONT

**300, 400, 500 & 600 CFM UNITS
WITH 3/4" & 1" RISERS**
**600X, 800, 1000, 1200 & 1600 CFM UNITS
WITH 1 1/4" & 1 1/2" RISERS**



UNIT FRONT

**600X, 800, 1000, 1200 & 1600 CFM UNITS
WITH 2" RISERS**

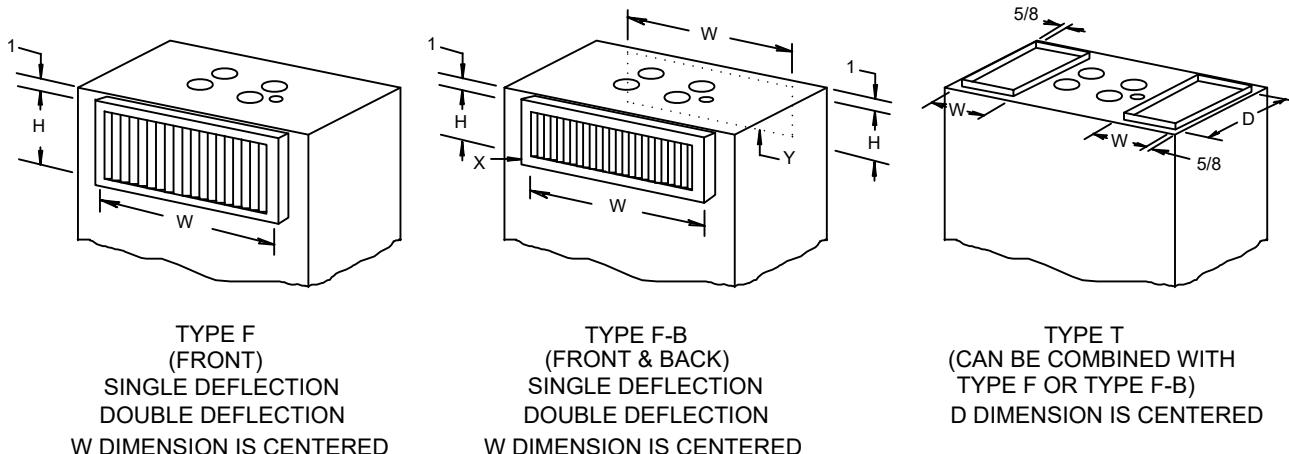
NOTES:

1. Sleeve hole dimensions "J" and "K" are recommended minimums.
2. "K" dimension is centered on unit.
3. Also see applicable unit drawing for unit details and dimensions not shown.

NOM. UNIT SIZE	RISER SIZE	J	K	M
400	3/4 1	7	5	8
600	3/4 1	7	5	8
600X	1 1/4 1 1/2	10	8	8 1/8
	2	13 1/2	10	6 5/8
800	1 1/4 1 1/2	10	8	10 1/8
	2	13 1/2	10	8 5/8
1000	1 1/4 1 1/2	10	8	10 1/8
	2	13 1/2	10	8 5/8
1200	1 1/4 1 1/2	10	8	12 1/8
	2	13 1/2	10	10 5/8
1600	1 1/4 1 1/2	10	8	12 1/8
	2	13 1/2	10	10 5/8

DRAWING NUMBER 201-SH
APRIL 2013

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Innoline® 50/50 Supply Grille Discharge Arrangements

NOTES:

1. All standard Whalen supply grilles and registers are fabricated of clear anodized aluminum.
2. See unit schedule for type of grilles or registers.
Optional supply registers are available with either parallel or opposed blade dampers at extra cost.
3. Supply and return air grilles are shipped loose, for installation after the drywall installation is complete.
4. Listed grille and register dimensions are for the grille opening size.
5. Unless otherwise noted, the front grille blades will be vertical, as drawn.
6. Type T ducted units include internal backdraft dampers.

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UNIT CFM	1 GRILLE TYPE (F, B)		GRILLE	2 GRILLE TYPE (F-B)		TOP DUCTED TYPE (T)	
	W	H		W	H	W	D
300 400	18	8	X	18	4	6	12
			Y	18	4		
500 600	18	10	X	18	5	6	12
			Y	18	5		
800 1000	26	10	X	26	5	8	12
			Y	26	5		
1200	30	10	X	30	5	10	14
			Y	30	5		
1600	30	12	X	30	6	10	14
			Y	30	6		

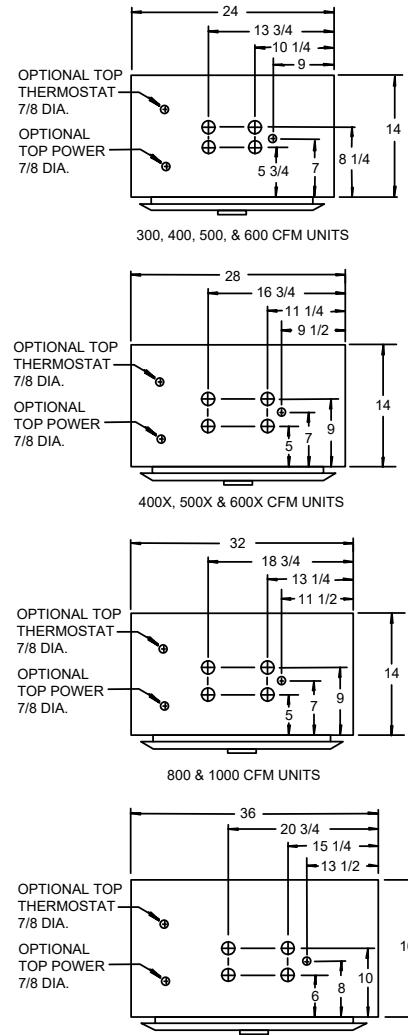
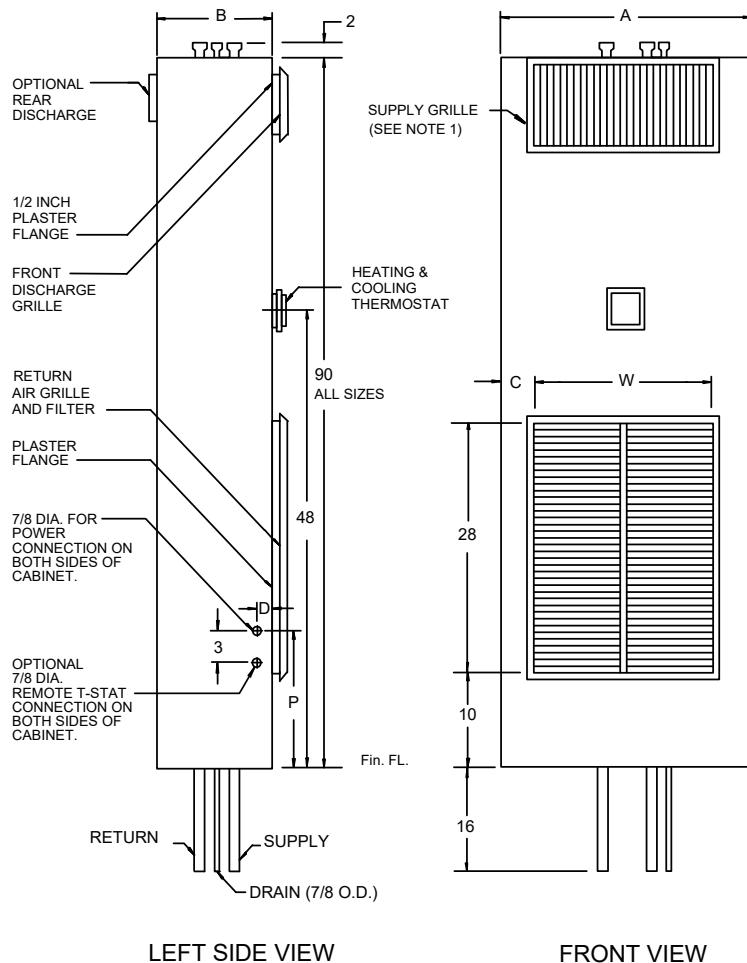
All dimensions in inches. All sizes are maximum.

DRAWING NUMBER 211G
AUGUST 2016

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Innoline® 50/50 Units with Fan Cycle Control



UNIT MODEL	NOM CFM	A	B	C	W	P	D	MINIMUM SLEEVE SIZE
W3022	300	24	14	3	18	17 1/2	4	8x10
W4022	400	24	14	3	18	17 1/2	4	8x10
W5022	500	24	14	3	18	17 1/2	4	8x10
W6022	600	24	14	3	18	17 1/2	4	8x10
W4022X	400	28	14	2	24	17 1/2	3 1/4	10x10
W5022X	500	28	14	2	24	17 1/2	3 1/4	10x10
W6022X	600	28	14	2	24	17 1/2	3 1/4	10x10
W8022	800	32	14	3	26	17 1/2	3 3/4	10x10
W10022	1000	32	14	3	26	17 1/2	3 3/4	10x10
W12022	1200	36	16	3	30	9 3/4	3 3/4	10x10
W16022	1600	36	16	3	30	9 3/4	3 3/4	10x10

All dimensions in inches.

NOTES:

1. See drawing number 211 for supply grille or register options. The return air grille is always on the front of the unit.
2. Cabinet is continuous galvanized steel, suitable for direct application of "drywall" plaster board.
3. Return air grille is clear anodized aluminum.
4. Supply and return risers are copper.
5. There are no "hands" with standard unit configuration.

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DRAWING NUMBER 201E-ES
APRIL 2013

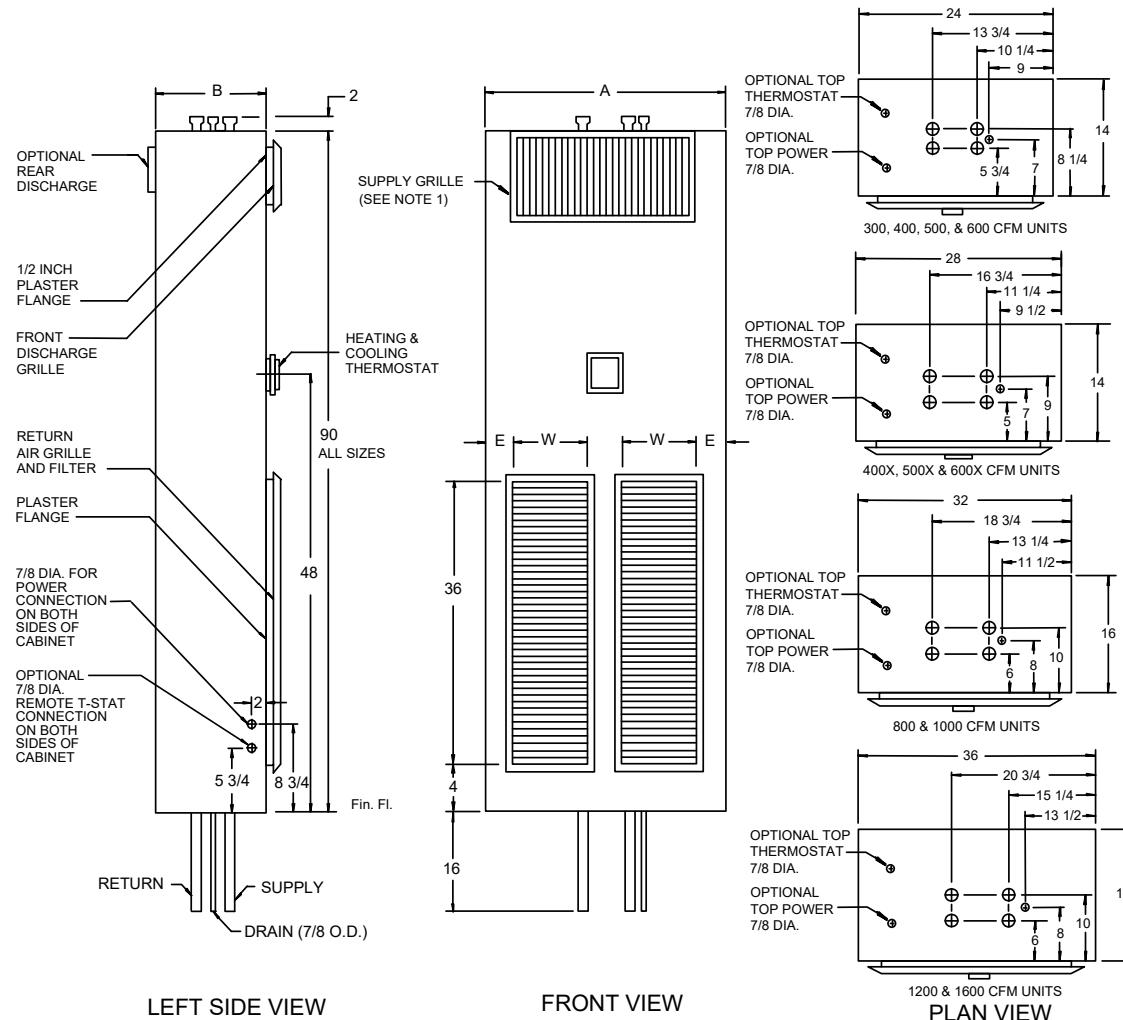
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The Whalen Company

Innoline® 50/50 Cabinet Drawings

Innoline® 50/50 Units with Face and Bypass Damper Control



NOTES:

1. See drawing number 211 for supply grille or register options. The return air grille is always on the front of the unit.
2. Cabinet is continuous galvanized steel, suitable for direct application of "drywall" plaster board.
3. Return air grille is clear anodized aluminum.
4. Supply and return risers are copper.
5. There are no "hands" with this unit.

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UNIT MODEL	NOM-CFM	A	B	E	W	MINIMUM SLEEVE SIZE
W3022F	300	24	14	2	8	8x10
W4022F	400	24	14	2	8	8x10
W5022F	500	24	14	2	8	8x10
W6022F	600	24	14	2	8	8x10
W4022XF	400	28	14	2	10	10x10
W5022XF	500	28	14	2	10	10x10
W6022XF	600	28	14	2	10	10x10
W8022F	800	32	16	3	10	10x10
W10022F	1000	32	16	3	10	10x10
W12022F	1200	36	16	3	12	10x10
W16022F	1600	36	16	3	12	10x10

All dimensions in inches.

DRAWING NUMBER 201FB-C

APRIL 2013

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Mechanical Specifications**FOUR-PIPE FAN-COIL UNIT****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Four Pipe 50/50 Fan Coil Unit

1.02 RELATED SECTIONS**1.03 REFERENCES**

- A. UL Listed under Underwriters Laboratories Standard for Safety UL1995 for fan coil units.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site, store and protect from the weather and construction debris. Units must be individually packaged. Units must be tagged with site location, model number and configuration.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Protect units from construction debris by covering all openings prior to start-up of the equipment. Units must not be used for heating, cooling, or ventilation prior to the start-up of equipment for permanent use. Use of the equipment for the temporary heating, cooling or ventilation is prohibited.

PART 2 PRODUCTS**2.01 TYPE**

- A. The fan-coil unit shall be of the factory assembled, integral fan type with two combination hot water heating and chilled water cooling riser heat exchangers, integral hot water and chilled water supply, return and drain risers and all accessories (ADD SPECIFIC OPTIONS HERE).
- B. The fan-coil unit must be designed to operate without the use of unit mounted control valves or balancing devices.

C. ALTERNATE FAN-COIL UNITS:

- a. In the event the mechanical contractor wishes to propose the installation of valve-controlled fan-coil units, each coil shall include a two-way two-position electric valve with a 50-psi minimum shut off differential, two ball type shut-off valves, a removable Griswold Flowcon control valve, and an automatic air vent.

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- i. The bottom of each supply and return riser shall be fitted with a drain valve and piped to the nearest drain.
- ii. The circulating pumps shall be selected to handle the increased water friction through the unit piping packages and coil. Any electrical changes shall be the responsibility of the HVAC contractor.
- iii. An independent balancing sub-contractor shall balance the entire system.
- iv. The fan-coil units shall otherwise conform to all requirements of the specification with respect to performance, construction and accessories.

2.02 CAPACITY

- A. Shall be as indicated on the drawings or specifications, which are based on Whalen units.

2.03 CABINETS

- A. The one-piece unit cabinet shall be fabricated of reinforced 22 gauge continuous G60 galvanized steel. All internal assemblies shall be welded and treated to prevent corrosion.
- B. The cabinet shall be insulated with 1/2-inch thick 2-pound density thermal and acoustical fiberglass insulation having an integral water repellent, fungi and bacteria resistant barrier conforming to NFPA90A.
- C. The cabinets shall be designed for direct attachment of gypsum wallboard.

2.04 COIL

- A. The coil shall be a riser heat exchanger capable of performing the supply and return riser duties of the unit and be constructed of seamless copper tubing mechanically expanded into .008-inch thick aluminum plate fins. Tube wall thickness shall be not less than .032 inches.

2.05 RISERS

- A. The unit shall incorporate a factory assembled type "M" (Optional type "L") riser heat exchanger and drain riser of suitable length to reach floor-to-floor without additional contractor furnished material. The tops of all risers shall be swaged so that the risers can be joined during installation without couplings. On down-feed units, the unit manufacturer shall furnish factory assembled bottom U-bends with drains inside the bottom unit for each riser, as noted on the drawings. On up-feed units, the unit manufacturer shall furnish factory assembled top U-bends with manual air vents inside the top unit for each riser, as noted on the drawings.
- B. The supply, return, and drain risers shall be factory insulated with insulation the length of the cabinet.
(OPTION) The supply, return and drain riser extensions shall be factory-insulated with 1/2" (Optional 3/4") Armaflex or equal.



2.06 DRAIN PAN

A. (STANDARD) The drain pan shall collect and drain condensate that may form from any component internal to the fan coil unit and shall be fabricated of not less than 18 gauge continuous G90 galvanized steel. The copper condensate drain shall be rolled and soldered into the pan prior to coating of the pan with rustproof and waterproof fire rated mastic.

(OPTION) Stainless Steel Drain Pan - Drain pan shall collect and drain condensate that may form from any component internal to the fan-coil unit and shall be fabricated of welded and soldered 20 Ga. 304 stainless steel. The copper condensate drain shall be rolled and soldered into the pan.

2.07 FANS

A. Each unit shall include two fans assemblies that shall be slow speed and forward curved centrifugal type, and shall be accessible for removal and maintenance through the return air opening.

2.08 MOTORS

A. Units shall contain two motors that shall be of the permanent split capacitor (PSC) type, suitable for the current characteristics shown on the drawings, and shall have built-in thermal overload protection. Motors shall be two-speed type with 1050 RPM maximum.

2.09 SUPPLY GRILLES

A. (STANDARD) The supply grilles shall be of the single deflection type fabricated of clear anodized aluminum. All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

(OPTION 1) The supply grilles shall be of the single deflection type fabricated of (factory white painted extruded aluminum) or (custom painted extruded aluminum). (SELECT ONE) All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

(OPTION 2) The supply grilles shall be of the double deflection type fabricated of (clear anodized extruded aluminum), (factory white painted extruded aluminum) or (custom painted extruded aluminum). (SELECT ONE) All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

(OPTION) Insulated Sight Baffle - Sound insulation shall be furnished on the sight baffle to limit the transmission of sound between two rooms utilizing the same unit.

B. Steel grilles are not acceptable.

2.10 RETURN AIR PANEL

A. (STANDARD) Standard Return Air Grille – The return air opening shall be covered with a clear anodized extruded aluminum return air grille that is attached directly to the unit with two screws.



(OPTION) The return air opening shall be covered with a factory white painted extruded aluminum return air grille that is attached directly to the unit with two screws.

(OPTION) The return air opening shall be covered with a custom painted extruded aluminum return air grille that is attached directly to the unit with two screws.

(OPTION) Hinged Return Air Grille – The return air opening shall be covered with a clear anodized extruded aluminum hinged return air grille that is attached directly to the unit with two screws and contains quick removal fasteners for easy filter maintenance.

(OPTION) The return air opening shall be covered with a factory white painted extruded aluminum hinged return air grille that is attached directly to the unit with two screws and incorporates quick removal fasteners for easy filter maintenance.

(OPTION) The return air opening shall be covered with a custom painted extruded aluminum hinged return air grille that is attached directly to the unit with two screws and contains quick removal fasteners for easy filter maintenance.

- B. A second return air opening shall be included when one unit is serving two separate rooms. The second opening shall be located on the rear of the unit and allow the return air to pass through the cooling/heating coil prior to entering the conditioned space.

2.11 FILTERS

- 2.11.1.1 (STANDARD) 1/2" (MERV 4) Throwaway filter

(Optional) 1/2" (MERV 7) filter

(Optional) 1/2" Aluminum filter

2.12 OUTDOOR AIR

- A. (OPTION) Each unit includes an Outdoor Air (OA) opening, located on the (left) or (right) (SELECT ONE) side of cabinet, with manual block-off damper and outdoor air filter. A dedicated outdoor air duct must provide outdoor air directly to the chilled/hot water coil and prevent it from blowing through the return air grille.

2.13 POWER SUPPLY

The unit manufacturer shall furnish a single point (115/1/60 or 265/1/60) (SELECT ONE) power connection for the fan. Power connections are made to the unit junction box through a 7/8" knockout located on the side of the cabinet as shown on the drawings.

2.14 DISCONNECT

- A. (OPTION 1) Each unit shall include a non-fused disconnect switch, factory mounted and wired.
- (OPTION 2) Each unit shall include a fused disconnect switch, factory mounted and wired.

2.15 CONTROLS

- A. The unit manufacturer shall furnish a 115-volt wall thermostat for field mounting on the front of the unit after the wall is finished. The thermostat shall plug into the unit through a polarized male-female plug. The thermostat shall be of the automatic changeover type in conjunction with a factory-mounted and wired changeover aquastat, and shall incorporate a HI-LO fan speed switch. Remote bulb, return air thermostats are not acceptable. The unit shall cycle the fan motor off when the room thermostat is satisfied.
 - a. (OPTION) The unit manufacturer shall furnish a 24-volt thermostat that shall plug into the unit through a polarized male-female plug. The thermostat shall be of the automatic changeover type and incorporate a HI-LO fan speed switch.
 - b. (OPTION) The unit manufacturer shall furnish a (24-volt or 115-volt) (SELECT ONE) thermostat for remote mounting. The unit shall be provided with a junction box for connection of the thermostat field wiring to the top or bottom of the unit as shown in the drawings. The thermostat shall be of the automatic changeover type and incorporate a HI-LO fan speed switch.
 - c. (OPTION) The unit manufacturer shall be furnish a 115-volt factory wired remote thermostat with 6 feet of flexible conduit connected to the top of the unit. The thermostat that shall plug into the factory furnished junction box through a polarized male-female plug. The thermostat shall be of the automatic changeover type and incorporate a HI-LO fan speed switch.
- B. The unit shall cycle the fan motor off when the room thermostat is satisfied and the speed switch is in the HI or LO position.
- C. The thermostat shall be unit mounted at a height of 48 inches from the bottom of the cabinet. Remote bulb, return air thermostats are not acceptable.
- D. Others shall install thermostat by plugging into the control wiring with a polarized male-female plug after the walls are finished when unit mounted or attaching to color coded pigtails when remote mounted.

2.16 SPARE PARTS

- A. (ADD ANY SPARE PART REQUIREMENT HERE)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Furnish as shown on the drawings and as specified herein, four pipe 50/50 fan coil unit, and with capacity and electrical characteristics as scheduled. Units shall be Riser Heat Exchanger Fan Coil Unit as manufactured by The Whalen Company of Easton, MD.
- B. Install in accordance with manufacturer's installation instructions. Install units plumb and level, and maintain manufacturer's recommended clearances for the unit and accessories.



The Whalen Company Limited Express Warranty Company Room Fan Coil Standard Warranty

The Whalen Company warrants to the purchaser each water-to-air heat pump to be free from original defects in materials and workmanship.

Where inspection by an authorized representative of The Whalen Company confirms such defects to be present, for a period of eighteen months from date of shipment, Whalen will furnish replacement components or materials to the original purchaser without charge.

This Limited Express Warranty is intended to cover original equipment defects only and does not cover or apply to: (1) Air filters, refrigerant, fluids, oil; (2) Equipment relocated after initial installation; (3) Any portion or component of any system that is not supplied by The Whalen Company, regardless of the cause of the failure of such portion or component; (4) Equipment on which the unit identification tags or labels have been removed or modified; (5) Equipment which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or are caused by accident, misuse or abuse, fire, flood, acts of God, alteration or misapplication of the product; (6) Equipment used as temporary heating or cooling while the facility is still under construction is considered misuse and as such, will void all warranty coverage regardless of the cause of failure; (7) Equipment which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Equipment subjected to corrosion or abrasion; (10) Equipment manufactured or supplied by others; (11) Equipment which have been operated in any manner contrary to The Whalen Company printed instructions; or (12) Equipment which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of The Whalen Company products.

The Whalen Company neither assumes nor authorizes any person to assume for it any obligation or warranty other than those stated herein.

This Limited Express Warranty does not cover labor charges associated with making repairs, inspection and diagnosis of malfunctions, all field labor in connection with repair or replacement of parts, all field labor in connection with removal and transportation to and from a repair facility and all field labor in connection with reinstallation after repairs are completed. However, The Whalen Company at its sole discretion may provide a labor allowance in cases of DOA (Dead on Arrival) equipment for replacement or repair of defective components within 30-days of start-up or 90-days from factory shipment, whichever comes first. After this period only the Limited Express Warranty will apply. Labor will be paid per The Whalen Company Warranty Labor Allowance schedule.

Replacement or repair under this warranty will not extend the warranty time periods defined above. Whalen shall not, in any event, have any liability under this warranty unless and until it has been paid in full for the equipment supplied. The warranty period shall commence on the date of shipment, however, whether or not payment has been made.

This warranty applies only to Whalen heat pump installations in the fifty United States and in Canada. There are no warranties outside those areas.

The Whalen Company has no liability for incidental or consequential damages arising out of the ownership, use or operation of Whalen heat pumps.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. NO IMPLIED WARRANTY OR MERCHANTABILITY SHALL ACCOMPANY THE SALE OF THIS EQUIPMENT, AND THIS EXPRESS WARRANTY IS INTENDED TO AND DOES REPLACE ANY IMPLIED WARRANTY OF MERCHANTABILITY.

This warranty, its limitations and its exclusions are to be governed by the laws of Maryland. Although some warranties may vary in their effect and coverage from locality to locality, this warranty, its effects, coverage and remedies are only those available in Maryland.



The Whalen Company Limited Express Warranty Room Fan Coil Two Year Warranty

The Whalen Company warrants to the purchaser each fan coil unit to be free from original defects in materials and workmanship. Where inspection by an authorized representative of The Whalen Company confirms such defects to be present, for a period of twenty four months from date of shipment, Whalen will furnish replacement components or materials to the original purchaser without charge.

This Limited Express Warranty is intended to cover original equipment defects only and does not cover or apply to: (1) Air filters, refrigerant, fluids, oil; (2) Equipment relocated after initial installation; (3) Any portion or component of any system that is not supplied by The Whalen Company, regardless of the cause of the failure of such portion or component; (4) Equipment on which the unit identification tags or labels have been removed or modified; (5) Equipment which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or are caused by accident, misuse or abuse, fire, flood, acts of God, alteration or misapplication of the product; (6) Equipment used as temporary heating or cooling while the facility is still under construction is considered misuse and as such, will void all warranty coverage regardless of the cause of failure; (7) Equipment which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Equipment subjected to corrosion or abrasion; (10) Equipment manufactured or supplied by others; (11) Equipment which have been operated in any manner contrary to The Whalen Company printed instructions; or (12) Equipment which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of The Whalen Company products.

The Whalen Company neither assumes nor authorizes any person to assume for it any obligation or warranty other than those stated herein.

This Limited Express Warranty does not cover labor charges associated with making repairs, inspection and diagnosis of malfunctions, all field labor in connection with repair or replacement of parts, all field labor in connection with removal and transportation to and from a repair facility and all field labor in connection with reinstatement after repairs are completed. However, The Whalen Company at its sole discretion may provide a labor allowance in cases of DOA (Dead on Arrival) equipment for replacement or repair of defective components within 30 days of start-up or 90-days from factory shipment, whichever comes first. After this period only the Limited Express Warranty will apply. Labor will be paid per The Whalen Company Warranty Labor Allowance schedule.

Replacement or repair under this warranty will not extend the warranty time periods defined above. Whalen shall not, in any event, have any liability under this warranty unless and until it has been paid in full for the equipment supplied. The warranty period shall commence on the date of shipment, however, whether or not payment has been made.

This warranty applies only to Whalen fan coil unit installations in the fifty United States and in Canada. There are no warranties outside those areas.

The Whalen Company has no liability for incidental or consequential damages arising out of the ownership, use, or operation of Whalen fan coil units.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. NO IMPLIED WARRANTY OR MERCHANTABILITY SHALL ACCOMPANY THE SALE OF THIS EQUIPMENT, AND THIS EXPRESS WARRANTY IS INTENDED TO AND DOES REPLACE ANY IMPLIED WARRANTY OF MERCHANTABILITY.

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The Whalen Company

Revision Table

Innoline® 50/50 Design Guide Revision Table

Date	Description
01/19/2021	Updated Warranty Certificates
12/4/2017	Registered mark added to Innoline name
4/28/2017	Addition of Innoline Name
12/2015	New Release of document

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