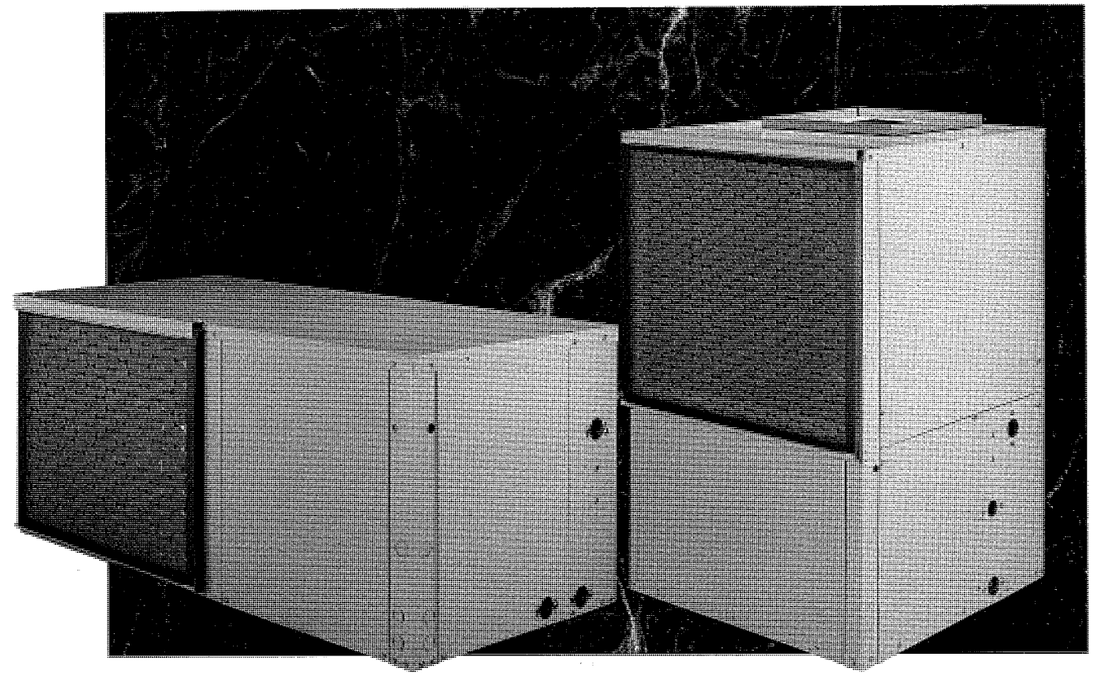
HORIZONTAL & VERTICAL

HS & VS Standard Temperature Range - HL & VL Extended Temperature Range



Water Source Heat Pumps

ClimateMaster®
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Oklahoma City, OK 73179
(405) 745-6000 Fax # (405) 745-6058

02-CA100-9207-0

ClimateMaster®
Quality Heat Pumps Built For Life

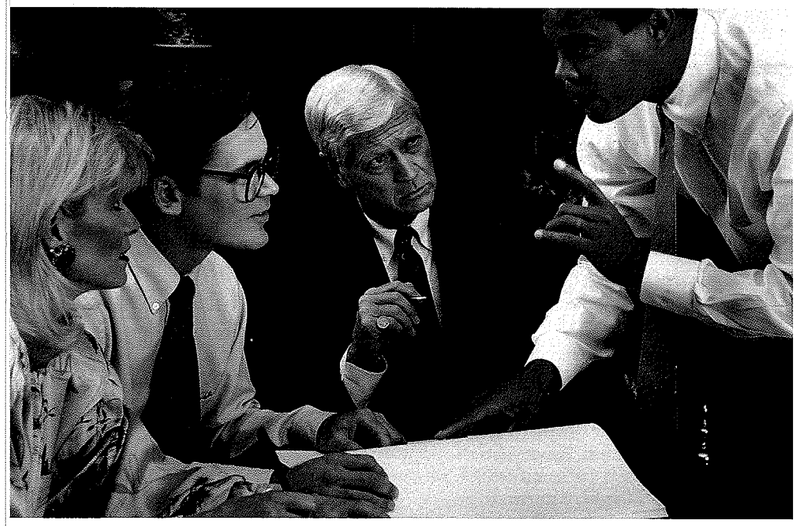
ClimateMaster's state-of-the-art facility reflects the company's commitment to its customers, employees and products. More than quarter of a million square feet is home to the hundreds of dedicated employees who design, build and market ClimateMaster heat pumps for use around the world. This is the largest facility in the world dedicated to the manufacture of water source heat pump products.

Table of Contents

Built For Life . . .

When ClimateMaster says "Quality Heat Pumps Built for Life", we are acknowledging that it is not enough just to manufacture equipment that works. The ClimateMaster philosophy integrates superior standards in engineering and manufacturing with an awareness of the lifestyle integrity of the end user. ClimateMaster manufactures premium quality heating and cooling systems for the health and comfort of people.

At ClimateMaster, we're building heat pumps for life...for the life of buildings and the ***lifestyle of the people who use them.***



For more than forty years, ClimateMaster has met air comfort needs by designing and building quality heat pump systems for a wide range of applications in many of the world's most prestigious buildings. Buildings like the Columbia Seafirst Center in Seattle, Ontario Place in Chicago, Tower City in Cleveland, and others around the world. To millions of people who use our equipment every day, the ClimateMaster name stands for quality and reliability. They know our heat pumps don't just heat and cool air, but actually provide an optimum air quality environment for people, whatever their activity.

ClimateMaster is the world leader in the production of water source heat pumps, manufacturing a complete line of quality-constructed units for a variety of commercial, industrial, and residential applications.

ClimateMaster offers more configurations than any other water source heat pump manufacturer. That is why ClimateMaster supplies more water source heat pumps for new construction and remodeling than anyone else.

Since the early 1950's, ClimateMaster has been the world's leading innovator in water source heat pump technology, for both ground source and closed-loop systems. We have transformed a simple, common sense concept into one of the finest heating and cooling systems available anywhere. By focusing special attention to advanced product design, solid construction and installation flexibility, ClimateMaster systems are capable of satisfying even the most unique and demanding heating and cooling requirements.

Today, ClimateMaster products are manufactured in a factory spanning over a quarter of a million square feet. Built in 1987, this state-of-the-art facility incorporates technologically advanced manufacturing equipment with a factory design that encourages efficiency and quality.

Employing over 100 quality control check points from start to finish, ClimateMaster builds heat pumps which meet the consistently high standards our customers have come to rely on.

No matter what your construction needs - new or remodel - when you select ClimateMaster, you will enjoy the confidence that comes from knowing you have selected...

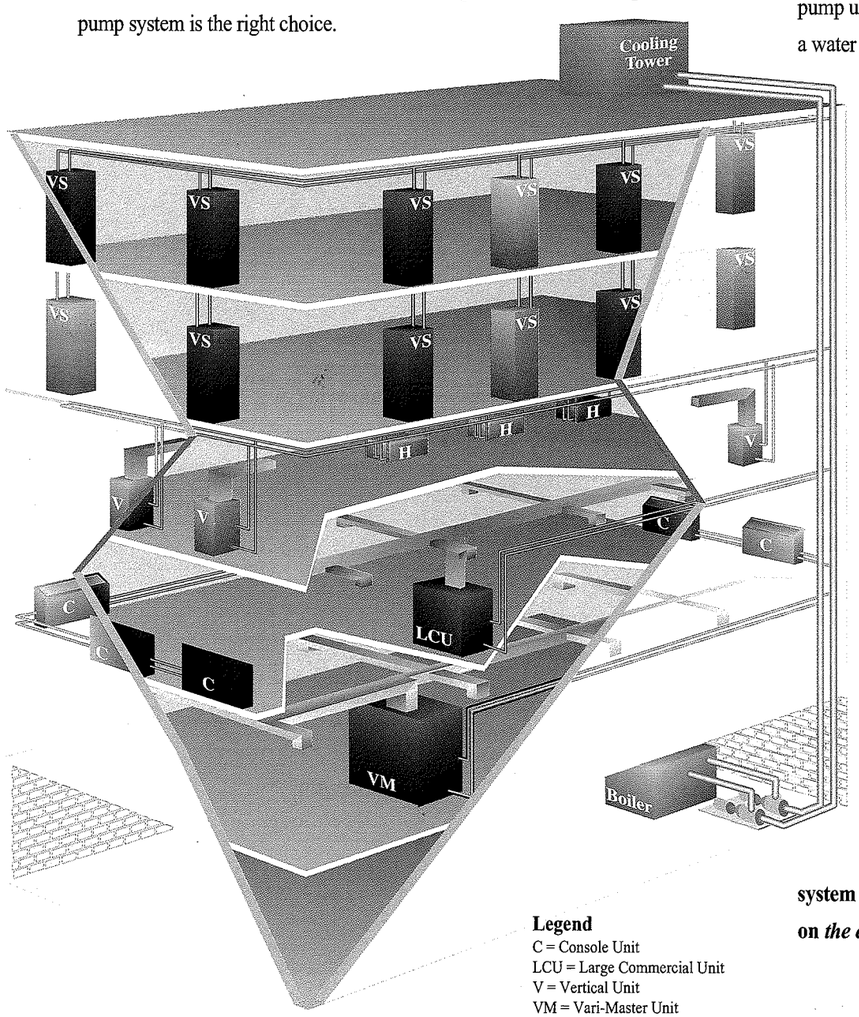
QUALITY HEAT PUMPS

BUILT FOR LIFE!

A Simply Efficient System

For the design of an ideal heating and cooling system that offers individual zone control, recovers and utilizes excess heat for space conditioning or alternative uses and serves multi-tenant needs simply and efficiently, the ClimateMaster water source heat pump system is the right choice.

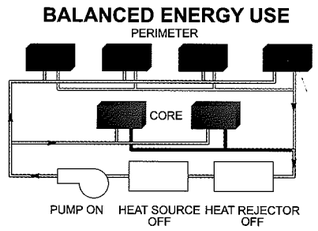
The closed-loop water source heat pump system is simple by design, and yet it is among the most efficient HVAC systems available today. **The primary concept is to take advantage of the heating and cooling requirements of each space in the *entire building* by recovering otherwise wasted energy in some spaces and utilizing it where needed elsewhere in the system.**



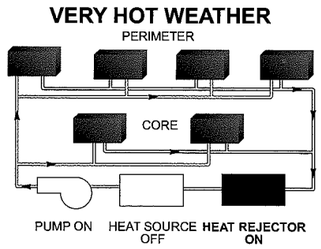
Legend
C = Console Unit
LCU = Large Commercial Unit
V = Vertical Unit
VM = Vari-Master Unit
VS = Vertical Stacked Unit

The system is comprised of highly efficient packaged reverse cycle heat pump units interconnected by way of a water loop. Each unit satisfies the air comfort requirements of the particular zone in which it is installed. When heat is required, the heat pump removes heat from the water loop via the unit's specially designed refrigerant-to-water coaxial heat exchanger and transfers it to the air in the space. When in the cooling mode, the unit removes heat from the air in the zone and transfers it back into the water loop through the coaxial heat exchanger. The circulation of water in the closed-loop moves heat energy from zone to zone for use where needed. Since zones have different cooling and heating requirements, **the system balances energy use based on *the entire system's needs.***

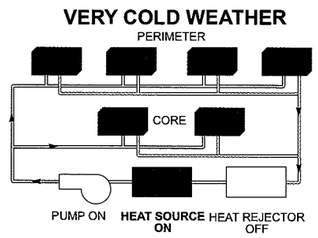
During certain times of the year, the constantly changing combination of units in the heating and cooling operating modes may actually balance the system so that no additional heat injection or rejection is required to maintain the water loop at satisfactory operating temperatures.



In very hot weather, when most of the system's individual units are operating in the cooling mode, more heat is extracted from the building and added to the water loop than is being utilized in other zones. This requires the rejection of heat from the system by way of a heat rejector (most often a cooling tower) which is attached to the loop.



When the weather is very cold, most of the units are operating in the heating mode and the system requires more heat than is being placed in the loop by the other units. It then becomes necessary to add heat to the loop by way of a heat source (usually an energy efficient boiler).

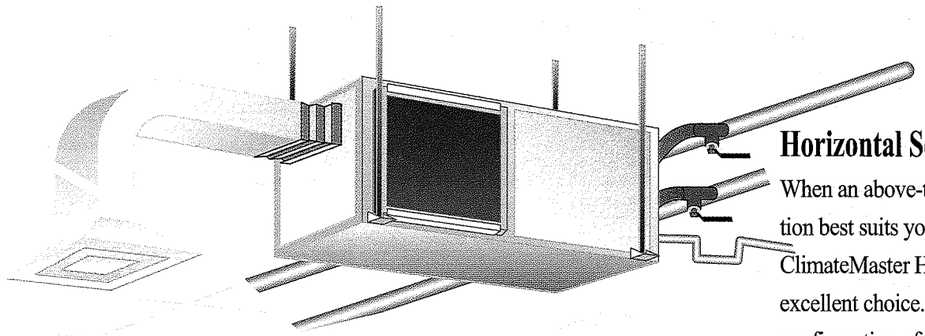


Unlike other systems, at no time are the boiler and cooling towers operating simultaneously. Understandably, *this total system operating concept is more efficient than other conventional systems.*

One of the most important reasons for selecting a quality heat pump system includes the ability to easily and effectively meter the energy usage of individual zones or rooms. Any combination of spaces, large and small, can enjoy efficient, individual heating and cooling control. The ability to monitor individual energy usage can be especially beneficial for any multi-tenant application such as office suites, shopping malls, condominiums, apartments and retirement facilities. As an added feature, the ClimateMaster water source heat pump system allows the option of installing only the units needed as the space is leased, staging the initial system installation expenses, and allowing increased flexibility regarding individual unit selection as the actual space configuration of the facility takes shape.

Since ClimateMaster offers more unit configurations than any other water source heat pump manufacturer in the world, our heat pumps satisfy the widest range of applications, regardless of size, shape or use. This allows the recapture of energy from many different sources within buildings, such as lights, equipment, computers...even people. ***It is this total building energy utilization which distances closed loop water source heat pumps from other systems.***

Applications

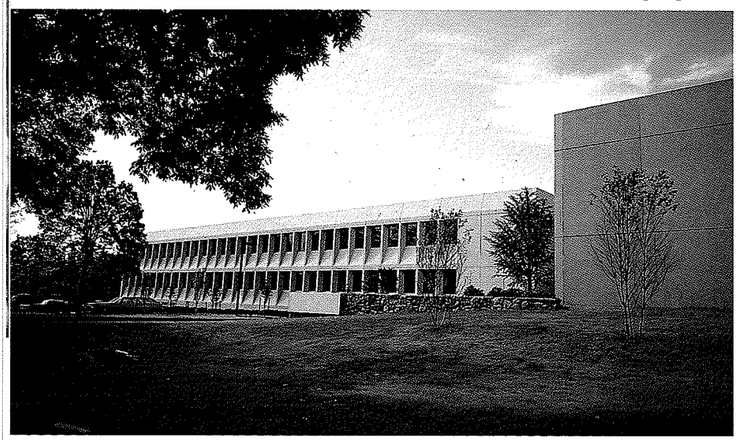


ClimateMaster Horizontal and Vertical heat pumps are an excellent choice for a multitude of building applications ranging from office, school, health care and retirement facilities to hotel and motel, multi-family housing and industrial operations.

Horizontal Series

When an above-the-ceiling application best suits your needs, the ClimateMaster Horizontal unit is an excellent choice. The horizontal configuration of these ducted units make concealed, ceiling-mounted applications simple to install. Hanger and vibration isolator kits are provided with the horizontal unit. The ClimateMaster Horizontal units come in a variety of return air configurations, resulting in superior installation versatility. Each unit has several removable panels,ensuring easy access and service. Installation flexibility and various air flow configuration options distinguish the ClimateMaster Horizontal unit as an ideal selection for office buildings, schools and dormitories, retirement centers and hotels.

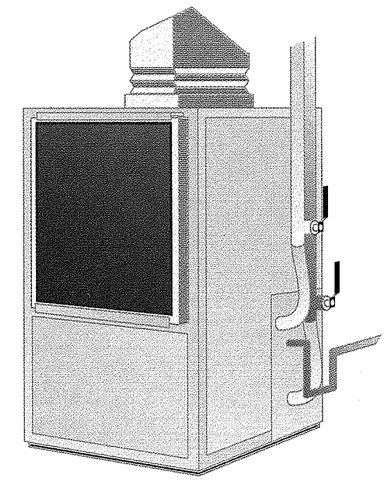
This low-rise office building in Stamford, Connecticut, where floor space is valuable, is a typical above the ceiling application of horizontal water source heat pump units.



Vertical Series

The ClimateMaster Vertical unit is most commonly utilized in condominiums, apartments and core areas of office buildings, but can be installed in any building area where a utility closet or room is available. The Vertical unit's configuration creates a significant space savings. In multi-unit residential applications such as apartments and condominums, the unit is usually set in a closet or utility room and can even be installed above the hot water heater for space savings. The air is distributed upward through duct work into the various rooms. The many return air options of the Vertical unit allow for ease of application in unusual closet configurations. These units can be installed where the room acts as a return air plenum and or can be equipped with return air ducts. The interior of the units are lined with an extra-heavy density thermal insulation to provide acoustical absorption and years of quiet operation.

Tower City, in Cleveland, Ohio, is a Class A mixed use development which typifies vertical unit application. Many ClimateMaster configurations are also used to complete this efficient system.



Features and Benefits

1 Air Discharge Arrangements Factory Built/Field Convertible

ClimateMaster offers a wide variety of end and side air discharge arrangements, factory-built to your specifications. If, for any reason, your configuration needs are changed or modified after the unit has arrived on the job site, the discharge patterns can be easily field-converted without any loss of blower performance.

2 Unit Refrigerant Circuit Protection

The *High Pressure Cut-out* and *Thermal Overload Cut-out* will turn the compressor off when experiencing excessive entering water temperature or no water flow during the cooling cycle. The *Low Temperature Cut-out* guards against water freezing due to low entering water temperature or no water flow during the heating cycle. The *Lock-out Relay* will protect the unit from short-cycling if the previously mentioned safety controls turn the unit off. This may be re-set at the thermostat.

3 Compressor Springs to Ensure Quiet Operation

Heavy-duty coil compressor springs on units larger than 1 ton ensure minimal compressor vibration, resulting in quiet operation, higher quality performance and a longer life of the unit.

4 Anchored Water Pipe Connections

Secured, female-threaded, flush-mounted connections assure dependable water flow performance while reducing the possibility of internal damage caused by rough treatment on the job site and the negative effects of vibration on the fittings.

5 Easy Access To Compressor and Fan Motor

Cabinet panels are easily removed, providing convenient access for maintenance or service.

6 Easy Fan Speed Selection with Quick Connect Terminal

Fan motor speed can be quickly and easily changed to accommodate any last-minute installation changes, making air balancing a simple procedure.

7 Service Access Ports on High and Low Side of the Refrigerant Circuit

Each unit incorporates easily accessible service access ports on both the suction and discharge refrigerant lines, allowing for easy monitoring of the refrigerant pressure. This allows for easy refrigerant recovery in the event service is needed.

8 Convenient Access to All Piping and Electrical Connections

All piping connections are flush-mounted and pipe-threaded for easy connection. Electrical connections are made simple with easy access knock-outs.

9 Dual Density Insulation for Thermal and Acoustical Control

All external panels are lined with a special 1/2" (13mm) thick glass fiber dual density insulation. The optional sound attenuation package includes a heavy dampening material on the compressor, a discharge muffler (units 19,000 BTU (5008 watts) and larger) and 1/2" (13mm) insulation with a 5 lb/cu-ft density surrounding the compressor compartment. Special sound attenuation packages are available for installations requiring extreme sensitivity to sound.

10 Select from Electromechanical, Electronic or DDC Controls

In addition to standard 24-volt controls with a terminal block, ClimateMaster offers as options the "CMC 2000" Series electronic controllers with advanced custom control technology. These controllers are specifically designed to enhance water source heat pump unit and system performance. Units can be provided with RS-485 communications capability for DDC control. This feature can be easily added in the field (See pages 46 & 47 for detailed information). ClimateMaster will also work with other DDC board manufacturers to factory-mount their controllers, if so desired.

11 Separate Fan/Compressor Compartments

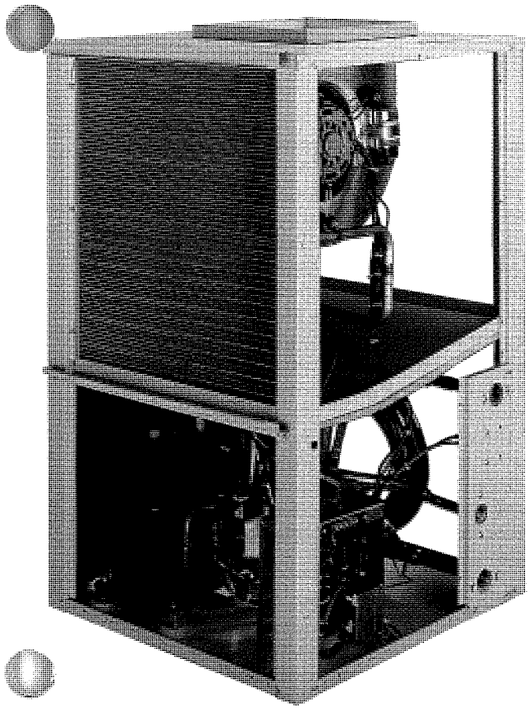
Individual fan and compressor compartments assist in preventing compressor heat from entering the system air flow while significantly reducing unwanted compressor noise.

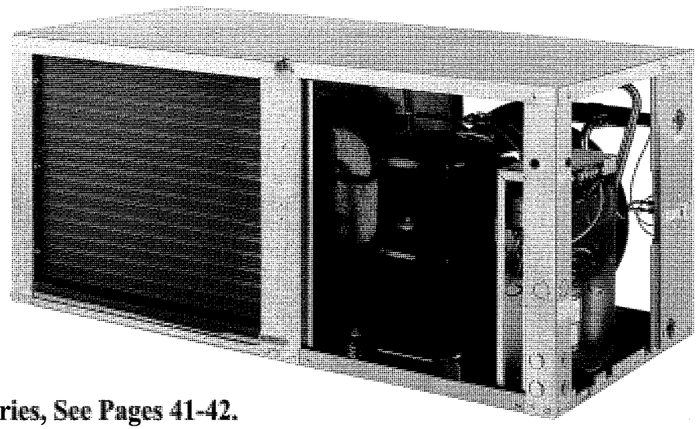
12 Hanger & Vibration Isolator Kits

Horizontal units come complete with hanger & vibration isolator kits, specially designed to eliminate unnecessary rigging in the field, thereby facilitating easier installation. The vibration isolators reduce noise during operations.

13 All Units are UL, ARI and CSA Listed

Both contractor and owner can be confidant that the ClimateMaster units installed will be reliable and perform as specified.





For Optional Features and Accessories, See Pages 41-42.

Selection Procedure

Unit Model Number Designation

HS = Horizontal Standard Operating Range
VS = Vertical Standard Operating Range
HL = Horizontal Low Operating Range
VL = Vertical Low Operating Range

Standard Water Temperature Range 60°F - 95°F
Low Water Temperature Range 40°F - 110°F

Capacity Table Index

Glossary of Terms

CFM	= Cubic Feet Per Minute
BTUH	= British Thermal Unit Per Hour
EER	= Energy Efficiency Rating
T	= Total
S	= Sensible
LWT	= Leaving Water Temperature
GPM	= Gallons Per Minute
WB	= Wet Bulb
DB	= Dry Bulb
Absorp	= Heat Absorption Rate
EWT	= Entering Water Temperature
PD	= Pressure Drop
EAT	= Entering Air Temperature

ARI Conditions

Ratings @ ARI Conditions

		Cooling (EAT=80/67, EWT=85)				Heating (EAT=70, EWT=70)					
Model Number	Nominal CFM	Total BTUH	EER	Input Watts	LWT Deg. F.	Total BTUH	COP	Input Watts	ESP - In. WG	GPM	Pressure Drop Ft. H_2o
HS/HL 006	265	7400	11.8	630	95	8800	4.0	645	.10	1.9	3.3
HS/HL-VS/VL 009	340	9800	11.6	845	95	12000	4.2	827	.10	2.5	5.8
HS/HL-VS/VL 012	385	12200	11.2	1089	95	16200	4.0	1193	.10	3.2	9.5
HS/HL-VS/VL 015	530	14100	10.5	1343	95	18800	4.0	1377	.10	3.8	3.9
HS/HL-VS/VL 019	650	20600	12.0	1717	95	23600	3.9	1779	.10	5.3	9.0
HS/HL-VS/VL 024	800	23400	12.2	1918	95	30000	4.5	1957	.10	6.0	11.3
HS/HL-VS/VL 030	1000	29000	11.7	2468	95	39000	4.3	2675	.15	7.5	6.5
HS/HL-VS/VL 036	1250	35000	11.0	3188	95	42500	3.9	3199	.15	9.4	9.4
HS/HL-VS/VL 042	1500	41500	11.2	3705	95	52500	4.0	3846	.15	10.7	11.7
HS/HL-VS/VL 048	1700	47500	11.0	4320	95	57000	3.8	4403	.20	12.4	17.0
HS/HL-VS/VL 060	2000	62000	11.2	5539	95	75000	3.8	5792	.20	16.2	17.0
HS/HL 072	2400	70000	11.0	6363	95	91000	3.9	6836	.25	18.3	10.2
HS/HL 096	3400	95000	11.0	8640	95	114000	3.8	8801	.25	24.8	19.3
HS/HL 120	4000	124000	11.2	11076	95	150000	3.8	11582	.30	32.4	23.6

Selection Procedure

Step 1. Determine the actual heating and cooling loads for the space in question at the desired dry bulb and wet bulb conditions.

Step 2. Obtain the following design parameters: Entering water temperature, water flow rate in GPM, air flow in CFM, external static pressure, water flow pressure drop and design wet and dry bulb temperatures. Air flow CFM should be between 300 and 525 CFM per ton. Unit water pressure drops should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables (pages 12-46) and find the proper indicated water flow and water temperature.

Step 3. Select a unit based on total and sensible cooling at ARI conditions. Select a unit which is closest to, but no larger than, the actual load.

Step 4. Enter tables (pages 12-46) at the design water flow and water temperature. Read the total and sensible cooling capacities. (Note interpolation is permissible, extrapolation is not).

Step 5. Read the heating capacity. If it exceeds the design criteria it is acceptable. It is quite normal for water source heat pumps to be selected on cooling capacity only since the heating capacity is always greater than the cooling capacity.

Step 6. Determine the correction factors associated with the variable factors of CFM, dry bulb and wet bulb.
Corrected Total Cooling = tabulated total cooling x wet bulb correction x CFM correction.
Corrected Sensible Cooling = tabulated sensible cooling x wet/dry bulb correction x CFM correction.

Step 7. Compare the corrected capacities to the load requirements. Normally if the capacities are within 10% of the loads, the equipment is acceptable. It is better to undersize than oversize, as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.

Step 8. If the units selected are not within 10% of the load calculations, then review what affect changing the GPM, water temperature and/or air flow and air temperature would have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure. Remember, when in doubt, undersize slightly for best performance.

Call 1-405-745-6000 and ask about how you can purchase a copy of our *Design Point Data* software program. This software package will assist you in selecting the correct ClimateMaster water source heat pump. You must have IBM or compatible computer with a minimum of 512K Ram and 5MB of hard drive space or two floppy disk drives to operate this program.

Selection Example

The following is an example of an appropriate unit selection based upon the procedure described on page 10.

For Cooling:
Assume we have determined that the appropriate cooling load at the desired dry bulb 80° and wet bulb 64° conditions is as follows:

Total Cooling ..... 21800 BTUH
Sensible Cooling ..... 16500 BTUH
Entering Air Temp ..... 80° Dry Bulb / 64° Wet Bulb

Similarly, we have also obtained the following design parameters:

Entering Water Temp ..... 90°F
GPM = 4.5 (Based upon a 12°F rise in temperature)
CFM = 700

After making our preliminary selection (HS024), we enter the tables at design water flow and water temperature and read Total Cooling and Sensible Cooling capacities:

Total Cooling ..... 22300 BTUH
Sensible Cooling ..... 17200 BTUH

Next, we determine our correction factors based upon the formulas introduced on page 10.

Corrected Total Cooling = 22300 x .942 x .991 = 20317

Corrected Sensible Cooling = 17200 x 1.118 x .898 = 17268

$$\textit{Actual Temperature Rise} = \left[\frac{\text{Correction of Heat of Rejection}}{\text{GPM x 500}}\right] \frac{28845 \times .952}{4.5 \times 500} = 12.2°F$$

When we compare the *Corrected Total Cooling* and *Corrected Sensible Cooling* figures with our load requirements stated in Step 1, we discover that our selection is well within ±10% of our actual load requirement. Furthermore, we see that our *Corrected Total Cooling* figure is actually undersized as recommended, when compared to the actual indicated load.

Performance Data

HS/HL Horizontal 006

Rated Air Flow 265 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.8)				Heating Performance - EAT 70°F (COP = 4.0)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
1.0	40	9270	6160	10500	480	OPERATION NOT RECOMMENDED			1.1
1.4	40	9560	6250	11200	470				1.9
1.9	40	9970	6370	11400	450				3.3
2.4	40	10090	6410	11484	440	6750	4800	570	4.9
1.0	50	8670	5960	10300	510	7040	5000	590	1.1
1.4	50	8940	6050	11550	500	7310	5250	600	1.9
1.9	50	9220	6140	11780	480	7670	5415	610	3.3
2.4	50	9480	6220	12000	470	7830	5400	620	4.9
1.0	60	7960	5710	9800	560	7940	5900	620	1.1
1.4	60	8300	5830	10080	540	8240	6160	630	1.9
1.9	60	8590	5930	10307	520	8490	6365	640	3.3
2.4	60	8750	5980	10440	510	8660	6480	650	4.9
1.0	60	8450	5550	10300	566	8230	6090	627	1.1
1.4	60	8640	5720	10400	541	8240	6100	638	1.9
1.9	60	8720	5830	10450	532	8310	6115	644	3.3
2.4	60	8740	5890	10480	529	8380	6160	648	4.9
1.0	70	7710	5340	9550	611	8390	6200	634	1.1
1.4	70	8260	5490	10010	578	8590	6370	640	1.9
1.9	70	8550	5590	10213	559	**8800**	**6555**	**645**	3.3
2.4	70	8650	5640	10284	551	8940	6600	648	4.9
1.0	85	6720	5140	8750	682	9320	7050	649	1.1
1.4	85	7060	5210	9205	652	9610	7280	655	1.9
1.9	**85**	**7400**	**5280**	**9453**	**630**	9750	7410	660	3.3
2.4	85	7550	5310	9552	620	9890	7500	663	4.9
1.0	90	6650	5130	8940	699				1.1
1.4	90	6780	5160	8995	675				1.9
1.9	90	7010	5200	9148	655				3.3
2.4	90	7170	5230	9276	645				4.9
1.0	95	6650	5130	8990	712				1.1
1.4	95	6700	5140	9012	695				1.9
1.9	95	6740	5150	9022	679				3.3
2.4	95	6860	5170	9036	668				4.9
1.0	100	5640	4740	8050	740				1.1
1.4	100	5920	4870	8260	720				1.9
1.9	100	6050	4930	8313	700				3.3
2.4	100	6210	4990	8436	690				4.9
1.0	110	OPERATION NOT RECOMMENDED							1.1
1.4	110								1.9
1.9	110	5540	4690	7980	750				3.3
2.4	110	5620	4730	8040	740				4.9

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections			* Sensible equals Total				Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.901	0.916	1.151	1.290	*	*	0.917	60	1.087	1.049	0.961
64	0.950	0.763	1.007	1.147	1.388	*	0.960	65	1.045	1.022	0.980
67	1.000	0.610	0.863	1.000	1.235	*	1.000	70	1.000	1.000	1.000
70	1.054		0.719	0.852	1.073	1.325	1.049	75	0.981	0.957	1.030
73	1.108			0.706	0.930	1.168	1.090	80	0.940	0.920	1.064

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Inpnt Watts	Heating Capacity	Heat of Absorption	Power Input Watts
165	0.947	0.890	0.979	0.981	0.940	0.950	1.019
200	0.968	0.949	0.991	0.990	0.967	0.980	1.010
265	1.000	1.000	1.000	1.000	1.000	1.000	1.000
290	1.008	1.021	1.014	1.009	1.008	1.009	0.995
320	1.014	1.040	1.035	1.020	1.015	1.018	0.989

HS/HL Horizontal &VS/VL Vertical 009

Rated Air Flow 340 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.6)				Heating Performance - EAT 70°F (COP = 4.2)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
1.2	40	12270	8120	14400	650	OPERATION NOT RECOMMENDED			1.7
1.8	40	12540	8280	14580	630				3.5
2.5	40	12850	8470	14750	610				5.8
3.0	40	13050	8590	14850	590	8050	5550	780	8.6
1.2	50	11720	7780	13920	690	8670	6060	790	1.7
1.8	50	11970	7930	14085	670	9230	6570	800	3.5
2.5	50	12260	8110	14313	650	9760	7075	810	5.8
3.0	50	12480	8250	14475	630	10190	7500	810	8.6
1.2	60	11060	7360	13500	740	10350	10680	820	1.7
1.8	60	11410	7590	13770	710	10920	12735	830	3.5
2.5	60	11670	7750	13875	690	11200	14750	830	5.8
3.0	60	11830	7850	14070	680	11330	16125	830	8.6
1.2	60	10730	7680	13320	790	10770	8400	785	1.7
1.8	60	10890	7730	13410	751	11010	8595	797	3.5
2.5	60	10950	7640	13475	733	11170	8725	803	5.8
3.0	60	11130	7570	13500	727	11320	8865	808	8.6
1.2	70	9960	7450	12780	844	11300	8700	807	1.7
1.8	70	10660	7730	13320	796	11710	9090	819	3.5
2.5	70	10890	7640	13500	771	**12000**	**9350**	**827**	**5.8**
3.0	70	10920	7570	13560	762	12120	9450	830	8.6
1.2	85	8610	6970	11700	929	12420	9780	837	1.7
1.8	85	9280	7230	12240	877	12890	10233	849	3.5
2.5	**85**	**9800**	**7400**	**12500**	**845**	13050	10313	853	5.8
3.0	85	9940	7450	12600	836	13160	10380	858	8.6
1.2	90	8350	6840	11520	969				1.7
1.8	90	8840	7070	11835	918				3.5
2.5	90	9250	7220	12125	889				5.8
3.0	90	9440	7280	12300	876				8.6
1.2	95	8230	6730	11385	1000				1.7
1.8	95	8480	6910	11400	951				3.5
2.5	95	8750	7030	11563	926				5.8
3.0	95	8960	7110	11700	909				8.6
1.2	100	8770	5920	12000	960				1.7
1.8	100	9060	6110	12150	930				3.5
2.5	100	9200	6200	12125	920				5.8
3.0	100	9350	6290	12150	900				8.6
1.2	110	OPERATION NOT RECOMMENDED							1.7
1.8	110								3.5
2.5	110	8610	5820	11750	980				5.8
3.0	110	8690	5870	11775	970				8.6

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections			* Sensible equals Total				Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.880	0.689	0.973	*	*	*	0.913	60	1.027	1.024	0.939
64	0.940	0.628	0.854	1.140	*	*	0.956	65	1.012	1.010	0.970
67	1.000	0.566	0.735	1.000	1.158	*	1.000	70	1.000	1.000	1.000
70	1.059		0.616	0.859	1.016	1.289	1.044	75	0.993	0.987	1.038
73	1.119			0.720	0.873	1.196	1.087	80	0.988	0.973	1.075

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
235	0.957	0.959	0.953	0.923	0.961	0.965	1.053
285	0.981	0.985	0.974	0.961	0.983	0.986	1.027
340	1.000	1.000	1.000	1.000	1.000	1.000	1.000
360	1.006	1.006	1.009	1.007	1.005	1.007	0.990
375	1.013	1.016	1.018	1.019	1.011	1.013	0.981

Performance Data

HS/HL Horizontal &VS/VL Vertical 012

Rated Air Flow 385 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.2)				Heating Performance - EAT 70°F (COP = 4.0)			UNIT
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	WATER PRESSURE DROP
1.8	40	15190	9650	18113	890	OPERATION NOT RECOMMENDED			3.3
2.5	40	15520	9860	18375	860				6.2
3.2	40	15850	10060	18560	830				9.5
4.0	40	15980	10150	18640	810	10820	7400	1020	14.0
1.8	50	14680	9340	17763	940	11460	7963	1040	3.3
2.5	50	14900	9480	17875	920	12130	8500	1060	6.2
3.2	50	15210	9670	18080	890	12890	9200	1090	9.5
4.0	50	15440	9810	18240	860	13020	9300	1100	14.0
1.8	60	13970	8930	17369	1020	13450	9704	1110	3.3
2.5	60	14340	9140	17563	980	14080	10213	1140	6.2
3.2	60	14610	9310	17760	950	14420	10528	1150	9.5
4.0	60	14760	9830	17800	930	14600	10720	1150	14.0
1.8	60	13250	8600	16625	1002	14170	10413	1121	3.3
2.5	60	14050	8992	17330	968	14590	10750	1139	6.2
3.2	60	14176	9073	17390	951	14800	10912	1148	9.5
4.0	60	14270	9053	17542	940	15000	11080	1155	14.0
1.8	70	12470	8330	15925	1060	15160	11288	1160	3.3
2.5	70	13140	8540	16300	1025	15760	11825	1180	6.2
3.2	70	13230	8590	16460	1008	**16200**	**12208**	**1193**	**9.5**
4.0	70	13250	8610	16480	998	16600	12570	1204	14.0
1.8	85	11620	7630	14875	1158	16800	12775	1209	3.3
2.5	85	11980	7900	15687	1108	17540	13562	1228	6.2
3.2	**85**	**12200**	**8030**	**16000**	**1089**	18130	14096	1244	9.5
4.0	85	12340	8110	16400	1079	18550	14480	1257	14.0
1.8	90	11540	7500	15540	1193				3.3
2.5	90	11700	7700	15570	1149				6.2
3.2	90	11870	7820	15600	1129				9.5
4.0	90	11990	7910	15630	1117				14.0
1.8	95	11460	7430	15375	1217				3.3
2.5	95	11590	7540	15400	1191				6.2
3.2	95	11620	7640	15460	1170				9.5
4.0	95	11710	7720	15600	1157				14.0
1.8	100	11530	7580	15837	1300				3.3
2.5	100	11820	7730	16000	1270				6.2
3.2	100	12000	7830	16112	1250				9.5
4.0	100	12140	7900	16200	1230				14.0
1.8	110	OPERATION NOT RECOMMENDED							3.3
2.5	110								6.2
3.2	110	11370	7500	15680	1320				9.5
4.0	110	11490	7560	15760	1310				14.0

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total						Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.932	0.818	1.036	1.228	*	*	0.930	60	1.070	1.041	0.963
64	0.967	0.702	0.911	1.116	1.267	*	0.965	65	1.033	1.020	0.984
67	1.000	0.585	0.788	1.000	1.166	1.410	1.000	70	1.000	1.000	1.000
70	1.038		0.660	0.887	1.066	1.310	1.030	75	0.975	0.976	1.030
73	1.080			0.771	0.966	1.194	1.067	80	0.960	0.960	1.056

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
290	0.930	0.860	0.970	0.989	0.957	0.947	1.021
340	0.970	0.921	0.986	0.994	0.980	0.981	1.010
385	1.000	1.000	1.000	1.000	1.000	1.000	1.000
410	1.009	1.017	1.011	1.030	1.025	1.025	0.991
435	1.019	1.031	1.020	1.043	1.048	1.041	0.985

HS/HL Horizontal &VS/VL Vertical 015

Rated Air Flow 530 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 10.5)				Heating Performance - EAT 70°F (COP = 4.0)			UNIT
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	WATER PRESSURE DROP
2.0	40	16150	11490	19750	1100	OPERATION NOT RECOMMENDED			1.3
2.8	40	16310	11570	21440	1070				2.3
3.8	40	16440	11630	22040	1050				3.9
5.0	40	16490	11660	23300	1040	13020	9250	1210	6.4
2.0	50	15830	11360	20300	1150	13680	9100	1230	1.3
2.8	50	16010	11430	21020	1120	14350	9520	1260	2.3
3.8	50	16160	11500	21470	1100	15110	10925	1280	3.9
5.0	50	16260	11540	22800	1080	15230	11625	1280	6.4
2.0	60	15250	11130	19670	1230	15660	11090	1300	1.3
2.8	60	15550	11250	19850	1190	16290	11438	1320	2.3
3.8	60	15760	11330	21090	1160	16620	12502	1330	3.9
5.0	60	15760	11330	22250	1160	16800	13400	1330	6.4
2.0	60	15170	11380	18510	1226	16600	11900	1310	1.3
2.8	60	15220	11230	19120	1162	17480	12040	1348	2.3
3.8	60	15300	11040	19150	1149	17610	12958	1353	3.9
5.0	60	15665	11400	19575	1151	17830	13850	1362	6.4
2.0	70	14590	11280	19050	1310	18040	12900	1352	1.3
2.8	70	15030	11300	19250	1237	18540	13244	1369	2.3
3.8	70	15220	11340	19310	1220	**18800**	**14497**	**1377**	**3.9**
5.0	70	15290	11380	19350	1204	19100	15700	1385	6.4
2.0	85	13320	10520	18110	1426	19690	14600	1417	1.3
2.8	85	13830	10930	18480	1373	20090	15190	1426	2.3
3.8	**85**	**14100**	**11150**	**18610**	**1343**	20330	16739	1430	3.9
5.0	85	14350	11220	18861	1322	20470	18100	1433	6.4
2.0	90	13000	10740	18050	1480				1.3
2.8	90	13390	10880	18070	1431				2.3
3.8	90	13690	10990	18620	1400				3.9
5.0	90	13910	11070	18633	1378				6.4
2.0	95	12800	10670	17990	1520				1.3
2.8	95	13040	10750	18060	1474				2.3
3.8	95	13280	10840	18240	1444				3.9
5.0	95	13470	10910	18320	1423				6.4
2.0	100	12390	10150	18100	1540				1.3
2.8	100	12770	10280	17920	1500				2.3
3.8	100	12990	10350	19133	1480				3.9
5.0	100	13190	10420	20250	1460				6.4
2.0	110	OPERATION NOT RECOMMENDED							1.3
2.8	110								2.3
3.8	110	12080	10050	18620	1570				3.9
5.0	110	12260	10110	19700	1560				6.4

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total						Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.890	0.826	1.028	*	*	*	0.895	60	1.008	1.035	0.965
64	0.945	0.730	0.889	1.165	*	*	0.950	65	1.005	1.020	0.980
67	1.000	0.631	0.751	1.000	1.139	*	1.000	70	1.000	1.000	1.000
70	1.023		0.612	0.835	1.012	1.230	1.027	75	0.988	0.978	1.030
73	1.040			0.669	0.884	1.097	1.045	80	0.972	0.960	1.052

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
450	0.952	0.912	0.976	0.988	0.963	0.950	1.018
490	0.976	0.956	0.988	0.994	0.980	0.977	1.010
530	1.000	1.000	1.000	1.000	1.000	1.000	1.000
570	1.008	1.029	1.010	1.009	1.011	1.011	0.982
620	1.015	1.044	1.021	1.017	1.020	1.019	0.967

Performance Data

HS/HL Horizontal &VS/VL Vertical 019

Rated Air Flow 650 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 12.0)				Heating Performance - EAT 70°F (COP = 3.9)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
2.5	40	24020	15910	28500	1330	OPERATION NOT RECOMMENDED			1.7
3.8	40	24560	16150	28804	1260				5.0
5.3	40	24840	16270	28938	1220				9.0
6.3	40	25110	16390	29106	1190	17790	12757	1530	12.2
2.5	50	23560	15700	28250	1390	18560	13438	1560	1.7
3.8	50	23970	15880	28481	1340	19350	14098	1600	5.0
5.3	50	24330	16040	28673	1290	20280	14893	1640	9.0
6.3	50	24590	16160	28823	1260	20440	15057	1640	12.2
2.5	60	22230	15140	27400	1540	20970	15488	1670	1.7
3.8	60	22970	15450	26695	1450	21750	16150	1700	5.0
5.3	60	23380	15630	26977	1410	22390	16695	1730	9.0
6.3	60	23420	15640	26980	1400	22410	16711	1730	12.2
2.5	60	22200	15900	26363	1574	21300	15650	1716	1.7
3.8	60	22500	16200	26315	1477	21800	16112	1729	5.0
5.3	60	22300	16100	25970	1434	22200	16483	1737	9.0
6.3	60	22100	16000	25704	1415	22300	16569	1741	12.2
2.5	70	21100	15400	25688	1700	22600	16838	1748	1.7
3.8	70	21400	15500	25897	1670	23200	17366	1768	5.0
5.3	70	22400	16000	26473	1548	**23600**	**17728**	**1779**	**9.0**
6.3	70	22500	16100	26491	1528	23800	17908	1784	12.2
2.5	85	18700	14500	23875	1851	24600	18625	1810	1.7
3.8	85	19900	14900	24795	1769	25300	19247	1833	5.0
5.3	**85**	**20600**	**15200**	**26500**	**1717**	25600	19504	1844	9.0
6.3	85	20800	15300	26618	1703	25800	19688	1850	12.2
2.5	90	18000	14300	23313	1921				1.7
3.8	90	19200	14600	24225	1839				5.0
5.3	90	19700	14800	24632	1810				9.0
6.3	90	20200	15000	25011	1772				12.2
2.5	95	17500	14200	22937	1953				1.7
3.8	95	18400	14400	23655	1897				5.0
5.3	95	18800	14500	23930	1865				9.0
6.3	95	19200	14600	24255	1842				12.2
2.5	100	17940	13390	23375	1960				1.7
3.8	100	18480	13610	23750	1910				5.0
5.3	100	18790	13730	23956	1880				9.0
6.3	100	18930	13790	24066	1870				12.2
2.5	110	OPERATION NOT RECOMMENDED							1.7
3.8	110								5.0
5.3	110	17390	13180	24274	2010				9.0
6.3	110	17630	13270	24444	1990				12.2

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.900	0.837	1.051	1.210	*	*	0.901	60	1.073	1.132	0.962
64	0.965	0.709	0.918	1.145	1.262	*	0.960	65	1.035	1.067	0.984
67	1.000	0.580	0.785	1.000	1.135	1.320	1.000	70	1.000	1.000	1.000
70	1.030		0.652	0.856	1.009	1.206	1.020	75	0.997	0.975	1.038
73	1.050			0.709	0.882	1.092	1.039	80	0.995	0.955	1.082

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
550	0.989	0.821	0.980	0.981	0.976	0.969	1.026
600	0.995	0.911	0.991	0.992	0.990	0.980	1.011
650	1.000	1.000	1.000	1.000	1.000	1.000	1.000
690	1.009	1.060	1.009	1.010	1.009	1.008	0.988
730	1.016	1.130	1.020	1.021	1.021	1.016	0.970

HS/HL Horizontal &VS/VL Vertical 024

Rated Air Flow 800 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 12.2)				Heating Performance - EAT 70°F (COP = 4.5)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
3.0	40	28000	20200	32850	1478	OPERATION NOT RECOMMENDED			3.4
4.5	40	29000	20400	33650	1390				6.9
6.0	40	29200	20600	33741	1360				11.3
7.5	40	29300	20700	33820	1334	19900	14550	1613	16.7
3.0	50	27700	19700	32950	1600	21200	15600	1674	3.4
4.5	50	27900	20000	33030	1526	22800	17100	1708	6.9
6.0	50	28100	20200	33065	1463	23800	18000	1741	11.3
7.5	50	28300	20300	33150	1437	24300	18450	1757	16.7
3.0	60	27000	18900	32550	1709	25000	19080	1773	3.4
4.5	60	27500	19400	32850	1658	26400	20340	1816	6.9
6.0	60	27700	19700	32850	1600	27300	21150	1840	11.3
7.5	60	27800	19800	32887	1584	27800	21563	1863	16.7
3.0	60	24800	17600	30300	1664	24900	18540	1896	3.4
4.5	60	25100	17800	30500	1603	26400	19957	1911	6.9
6.0	60	25800	20700	30750	1564	27300	20820	1921	11.3
7.5	60	26400	21000	31400	1539	27800	21300	1927	16.7
3.0	70	24400	17300	30300	1799	28100	21585	1931	3.4
4.5	70	24900	17800	30532	1728	29300	22725	1947	6.9
6.0	70	25600	18300	30060	1679	**30000**	**23400**	**1957**	**11.3**
7.5	70	26100	18500	31600	1652	30500	23887	1964	16.7
3.0	85	22200	17100	28800	2014	31800	25110	1985	3.4
4.5	85	23100	17400	29475	1937	32400	25650	1996	6.9
6.0	**85**	**23400**	**17600**	**30000**	**1918**	32800	26010	2003	11.3
7.5	85	23900	17700	31330	1856	33000	26175	2008	16.7
3.0	90	21500	16900	28350	2080				3.4
4.5	90	22300	17200	28845	2005				6.9
6.0	90	22900	17300	29280	1956				11.3
7.5	90	23200	17400	29475	1926				16.7
3.0	95	20900	16700	28050	2145				3.4
4.5	95	21600	16900	28535	2074				6.9
6.0	95	22100	17100	28875	2025				11.3
7.5	95	22400	17200	29100	1998				16.7
3.0	100	20200	16500	27525	2227				3.4
4.5	100	20800	16700	27900	2155				6.9
6.0	100	21300	16800	30210	2101				11.3
7.5	100	21600	16900	30375	2073				16.7
3.0	110	OPERATION NOT RECOMMENDED							3.4
4.5	110								6.9
6.0	110	20100	16500	27600	2254				11.3
7.5	110	20300	16500	27750	2222				16.7

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.905	0.790	1.035	1.200	*	*	0.889	60	1.015	1.051	0.950
64	0.942	0.674	0.887	1.118	1.250	*	0.952	65	1.008	1.025	0.975
67	1.000	0.558	0.740	1.000	1.218	1.312	1.000	70	1.000	1.000	1.000
70	1.019		0.648	0.838	1.026	1.209	1.028	75	0.993	0.974	1.025
73	1.038		0.556	0.620	0.787	1.066	1.043	80	0.985	0.949	1.050

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
600	0.981	0.796	0.977	0.976	0.972	0.963	1.031
700	0.991	0.898	0.989	0.988	0.986	0.981	1.015
800	1.000	1.000	1.000	1.000	1.000	1.000	1.000
900	1.010	1.067	1.012	1.011	1.012	1.010	0.978
1000	1.019	1.135	1.023	1.023	1.023	1.019	0.955
1100	1.027	1.204	1.033	1.035	1.030	1.027	0.931

Performance Data

HS/HL Horizontal &VS/VL Vertical 030

Rated Air Flow 1000 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.7)				Heating Performance - EAT 70°F (COP = 4.3)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
3.7	40	33600	23700	39960	1917	OPERATION NOT RECOMMENDED			1.8
5.6	40	34200	23800	40208	1820				3.7
7.5	40	34500	23800	40125	1721				6.5
9.4	40	34700	23900	40256	1702	24100	18236	1967	9.6
3.7	50	32700	23400	39479	2061	25700	19240	1981	1.8
5.6	50	33200	23600	39620	1959	27700	21280	2049	3.7
7.5	50	33500	23700	39806	1924	29200	22500	2083	6.5
9.4	50	33700	23700	39903	1894	29700	23124	2099	9.6
3.7	60	31600	22900	38850	2202	31100	23532	2154	1.8
5.6	60	32300	23200	39312	2123	33400	25312	2257	3.7
7.5	60	32700	23400	39488	2058	35100	26437	2292	6.5
9.4	60	33200	23500	39809	2008	36700	27025	2324	9.6
3.7	60	30600	22950	37650	2160	31200	22866	2360	1.8
5.6	60	30900	23175	37810	2105	33500	24836	2446	3.7
7.5	60	31200	23400	37960	2032	34800	26025	2497	6.5
9.4	60	31700	23775	38410	1994	35300	26696	2517	9.6
3.7	70	29600	22200	37740	2391	35400	26622	2522	1.8
5.6	70	29900	22425	37812	2318	37800	28280	2621	3.7
7.5	70	30100	22575	37875	2270	**39000**	**29250**	**2675**	**6.5**
9.4	70	30500	21900	37900	2169	39500	29939	2699	9.6
3.7	85	26600	20800	35372	2628	41400	30969	2785	1.8
5.6	85	28300	21400	36680	2526	43300	31920	2879	3.7
7.5	**85**	**29000**	**21700**	**37500**	**2468**	44300	32513	2932	6.5
9.4	85	29400	21800	37600	2433	44700	32806	2954	9.6
3.7	90	25100	20100	34077	2705				1.8
5.6	90	27000	20900	35896	2608				3.7
7.5	90	27900	21300	36600	2550				6.5
9.4	90	28400	21500	36989	2519				9.6
3.7	95	23200	19300	32690	2785				1.8
5.6	95	25500	20300	34664	2688				3.7
7.5	95	26500	20700	35475	2633				6.5
9.4	95	27000	20900	35861	2605				9.6
	100	23900	19500	33948	2938				1.8
	100	24600	20000	34132	2785				3.7
	100	25400	20400	34688	2715				6.5
	100	25700	20600	34921	2698				9.6
	110	OPERATION NOT RECOMMENDED							1.8
	110								3.7
	110	23900	19400	34500	2951				6.5
	110	24000	19600	47000	2894				9.6

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections						* Sensible equals Total	Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.844	0.804	1.023	1.194	*	*	0.856	60	1.011	1.044	0.915
64	0.923	0.685	0.893	1.119	1.260	*	0.936	65	1.006	1.022	0.958
67	1.000	0.581	0.763	1.000	1.187	1.330	1.000	70	1.000	1.000	1.000
70	1.036		0.633	0.860	1.059	1.248	1.026	75	0.987	0.972	1.039
73	1.071		0.506	0.735	0.929	1.132	1.039	80	0.974	0.945	1.078

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
750	0.949	0.802	0.949	0.957	0.974	0.965	1.030
875	0.980	0.915	0.979	0.979	0.986	0.981	1.015
1000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1125	1.011	1.063	1.012	1.019	1.014	1.021	0.990
1250	1.018	1.117	1.020	1.037	1.031	1.043	0.981

HS/HL Horizontal &VS/VL Vertical 036

Rated Air Flow 1250 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.0)				Heating Performance - EAT 70°F (COP = 3.9)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
4.5	40	41860	28600	50180	2512	OPERATION NOT RECOMMENDED			2.2
6.6	40	42418	29138	50460	2426				4.6
9.4	40	42828	29503	50710	2366				9.4
12.0	40	43080	29820	50840	2313	27658	23280	3011	15.3
4.5	50	40305	28238	50080	2883	28804	23400	2988	2.2
6.6	50	41177	28893	49995	2779	31282	25080	3072	4.6
9.4	50	41586	29379	49961	2656	33221	28200	3269	9.4
12.0	50	41838	29571	49920	2567	34085	29520	3302	15.3
4.5	60	38916	27634	43763	3079	34856	28620	3176	2.2
6.6	60	40061	28404	49500	2960	37720	29832	3348	4.6
9.4	60	40593	29007	49632	2837	39933	33135	3587	9.4
12.0	60	41218	29321	49800	2712	42119	34500	4000	15.3
4.5	60	39100	29200	47768	2736	33600	27810	2467	2.2
6.6	60	40500	30200	48411	2513	35700	29271	2623	4.6
9.4	60	41400	30900	48833	2367	37200	32618	2733	9.4
12.0	60	42000	31300	49200	2292	37900	34080	2794	15.3
4.5	70	36900	27500	46710	3055	38700	32378	2892	2.2
6.6	70	38300	28600	47355	2837	41000	33330	3072	4.6
9.4	70	39300	29300	47846	2696	**42500**	**36660**	**3199**	9.4
12.0	70	39800	29700	48090	2622	43200	38220	3268	15.3
4.5	85	33600	25100	44300	3534	46400	37665	3524	2.2
6.6	85	34300	26200	45100	3230	48900	37620	3744	4.6
9.4	**85**	**35000**	**26900**	**45600**	**3182**	50400	40749	3898	9.4
12.0	85	36500	27200	47220	3116	51300	41880	3979	15.3
4.5	90	32600	24300	44550	3695				2.2
6.6	90	34000	25400	45210	3487				4.6
9.4	90	34600	26000	45637	3341				9.4
12.0	90	35400	26400	45900	3281				15.3
4.5	95	31600	23600	44055	3855				2.2
6.6	95	33000	24600	44748	3650				4.6
9.4	95	33800	25200	45120	3515				9.4
12.0	95	34300	25600	45378	3446				15.3
4.5	100	39100	29200	51300	3759				2.2
6.6	100	40500	30200	52338	3663				4.6
9.4	100	41400	30900	52499	3440				9.4
12.0	100	42000	31300	53160	3463				15.3
4.5	110	OPERATION NOT RECOMMENDED							2.2
6.6	110								4.6
9.4	110	29669	24049	43240	3656				9.4
12.0	110	29796	24455	60000	3642				15.3

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections						* Sensible equals Total	Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.910	0.763	1.030	*	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	1.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.015
70	1.045		0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090		0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
900	0.961	0.955	0.954	0.931	0.961	0.966	1.045
1075	0.980	0.978	0.982	0.957	0.980	0.983	1.022
1163	0.990	0.989	0.996	0.978	0.990	0.992	1.011
1250	1.000	1.000	1.010	1.000	1.000	1.000	1.000
1375	1.014	1.016	1.030	1.031	1.014	1.012	0.984
1500	1.028	1.032	1.050	1.062	1.028	1.024	0.968

Performance Data

HS/HL Horizontal &VS/VL Vertical 042

Rated Air Flow 1500 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.2)				Heating Performance - EAT 70°F (COP = 4.0)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
5.2	40	48137	30920	58350	3038	OPERATION NOT RECOMMENDED			2.8
7.6	40	48943	32030	58410	2820				5.9
10.7	40	49371	32355	58500	2675				11.7
13.8	40	49689	32780	58610	2637	35260	22563	3725	19.5
5.2	50	47321	31163	57880	3120	36315	23842	3651	2.8
7.6	50	47512	31761	57920	3063	39599	26790	3753	5.9
10.7	50	47940	32219	58040	2990	42317	28623	4017	11.7
13.8	50	48257	32506	58150	2921	43454	29601	4061	19.5
5.2	60	45960	30497	57160	3310	43946	30784	3856	2.8
7.6	60	46224	31222	57310	3271	47747	33858	4066	5.9
10.7	60	46795	31811	57559	3219	50867	35899	4385	11.7
13.8	60	47541	32232	57822	3088	53695	36915	4915	19.5
5.2	60	45000	32000	55380	3117	42100	32006	2961	2.8
7.6	60	46600	33100	56126	2867	45200	34390	3163	5.9
10.7	60	47800	34000	56764	2706	47300	36006	3307	11.7
13.8	60	48300	34300	56925	2616	48400	36777	3394	19.5
5.2	70	42500	30200	54080	3483	48600	36790	3467	2.8
7.6	70	44200	31400	54910	3238	51900	39292	3704	5.9
10.7	70	45200	32100	55372	3080	**52500**	**40821**	**3872**	11.7
13.8	70	45800	32600	55683	2992	55200	41676	3970	19.5
5.2	85	38900	27700	52338	4031	58500	44096	4224	2.8
7.6	85	40500	28800	53124	3794	61900	46512	4517	5.9
10.7	**85**	**41500**	**29500**	**53500**	**3705**	64200	48097	4719	11.7
13.8	85	42100	29900	53820	3557	65400	48921	4837	19.5
5.2	90	37600	26700	51558	4213				2.8
7.6	90	39200	27900	52364	3980				5.9
10.7	90	40200	28600	52858	3829				11.7
13.8	90	40700	28900	53061	3744				19.5
5.2	95	36400	25900	50960	4396				2.8
7.6	95	38000	27000	51756	4165				5.9
10.7	95	39000	27700	52269	4016				11.7
13.8	95	39500	28100	52509	3933				19.5
5.2	100	45000	32000	59150	4267				2.8
7.6	100	46600	33100	60496	4189				5.9
10.7	100	47800	34000	60776	3921				11.7
13.8	100	48300	34300	61410	3960				19.5
5.2	110	OPERATION NOT RECOMMENDED							2.8
7.6	110								5.9
10.7	110	34202	26373	50290	4171				11.7
13.8	110	34367	26883	54165	4168				19.5

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.910	0.763	1.030	*	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	1.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.015
70	1.045		0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090		0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
1000	0.953	0.947	0.943	0.941	0.953	0.960	1.053
1250	0.977	0.973	0.977	0.971	0.977	0.980	1.027
1375	0.988	0.987	0.993	0.984	0.988	0.990	1.013
1500	1.000	1.000	1.010	1.000	1.000	1.000	1.000
1540	1.004	1.004	1.015	1.008	1.004	1.003	0.996
1580	1.007	1.009	1.021	1.017	1.007	1.006	0.991

HS/HL Horizontal &VS/VL Vertical 048

Rated Air Flow 1700 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.0)				Heating Performance - EAT 70°F (COP = 3.8)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
5.9	40	54930	36689	66970	3528	OPERATION NOT RECOMMENDED			3.9
8.7	40	55832	37479	67300	3395				8.4
12.4	40	56509	37948	67400	3223				17.0
15.8	40	56771	38481	67580	3148	37094	23068	4100	27.6
5.9	50	53336	36225	66200	3778	38612	24721	4071	3.9
8.7	50	54199	37164	66800	3717	41902	27579	4192	8.4
12.4	50	54871	37789	67000	3580	44624	29388	4466	17.0
15.8	50	55135	38159	67100	3518	45713	30336	4510	27.6
5.9	60	52508	35451	66375	4206	46725	31890	4343	3.9
8.7	60	52730	36535	66555	4062	50524	34887	4581	8.4
12.4	60	53560	37311	68820	3844	53640	36890	4914	17.0
15.8	60	54317	37837	74102	3709	56487	37841	5467	27.6
5.9	60	51500	37500	64815	3717	45000	33394	3390	3.9
8.7	60	53500	39000	65490	3408	47900	35583	3608	8.4
12.4	60	54800	39900	66340	3209	49900	37076	3761	17.0
15.8	60	55400	40400	71100	3107	50900	37762	3845	27.6
5.9	70	48600	35400	62835	4150	51800	38291	3970	3.9
8.7	70	50600	36900	64380	3848	55000	40586	4224	8.4
12.4	70	51800	37800	66960	3653	**57000**	41974	**4403**	17.0
15.8	70	52500	38300	71100	3554	58000	42739	4498	27.6
5.9	85	44200	32200	57525	4798	62200	45696	4840	3.9
8.7	85	46200	33700	59160	4508	65500	47894	5152	8.4
12.4	**85**	**47500**	**34600**	**62620**	**4320**	67700	49414	5364	17.0
15.8	85	48100	35100	66360	4224	68800	50086	5477	27.6
5.9	90	42800	31200	56640	5014				3.9
8.7	90	44800	32700	59203	4728				8.4
12.4	90	46000	33500	60140	4542				17.0
15.8	90	46600	34000	64780	4447				27.6
5.9	95	41400	30200	56050	5231				3.9
8.7	95	43300	31600	58028	4948				8.4
12.4	95	44600	32500	60600	4764				17.0
15.8	95	45200	32900	61620	4670				27.6
5.9	100	39714	31088	59000	5078				3.9
8.7	100	40160	31495	59725	4965				8.4
12.4	100	41603	32527	60140	4625				17.0
15.8	100	42047	33168	63990	4681				27.6
5.9	110	OPERATION NOT RECOMMENDED							3.9
8.7	110								8.4
12.4	110	39147	30933	58280	4908				17.0
15.8	110	39265	31558	62015	4913				27.6

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.910	0.763	1.030	*	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	1.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.015
70	1.045		0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090		0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
1400	0.975	0.972	0.975	0.945	0.975	0.979	1.028
1550	0.988	0.986	0.992	0.973	0.988	0.989	1.014
1625	0.994	0.993	1.001	0.986	0.994	0.995	1.007
1700	1.000	1.000	1.010	1.000	1.000	1.000	1.000
1915	1.018	1.020	1.035	1.039	1.018	1.015	0.980
2130	1.035	1.040	1.061	1.078	1.035	1.030	0.960

Performance Data

HS/HL Horizontal &VS/VL Vertical 060

Rated Air Flow 2000 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.2)				Heating Performance - EAT 70°F (COP = 3.8)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
7.8	40	72263	49347	88250	4687	OPERATION NOT RECOMMENDED			3.9
11.4	40	72992	50158	88500	4429				8.4
16.2	40	73759	50775	89100	4115				17.0
20.7	40	74121	51410	93150	4062	48847	30429	5395	27.8
7.8	50	70301	48723	87250	4968	50841	32565	5356	3.9
11.4	50	70858	49736	87460	4865	55144	36366	5506	8.4
16.2	50	71921	50562	87600	4615	58730	38637	5881	17.0
20.7	50	72650	50980	88040	4510	60197	39951	5935	27.8
7.8	60	68702	47682	86300	5210	61524	42042	5713	3.9
11.4	60	68937	48893	86600	5174	66491	45942	6016	8.4
16.2	60	69910	49922	86720	4927	70596	48519	6470	17.0
20.7	60	70917	50550	87120	4748	74385	49784	7194	27.8
7.8	60	67300	47338	83499	4747	59200	43992	4466	3.9
11.4	60	69800	49097	84702	4365	63100	46911	4746	8.4
16.2	60	71500	50293	85536	4114	65700	48762	4948	17.0
20.7	60	72300	50856	85905	3983	67100	49784	5060	27.8
7.8	70	63600	45836	81705	5303	68300	50505	5230	3.9
11.4	70	66100	47638	82878	4930	72400	53409	5559	8.4
16.2	70	67600	48720	83592	4684	**75000**	**55323**	5792	17.0
20.7	70	68500	49368	84042	4555	76500	56304	5919	27.8
7.8	85	58000	43309	78897	6136	81900	60216	6378	3.9
11.4	85	60400	45100	80085	5776	86200	63099	6778	8.4
16.2	**85**	**62000**	**46295**	**80919**	**5539**	89100	64962	7057	17.0
20.7	85	62800	46893	81351	5414	90600	66033	7208	27.8
7.8	90	56100	42378	78000	6414				3.9
11.4	90	58500	44191	79173	6058				8.4
16.2	90	60000	45324	79866	5823				17.0
20.7	90	60900	46004	80316	5700				27.8
7.8	95	54300	41460	77103	6692				3.9
11.4	95	56700	43324	78318	6341				8.4
16.2	95	58200	44471	78975	6108				17.0
20.7	95	59000	45082	79384	5987				27.8
7.8	100	52113	40602	74100	6493				3.9
11.4	100	52503	42150	74100	6373				8.4
16.2	100	54303	43522	72900	5960				17.0
20.7	100	54897	44312	72450	6030				27.8
7.8	110	OPERATION NOT RECOMMENDED							3.9
11.4	110								8.4
16.2	110	51097	41388	72900	6330				17.0
20.7	110	51265	42161	72450	6336				27.8

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.910	0.763	1.030	1.297	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	1.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.015
70	1.045		0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090		0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
1400	0.958	0.952	0.950	0.907	0.958	0.964	1.048
1700	0.979	0.976	0.980	0.954	0.979	0.982	1.024
1850	0.990	0.988	0.995	0.977	0.990	0.991	1.012
2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2065	1.005	1.005	1.017	1.010	1.005	1.004	0.995
2130	1.009	1.010	1.023	1.020	1.009	1.008	0.990

HS/HL Horizontal 072

Rated Air Flow 2400 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.0)				Heating Performance - EAT 70°F (COP = 3.9)			UNIT WATER PRESSURE WATER
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
9.9	40	83246	54960	99768	4842	OPERATION NOT RECOMMENDED			3.5
14.4	40	84322	55537	100247	4667				7.1
18.3	40	85255	56037	100663	4516				10.2
23.4	40	86475	56691	101206	4317	70910	50431	6002	14.3
9.9	50	79849	53709	97814	5265	71917	51017	6126	3.5
14.4	50	80925	54286	98294	5090	73835	52749	6180	7.1
18.3	50	81858	54786	98709	4939	75497	54250	6227	10.2
23.4	50	83078	55440	99252	4740	77671	56213	6289	14.3
9.9	60	76787	52600	96050	5644	77000	55334	6350	3.5
14.4	60	77528	53035	96340	5513	80596	58530	6467	7.1
18.3	60	78461	53535	96755	5362	82258	60032	6514	10.2
23.4	60	78500	54400	96181	5182	84000	61549	6580	14.3
9.9	60	75251	51548	94129	5531	79310	56994	6541	3.5
14.4	60	75977	51974	94413	5403	83014	60286	6661	7.1
18.3	60	76892	52464	94820	5255	84726	61833	6709	10.2
23.4	60	76930	53312	94257	5078	86520	63395	6777	14.3
9.9	70	73055	51207	93907	6111	85700	62703	6740	3.5
14.4	70	74131	51784	94050	5836	87357	64312	6754	7.1
18.3	70	74900	51900	94340	5696	**91000**	67676	**6836**	**10.2**
23.4	70	76284	52938	95344	5586	91193	67776	6863	14.3
9.9	85	67400	49500	90458	6758	95581	71253	7130	3.5
14.4	85	69036	49908	91456	6571	97498	72985	7185	7.1
18.3	**85**	**70000**	**49975**	**91712**	**6363**	101000	76297	7240	10.2
23.4	85	71000	51100	92335	6253	101334	76449	7293	14.3
9.9	90	66261	48705	90000	6957				3.5
14.4	90	67337	49282	90479	6782				7.1
18.3	90	69400	49760	91010	6432				10.2
23.4	90	69490	50436	91437	6332				14.3
9.9	95	63400	48099	87888	7177				3.5
14.4	95	65639	48657	89502	6994				7.1
18.3	95	66572	49157	89917	6842				10.2
23.4	95	68531	50100	91460	6720				14.3
9.9	100	62864	47454	88046	7380				3.5
14.4	100	63940	48031	88525	7205				7.1
18.3	100	64873	48531	88940	7054				10.2
23.4	100	66093	49185	89483	6855				14.3
9.9	110	OPERATION NOT RECOMMENDED							3.5
14.4	110								7.1
18.3	110								10.2
23.4	110	62696	47934	87530	7278				14.3

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.910	0.871	1.072	1.243	*	*	0.956	60	1.035	1.052	0.948
64	0.955	0.702	0.919	1.136	*	*	0.978	65	1.018	1.026	0.974
67	1.000	0.532	0.766	1.000	1.221	*	1.000	70	1.000	1.000	1.000
70	1.045		0.611	0.864	1.101	1.334	1.021	75	0.984	0.982	1.030
73	1.090		0.455	0.727	0.981	1.234	1.043	80	0.969	0.965	1.061

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
1800	0.936	0.940	0.948	0.978	0.935	0.928	1.022
2100	0.968	0.970	0.974	0.991	0.967	0.963	1.011
2250	0.984	0.985	0.987	0.998	0.984	0.982	1.006
2400	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2700	1.033	1.030	1.026	1.018	1.034	1.038	0.989
3000	1.065	1.060	1.050	1.032	1.070	1.077	0.979

Performance Data

HS/HL Horizontal 096

Rated Air Flow 3400 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.0)				Heating Performance - EAT 70°F (COP = 3.8)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
11.9	40	111168	73721	134700	6890	OPERATION NOT RECOMMENDED			4.4
17.4	40	111905	75070	134900	6760				9.5
24.8	40	113017	75897	153100	6477				19.3
31.7	40	113660	76962	135380	6366	74133	46124	8184	31.5
11.9	50	107164	72788	133750	7790	77286	49504	8144	4.4
17.4	50	108633	74439	134190	7590	83804	55245	8366	9.5
24.8	50	109741	75578	134240	7180	89182	58652	8931	19.3
31.7	50	110385	76318	134390	7034	91359	60706	9001	31.5
11.9	60	105492	71232	133150	8110	93525	63903	8687	4.4
17.4	60	105688	73178	133290	8089	101048	69861	9141	9.5
24.8	60	107121	74621	133400	7719	107202	73656	9826	19.3
31.7	60	108747	75674	134050	7416	112891	75605	10910	31.5
11.9	60	103200	75200	128520	7418	90000	66878	6787	4.4
17.4	60	107200	78100	130413	6817	95900	71340	7211	9.5
24.8	60	109700	80000	131564	6419	99800	74152	7519	19.3
31.7	60	111000	80900	132189	6213	101800	75605	7688	31.5
11.9	70	97500	71100	125723	8284	103800	76696	7950	4.4
17.4	70	101400	73900	127629	7697	109900	81084	8447	9.5
24.8	70	103900	75700	127968	7308	**114000**	**83948**	**8801**	**19.3**
31.7	70	105200	76700	128702	7106	116200	85432	8993	31.5
11.9	85	88800	64700	120368	9583	124500	91511	9692	4.4
17.4	85	92600	67500	122235	9015	131000	95874	10298	9.5
24.8	**85**	**95000**	**69200**	**123876**	**8640**	135300	98704	10724	19.3
31.7	85	96300	70200	124581	8444	137500	100172	10952	31.5
11.9	90	85900	62600	119446	10016				4.4
17.4	90	89700	65400	121365	9455				9.5
24.8	90	92100	67100	122760	9084				19.3
31.7	90	93400	68100	123472	8891				31.5
11.9	95	83000	60500	118583	10448				4.4
17.4	95	86800	63300	120495	9895				9.5
24.8	95	89200	65000	121644	9528				19.3
31.7	95	90500	66000	122362	9337				31.5
11.9	105	77200	56300	115787	11314				4.4
17.4	105	80900	59000	117624	10774				9.5
24.8	105	83400	60800	118916	10417				19.3
31.7	105	84600	61700	119509	10230				31.5
11.9	110	OPERATION NOT RECOMMENDED							4.4
17.4	110								9.5
24.8	110	78293	61865	100192	6419				19.3
31.7	110	78612	63116	99696	6213				31.5

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.910	0.763	1.030	*	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	1.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.015
70	1.045		0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090		0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
2800	0.975	0.972	0.975	0.945	0.975	0.979	1.028
3100	0.988	0.986	0.992	0.973	0.988	0.989	1.014
3250	0.994	0.993	1.001	0.986	0.994	0.995	1.007
3400	1.000	1.000	1.010	1.000	1.000	1.000	1.000
3800	1.016	1.019	1.034	1.036	1.016	1.014	0.981
4200	1.033	1.038	1.057	1.073	1.033	1.028	0.962

HS/HL Horizontal 120

Rated Air Flow 4000 CFM

Shaded areas represent HL/VL units only.
HS - Water temperature range (60°F - 95°F)
HL - Water temperature range (40°F - 110°F)

		Cooling Performance - EAT 80/67°F (EER = 11.2)				Heating Performance - EAT 70°F (COP = 3.8)			UNIT WATER PRESSURE DROP
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	HEATING BTUH	HEAT OF ABSORPTION BTUH	POWER INPUT WATTS	
15.5	40	142400	96965	174500	9410	OPERATION NOT RECOMMENDED			5.4
22.7	40	144984	98648	174780	8729				11.6
32.4	40	147517	99806	175600	8230				23.6
41.3	40	148360	101082	175970	8090	97532	60711	10771	38.4
15.5	50	136199	95738	170810	10053	101558	65023	10707	5.4
22.7	50	139716	97819	172250	9532	110224	72640	11010	11.6
32.4	50	143241	99387	174400	9130	117327	77274	11740	23.6
41.3	50	144085	100236	174670	8963	120195	79709	11846	38.4
15.5	60	132686	93692	165300	9556	122898	83933	11422	5.4
22.7	60	135874	96161	167700	9351	132906	91822	12030	11.6
32.4	60	139821	98129	169700	8754	141034	96876	12916	23.6
41.3	60	141947	99390	171700	8738	148524	99533	14360	38.4
15.5	60	134600	98800	167400	9509	118200	87808	8922	5.4
22.7	60	139700	102500	170136	8738	126000	93751	9486	11.6
32.4	60	142900	104900	171882	8227	131200	97524	9896	23.6
41.3	60	144600	106100	172221	7966	133900	99327	10116	38.4
15.5	70	127100	93300	163758	10619	136300	100673	10450	5.4
22.7	70	132300	97000	166504	9866	144600	106690	11109	11.6
32.4	70	135400	99400	167184	9366	**150000**	**110484**	**11582**	23.6
41.3	70	137000	100500	167678	9112	152800	112336	11834	38.4
15.5	85	119000	85100	156782	12286	163600	120203	12739	5.4
22.7	85	120800	88700	159468	11557	172300	126099	13545	11.6
32.4	**85**	**124000**	**91000**	**161838**	**11076**	178000	129924	14112	23.6
41.3	85	125700	92200	162309	10830	180900	131747	14412	38.4
15.5	90	113700	82350	155620	12841				5.4
22.7	90	117050	85900	158333	12122				11.6
32.4	90	120200	88200	160380	11646				23.6
41.3	90	121900	89450	160864	11403				38.4
15.5	95	108400	79600	154457	13396				5.4
22.7	95	113300	83100	157197	12686				11.6
32.4	95	116400	85400	158922	12215				23.6
41.3	95	118100	86700	159418	11975				38.4
15.5	105	101000	74100	150815	14508				5.4
22.7	105	105800	77600	153452	13814				11.6
32.4	105	108900	79900	155358	13355				23.6
41.3	105	110500	81100	155701	13120				38.4
15.5	110	OPERATION NOT RECOMMENDED							5.4
22.7	110								11.6
32.4	110	102193	81355	130896	12661				23.6
41.3	110	102612	82895	129888	12648				38.4

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In **Entering Air Temperature**

	Cooling Corrections * Sensible equals Total							Heating Corrections			
Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB	Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
61	0.910	0.763	1.030	*	*	*	0.895	60	1.025	1.047	0.965
64	0.955	0.615	0.881	1.148	*	*	0.948	65	1.010	1.023	0.990
67	1.000	0.466	0.733	1.000	1.267	*	1.002	70	0.995	1.000	1.015
70	1.045		0.585	0.852	1.118	*	1.055	75	0.980	0.977	1.040
73	1.090		0.436	0.703	0.970	1.139	1.109	80	0.965	0.953	1.065

For Variations In **Entering Air Flow**

	Cooling Corrections				Heating Corrections		
CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
3200	0.972	0.968	0.970	0.938	0.972	0.976	1.032
3600	0.986	0.984	0.990	0.969	0.986	0.988	1.016
3800	0.993	0.992	1.000	0.985	0.993	0.994	1.008
4000	1.000	1.000	1.010	1.000	1.000	1.000	1.000
4200	1.007	1.008	1.020	1.016	1.007	1.006	0.992
4400	1.014	1.016	1.030	1.031	1.014	1.012	0.984

Blower Performance

Sizes HS/HL - VS/VL 006 - 060

Based on wet air coil and clean air filter

* Factory connected tap. Field connection required to other taps.
Do not extrapolate.

Size	Fan Speed	0.10	0.20	0.30	0.40	0.50	0.60	0.70	Minimum CFM	Maximum CFM
006	HI MED* LO	320 265 245	285 235 225	250 215 205	220 180 165	175			165	320
009	HI MED* LO	375 340 325	335 315 300	295 280 265	258 245 235				235	375
012	HI MED* LO	435 385 320	400 360 305	365 330 290	335 305	300			290	435
015	HI MED* LO	620 530 450	585 505	555 490	530 465	505 450	475		450	620
019	HI MED* LO	730 650 560	700 620	660 585	610 550	570			550	730
024	HI MED* LO	1105 965 795	1050 910 750	980 850 695	900 770 640	810 695	700		600	1105
030	HI MED* LO	1190 1110 1000	1150 1070 960	1085 1005 910	1005 930 850	925 845 760	830 780	750	750	1190
036	HI MED* LO	1500 1360 1290	1420 1310 1240	1340 1250 1190	1250 1190 1120	1170 1110 1030	1080 1000 930	990 900 -	900	1500
042	HI MED* LO	1580 1490 1210	1510 1415 1170	1425 1335 1125	1340 1255 1080	1250 1170 1040	1165 1085 1000	1080	1000	1580
048	HI MED* LO	2130 1980 1810	2050 1900 1730	1960 1810 1650	1860 1720 1570	1750 1620 1490	1630 1520 1400	1470 1400 -	1400	2130
060	HI MED* LO	2200 2110 2060	2140 2050 2000	2080 2000 1940	2010 1940 1880	1940 1870 1820	1860 1800 1760	1740 1710 1700	1700	2200

Maximum CFM 3000 Minimum CFM 1800

Size HS/HL 072

Based on wet air coil and clean air filter.

Minimum CFM 1600 HL

SCFM Air Flow		CFM External Static Pressure (in wg.)														
		0.20	0.25	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50
1800	BHP RPM Turns Out	0.27 560 5.0	0.28 590 4.5	0.30 610 4.0	0.34 660 3.5	0.38 700 2.5	0.42 740 1.5	0.45 770 5.0								
2000	BHP RPM Turns Out	0.34 600 5.0	0.36 625 4.0	0.39 650 3.5	0.43 690 2.5	0.47 735 2.0	0.52 770 5.0	0.54 810 4.0	0.59 840 3.0	0.63 880 2.5						
2200	BHP RPM Turns Out	0.44 640 3.0	0.46 665 3.5	0.48 690 2.5	0.53 730 2.0	0.58 770 5.0	0.63 810 4.0	0.68 850 3.0	0.73 880 2.5	0.77 905 1.5	0.80 845 1.0	0.84 980 0.5				
2400	BHP RPM Turns Out	0.55 690 3.0	0.57 710 2.5	0.60 730 2.0	0.65 765 5.0	0.70 800 4.0	0.76 840 3.0	0.82 880 2.5	0.87 910 1.5	0.92 940 1.0	0.96 970 0.5	1.00 990 0.0	1.03 1110	1.20 1140		
2600	BHP RPM Turns Out	0.68 730 2.0	0.71 750 1.5	0.73 770 5.0	0.79 800 4.0	0.84 840 3.0	0.90 875 2.5	0.98 920 1.5	1.03 950 1.0	1.08 980 0.5	1.14 1000 0.0	1.18 1030	1.23 1050	1.27 1075	1.32 1105	1.41 1120
2800	BHP RPM Turns Out	0.83 780 5.0	0.86 790 4.0	0.89 810 3.5	0.95 880 3.0	1.00 910 2.5	1.07 950 2.0	1.14 980 1.0	1.21 1010 0.5	1.27 1040 0.0	1.33 1060	1.37 1090	1.43 1110	1.48 1135	**1.54** **1160**	**1.59**
3000	BHP RPM Turns Out	1.01 820 3.5	1.04 840 3.0	1.07 855 2.5	1.13 890 2.0	1.19 920 1.5	1.25 950 1.0	1.34 990 0.5	1.40 1020 0.0	1.47 1050	**1.54** **1080**	**1.58** **1100**	**1.65** **1120**	**1.71** **1150**	1.77 1170	**1.83** **1190**

Shaded area = Special sheaves required. RPM above range of standard sheaves or motor.
Bold Face = 2 HP Motor required.

For applications requiring higher static pressures, contact your local representative.

Size HS/HL 096

Based on wet air coil and clean air filter.

Maximum CFM 4200 Minimum CFM 3000 HS
Minimum CFM 2800 HL

SCFM Air Flow		CFM External Static Pressure (in wg.)														
		0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50
3000	BHP RPM Turns Out	0.80 980	0.87 1023 5.0	0.94 1064 4.0	1.06 1105 3.5	1.09 1144 2.5	1.16 1183 2.0	1.23 1220 1.0	1.30 1256 0.5	1.37 1292 0.0	1.45 1327	**1.52** **1362**	**1.42** **1365**	**1.49** **1399**	**1.56** **1433**
3200	BHP RPM Turns Out	0.94 1034 5.0	1.01 1074 4.0	1.08 1114 3.5	1.21 1153 2.5	1.23 1191 2.0	1.30 1228 1.0	1.37 1264 0.5	1.44 1299 0.0	**1.51** **134**	**1.59** **1368**	**1.66** **1402**	**1.67** **1403**	**1.56** **1437**	**1.63** **1470**
3400	BHP RPM Turns Out	1.09 1094 4.0	1.16 1133 3.0	1.23 1172 2.5	1.29 1209 2.0	1.36 1246 1.0	1.43 1282 0.5	1.49 1317 0.0	**1.56** **1351**	**1.63** **1386**	**1.70** **1419**	**1.77** **1452**	**1.83** **1484**	**1.90** **1516**	**1.97** **1548**
3600	BHP RPM Turns Out	1.27 1143 3.0	1.34 1180 2.5	1.41 1216 1.5	**1.55** **1252** **1.0**	**1.55** **1287** **0.5**	**1.62** **1322** **0.0**	**1.69** **1356**	**1.76** **1389**	**1.83** **1422**	**1.91** **1454**	**1.98** **1486**			
3800	BHP RPM Turns Out	1.46 1198 2.0	**1.53** **1234** **1.5**	**1.60** **1268** **1.0**	**1.75** **1303** **0.0**	**1.74** **1337**	**1.80** **1370**	**1.87** **1403**	**1.94** **1435**						
4000	BHP RPM Turns Out	**1.68** **1254** **1.0**	**1.74** **1288** **0.5**	**1.81** **1321** **0.0**	**1.96** **1354**	**1.94** **1387**									
4200	BHP RPM Turns Out	**1.91** **1310** **0.0**	**1.97** **1342**												

Shaded area = Special sheaves required. RPM above range of standard sheaves or motor.
Bold Face = 2 HP Motor required

Size HS/HL 120

Based on wet air coil and clean air filter.

Maximum CFM 4400 Minimum CFM 3200 HS
Minimum CFM 2800 HL

SCFM Air Flow		CFM External Static Pressure (in wg.)													
		0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50
3200	BHP RPM Turns Out	0.80 978	0.86 1009 5.0	0.91 1040 4.5	0.96 1070 4.0	1.01 1098 3.5	1.06 1126 3.0	1.11 1153 2.5	1.16 1180 2.0	1.21 1207 1.5	1.26 1232 1.0	1.30 1258 0.5	1.36 1282 0.0	1.41 1306	1.46 1329
3400	BHP RPM Turns Out	0.94 1031 5.0	0.99 1061 4.5	1.05 1090 4.0	1.10 1119 3.5	1.15 1146 3.0	1.20 1173 2.5	1.24 1199 2.0	1.29 1225 1.5	1.35 1250 1.0	1.40 1275 0.5	1.44 1300 0.0	1.49 1323	1.54 1347	1.59 1369
3600	BHP RPM Turns Out	1.10 1085 4.0	1.15 1113 3.5	1.20 1141 3.0	1.25 1168 2.5	1.30 1195 2.0	1.35 1221 1.5	1.39 1246 1.0	1.45 1270 1.0	1.50 1295 0.5	1.55 1319 0.0	1.59 1343	1.64 1366	1.69 1388	1.74 1410
3800	BHP RPM Turns Out	1.27 1139 3.0	1.32 1166 2.5	1.37 1193 2.0	1.42 1219 1.5	1.47 1244 1.0	1.52 1269 0.5	1.56 1293 0.0	1.61 1317	1.66 1341	1.71 1364	1.75 1387	1.80 1409	1.85 1431	1.90 1452
4000	BHP RPM Turns Out	1.46 1193 2.0	1.51 1219 1.5	1.56 1245 1.5	1.61 1270 1.0	1.65 1294 0.5	1.70 1318 0.0	1.74 1341	1.79 1364	1.84 1387	1.89 1410	1.93 1432	1.97 1453		
4200	BHP RPM Turns Out	1.67 1248 1.5	1.72 1272 1.0	1.76 1297 0.5	1.81 1321 0.0	1.86 1344	1.90 1368	1.94 1390	1.98 1412						
4400	BHP RPM Turns Out	1.90 1303 0.0	1.94 1326	1.99 1350											

Shaded area = Special sheaves required. RPM above range of standard sheaves or motor.

For applications requiring higher static pressures, contact your local representative.

Electrical Data

Models 006-060

Size	Model No.	Voltages	Phases	Minimum Circuit Ampacity	MAX. Fuse or HAC R Breaker	MAX. Circuit Breaker Canada Only	LRA Comp. (ea.)	RLA Comp. (ea.)	Blower FLA	Total FLA	Blower Motor HP
006	HS/HL	208/230	1	3.8	15	15	15.9	2.8	0.34	3.14	1/25
		265	1	3.6	15	15	12.3	2.6	0.34	2.94	1/25
009	HS/HL & VS/VL	115	1	10.5	15	15	40.0	7.0	0.90	7.90	1/8
		208/230	1	5.2	15	15	20.0	3.5	0.80	4.30	1/10
		265	1	4.8	15	15	16.0	3.1	0.90	4.00	1/6
012	HS/HL & VS/VL	208/230	1	6.6	15	15	31.2	4.6	0.80	5.40	1/10
		265	1	6.2	15	15	27.0	4.2	0.90	5.10	1/10
015	HS/HL & VS/VL	208/230	1	7.8	15	15	31.2	5.5	0.92	6.42	1/10
		265	1	6.8	15	15	27.0	4.8	0.83	5.63	1/10
019	HS/HL & VS/VL	208/230	1	11.3	15	15	43.0	7.6	1.20	8.80	1/8
		265	1	10.2	15	15	45.0	6.6	0.90	7.50	1/8
024	HS/HL & VS/VL	208/230	1	12.5	15	20	49.0	8.1	1.50	9.60	1/4
		265	1	10.9	15	15	46.5	7.1	1.30	8.40	1/4
030	HS/HL & VS/VL	208/230	1	15.6	25	25	61.0	10.2	1.60	11.8	1/4
		265	1	13.7	20	20	58.0	9.2	1.30	10.5	1/4
	HS/HL & VS/VL	208/230	3	10.0	15	20	50.0	6.7	1.60	8.30	1/4
		460	3	5.1	15	15	25.0	3.4	0.80	4.20	1/4
036	HS/HL & VS/VL	208/230	1	22.6	35	35	78.0	15.5	3.20	18.7	1/2
		265	1	20.8	30	30	73.8	14.1	3.20	17.3	1/2
	HS/HL & VS/VL	208/230	3	16.5	25	25	59.5	10.6	3.20	13.8	1/2
		460	3	7.6	15	15	30.7	4.6	1.80	6.40	1/2
042	HS/HL & VS/VL	208/230	1	25.3	40	35	88.0	17.7	3.20	20.8	1/2
	HS/HL & VS/VL	208/230	3	17.7	25	25	65.1	11.6	3.20	14.7	1/2
		460	3	8.2	15	15	32.8	5.1	1.80	6.90	1/2
048	HS/HL & VS/VL	208/230	1	32.3	50	40	95.4	21.5	5.40	26.9	3/4
	HS/HL & VS/VL	208/230	3	22.7	35	35	82.0	13.8	5.44	19.2	3/4
		460	3	10.9	15	15	41.0	6.9	2.20	9.10	3/4
		575	3	8.3	15	15	36.0	5.1	1.40	6.50	3/4
060	HS/HL & VS/VL	208/230	1	40.3	60	50	125.0	27.6	5.80	33.4	1
	HS/HL & VS/VL	208/230	3	26.0	40	40	90.0	16.1	5.80	21.9	1
		460	3	12.3	15	20	45.0	7.7	2.60	10.3	1
		575	3	10.3	15	20	36.0	6.4	2.30	8.70	1

NOTE: 208/230 Voltage is factory tapped at 208V. Field connection required for 230V.

Models 072-120 (Belt Driven Units)

Size	Model No.	Voltages	Phases	Minimum Circuit Ampacity	MAX. Fuse or HACR Breaker	MAX. Circuit Breaker Canada Only	LRA Comp. (ea.)	RLA Comp. (ea.)	Blower FLA	Total FLA	Blower Motor HP
072	HS/HL	208/230	3	29.6	40	40	59.5(2)	10.6(2)	5.7	26.9	1 1/2
		460	3	13.0	15	15	30.7(2)	4.6(2)	2.6	11.8	1 1/2
	HS/HL	208/230	3	31.5	40	40	59.5(2)	10.6(2)	7.5	28.7	2*
		460	3	13.8	20	15	30.7(2)	4.6(2)	3.4	12.6	2*
096	HS/HL	208/230	3	36.8	50	50	82.0(2)	13.8(2)	5.7	33.3	1 1/2
		460	3	18.6	25	25	41.0(2)	6.9(2)	2.6	16.4	1 1/2
		575	3	13.4	15	15	36.0(2)	51.2(2)	1.9	12.1	1 1/2
	HS/HL	208/230	3	38.6	50	50	82.0(2)	13.8(2)	7.5	35.1	2*
		460	3	19.4	25	25	41.0(2)	6.9(2)	3.4	17.2	2*
		575	3	14.0	20	20	36.0(2)	51.2(2)	2.5	12.7	2*
120	HS/HL	208/230-	3	43.7	60	60	90.0(2)	16.1(2)	7.5	39.7	2
		460	3	20.7	25	25	45.0(2)	7.7(2)	3.4	18.8	2
		575	3	16.9	20	20	36.0(2)	6.4(2)	2.5	15.3	2
	HS/HL	208/230-	3	44.8	60	60	90.0(2)	16.1(2)	8.6	40.8	3*
		460	3	21.6	30	30	45.0(2)	7.7(2)	4.3	19.7	3*
		575	3	17.8	20	25	36.0(2)	6.4(2)	3.4	16.2	3*

Physical Characteristics

Size	Model No.	Ship. Wt. Lbs.	Oper. Wt. Lbs.	Refrigerant.-to-Air Heat Exchanger				Refrig. Charge R-22/CKT oz.	No. of Circuits	Hi Volt. Knockout In.	Blower Diameter	Blower Width
				Face Are Sq. Ft.	No. of Rows Rows Deep	Copper Tube Sz. OD in.	No. of Fin Inch					
006	HS/HL	118	108	0.97	2	3/8	11	12	1	7/8, 1-1/8	5.500	5.0
009	HS/VS	118	108	0.97	2	3/8	12	16	1	7/8, 1-1/8	5.500	5.0
	HL/VL	118	108	0.97	2	3/8	12	17	1	7/8, 1-1/8	5.500	5.0
012	HS/VS	123	117	0.97	2	3/8	12	16	1	7/8, 1-1/8	6.0	4.0
	HL/VL	123	117	0.97	2	3/8	12	17	1	7/8, 1-1/8	6.0	4.0
015	HS/VS	160	150	2.22	3	3/8	12	28/25	1	7/8, 1-1/8	6.0	5.0
	HL/VL	160	150	2.22	3	3/8	12	.. 25	1	7/8, 1-1/8	6.0	5.0
019	HS	180	173	2.22	3	3/8	12	30	1	7/8, 1-1/8	7.625	7.0
	VS	180	173	2.22	3	3/8	12	30	1	7/8, 1-1/8	9.0	7.0
	HL	180	173	2.22	3	3/8	12	32	1	7/8, 1-1/8	7.625	7.0
	VL	180	173	2.22	3	3/8	12	32	1	7/8, 1-1/8	9.0	7.0
024	HS/VS	220	200	2.50	3	3/8	13	46	1	7/8, 1-1/8	9.0	7.0
	HL/VL	235	215	2.50	3	3/8	13	38	1	7/8, 1-1/8	9.0	7.0
030	HS/VS	220	200	2.50	3	3/8	13	44	1	7/8, 1-1/8	9.0	7.0
	HL/VL	235	215	2.50	3	3/8	13	51	1	7/8, 1-1/8	9.0	7.0
036	HS/VS	235	225	3.33	2	3/8	14	35	1	7/8, 1-1/8	9.0	7.0
	HL/VL	235	225	3.33	2	3/8	14	36	1	7/8, 1-1/8	9.0	7.0
042	HS/VS	240	230	3.33	3	3/8	12	50	1	7/8, 1-1/8	9.0	8.0
	HL/VL	240	230	3.33	3	3/8	12	44	1	7/8, 1-1/8	9.0	8.0
048	HS/VS	300	290	4.17	2	3/8	14	46	1	7/8	10.0	10.0
	HL/VL	300	290	4.17	2	3/8	14	42	1	7/8	10.0	10.0
060	HS/VS	357	347	4.17	3	3/8	14	82	1	7/8	11.0	10.0
	HL/VL	357	347	4.17	3	3/8	14	82	1	7/8	11.0	10.0
072	HS	635	615	6.66	2	3/8	14	38	2	1 3/8	12.0	11.0
	HL	635	615	6.66	2	3/8	14	36	2	1 3/8	12.0	11.0
096	HS	665	645	8.33	2	3/8	14	46	2	1 3/8	10.0(2)	10.0(2)
	HL	665	645	8.33	2	3/8	14	42	2	1 3/8	10.0(2)	10.0(2)
120	HS	675	655	8.33	3	3/8	14	82	2	1 3/8	11.0(2)	10.0(2)
	HL	675	655	8.33	3	3/8	14	82	2	1 3/8	11.0(2)	10.0(2)

Operating Limits

Environment

This equipment is designed for indoor installation ONLY.

Power Supply

A voltage variation of +/- 10% of nameplate utilization voltage is acceptable. Three-phase system imbalance shall not exceed 2%.

Starting Conditions

HS/VS Units:

HS/VS Units start and operate in an ambient of 40°F, with entering air at 40°F, with entering water at 70°F, with both air and water at the flow rates used in the ARI Standard 320-86 rating test, for initial start-up in winter.

HL/VL Units:

HL/VL Unit Heat Pumps will start and operate in an ambient of 40°F, with entering air at 40°F, with entering water at 40°F, with both air and water at the flow rates used in the ARI Standard 320-86 rating test, for initial start-up in winter.

Note: These are not normal or continuous operating conditions. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.

Air and Water Limits

	HS/VS		HL/VL	
	Cooling	Heating	Cooling	Heating
Min. Ambient Air	50°F	50°F	40°F	40°F
Rated Ambient Air	80°F	70°F	80°F	70°F
Max. Ambient Air	100°F	85°F	100°F	85°F
Min. Entering Air	50°F	50°F	50°F	40°F
Rated Entering Air, db/wb	80/67°F	70°F	80/67°F	70°F
Max. Entering Air, db/wb	100/83°F	80°F	100/83°F	80°F

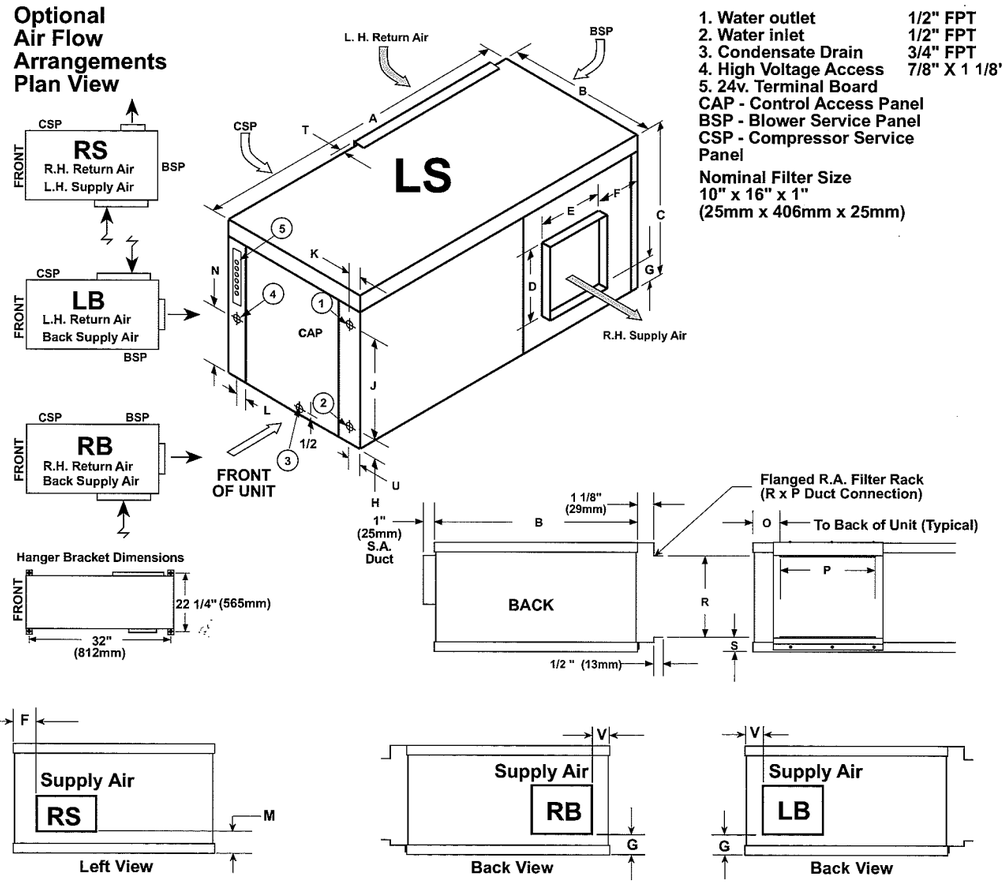
Water Limits

	HS/VS		HL/VL	
	Cooling	Heating	Cooling	Heating
Min. Entering Water	55°F	55°F	40°F	40°F
Normal Entering Water	85°F	70°F	85°F	70°F
Max. Entering Water	110°F	90°F	110°F	90°F

NOTES: (A) Minimum Air and Water conditions can only be used at ARI flow rates.
(B) Only one maximum or minimum value may be used with HS/VS Units, all other parameters must be at normal conditions. HL/VL Units may have up to two values at maximum or minimum with all other parameters at normal condition.

Dimensions

Horizontal Models 006/009/012



1. Water outlet 1/2" FPT
2. Water inlet 1/2" FPT
3. Condensate Drain 3/4" FPT
4. High Voltage Access 7/8" X 1 1/8" K.O.
5. 24v. Terminal Board

CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel

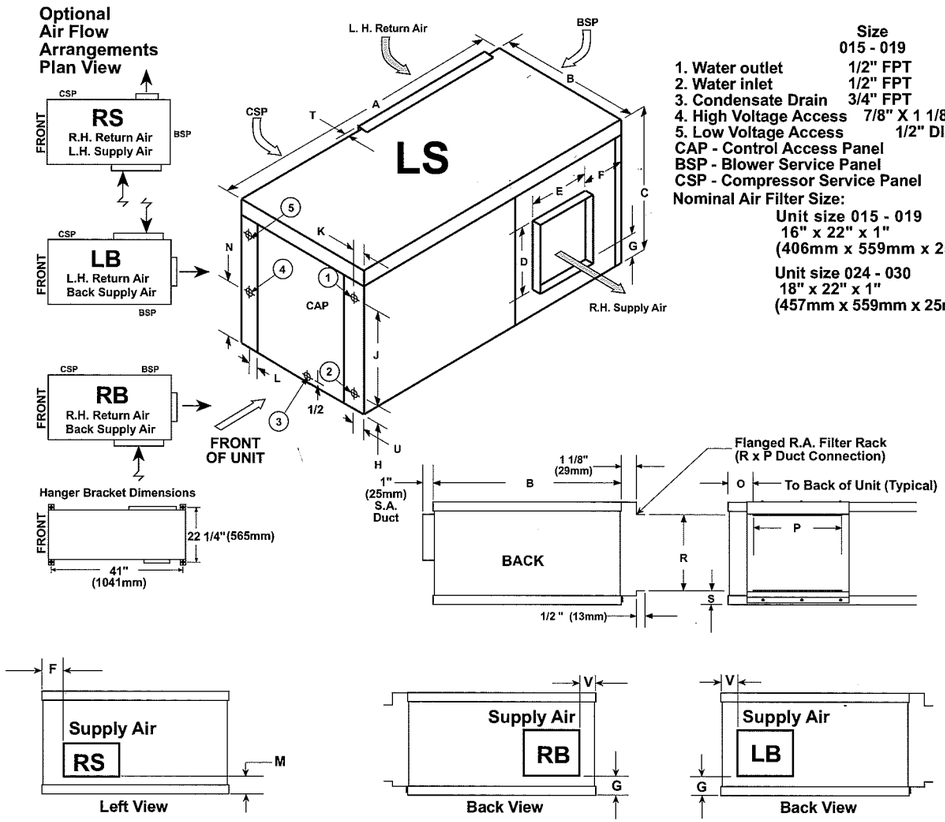
Nominal Filter Size
10" x 16" x 1"
(25mm x 406mm x 25mm)

Supply Air Duct locations (LS shown on main drawing)

Note: Air flow pattern can be converted in the field by interchanging the blower discharge panel (w/blower assembly attached) with the blower service panel. Only LS to LB and RS to RB can be converted.

MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	U	V
006	INCHES	34	20	11 1/8	5 3/4	8	7	4	2 3/8	6 1/8	1	1	1	4 3/4	2	15	9	1/2	1	4 1/2
	MM	854	508	283	146	203	178	102	60	156	25	25	25	121	51	381	229	13	25	114
009	INCHES	34	20	11 1/8	5 3/4	8	7	4	2 3/8	6 1/8	1	1	1	4 3/4	2	15	9	1/2	1	4 1/2
	MM	854	508	283	146	203	178	102	60	156	25	25	25	121	51	381	229	13	25	114
012	INCHES	34	20	11 1/8	5 3/4	8	7	4	2 3/8	6 1/8	1	1	1	4 3/4	2	15	9	1/2	1	4 1/2
	MM	854	508	283	146	203	178	102	60	156	25	25	25	121	51	381	229	13	25	114

Horizontal Models 015/019/024/030



	Size 015 - 019	Size 024 - 030
1. Water outlet	1/2" FPT	3/4" FPT
2. Water inlet	1/2" FPT	3/4" FPT
3. Condensate Drain	3/4" FPT	3/4" FPT
4. High Voltage Access	7/8" X 1 1/8" K.O.	
5. Low Voltage Access	1/2" DIA.	

CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel

Nominal Air Filter Size:
Unit size 015 - 019
16" x 22" x 1"
(406mm x 559mm x 25mm)
Unit size 024 - 030
18" x 22" x 1"
(457mm x 559mm x 25mm)

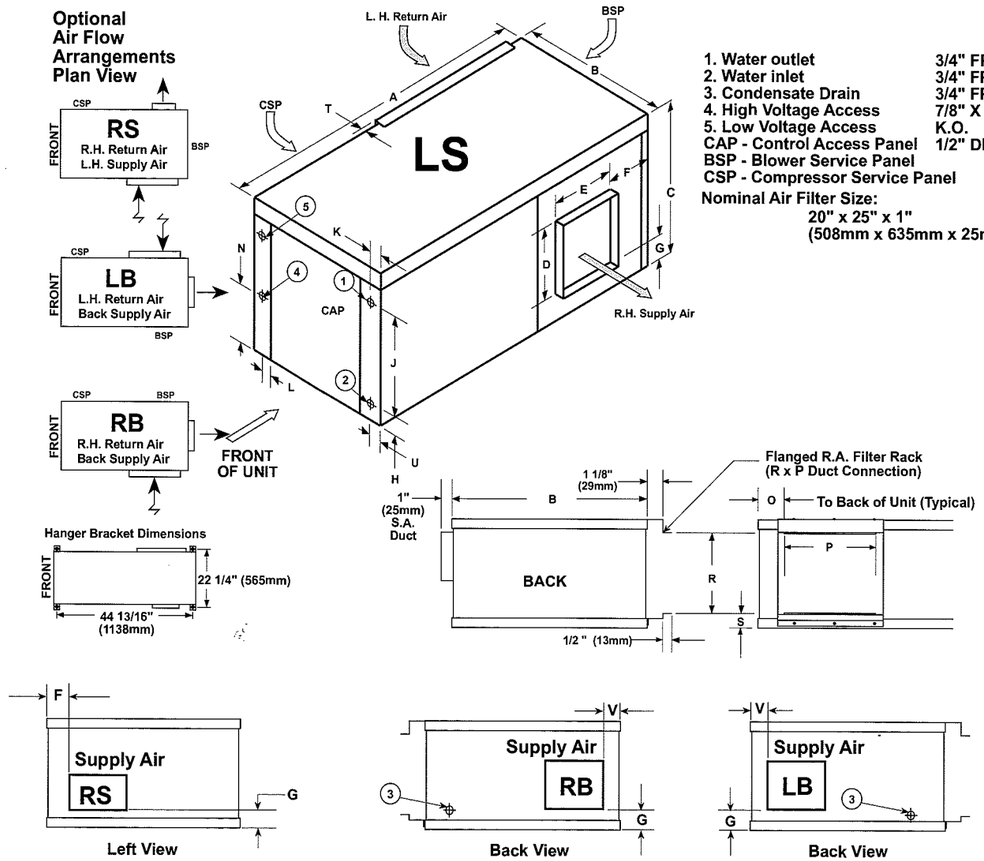
Supply Air Duct locations (LS shown on main drawing)

Note: Air flow pattern can be converted in the field by interchanging the blower discharge panel (w/blower assembly attached) with the blower service panel. Only LS to LB and RS to RB can be converted.

MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	U	V
015	INCHES	43	20	17	7 3/4	10	6 3/4	5 1/4	1 1/4	12	2 3/8	1	4 1/4	7 1/4	2	20 1/2	14 3/4	1/2	4	5
	MM	1092	508	432	197	254	171	133	32	305	60	25	108	184	51	521	375	13	102	127
019	INCHES	43	20	17	10 1/4	7	6 1/2	5 1/4	1 1/4	11	2 3/8	1	1 1/4	7 1/4	2	20 1/2	14 3/4	1/2	4	6 1/2
	MM	1092	508	432	260	178	165	133	32	279	60	25	32	184	51	521	375	13	102	165
024	INCHES	43	20	19	10	9	5 1/4	5 1/4	1 1/4	11	2 3/8	1	4	7 1/4	2	20 1/2	16 3/4	1/2	4	5 1/4
	MM	1092	508	483	254	229	133	133	32	279	60	25	102	184	51	521	425	13	102	133
030	INCHES	43	20	19	10	9	5 1/4	5 1/4	1 1/4	13 1/4	2 3/8	1	4	7 1/4	2	20 1/2	16 3/4	1/2	4	5 1/4
	MM	1092	508	483	254	229	133	133	32	337	60	25	102	184	51	521	425	13	102	133

Dimensions

Horizontal Models 036/042



1. Water outlet	3/4" FPT
2. Water inlet	3/4" FPT
3. Condensate Drain	3/4" FPT
4. High Voltage Access	7/8" X 1 1/8"
5. Low Voltage Access	K.O.
CAP - Control Access Panel	1/2" DIA.
BSP - Blower Service Panel	
CSP - Compressor Service Panel	

Nominal Air Filter Size:
20" x 25" x 1"
(508mm x 635mm x 25mm)

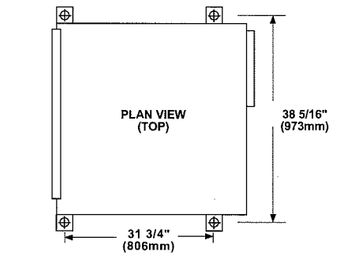
Supply Air Duct locations (LS shown on main drawing)

Note: Field rework of air flow arrangement (LS to LB, LB to LS, RS to RB, RB to RS) requires sheet metal changes.

MODEL		A	B	C	D	E	F	G	H	J	K	L	N	O	P	R	S	U	V
036	INCHES	47	20	21	10 3/8	9 3/8	7 1/2	3 1/4	3 7/8	13 3/8	2 1/4	1	11	2 3/4	22 3/4	18 3/8	1 3/4	3 3/4	3 1/4
	MM	1194	508	533	264	238	191	83	98	340	57	25	279	70	578	467	44	95	83
042	INCHES	47	20	21	10 3/8	10 3/4	6	3 1/4	3 5/8	13 3/8	2 1/4	1	10 1/2	2 3/4	22 3/4	18 3/8	1 3/4	3 3/4	2 3/4
	MM	1194	508	533	264	273	152	83	92	340	57	25	267	70	578	467	44	95	67

Horizontal Models 048/060

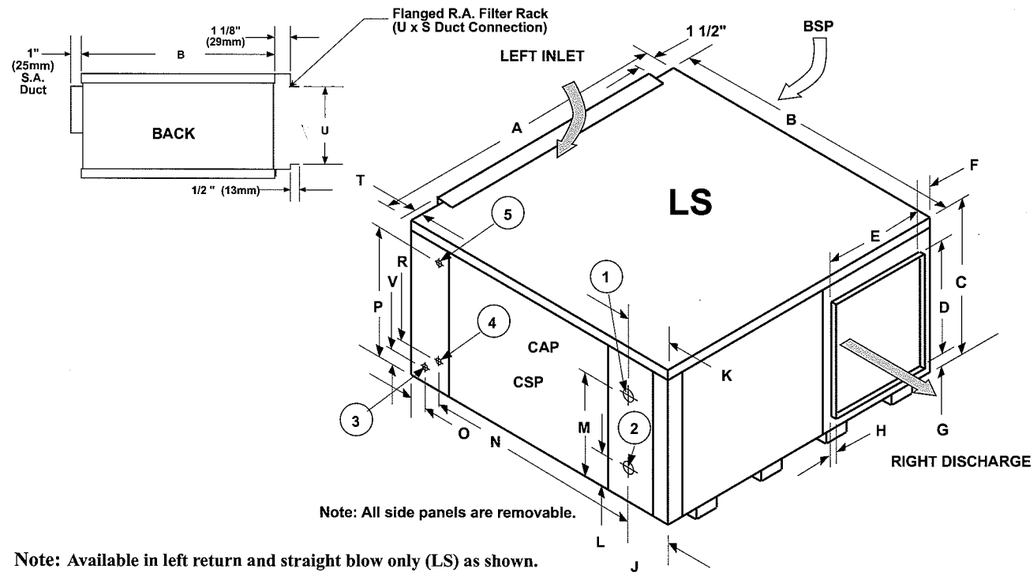
Hanger Bracket Dimensions



1. Water outlet	1" FPT
2. Water inlet	1" FPT
3. Condensate Drain	3/4" FPT
4. High Voltage Access	7/8" X 1 1/8" DIA., 22mm x 29mm DIA.
5. Low Voltage Access	1/2" DIA., 13mm DIA.
CAP - Control Access Panel	
BSP - Blower Service Panel	
CSP - Compressor Service Panel	

Return Air Duct Size
18 1/4" High X 29 3/4" Wide
464mm High X 756mm Wide

Nominal Filter Size
16 x 20 X 1 Two Required
406mm x 508mm x 25mm Two Required

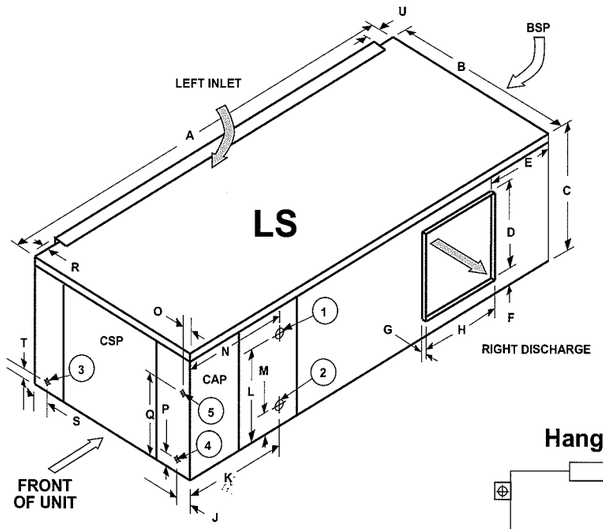


Note: Available in left return and straight blow only (LS) as shown.

MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	T	U	V
048	INCHES	36 1/4	36 1/4	21	15	15	1 3/4	2 5/8	1	4 7/8	3 3/8	3 7/8	18	7 1/2	5 3/8	17 1/2	3 1/8	32	1	18 1/4	1 1/2
	MM	921	921	533	381	381	44	67	25	124	86	98	457	191	137	445	79	813	25	464	38
060	INCHES	36 1/4	36 1/4	21	15	15	1 3/4	2 /58	1	5 1/8	1 7/8	2 5/8	18 1/2	7 1/2	5 3/8	17 1/2	3 1/8	32	1	18 1/4	1 1/2
	MM	921	921	533	381	381	44	67	25	130	48	67	470	191	137	445	79	813	25	464	38

Dimensions

Horizontal Model 072



Note: All side panels are removable.

1. Water outlet 1 1/4" FPT
2. Water inlet 1 1/4" FPT
3. Condensate Drain 3/4" FPT
4. High Voltage Access 1 3/8" K.O. (35mm)
5. Low Voltage Access 1/2" DIA (13mm)

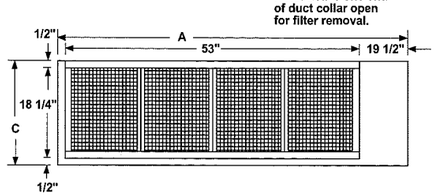
CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel

Return Air Duct Size
18 1/4" High X 53" Wide
464mm High X 1346mm Wide

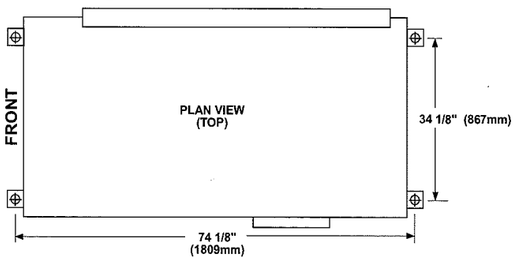
Nominal Filter Size
20 X 26 1/2 X 1 Two required
508mm X 673mm X 25mm Two required

FLANGED FILTER RACK VIEW AT INLET

Note: Leave one end of duct collar open for filter removal.



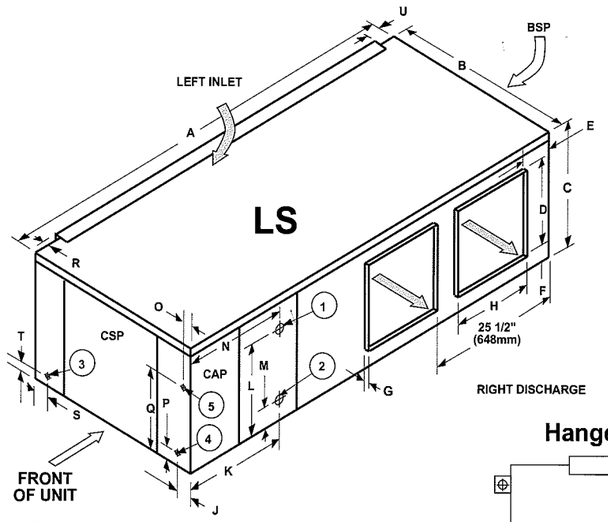
Hanger Bracket Dimensions



Note: Available in left return, straight blow only (LS) as shown

MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	T	U	V
072	INCHES	72 1/4	36	21	16	14 1/2	3	1	16	1 7/8	19 3/4	16 1/2	3 1/4	21 1/4	1/2	2 1/2	1	4 1/4	1 3/8	3/4	13 1/2
	MM	1835	914	533	406	368	76	25	406	48	502	419	83	540	13	64	25	108	35	19	343

Horizontal Models 096/120



Note: All side panels are removable.

1. Water outlet 1 1/4" FPT
2. Water inlet 1 1/4" FPT
3. Condensate Drain 3/4" FPT
4. High Voltage Access 1 3/8" K.O. (35mm)
5. Low Voltage Access 1/2" DIA (13mm)

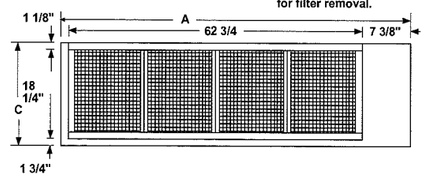
CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel

Return Air Duct Size
18 1/4" High X 62 3/4" Wide
464mm High X 1594mm Wide

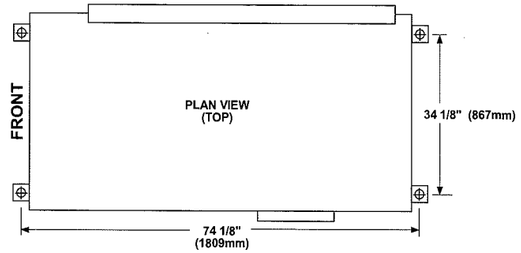
Nominal Filter Size
16 X 20 X 1 Four required
406mm X 508mm X 25mm Four required

FLANGED FILTER RACK VIEW AT INLET

Note: Leave one end of duct collar open for filter removal.



Hanger Bracket Dimensions



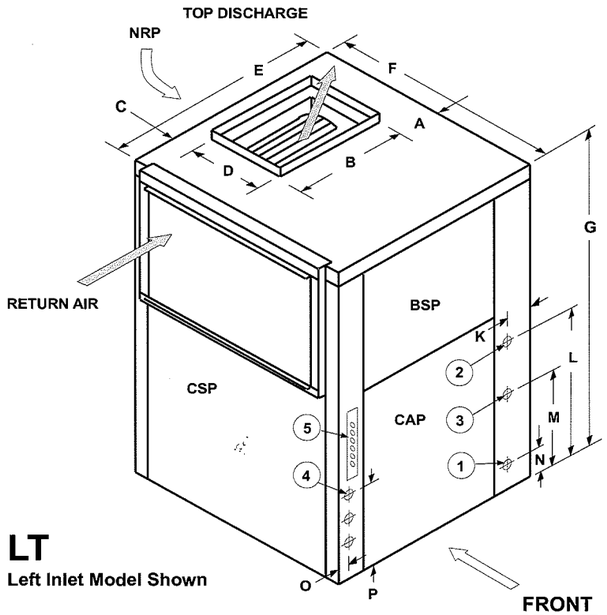
Note: Available in left return, straight blow only (LS) as shown

MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	T	U	V
096	INCHES	72 1/4	36 1/4	21	15 1/8	3 1/4	3 1/4	1	15 1/8	1 7/8	18 1/4	17	3 1/4	20	1/2	2 1/2	1	4 1/8	1 1/4	1 7/8	13 1/2
	MM	1835	921	533	384	83	83	25	384	48	464	432	83	508	13	64	25	105	32	48	343
120	INCHES	72 1/4	36 1/4	21	15 1/8	2 5/8	4 1/4	1	15 1/8	1 7/8	18 1/4	18 5/8	3 1/4	22 1/4	1/2	2 1/2	1	4 1/8	1 1/4	1 7/8	13 1/2
	MM	1835	921	533	384	67	108	25	384	48	464	473	83	565	13	64	25	105	32	48	343

Dimensions

Vertical Models 009/012

Standard Arrangement



1. Water inlet 1/2" FPT
2. Water outlet 1/2" FPT
3. Condensate Drain 3/4" FPT
4. High Voltage Access 7/8" X 1 1/8" K.O. (22mm X 29mm K.O.)
5. Low Voltage Access 1/2" DIA (13mm DIA)

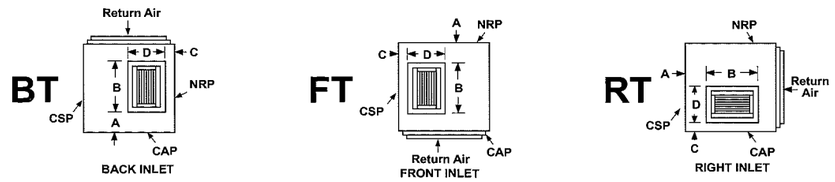
CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel
NRP - Non-Removable Panel

Return Air Duct Size
9" High X 15 1/8" Wide
229mm High X 384mm Wide

Nominal Filter Size
10" X 16" X 1"
254mm X 406mm X 25mm

LT
Left Inlet Model Shown

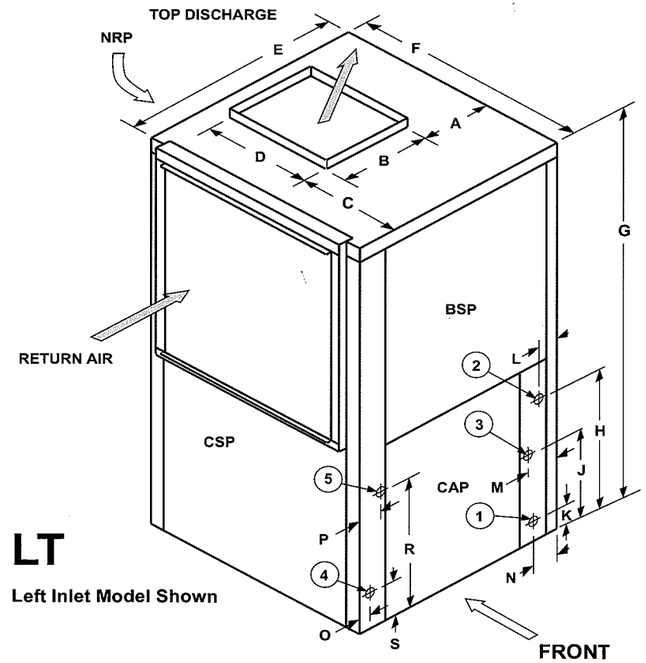
Optional Air Flow Patterns



MODEL		A	B	C	D	E	F	G	K	L	M	N	O	P
009	INCHES	3 7/8	9 7/8	1 3/4	7	19 1/8	19 1/8	24 1/8	1	8 3/4	5 5/8	2 3/8	1	4 1/2
	MM	98	251	44	178	486	486	613	25	222	143	60	25	114
012	INCHES	3 7/8	8 7/8	1 5/8	7 3/8	19 1/8	19 1/8	24 1/8	1	8 3/4	5 5/8	2 3/8	1	4 1/2
	MM	98	251	41	187	486	486	613	25	222	143	60	25	114

Vertical Models 015/019

Standard Arrangement



1. Water inlet 1/2" FPT
2. Water outlet 1/2" FPT
3. Condensate Drain 3/4" FPT
4. High Voltage Access 7/8" X 1 1/8" K.O. (22mm X 29mm K.O.)
5. Low Voltage Access 1/2" DIA (13mm DIA)

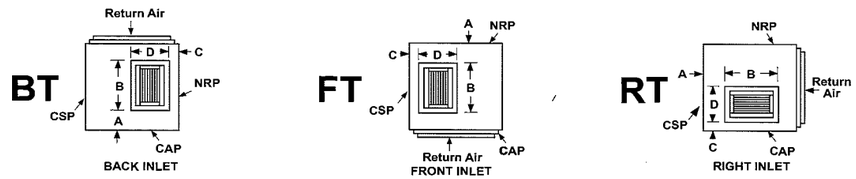
CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel
NRP - Non-Removable Panel

Return Air Duct Size
18 3/4" High X 18 1/8" Wide
476mm High X 460mm Wide

Nominal Filter Size
20" X 20" X 1"
508mm X 508mm X 25mm

LT
Left Inlet Model Shown

Optional Air Flow Patterns

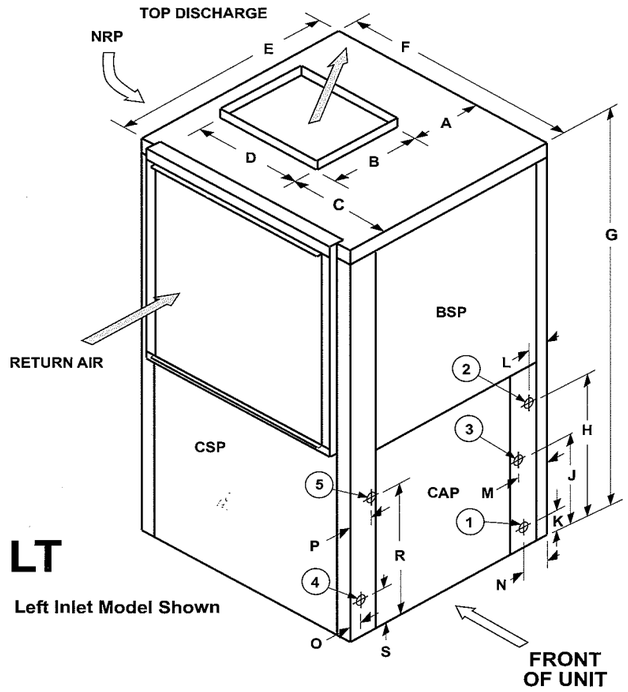


MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S
015	INCHES	5 1/2	10	9 1/4	7 5/8	21 1/8	21 1/8	37 1/2	11 7/8	9 3/4	1 7/8	3 7/8	6	5 3/8	1 1/8	1 5/8	14 1/2	7 1/4
	MM	140	254	235	194	537	537	953	302	248	48	98	152	137	29	41	368	184
019	INCHES	6	9	5 5/8	12 5/8	21 1/8	21 1/8	37 1/2	12 7/8	9 3/4	1 7/8	3 7/8	6	5 3/8	1 1/8	1 5/8	14 1/2	7 1/4
	MM	140	229	143	321	537	537	953	327	248	48	98	152	137	29	41	368	184

Dimensions

Vertical Models 024/030

Standard Arrangement



LT

Left Inlet Model Shown

1. Water inlet 3/4" FPT
2. Water outlet 3/4" FPT
3. Condensate Drain 3/4" FPT
4. High Voltage Access 7/8" X 1 1/8" K.O. (22mm X 29mm K.O.)
5. Low Voltage Access 1/2" DIA (13mm DIA)

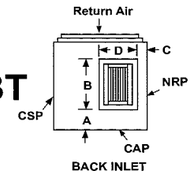
CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel
NRP - Non-Removable Panel

Return Air Duct Size
18 1/2" High X 20" Wide
470mm High X 502mm Wide

Nominal Filter Size
20" X 20" X 1"
508mm X 508mm X 25mm

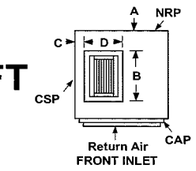
Optional Air Flow Patterns

BT



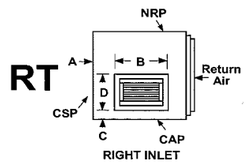
BACK INLET

FT



FRONT INLET

RT

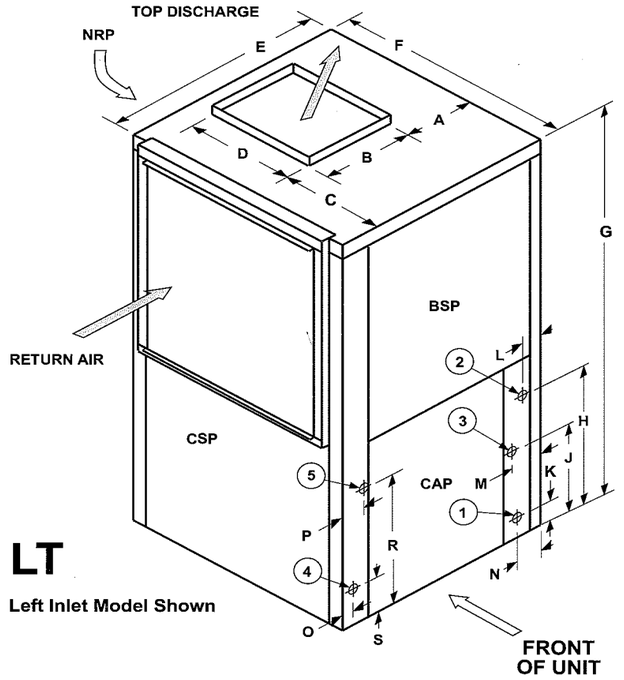


RIGHT INLET

MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S
024	INCHES	5 3/4	11 5/8	7 5/8	12 3/4	23 1/4	23 1/4	37 1/2	13 1/8	9 3/4	1 7/8	3 7/8	6	5 3/8	1 1/2	1	14 1/2	7 1/4
	MM	146	295	194	324	591	591	953	33	248	48	98	152	137	38	25	368	184
030	INCHES	5 3/4	11 5/8	7 5/8	12 3/4	23 1/4	23 1/4	37 1/2	15 1/4	9 3/4	1 7/8	3 7/8	6	5 3/8	1 1/2	1	14 1/2	7 1/4
	MM	146	295	194	324	591	591	953	387	248	48	98	152	137	38	25	368	184

Vertical Models 036/042

Standard Arrangement



LT

Left Inlet Model Shown

1. Water inlet 3/4" FPT
2. Water outlet 3/4" FPT
3. Condensate Drain 3/4" FPT
4. High Voltage Access 7/8" X 1 1/8" K.O. (22mm X 29mm K.O.)
5. Low Voltage Access 1/2" DIA (13mm DIA)

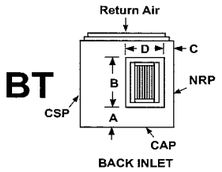
CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel
NRP - Non-Removable Panel

Return Air Duct Size
22 1/2" High X 23 3/4" Wide
572mm High X 603mm Wide

Nominal Filter Size
24" X 24" X 1"
610mm X 610mm X 25mm

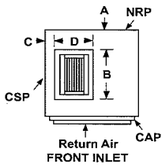
Optional Air Flow Patterns

BT



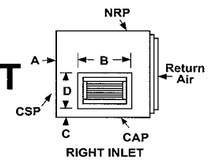
BACK INLET

FT



FRONT INLET

RT



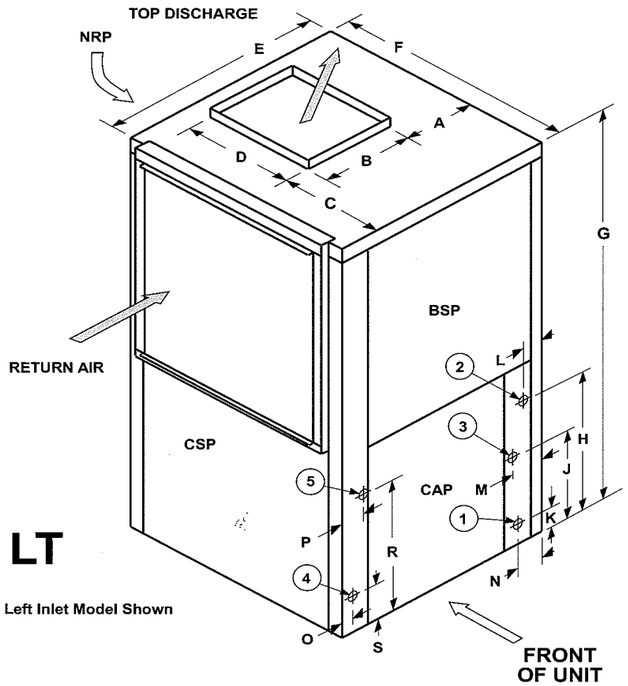
RIGHT INLET

MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S
036	INCHES	4 1/4	12 5/8	6 7/8	11 5/8	25 3/8	25 3/8	42	15 1/2	7 1/2	2 3/8	4	5 3/4	5 3/8	1 1/2	1 1/4	16 1/2	6
	MM	108	321	175	295	644	644	1062	394	191	60	102	146	137	38	32	419	152
042	INCHES	2	12 5/8	6 1/4	12 7/8	25 3/8	25 3/8	42	15 1/2	7 1/2	2 3/8	4	5 3/4	5 3/8	1 1/2	1 1/4	16 1/2	6
	MM	51	321	159	327	644	644	1062	394	191	60	102	146	137	38	32	419	152

Dimensions

Vertical Models 048/060

Standard Arrangement



LT

Left Inlet Model Shown

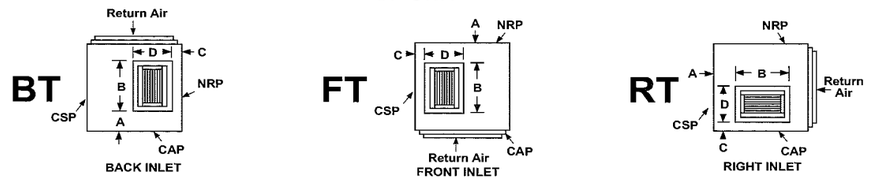
1. Water inlet	1" FPT
2. Water outlet	1" FPT
3. Condensate Drain	3/4" FPT
4. High Voltage Access	7/8" X 1 1/8" K.O. (22mm X 29mm K.O.)
5. Low Voltage Access	1/2" DIA (13mm DIA)

CAP - Control Access Panel
BSP - Blower Service Panel
CSP - Compressor Service Panel
NRP - Non-Removable Panel

Return Air Duct Size
24" High X 28" Wide
610mm High X 711mm Wide

Nominal Filter Size
28" X 25" X 1"
711mm X 635mm X 25mm

Optional Air Flow Patterns



MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S
048	INCHES	1 1/2	14 7/8	6 1/4	15 5/8	28 1/8	28 1/8	43 1/4	15 3/8	9 1/2	1 1/2	3 1/4	5 1/2	4 5/8	1 1/2	1	16 1/2	9
	MM	38	378	159	397	714	714	1099	391	241	38	83	140	117	38	25	419	229
060	INCHES	1 1/2	14 7/8	6 1/4	15 5/8	28 1/8	28 1/8	43 1/4	15 3/8	9 1/2	1 1/2	3 1/4	5 1/2	4 5/8	1 1/2	1	16 1/2	11
	MM	38	378	159	397	714	714	1099	391	241	38	83	140	117	38	25	419	279

Options and Accessories

Factory-Installed Options

Air Flow Arrangements

Horizontal unit air flow arrangements can be supplied with Left-Return/Straight-Discharge, Right-Return/ Straight-Discharge, Left-Return/Back-Discharge or Right-Return/Back-Discharge air flow arrangements. All of these arrangements are available on units 006-042. For units larger than size 042, only Left-Return/ Straight-Discharge is available. Vertical units are available in Left-Return/Top-Discharge, Right-Return/ Top-Discharge, Back-Return/Top-Discharge or Front-Return/Top-Discharge.

Water Coils

In place of the standard steel/copper water coil, a cupro-nickel water coil is optional on all units.

Sound Package

The optional sound attenuation package includes a heavy dampening material on the compressor, a discharge muffler (units 19,000 BTU and larger) and 1/2" insulation with a 5 lb/cu-ft. density. All external panels are lined with a special 1/2" thick glass fiber dual density insulation.

Extended Range (HL UNITS)

Units are available for water systems with 110°F/43°C entering water conditions. In closed-loop systems, this increases the temperature swing of the loop from 40°F/4°C to 110°F/43°C, effectively doubling the storage capacity of the pipe loop and reducing the size of the heat rejector required. The increased temperature swing results in reduced operation of the boiler through more efficient heat transfer and use of recovered energy.

Extra Extended Range (HE UNITS)

Units are available for water/anti-freeze systems with fluid temperatures as low as 25°F/-4°C. This permits buildings to be directly coupled to the earth and can result in the elimination of both cooling towers and boilers. **These units have insulated water coils and are specifically designed for operation at these low temperatures. Capacities and unit dimensions are separate from the products shown in this catalog and are available from your ClimateMaster representative.**

Motorized Shut Off Valves

ClimateMaster can provide a motorized shut off valve for field installation. A wiring plug is provided on the unit to allow for easy connection. **This feature allows variable pumping to be utilized.**

Water Regulating Valves

Water regulating valves can be provided for variable pumping operations where the water pressure is 150 PSIG or less on sizes 006-042. The dual acting water regulating valve is controlled by the refrigerant pressure. By reducing the amount of water required, significant energy savings in pumping costs can be achieved.

Water Regulating Valves For Cooling Only

Where permitted by code, units may be connected to city water for cooling only operation. An optional direct acting water valve will modulate the water flow to provide optimum equipment operation and reduced water usage.

Options and Accessories cont.

Direct Digital Control (DDC) Board

ClimateMaster can provide a DDC board (CMC-2000 Series, (See pages 46-47) which can be factory-mounted or field-installed. ClimateMaster will also work with other DDC board manufacturers to factory-mount their controllers, if so desired. Contact your ClimateMaster representative to discuss particular applications as there are usually unique requirements on each project.

Chicago Code Construction

This option includes features required to meet installation requirements within the jurisdiction of the City of Chicago Electrical Code.

Air Filters

Each water source heat pump can be provided with either field or factory-installed 2" filter racks and either glass fiber, permanent metal mesh or high efficiency 30% Class II ASHRAE Dust Spot pleated filters.

Paint

Standard horizontal units are produced with unpainted galvanized sheet metal. For exposed applications, factory-painted units are available in Polar Ice, baked enamel finish. All Vertical units are painted.

Field-Installed Options

Wall Mount Thermostats

Wall-mounted thermostats are available for both manual and automatic change-over applications. The automatic change-over thermostats are one-stage heating/one-stage cooling with system "OFF-AUTO" switch and fan "ON-AUTO" switch. A LED is available to indicate a need for service. Manual change-over thermostats are one-stage heating/one-stage cooling with "HEAT-OFF-COOL" system switch and "ON-OFF" fan switch. Electronic thermostats can be either automatic change-over or manual change-over with a LED for service. For multiple-compressor units, this thermostat can be provided as a two-stage heat/two-stage cool version. An optional remote sensor is available for this thermostat and allows for temperature sensing up to 400 feet away. A programmable thermostat is available which operates in either manual or automatic change-over. The thermostat is a true 7 day programmable thermostat with up to 4 heating and cooling temperatures for each day of the week.

Supply and Return Water Hoses

The standard hoses are 2 feet long, made of galvanized steel, and have a UL94 rating. Optional stainless steel hoses are also available.

Self Balancing Hose Kits

Each hose kit includes two fire rated hoses, each 2 feet in length (3-foot length is optional), an automatic flow control valve with test port, two shut-off valves (one with a test port), a blow down valve and a Y-strainer.

Ball Valves

Brass ball valves rated 400 lb. w.o.g., memory stop can be provided.

Installation

The following recommendations are ideas designed to promote efficient installation and operation of your unit. This information should not be interpreted as detailed installation procedures. For complete information on all proper installation procedures, please refer to your ClimateMaster Installation, Operation and Maintenance manual shipped with each order.

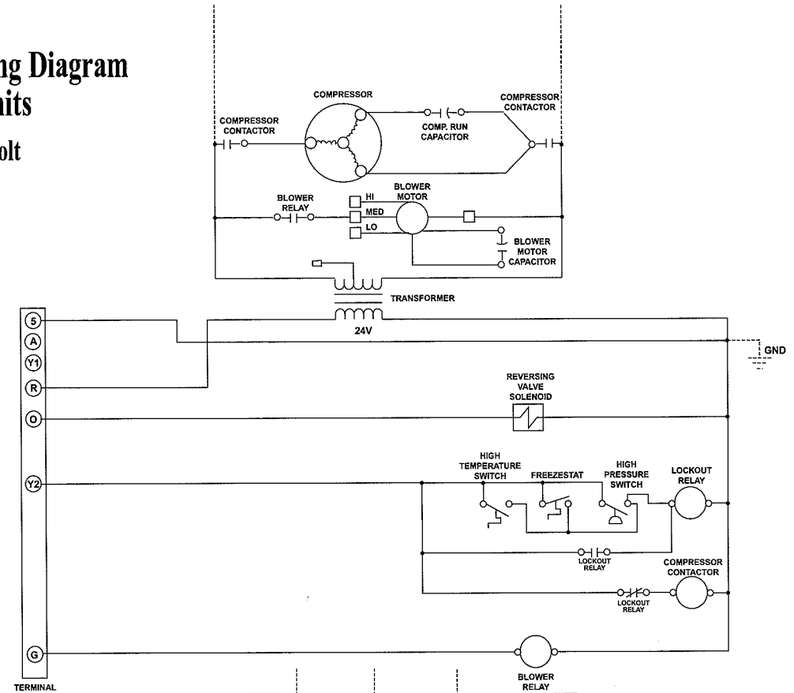
1. Before installing a unit, ensure that adequate space is available for routine maintenance and service. See dimensional drawings for access panel locations.
2. Electrical conduit, light fixtures, piping or any other electrical element should not be located directly below the installed unit.
3. Provide room for easy access for filter changes.
4. To ensure quiet performance of the Horizontal units, when using free return, always use a return air boot and an insulated discharge duct with a insulated 90° bend. For Vertical units, make sure that no line-of-sight path to the return air coil exists and that a similar discharge duct arrangement is used. Install Vertical units on vibration isolator pads.
5. To ensure a proper, trouble-free installation, it is very important to flush the entire pipe-loop before any units are connected to it. Once the units are connected, make sure that each unit has the correct water flow and water temperature within the range of specifications.
6. Connect a condensate drain and trap to each unit according to the installation instructions provided with the unit. The condensate pipe must be sloped away from the unit towards a drain.
7. The use of flexible hoses is recommended to eliminate vibration and noise transmission. If the unit must be removed for service, the use of hoses makes this task much easier.
8. All electrical connections must be made in accordance with NEC and local codes.
9. The units must be installed level or sloped slightly towards the condensate discharge.
10. Never use water source heat pumps for temporary heating or cooling.
11. Prior to system start-up, install a clean air filter in all units.

Typical Wiring Diagrams

Typical Single Phase Wiring Diagram for HS/HL and VS/VL Units

Single Phase, 60hz, 208/230/265 Volt

Single Phase, 50hz, 220 Volt

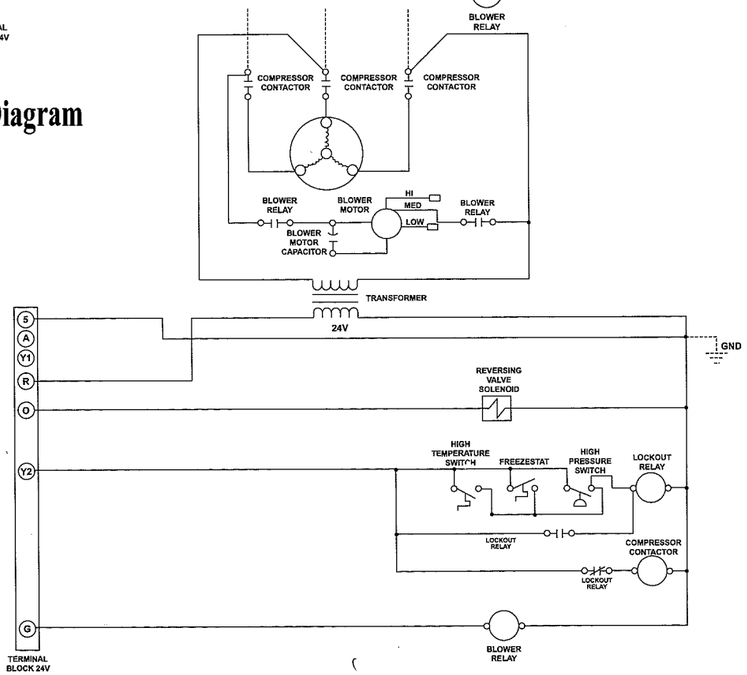


Typical Three Phase Wiring Diagram for HS/HL, VS/VL Units.

Three Phase, 60hz, 208/230/460 Volt

Three Phase, 50hz, 380 Volt

Single Compressor Units Only.



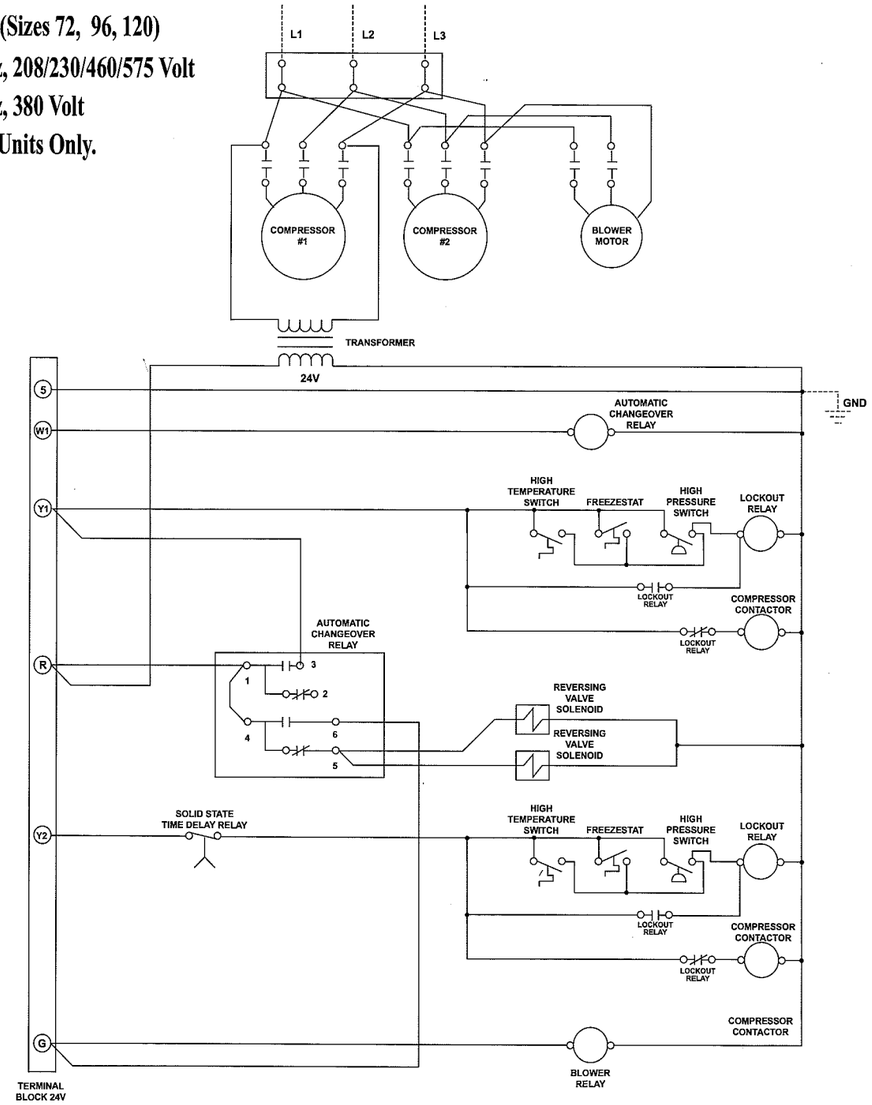
Typical Three Phase, Two Compressor Unit Wiring Diagram

For HS/HL Units (Sizes 72, 96, 120)

Three Phase, 60hz, 208/230/460/575 Volt

Three Phase, 50hz, 380 Volt

Two Compressor Units Only.



Control Features

CMC-2000 Series Controllers

The CMC-2000 Series Controllers are designed to enhance heat pump unit performance with the ability to coordinate complete systems. CMC 2000 Series Controllers offer either complete stand-alone unit control or allow you to connect your heat pump system to a DDC control system which includes lighting and other energy saving controls. The CMC Series is the most advanced controller made by any heat pump manufacturer today. And best of all, ***the CMC-2000 Series board is the ONLY electronic controller designed to accommodate future upgrades without board replacement.***

Standard Basic Functions

The basic controller package (CMC-2001) offers all the standard features available with electromechanical systems, plus ***13 additional standard functions.*** This group of added features include ***intelligent re-set,*** designed to automatically restart a unit within a specific period of time following a fault, given the fault has been adequately corrected. Also included is the ***fail-safe reversing valve operation***, a feature that energizes the reversing valve on cooling and de-energizes the reversing valve on heating.

Options

Three styles of CMC Controllers (CMC-2001, 2005, 2010) offer up to ***39 standard and optional features,*** from basic unit control to full DDC system control. With three basic control boards to choose from, along with a variety of options on each, you get the right amount of control you want for the price you want to pay.

Communications/ Future Upgrades to DDC Status

The CMC-2000 Series incorporates a socket which accommodates the future installation of an RS-485 interface board. This on-board programming system allows communication with local or remote PCs via a modem. With the availability of the RS-485, you have the flexibility to upgrade your control system as your demands require, giving you the freedom to choose the system you need for today, without sacrificing the upgrade you may need in the furture. The RS-485 interface board can be included on new products or simply snapped into place at a later date in the field. No other controller offers you this kind of flexibility.

Diagnostics

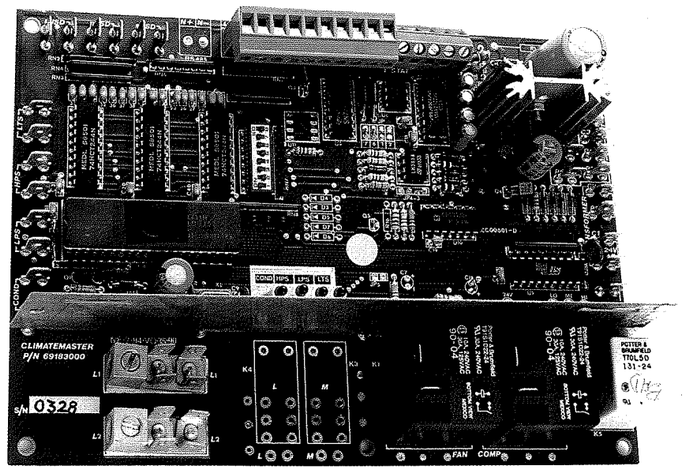
Five on-board diagnostics highlight seven different possible reasons for unit malfunction, speeding-up service time, eliminating unnecessary service charges and minimizing down-time. Diagnostics can be observed from a remote location when the RS-485 option is utilized.

Unit/System Operating Efficiency

Random-start, demand load-shed, night set-back, demand limit and protective circuits all work to enhance the performance of your system. These features are standard on CMC-2000 Series Electronic Controllers.

Comfort Control

Hi-Low fan speed controls, motorized air damper controls, and the ability to utilize more accurate electronic thermostats adds up to increased comfort through superior unit control.



CMC-2000 Series Electronic Controllers.

ClimateMaster offers three standard electronic controller configurations, each with optional features available, so that you can choose the control you need and **pay only for the features you want.**

	Electro-Mechanical	Electronic CMC-2001	Electronic CMC-2005	Electronic CMC-2010
High Pressure Protection	s	s	s	s
Low Pressure Protection	s	s	s	s
Low Refrigerant Gas Protection	s	s	s	s
Low Water Flow Protection	s	s	s	s
Room Temperature Set Point - In Room	s	s	s	s
Room Temperature Set Point - Remote				s*
Display Room Temperature - In Room	s	s	s	s
Display Room Temperature - Remote				s*
Demand Load Shed	o	s	s	s
Low Voltage Protection	o	s	s	s
High Voltage Protection	o	s	s	s
Emergency Shutdown	o	s	s	s
Random Start	o	s	s	s
Anti-Short-Cycle Time-Delay	o	s	s	s
Condensate Overflow Switch	o	s	s	s
Intelligent Re-set	o	s	s	s
Quick Service Test		s	s	s
Reduced Reversing Valve Operation		s	s	s
LED Status Lights	o	s	s	s*
Night Setback	o	s	s	s
Night Setback Override - Remote				s
Night Setback Override - Local	o	s	s	s
High/Low Fan Speed			s	s
Pump Restart	o	o	s	s*
Compressor Run Hours				s*
Compressor Starts				s*
Fan Run Hours				s*
Remote Alarm				s
Local Alarm	o	o	o	o
Local Alarm For Filter Replacement	o	o	o	o*
Remote Alarm For Filter Replacement				s
Local Alarm For Condensate Overflow	o	o	o	o*
Remote Alarm For Condensate Overflow				s*
RS-485 Communication		u	u	s
Outdoor-Air Damper-Control	o	o	e	e
Motorized Water Valve	o	o	e	e
Totally-Automated Building Interface				o
Leaving Water Temperature Display				o
Multiple Units On One Thermostat	none	3	3	3

s = Standard Feature o = Optional Feature u = Upgrade e = either Outdoor-Air Damper-Control or Motorized Water Valve can be selected, but not both.

* To use this feature requires a personal computer to link to the system and run the required ClimateMaster software.

Specifications

Ceiling Concealed Horizontal and/or Concealed Vertical Heat Pumps

General

Furnish and install ClimateMaster Water Source Heat Pumps, as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow.

Horizontal Only
Units shall be ClimateMaster model HS for standard range 60°/95° F (15.5°/35.0° C), HL for extended range 40°/110° F (4.4°/43° C) and HE for ground coupled systems 25°/110° F (-3.85°/43° C). Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing.

Vertical Only
Units shall be ClimateMaster model VS for standard range 60°/95° F (15.5°/35.0° C), VL for extended range 40°/110° F (4.4°/43° C) and VE for ground coupled systems 25°/110° F (-3.85°/43° C). Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing.

All equipment listed in this section must be rated in accordance with American Refrigeration Institute (ARI), Underwriters Laboratories (UL) and Canadian Standards Association (CSA). The units shall have ARI, UL, CSA labels. All units shall be factory tested under normal operating conditions at nominal water flow rates. Units which are tested without water flow are not acceptable. Ground coupled units must be rated in accordance with the Canadian Earth Energy Association (CEEA) (Canada only).

Basic Construction

Horizontal Only
Units shall have one of the following air flow arrangements, Right-Discharge/Left-Inlet; Left-Discharge/Right-Inlet; Back-Discharge/Left-Inlet; or Back-Discharge/Right-Inlet as shown on the plans. If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. If other arrangements make servicing difficult the contractor must provide access panels and clear routes to ease service. These changes in layout must be approved by the architect.

Vertical Only
Units shall have one of the following air flow arrangements, Left-Return/Top-Discharge, Right-Return/Top-Discharge, Back-Return/Top-Discharge, or Front-Return/Top-Discharge inlet as shown on the plans. If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. If other arrangements make servicing difficult the contractor must provide access panels and clear routes to ease service. These changes in layout must be approved by the architect.

Horizontal shall be fabricated from heavy gauge galvanized (GS90) sheet metal. All interior surfaces shall be lined with 1/2 inch, 1 1/2 lb. acoustic type glass fiber insulation. All fiberglass shall be coated and have exposed edges tucked under flanges to prevent the introduction of glass fibers into the airstream. All insulation must meet NFPA 90A.

Option: All units shall have a painted baked enamel finish. The color will be Polar Ice. Plain galvanized units are not acceptable.

Units must have an insulated panel separating the fan compartment from the compressor compartment. Units with the compressor in the airstream are not acceptable.

Units shall have a factory installed 1 inch thick filter bracket for side filter removal. Units shall have a 1 inch thick throwaway type glass fiber filter. Contractor shall purchase one spare set of filters and replace factory-shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

Option: Contractor shall install 2 inch filter brackets and 2 inch glass fiber throwaway filters on all units.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. Supply and return water connections shall be copper FPT fittings and shall be securely mounted flush to the cabinet allowing for connection to a flexible hose without the use of a back-up wrench. Water connections which protrude through the cabinet or require the use of a backup wrench shall not be allowed.

To facilitate installation in minimal space requirements, units rated 30,000 BTUH (7908 watts) and under shall have all electrical and water connections on the end of the cabinet opposite the duct connections. Contractor shall be responsible for any extra costs involved in the installation of units which do not have this feature. Contractor must also ensure that non-specified units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: Manufacturer shall provide a sound attenuation package that shall include the following as a minimum.

a. All units 15,000 BTUH (5008 watts) and up must have a compressor discharge muffler.

b. Compressor side panels and base pan must have closed cell insulation rated at 5 lb./cu-ft. density.

c. All reciprocating compressors must have high density damping material applied to the compressor shell.

d. All units 15,000 BTUH (3954 watts) and up shall have the compressors mounted on springs.

Any units not meeting this design shall be operated and demonstrated to the engineer at the manufacturers expense. Any units not having this construction and producing noise problems on installation shall be repaired at the manufacturer's expense.

Fan and Motor Assembly

Units rated 60,000 BTUH (15815 watts) and under shall have a direct-drive centrifugal fan. The fan motor shall be 3-speed, permanently lubricated, PSC type with thermal overload protection. Units supplied without permanently lubricated motors must provide external oilers for easy service.

The fan motor shall be isolated from the fan housing by torsionally flexible isolation.

Units rated 72,00 BTUH (18978 watts) and above shall have a belt drive fan assembly. The assembly shall include a forward curved fan wheel, housing, solid steel fan shaft encased in ball bearings, fan pulley and adjustable motor sheave. The motor shall be a three phase, open type with internal thermal overload protection. The motor shall be mounted on an adjustable base for proper belt tension.

The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. External static pressure rating of the unit shall be based on a wet coil. Ratings based on a dry coil shall NOT be acceptable.

Refrigerant Circuit

Units shall have a sealed refrigerant circuit including a hermetic compressor, a refrigerant metering device, a finned tube refrigerant to air heat exchanger, a reversing valve, a coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, a low pressure sensor, and a low water temperature (thermostat) switch. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service.

Activation of any safety device shall prevent compressor operation via a lockout relay. The lockout relay shall be reset at the thermostat or at the contractor supplied disconnect switch. Units which may be reset at the disconnect switch only shall not be acceptable.

Option: Coaxial water to refrigerant heat exchangers shall be cupro nickel.

Hermetic compressors shall be internally sprung, externally isolated, with thermal overload protection and shall be located in an insulated compartment to minimize sound transmission. Units above 15,000 BTUH (3954 watts) shall have the compressor mounted on spring isolators to reduce noise and vibration transmission. Rubber mounts for these larger units are not acceptable.

Refrigerant to air heat exchangers shall utilize enhanced aluminum fins and rifled copper tube construction rated to withstand 425 PSI (2930 KPA) refrigerant working pressure.

Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 450 PSI (3103 KPA) working refrigerant pressure and 400 PSI (2758 KPA) working water pressure.

Refrigerant metering shall be accomplished by capillary tubes for units intended for use in standard operating ranges, or expansion valves for units intended for use in expanded operating ranges.

Reversing valves shall be four-way solenoid activated refrigerant valves which shall fail to heating operation should the solenoid fail to function. If the reversing valve solenoid fails to cooling, a low temperature thermostat must be provided to prevent over-cooling an already cold room.

Electrical

A control box shall be located within the unit and shall contain a transformer, controls for compressor, reversing valve and fan motor operation and shall have a terminal block for low voltage field wiring connections.

Units shall be name-plated for use with time delay fuses or HACR circuit breakers.

Unit controls shall be 24 volts and shall provide heating or cooling as required by the wall thermostat. Two compressor units shall have a solid state time delay relay to prevent both compressors from starting simultaneously.

Thermostats (Select one)

Thermostats shall be manual change over with OFF-HEAT-COOL system switch and fan ON-AUTO switch.

Thermostats shall be automatic change-over with OFF-AUTO system switch and fan ON-AUTO switch.

Thermostats shall be manual change over with OFF-HEAT-COOL system switch and fan ON-AUTO switch. A low temperature bulb set 10° F (5.6° C) below the room set-point shall maintain a minimum temperature when an unoccupied scheme is employed. A manual override switch of the unoccupied mode shall be furnished.

Thermostats shall be automatic change-over with OFF-AUTO system switch and fan ON-AUTO switch. A low temperature bulb set 10° F (5.6° C) below the room set-point shall maintain a minimum temperature when an unoccupied scheme is employed. A manual override switch of the unoccupied mode shall be furnished.

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Vertical Only
Units shall be ClimateMaster model VS for standard range 60°/95° F (15.5°/35.0° C), VL for extended range 40°/110° F (4.4°/43° C) and VE for ground coupled systems 25°/110° F (-3.85°/43° C). Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing.

All equipment listed in this section must be rated in accordance with American Refrigeration Institute (ARI), Underwriters Laboratories (UL) and Canadian Standards Association (CSA). The units shall have ARI, UL, CSA labels. All units shall be factory tested under normal operating conditions at nominal water flow rates. Units which are tested without water flow are not acceptable. Ground coupled units must be rated in accordance with the Canadian Earth Energy Association (CEEA) (Canada only).

Basic Construction

Horizontal Only
Units shall have one of the following air flow arrangements, Right-Discharge/Left-Inlet; Left-Discharge/Right-Inlet; Back-Discharge/Left-Inlet; or Back-Discharge/Right-Inlet as shown on the plans. If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. If other arrangements make servicing difficult the contractor must provide access panels and clear routes to ease service. These changes in layout must be approved by the architect.

Vertical Only
Units shall have one of the following air flow arrangements, Left-Return/Top-Discharge, Right-Return/Top-Discharge, Back-Return/Top-Discharge, or Front-Return/Top-Discharge inlet as shown on the plans. If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. If other arrangements make servicing difficult the contractor must provide access panels and clear routes to ease service. These changes in layout must be approved by the architect.

Horizontal shall be fabricated from heavy gauge galvanized (GS90) sheet metal. All interior surfaces shall be lined with 1/2 inch, 1 1/2 lb. acoustic type glass fiber insulation. All fiberglass shall be coated and have exposed edges tucked under flanges to prevent the introduction of glass fibers into the airstream. All insulation must meet NFPA 90A.

Option: All units shall have a painted baked enamel finish. The color will be Polar Ice. Plain galvanized units are not acceptable.

Units must have an insulated panel separating the fan compartment from the compressor compartment. Units with the compressor in the airstream are not acceptable.

Units shall have a factory installed 1 inch thick filter bracket for side filter removal. Units shall have a 1 inch thick throwaway type glass fiber filter. Contractor shall purchase one spare set of filters and replace factory-shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

Option: Contractor shall install 2 inch filter brackets and 2 inch glass fiber throwaway filters on all units.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. Supply and return water connections shall be copper FPT fittings and shall be securely mounted flush to the cabinet allowing for connection to a flexible hose without the use of a back-up wrench. Water connections which protrude through the cabinet or require the use of a backup wrench shall not be allowed.

To facilitate installation in minimal space requirements, units rated 30,000 BTUH (7908 watts) and under shall have all electrical and water connections on the end of the cabinet opposite the duct connections. Contractor shall be responsible for any extra costs involved in the installation of units which do not have this feature. Contractor must also ensure that non-specified units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: Manufacturer shall provide a sound attenuation package that shall include the following as a minimum.

a. All units 15,000 BTUH (5008 watts) and up must have a compressor discharge muffler.

b. Compressor side panels and base pan must have closed cell insulation rated at 5 lb./cu-ft. density.

c. All reciprocating compressors must have high density damping material applied to the compressor shell.

d. All units 15,000 BTUH (3954 watts) and up shall have the compressors mounted on springs.

Any units not meeting this design shall be operated and demonstrated to the engineer at the manufacturers expense. Any units not having this construction and producing noise problems on installation shall be repaired at the manufacturer's expense.

Fan and Motor Assembly

Units rated 60,000 BTUH (15815 watts) and under shall have a direct-drive centrifugal fan. The fan motor shall be 3-speed, permanently lubricated, PSC type with thermal overload protection. Units supplied without permanently lubricated motors must provide external oilers for easy service.

The fan motor shall be isolated from the fan housing by torsionally flexible isolation.

Units rated 72,00 BTUH (18978 watts) and above shall have a belt drive fan assembly. The assembly shall include a forward curved fan wheel, housing, solid steel fan shaft encased in ball bearings, fan pulley and adjustable motor sheave. The motor shall be a three phase, open type with internal thermal overload protection. The motor shall be mounted on an adjustable base for proper belt tension.

The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. External static pressure rating of the unit shall be based on a wet coil. Ratings based on a dry coil shall NOT be acceptable.

Refrigerant Circuit

Units shall have a sealed refrigerant circuit including a hermetic compressor, a refrigerant metering device, a finned tube refrigerant to air heat exchanger, a reversing valve, a coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, a low pressure sensor, and a low water temperature (thermostat) switch. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service.

Activation of any safety device shall prevent compressor operation via a lockout relay. The lockout relay shall be reset at the thermostat or at the contractor supplied disconnect switch. Units which may be reset at the disconnect switch only shall not be acceptable.

Option: Coaxial water to refrigerant heat exchangers shall be cupro nickel.

Hermetic compressors shall be internally sprung, externally isolated, with thermal overload protection and shall be located in an insulated compartment to minimize sound transmission. Units above 15,000 BTUH (3954 watts) shall have the compressor mounted on spring isolators to reduce noise and vibration transmission. Rubber mounts for these larger units are not acceptable.

Refrigerant to air heat exchangers shall utilize enhanced aluminum fins and rifled copper tube construction rated to withstand 425 PSI (2930 KPA) refrigerant working pressure.

Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 450 PSI (3103 KPA) working refrigerant pressure and 400 PSI (2758 KPA) working water pressure.

Refrigerant metering shall be accomplished by capillary tubes for units intended for use in standard operating ranges, or expansion valves for units intended for use in expanded operating ranges.

Reversing valves shall be four-way solenoid activated refrigerant valves which shall fail to heating operation should the solenoid fail to function. If the reversing valve solenoid fails to cooling, a low temperature thermostat must be provided to prevent over-cooling an already cold room.

Electrical

A control box shall be located within the unit and shall contain a transformer, controls for compressor, reversing valve and fan motor operation and shall have a terminal block for low voltage field wiring connections.

Units shall be name-plated for use with time delay fuses or HACR circuit breakers.

Unit controls shall be 24 volts and shall provide heating or cooling as required by the wall thermostat. Two compressor units shall have a solid state time delay relay to prevent both compressors from starting simultaneously.

Thermostats (Select one)

Thermostats shall be manual change over with OFF-HEAT-COOL system switch and fan ON-AUTO switch.

Thermostats shall be automatic change-over with OFF-AUTO system switch and fan ON-AUTO switch.

Thermostats shall be manual change over with OFF-HEAT-COOL system switch and fan ON-AUTO switch. A low temperature bulb set 10° F (5.6° C) below the room set-point shall maintain a minimum temperature when an unoccupied scheme is employed. A manual override switch of the unoccupied mode shall be furnished.

Thermostats shall be automatic change-over with OFF-AUTO system switch and fan ON-AUTO switch. A low temperature bulb set 10° F (5.6° C) below the room set-point shall maintain a minimum temperature when an unoccupied scheme is employed. A manual override switch of the unoccupied mode shall be furnished.

Specifications cont.

Hose Kits

All units 120,000 BTUH (31631 watts) and below shall be connected with hoses. The hoses shall be 2 feet (61mm) long, metal braided and fire rated to meet UL 94. Non fire rated hoses are not acceptable.

Option: All units 120,000 BTUH (31631 watts) and below shall be connected with hoses. The hoses shall be 2 feet (61mm)long, braided stainless steel, complete with adaptors.

Optional

Electro-Mechanical Controls

a. Units shall be supplied with a random start relay.

b. Units shall be supplied with a 24-volt night set back relay. Relay shall be NO or NC as shown on the control wiring diagram.

c. Units shall be supplied with an anti-short cycle relay.

d. Units shall be supplied with a condensate overflow switch.

e. Units shall be supplied with a 24-volt compressor cycling relay for demand load shed control.

f. Units shall be provided with a dry contact to initiate external alarm.

Optional

CMC-2001 Solid-State Control System

Unit shall have a solid-state control system. The control shall interface with any type of wall thermostat mechanical or electronic. The control system shall have the following features.

a. Anti-short cycle time delay on compressor operation, time delay shall be 5 minutes minimum.

b. Random start on power up mode or return from night setback.

c. Minimized reversing valve operation for extended life and quiet operation.

d. Night setback override from low temperature thermostat.

e. 2-hour override initiated by a signal from wall thermostat.

f. Low voltage protection.

g. High voltage protection.

h. Ability to work with any thermostat.

i. Single grounded wire to initiate night setback, demand load shed, or emergency shutdown.

j. Unit shutdown on high or low refrigerant pressures.

k. Unit shutdown on low water temperature.

l. Option to reset unit at thermostat or disconnect.

m. Automatic intelligent reset. Unit shall automatically reset the unit 10 minutes after trip if the fault has cleared. Should a fault re-occur within 30 minutes after reset, then permanent lockout will occur.

n. Ability to defeat time delays for servicing.

o. Light emitting diodes (LED) to indicate high pressure, low pressure, low voltage, high voltage, freeze protection, condensate overflow and control voltage status.

p. Control logic shall only move the reversing valve when cooling is called for the first time. The reversing valve shall be held in this position until the first call for heating. This scheme ensures quiet operation and increased valve life. Only control schemes that provide this reduced reversing valve operation will be accepted.

q. Thermostat shall be single stage automatic change-over with system OFF-AUTO switch and fan ON-Auto Switch. Thermostat shall incorporate an LED to indicate fault. If an unoccupied control is employed the thermostat shall have a low temperature setting 10° F (-12° C). below set-point to maintain unoccupied temperature. A momentary contact re-set switch shall be provided to initiate the two hour override.

r. Control board shall have an 8 pin plug to allow the future addition of RS485 DDC circuitry. Control boards that cannot be upgraded to DDC by plugging in a module shall not be allowed.

s. Control board shall allow up to 3 units to be operated from one thermostat without any auxiliary controls.

t. Optional 24 volt relay shall be required to provide dry contact alarm when used with a DDC system.

Optional

CMC-2005 Control System

Shall have all the features of the CMC-2001 panel with the following additional features:

a. The ability to select high, medium or low fan speed.

b. A relay to operate an external damper. The control to be such that the damper will not open until 30 minutes after the unit comes back from unoccupied mode or the relay will operate a motorized water valve. Relay or damper action to be selectable from a dip switch on the printed circuit board.

Optional

CMC-2010 Control System

Shall have all the features of the CMC-2001 panel with the following additional features:

a. The control board will be supplied with an RS-485 interface section. This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. "T" Tapping of the RS-485 Communications bus is not permitted, neither is the use of wire nuts. This contractor is responsible for all heat pump control wiring. The units shall be segregated into groups of 32. Each group connected to a UCI (unitary controller interface). All UCI's will be wired together with a 2-wire twisted shielded cable. A TAP interface and an IBM compatible computer shall be supplied.

b. All boards will have the electronic addresses FACTORY SET. The electronic address and the unit tagging shall be on the carton and on a nameplate affixed to the unit. In order to prevent field errors on site addressing is NOT PERMITTED.

The computer shall utilize a 286 chip as a minimum and have a 20M hard drive, a single 3.5" floppy drive and a color monitor. The WSHP manufacturer shall supply the software to supervise the operation of the individual WSHP units. This software must provide as a minimum the following:

a. Unoccupied control.

b. Emergency shutdown.

c. Demand limit control (Demand input by others)

d. Individual alarms for each fault if unit fails.

e. Water leaving temperature from each unit.

f. Ability to change room set points.

g. Ability to select high, medium or low fan speed.

h. Graphics of an individual unit or group of units. Complete with point readings displayed.

i. The ability to read individual points at fixed intervals thus provide trends.

j. Show the number of hours of compressor run time.

The unit manufacturer shall load the software and ensure that all units are communicating as part of the start-up procedure. The contractor is responsible to correct any wiring errors. Specific building graphics are not produced by the manufacturer but are custom made by the owner. Graphics may be purchased from the WSHP manufacturer under a separate quotation.

Optional Features

CMC-2001 and CMC-2010

a. The ability to select high, medium or low fan speed.

b. A relay to operate an external damper. The control to be such that the damper will not open until 30 minutes after the unit comes back from unoccupied or the relay will operate a motorized water valve. Relay action to be selectable from a dip switch on the printed circuit board.

CMC-2010 only:

c. Provide an electronic room sensor.
OR
Provide a digital room thermostat with set point adjustment, sensor and override button.

d. Ability to read leaving water temperature.

e. Ability to read compressor discharge temperature.

f. Show the number of compressor starts. Standard on CMC 2010

g. Show the number of hours of fan operation. Standard on CMC 2010

Warranty

Limited Express Warranty Limitation of Remedies and Liability

It is expressly understood that unless a statement is specifically identified as a warranty, statements made by ClimateMaster, Inc., a Delaware corporation, ("CM") or its representatives, relating to CM's products, whether oral, written or contained in any sales literature, catalog or agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely CM's opinion or commendation of CM's products. Except as specifically set forth herein, THERE IS NO EXPRESS WARRANTY as to any of CM's products and **CM MAKES NO WARRANTY OF MERCHANTABILITY OF THE GOODS OR OF THE FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE.**

GRANT OF LIMITED EXPRESS WARRANTY

CM warrants CM products purchased and retained in the United States of America and Canada to be free from defects in material and workmanship under normal use and maintenance as follows: (1) All complete air conditioning, heating, and/or heat pump units built or sold by CM for 12 months from date of unit start-up or 18 months from date of shipment (from factory), whichever comes first; and (2) Repair and replacement parts, which are not supplied under warranty, for 90 days from date of shipment (from factory). All parts must be returned to CM's factory in Oklahoma City, Oklahoma, freight prepaid, no later than 60 days after the date of the failure of the part; if CM determines the part to be defective and within CM's Limited Express Warranty, CM shall, when such part has been either replaced or repaired, return such to a factory recognized dealer, contractor or service organization, F.O.B. CM's factory, Oklahoma City, Oklahoma, freight prepaid. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty.

This warranty does not apply to: (1) Air filters, fuses, refrigerant, oil; (2) Products relocated after initial installation; (3) Any portion of the system not supplied by CM; (4) Products on which the unit tags have been removed or defaced; (5) Products on which payment to CM is or has been in default; (6) Products 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, alteration or mis-application of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening or refrigerant circuit; (8) Corrosion or abrasion; (9) Products manufactured or supplied by others; (10) Products which have been subjected to misuse, negligence or accidents; (11) Products which have been operated in a manner contrary to CM's printed instructions; or (12) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of CM's products.

CM is not responsible for: (1) the costs of labor, refrigerant, materials or services incurred in the removal of the defective part, or in obtaining and replacing the new or repaired part; or, (2) transportation costs of the defective part from the installation site to CM or of the return of any part not covered by CM's Limited Express Warranty.

Limitation: This Limited Express Warranty is given in lieu of all other warranties. If, not withstanding the disclaimers contained herein, it is determined that other warranties exist, any such express warranty, and any implied warranties of fitness for a particular purpose and merchantability shall be limited to the duration of the Limited Express Warranty.

LIMITATION OF REMEDIES

In the event of the Limited Express Warranty, CM will only be obligated at CM's option to repair the failed part or unit, or to furnish a new or rebuilt part or unit for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma of each defect, malfunction or other failure and a reasonable number of attempts by CM to correct the defect, malfunction or other failure and the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY AGAINST CM FOR THE BREACH OF ANY WARRANTY OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY.**

LIMITATION OF LIABILITY

CM shall not be liable for any damages occasioned by any delay in performance or any default caused by war, government restrictions or restraints, strikes, material shortages, acts of God or any other reason beyond the sole control of CM. **CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR NEGLIGENCE OR AS STRICT LIABILITY. CM MAKES NO WARRANTY AGAINST LATENT DEFECTS.**

OBTAINING WARRANTY PERFORMANCE

Normally, the contractor or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CM recognized dealer, contractor or service organization. If assistance is required in obtaining warranty performance, write or call:

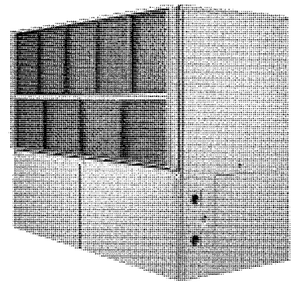
Climate Master, Inc.
Customer Service
7300 S.W. 44th Street
Oklahoma City, Oklahoma 73179
(405) 745-6000

NOTE: Some states or Canadian provinces do not allow limitations on how long an implied warranty lasts, or the limitation or exclusion of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state or Canadian province to Canadian province.

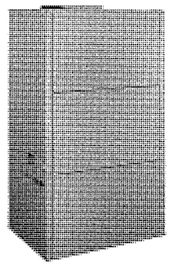
Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Additional Products

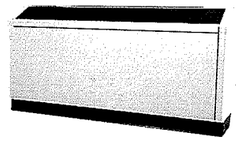
The ClimateMaster **Vertical Stacked** unit features a pre-piped and wired cabinet ready for direct application of drywall or for installation as an exposed unit. This space saving unit is ideally suited for multi-floor applications such as hotels, apartments and condominiums. The unit's cabinet becomes an integral part of the building with removable chassis, supply air grille and decorative return air panels. *Available in Sizes from **3/4 TON** to **3 TONS***



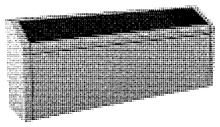
The ClimateMaster **Vari-Master** high-tonnage free-standing units combine the advantages of variable air volume systems with the flexibility and cost savings of a unitary product. Integrity of construction with solid support members and rugged components provide a unit that is quiet and vibration free. Our unique heat pump operation allows for morning warm up without additional equipment required. *Available in Sizes from **25 TONS** to **40 TONS***



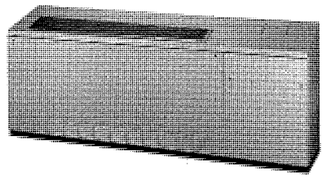
The ClimateMaster **Large Commercial Unit** (LCU) water-to-air heat pumps meet the most demanding requirements for greater energy efficiencies in new and renovated multi-room structures. Typically concealed, the units are installed in equipment rooms with air ducted into a comfort areas, where it is then individually controlled to maintain a specific comfort zone. While operating efficiencies are excellent for both the heating and cooling cycles, the LCU from ClimateMaster offers significantly lower first costs and operating costs than equipment with comparable flexibility. *Available in Sizes from **6 TONS** to **25 TONS***



A free-standing, ductless unit, The ClimateMaster **Console** provides zoned heating and cooling without wall penetration. When combined with unitary cooling units in core areas, these units take advantage of the heat recovery concept of transferring central heat gain to perimeter areas during the heating season. The slim, streamlined design is an excellent choice for public buildings, offices, hospitals and hotels. *Available in Sizes from **1/2 TON** to **1 1/2 TONS***



ClimateMaster's line of **Packaged Terminal Air Conditioners and Heat Pumps** offers energy efficient thru-the-wall units with a variety of attractive features. These compact, quiet units are available in three individual cabinet styles, designed to satisfy a broad range of application demands. *Available in Sizes from **1/2 TON** to **1 1/2 TONS***



The ClimateMaster **Classroom Ventilator** is specially designed for efficient heating and cooling of the classroom environment while its rugged, durable cabinet construction stands up to heavy traffic exposure. This quality, sloped-top unit utilizes 20% outside air, has unit-mounted controls and offers a tamper-proof, bar stock discharge grille. The unit can operate as a closed-loop or earth-coupled system. Available with internal pumping systems for stand alone GS applications. *Available in Sizes from **2 TONS** to **3 1/2 TONS***

ClimateMaster also manufactures a complete line of
Water-to-Water and Extended Range, Commercial and Residential Geo-Thermal Heat Pumps.
Ask your local representative about quality ClimateMaster Heat Pump Products...Built for Life!