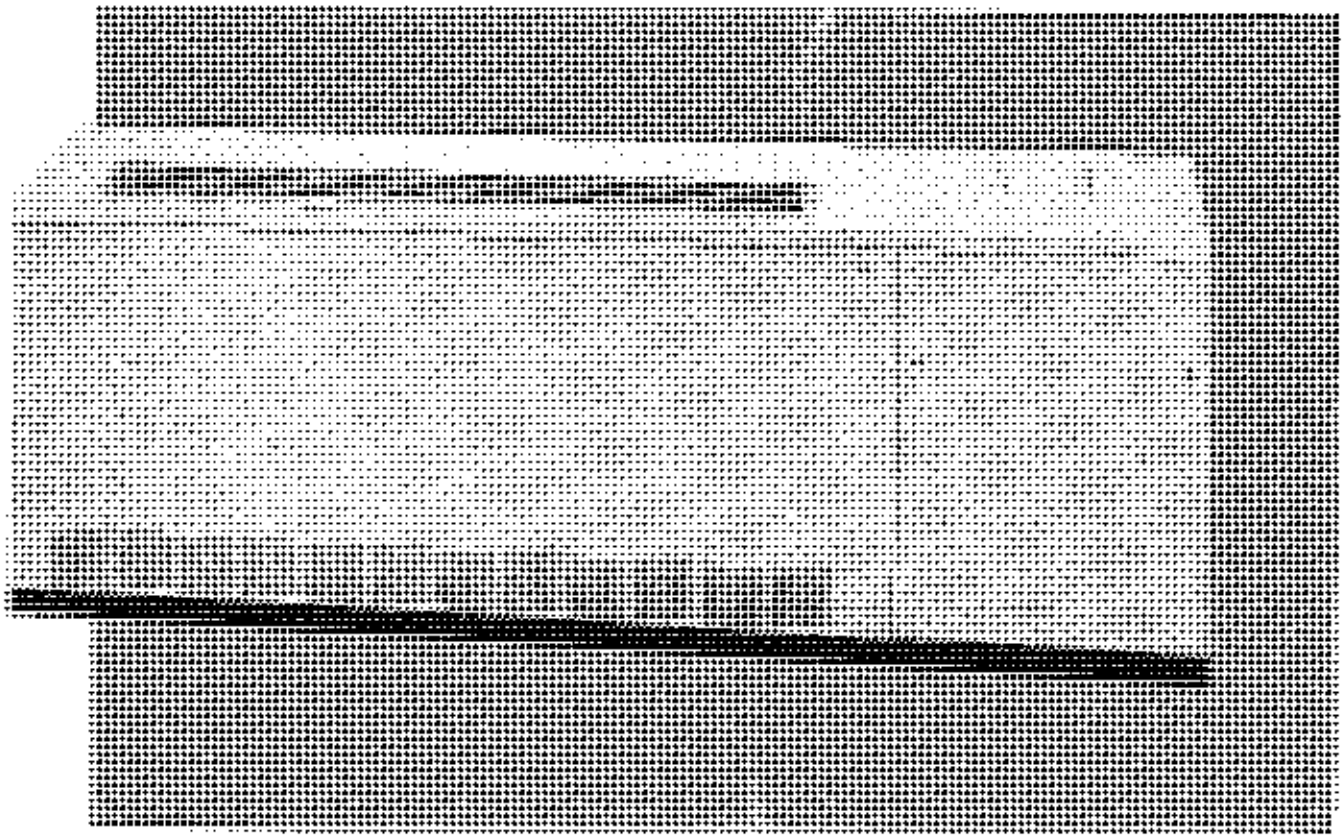
CLASSROOM CONSOLE HEAT PUMP

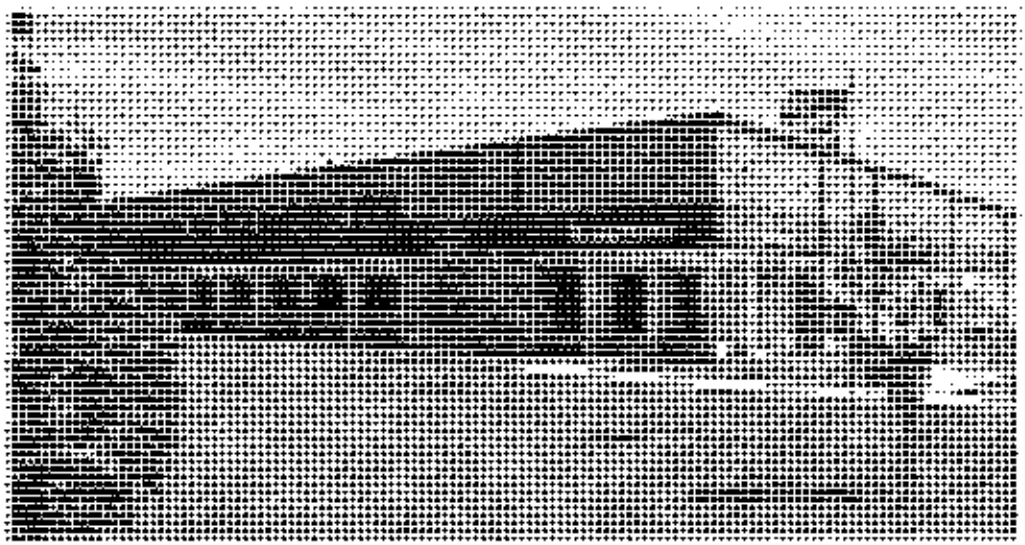
CCL Catalog



Water Source Heat Pumps

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 a 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.

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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

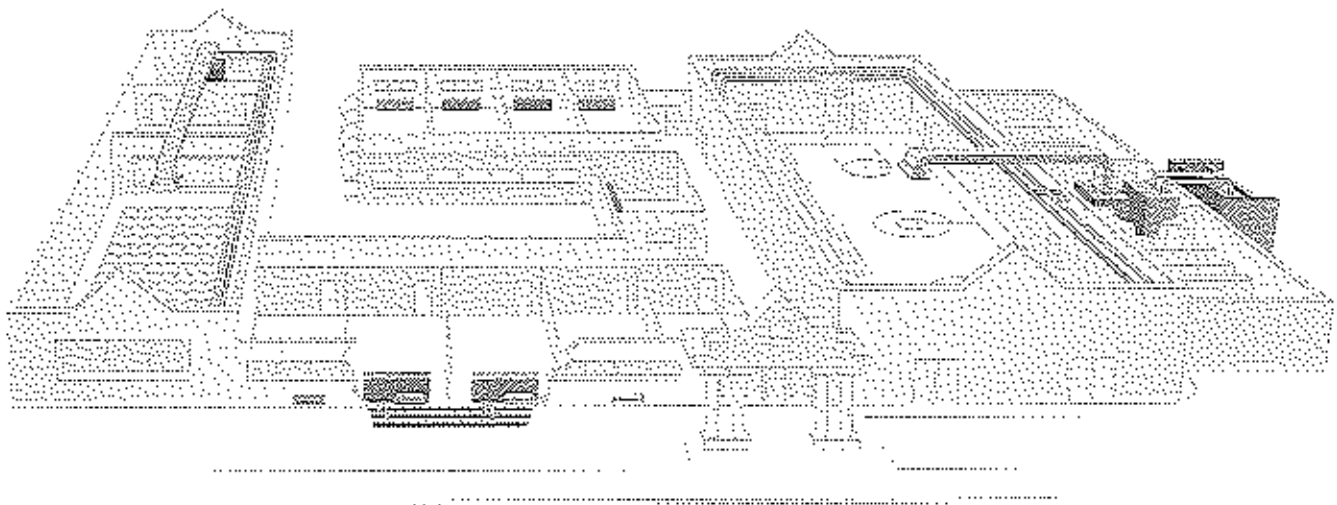
BUILT FOR LIFE!

A Simply Efficient System

For the design of an ideal heating and cooling system that offers individual classroom control, recovers and utilizes excess heat for space conditioning or alternative uses and serves school buildings' 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 school building* by recovering otherwise wasted energy in some spaces and utilizing it where needed elsewhere in the building.**

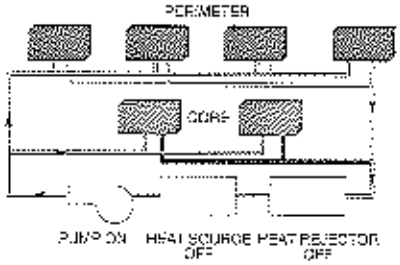
The system is comprised of highly efficient packaged reverse cycle heat pump units connected to a water loop. Each unit satisfies the air comfort requirements of the particular classroom in which it is installed. When heat is required, the heat pump removes heat from the water loop via the unit's specially designed refrigerant-to-water coaxial heat exchanger and transfers it to the air in the space. In the cooling mode, the unit removes heat from the air in the classroom and transfers it back into the water loop through a 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.***



Closed Loop System with Boiler and Cooling Tower

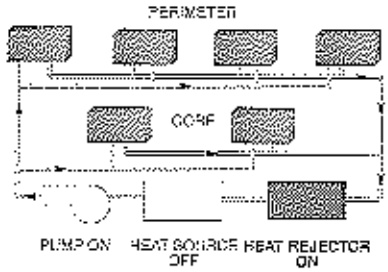
During certain times of the year, the constantly changing combination of units in the heating and cooling operating modes may actually balance the system so that no additional heat addition or rejection is required to maintain the water loop at satisfactory operating temperatures.

BALANCED ENERGY USE



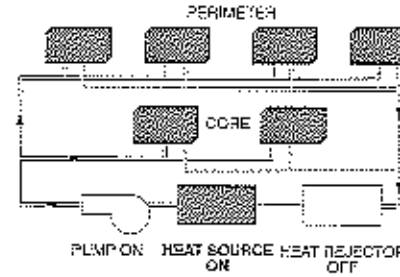
In very hot weather, when most of the system's individual units are operating in the cooling mode, more heat is extracted from the building and added to the water loop than is being utilized in other zones. This requires the rejection of heat from the system by way of a heat rejector (most often a cooling tower) which is attached to the loop or through the ground loop heat exchanger (see page 6 & 7).

VERY HOT WEATHER



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) or from the earth through the ground loop heat exchanger (see pages 6 & 7).

VERY COLD WEATHER



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.*

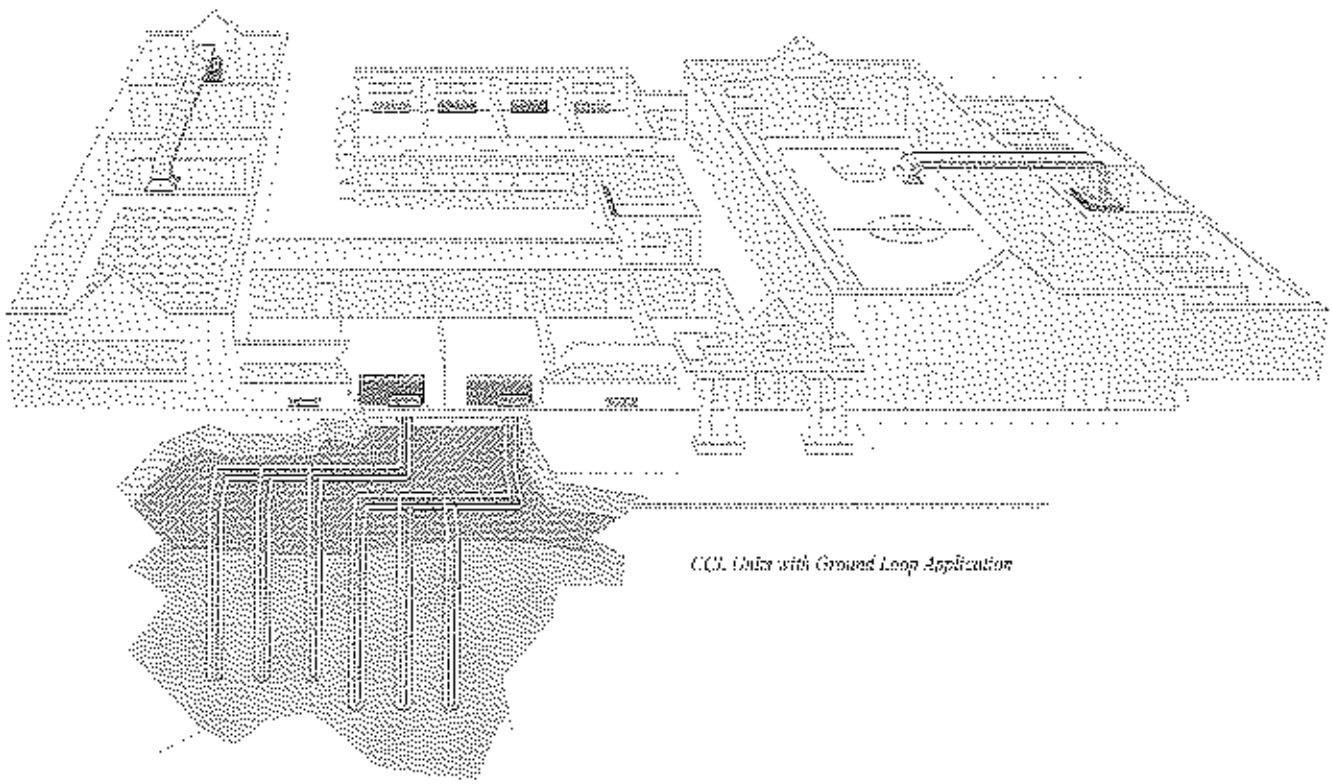
Since ClimateMaster offers more unit configurations than any other water source heat pump manufacturer in the world, our heat pumps satisfy the widest range of applications, regardless of size, shape or use from gymnasium to classroom, cafeteria to office. This allows the recapture of energy from many 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.***

The Earth's Energy System

If desired ClimateMaster Classroom Console can operate as a highly efficient Geo-Thermal Ground Loop heat pump. ClimateMaster Geo-Thermal heat pumps are among the cleanest, safest, and most cost-efficient heating and cooling alternatives anywhere.

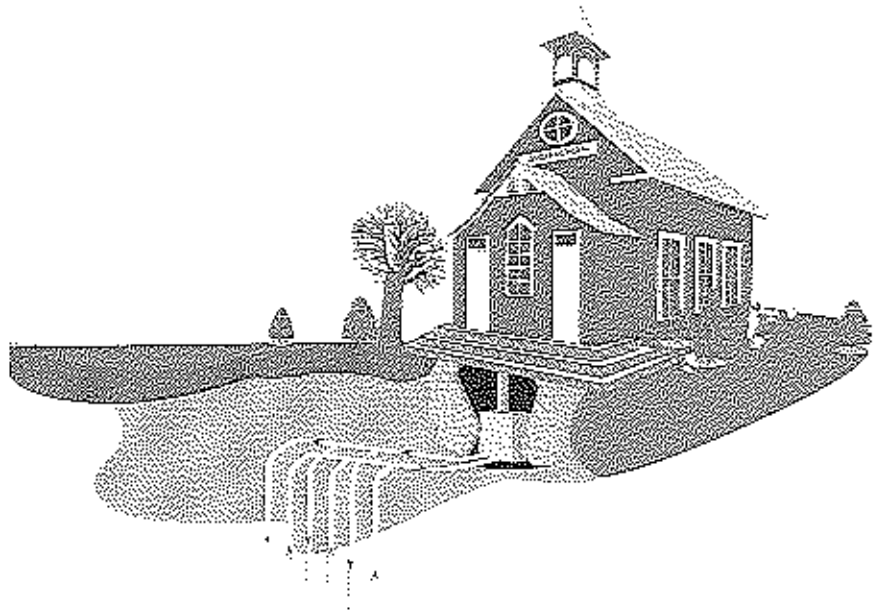
The Geo-Thermal system is comprised of a high efficiency water source heat pump connected to a ground loop water system and is ***specifically designed to utilize the natural heat storage ability of the earth as a primary source for heating and cooling.*** Depending upon whether you desire heating or cooling, heat is either extracted from or rejected into the near constant temperature of the earth as opposed to an air source system that rejects heat into or gathers heat from the temperature extremes of outside air. The water (sometimes treated with an anti-freeze solution) is recirculated through special pipe, absorbing heat from the warmer earth during the winter, and transferring heat to the cooler earth during the summer. Quite simply, with a Geo-Thermal heat pump, the earth serves as a heat energy storage system, allowing heat transfer to take place as conditions require. Since ***the system moves existing heat energy*** rather than creating heat energy, heating and cooling functions are more energy efficient and environmentally sound than those of traditional systems.

There are two primary types of Geo-Thermal heat pump systems. One is a ***Closed-Loop System***, the other, a ***Ground Water Open Loop System***. Though the Ground Water Open Loop System can be especially



CCL Units with Ground Loop Application

effective where a conventional well or lake exist nearby, the most commonly used of the two is the buried Closed-Loop System, consisting of an engineered loop of special plastic pipe that operates as a heat exchanger connected to the indoor heat pump to form a sealed, pressurized loop through which water is circulated.



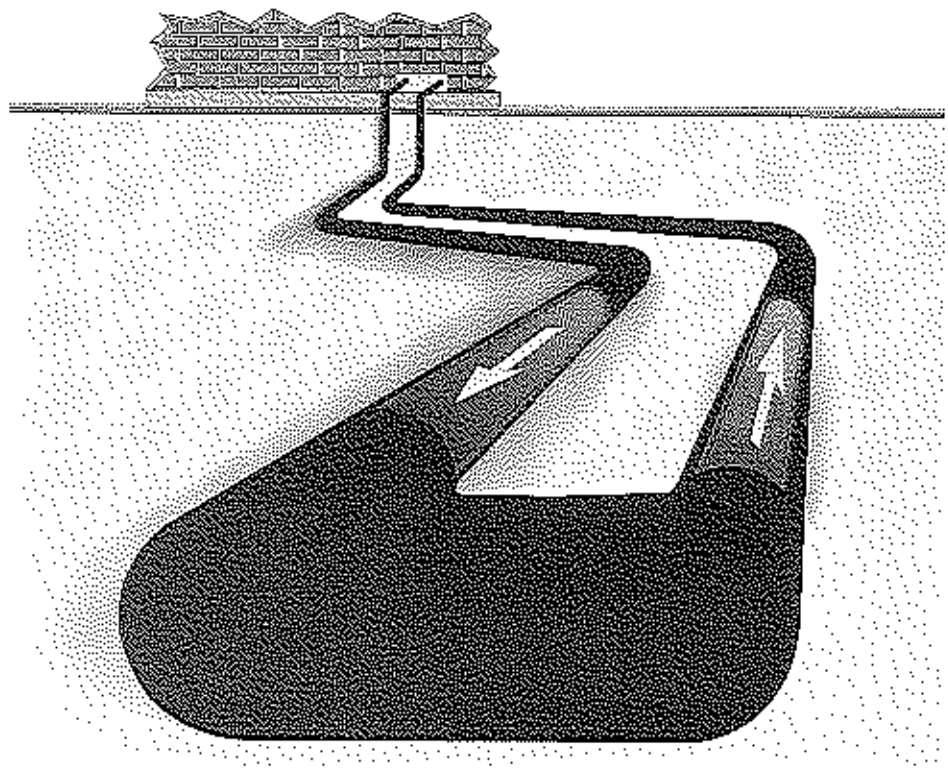
Classroom Console units are typically installed with vertical bore holes adjacent to the building. Depth of the holes are determined by tonnage, soil condition, and geographic location. Pipe is inserted into the hole, then backfilled.

Geo-Thermal Heat Pumps are highly dependable systems, with an estimated useful life expectancy of 20 years for units and over 50 years for ground loop material.*

With ClimateMaster Geo-Thermal Heat Pumps, there is **no outdoor equipment**, thereby eliminating undesirable visual and noise pollution, opportunities for theft and vandalism and damaging effects of weather extremes. Since the system uses fewer parts, service and manufacturing is greatly reduced.

Geo-Thermal units are easy to install and are available in numerous models and configurations. Plus, the units have no flue or vent requirements and perform well under strict indoor air quality conditions.

A ClimateMaster Geo-Thermal heat pump system is easily installed as a residential, commercial, or industrial system and can effectively accommodate retrofit or new construction applications.



*Estimated useful life per ASHRAE Standards.

Applications

Classroom Console Heat Pumps are designed to enhance classroom learning conditions by maximizing air quality and comfort. CCL units combine the energy efficiency of a water source heat pump with the practicality of a classroom ventilator system to provide flexible zone control of heating, air conditioning and ventilation within the classroom environment. And they do this quietly, without the annoying hum which often accompanies other classroom console units.

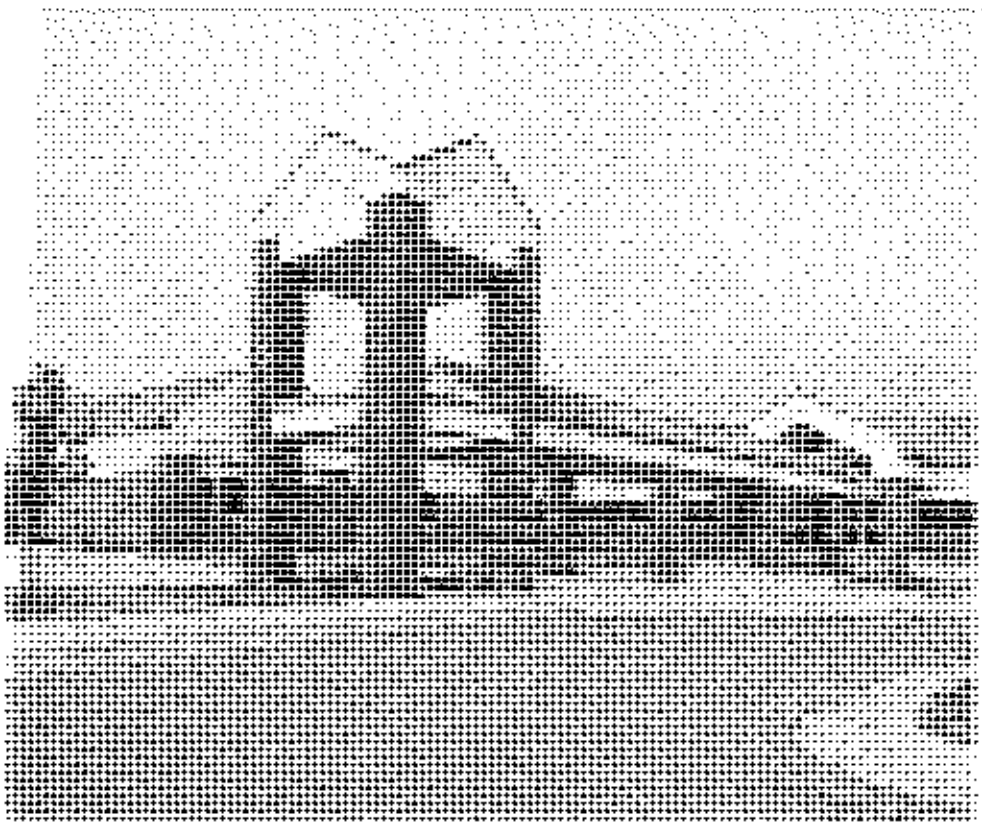
CCL units offer flexible classroom comfort control. Each classroom can be heated or cooled individually to meet the demands of its occupants without affecting the comfort of other classrooms. This means that each classroom can be used comfortably without the need to heat or cool the entire facility, even during setback periods. It also means that when one unit is shutdown for any reason, the rest of the system can continue to operate and classes can go on.

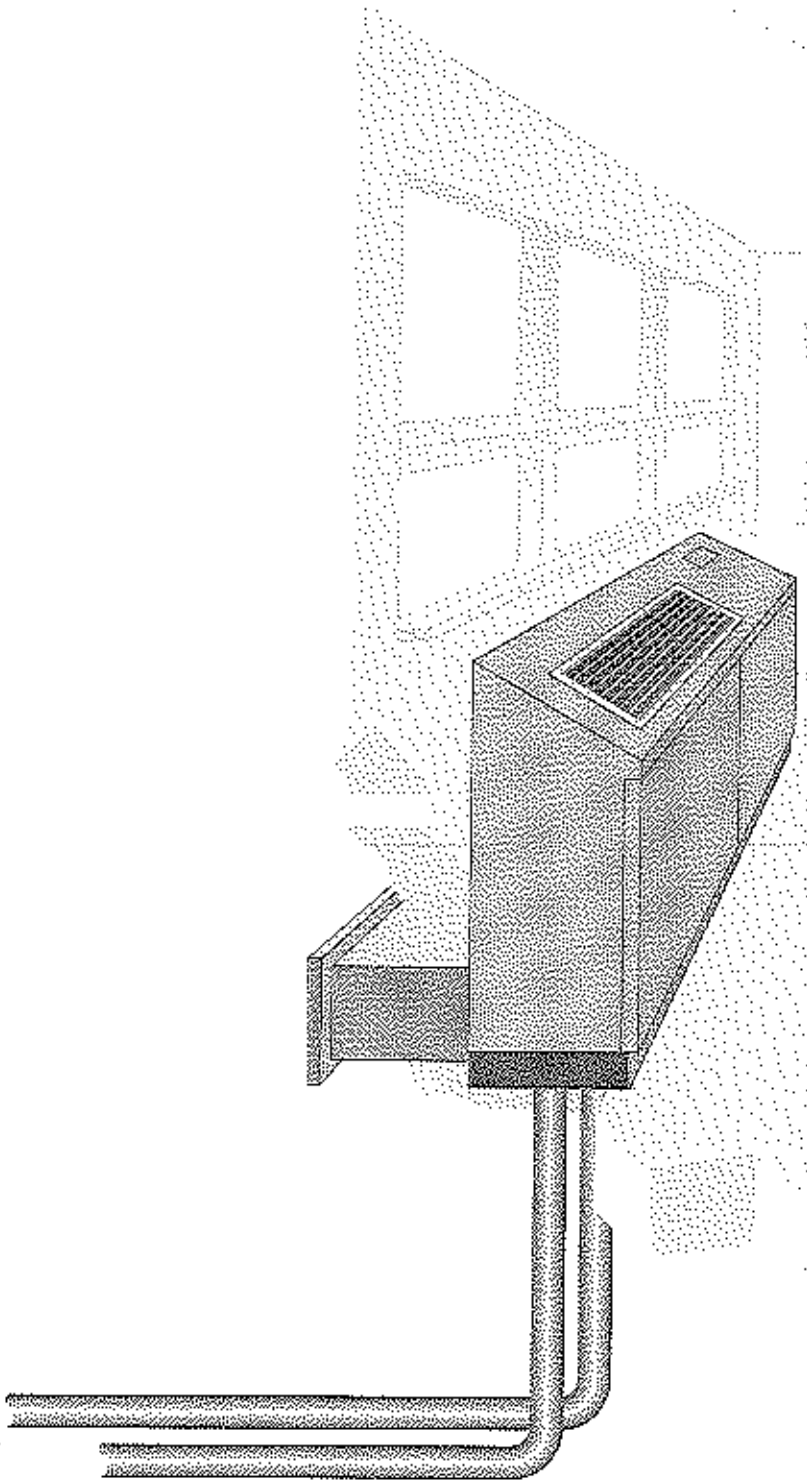
Because we know that the classroom world demands tough equipment, the CCL Series was specifically engineered with durability in mind. Each unit has a rugged, tamper-proof chassis which can stand up to years of classroom wear and tear. This means extended system life and fewer service calls.

To promote cost-effective installation and operation, **CCL units are designed to be simple to install and operate and easy to maintain.** Installation is ductless which minimizes construction cost and time. Typically, one or two units are located in each classroom under a window to bring in fresh air and to create a curtain of ambient air between the world outside the window and the world inside the classroom.

An opening behind the unit allows outside air to enter the unit blower section where it is mixed with classroom return air. Frequently this mixed air will satisfy room temperature requirements without additional compressor operation. This saves facility operating dollars - a critical issue when budgets are tight.

CCL units are versatile. They can be installed either as stand-alone systems or integrated with other types of water source heat pumps - either as part of a closed loop system (with a boiler and a cooling tower), or as part of a ground loop Geo-Thermal system.





CCL units are the perfect choice for retrofit applications. Single stand-alone units offer a cost effective alternative when renovations otherwise demand expansion of the heating and air-conditioning plant. Each stand-alone unit can be attached to its own individual ground loop system. The CCL is fully piped and includes a factory installed loop circulating pump for simple installation. Every CCL unit is UL listed and can be adapted to meet local code requirements to assure peace of mind.

Because of the many features inherent in CCL units, they can be used in applications other than educational facilities. CCL units are ideal for large office buildings, hospitals, nursing homes and hotel/motel environments, or for any other application where room heating and cooling must include satisfying "fresh" air requirements.

Regardless of application, CCL units provide the ultimate in quiet and efficient operation, zoned comfort control, durability and extended system life.

Features and Benefits

1 Fresh Air Ventilation

Classroom Units are provided with a motorized fresh air damper to bring in 25% outside air. This air is mixed with return air and is filtered for improved air quality. And because this mixed air often satisfies room temperature requirements without additional compressor operation, this feature can reduce operating costs.

2 Robust, Tamper Proof Construction

The Cabinet is constructed of heavy gauge steel with welded corner bracing to withstand the rigors of daily classroom activity. The control access door may be provided with a locking mechanism (optional) for added security.

3 Unit Refrigerant Circuit Protection

The ***High Pressure Cut-out*** turns the compressor off in case of excessive entering water temperature or low water flow during the cooling cycle. The ***Low Temperature Cut-out*** guards against water freezing due to low entering water temperature or low water flow during the heating cycle. The ***Low Pressure Sensor*** protects the compressor in the event of a refrigeration leak. The ***Lock-out Relay*** protects the unit from short-cycling if these safety controls turn the unit off. Safety Controls may be re-set at the thermostat.

4 Easy Access to Controls

The Control Box swings down to allow easy access for testing and service.

5 Factory Installed Valves

The factory installed shut-off valves are secured within the cabinet. These valves simplify installation and maintenance without detracting from the unit's appearance or system security.

6 Easy Access To Fan Motor

The fan section slides out for easy maintenance or service of the fan motor.

7 Easy Fan Speed Selection

Hi-Med-Lo speed fan selection is standard on unit mounted controls. Two-speed control is optional with remote thermostat controls.

8 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.

9 Convenient Access to All Piping and Electrical Connections

A separate pipe and electrical compartment is incorporated in the cabinet for adequate access to piping and electrical.

10 Service Switch and Fuses

All units are supplied with an on/off electrical service switch. Each unit also has main fuses to protect all internal components.

11 Dual Density Insulation for Thermal and Acoustical Control

All external cabinet parts are lined with 1" thick insulation for thermal and acoustical control.

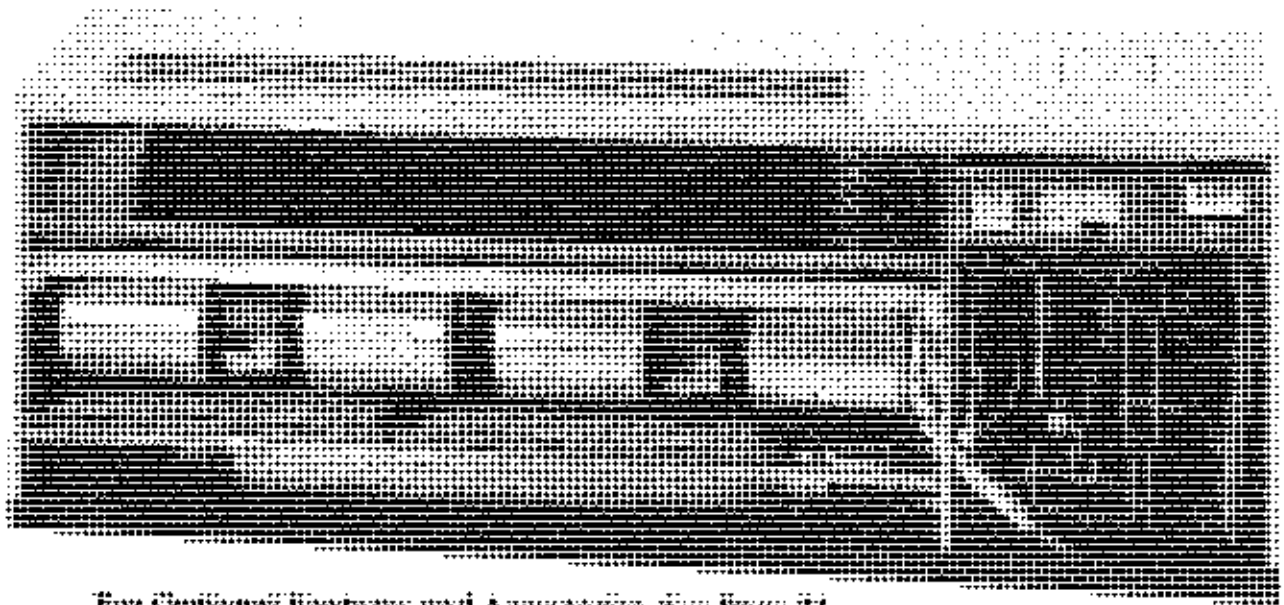
effectively doubling the storage capacity of the pipe loop and reducing the size of the heat rejector or geo-thermal loop required. The increased temperature swing results in reduced operation of the boiler through more efficient heat transfer and use of recovered energy.

12 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 (See pages 26-27 for detailed information). 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. ClimateMaster will also work with other DDC board manufacturers to factory-mount their controllers, if so desired.

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 Page 21.

Selection Procedure

Unit Model Number Designation - CCL

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
Absorb	= Heat Absorption Rate
EWT	= Entering Water Temperature
PD	= Pressure Drop
EAT	= Entering Air Temperature

Selection Procednre

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, 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 14-17) 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 14-17) 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.

ARI Conditions

Ratings @ ARI Conditions

Model Number	Cooling (EAT=80/67, EWT=85) Nominal CFM	Total BTUH	EER	Input Watts	LWT Deg. F.	Heating (EAT=70, EWT=70) Total BTUH	COP	Input Watts	GPM	Pressure Drop Ft. H2o
CCL 24	800	25378	12.1	1825	95.0	29778	3.8	2266	6.0	10.9
CCL 30	1000	29465	12.0	2454	95.0	33159	3.8	2436	7.5	6.3
CCL 36	1150	35017	11.9	2945	95.0	41317	3.8	3039	9.0	10.0
CCL 42	1375	41000	10.5	3909	95.0	55092	3.6	4506	10.5	12.9

50 Hertz Correction Factors

Cooling (EAT=80/67, EWT=85) TOTAL	SENSIBLE	KW	NOMINAL CFM	Heating (EAT=70, EWT=70) TOTAL	KW	HEAT OF ABSORPTION
.90	.94	.85	.89	.90	.85	.92

Selection Example

The following is an example of an appropriate unit selection.

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 ..... 32000 BTUH
Sensible Cooling ..... 27000 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 = 9.0
CFM = 1000

After making our preliminary selection (CCL 36), we enter the tables at design water flow and water temperature and read Total Cooling and Sensible Cooling capacities:

Total Cooling ..... 34059 BTUH
Sensible Cooling ..... 26516 BTUH

Next, we determine our correction factors.

Corrected Total Cooling = 34059 x .954 x .971 = 31559 BTU

Corrected Sensible Cooling = 26516 x 1.146 x .968 = 29415 BTU

Actual Temperature Rise = 44454 x .947 x .970 = 40834 BTU

$$\frac{40834}{500 \times 9} = 9.1° \quad \text{LWT} \quad 99.1°$$

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

Classroom CCL 24

Rated Air Flow 800 CFM

GPM	EWT °F	Cooling Performance - EAT 80/67°F (EER = 12.1) TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	Heating Performance - EAT 70°F (COP = 3.8) TOTAL BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	UNIT WATER PRESSURE DROP (FT.)
3.0	40	28196	19867	34627	1885				2.7
4.5	40	28857	19954	34850	1757				6.1
6.0	40	29477	20068	35081	1628	23588	17012	1927	10.9
7.5	40	30118	20127	35287	1506	24142	17458	1959	16.8
3.0	50	26821	19246	33496	1951	24541	17809	1977	2.7
4.5	50	27481	19333	33699	1822	25098	18245	2008	6.1
6.0	50	28122	19429	33903	1694	25652	18691	2040	10.9
7.5	50	28763	19507	34106	1566	26208	19136	2072	16.8
3.0	60	25485	18626	32365	2016	26007	19478	2035	2.7
4.5	60	26136	18715	32569	1888	27161	19934	2121	6.1
6.0	60	26767	18800	32772	1760	27715	20369	2153	10.9
7.5	60	27407	18887	32976	1632	28268	20814	2185	16.8
3.0	70	24130	18006	31235	2082	28670	23156	2202	2.7
4.5	70	24771	18093	31438	1954	29224	21602	2234	6.1
6.0	70	25411	18180	31642	1826	**29778**	**22047**	**2266**	**10.9**
7.5	70	26052	18267	31845	1698	30332	22493	2297	16.8
3.0	85	22887	17076	29529	2183	31768	23674	2371	2.7
4.5	85	22738	17161	29742	2055	32319	24119	2403	6.1
6.0	85	23578	17250	29946	1926	32872	24565	2435	10.9
7.5	85	24019	17336	30149	1797	33426	25010	2467	16.8
3.0	90	21619	16756	28973	2214				2.7
4.5	90	22060	16843	29177	2086				6.1
6.0	90	22781	16959	29580	1958				10.9
7.5	90	23341	17026	29584	1830				16.8
3.0	95	20742	16456	28408	2247				2.7
4.5	95	21382	16542	28612	2119				6.1
6.0	95	22023	16629	28815	1991				10.9
7.5	95	22663	16716	29019	1863				16.8
3.0	100	20094	16145	27843	2280				2.7
4.5	100	20705	16232	28046	2152				6.1
6.0	100	21345	16319	28250	2024				10.9
7.5	100	21985	16406	28453	1896				16.8
3.0	110								2.7
4.5	110								6.1
6.0	110	19890	15969	27139	2089				10.9
7.5	110	20532	15786	27323	1961				16.8

Interpolation is permissible. Extrapolation is not.

Bold Face - ARI Conditions

Correction Factors

For Variations In Entering Air Temperature

Cooling Corrections

Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB
61	0.905	0.749	1.003	1.308	*	*
64	0.945	0.579	0.890	1.117	1.251	*
67	1.000	0.500	0.744	1.000	1.219	1.139
70	1.030		0.630	0.840	1.038	1.298
73	1.066		0.538	0.625	0.758	1.061

Heating Corrections

Heat of Rejection	Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
0.887	60	1.019	1.050	0.969
0.950	65	1.010	1.025	0.980
1.000	70	1.000	1.000	1.000
1.059	75	0.955	0.976	1.026
1.102	80	0.987	0.951	1.056

For Variations In Entering Air Flow

Cooling Corrections

CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts
525	0.979	0.732	0.970	0.966
650	0.995	0.847	0.985	0.982
800	1.000	1.000	1.000	1.000

Heating Corrections

Heating Capacity	Heat of Absorption	Power Input Watts
0.968	0.951	1.040
0.979	0.972	1.023
1.000	1.000	1.000

Classroom CCL 30

Rated Air Flow 1000 CFM

		Cooling Performance - EAT 80/67°F (EER = 12.0)				Heating Performance - EAT 70°F (COP = 3.8)			
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	TOTAL BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	UNIT WATER PRESSURE DROP (FT.)
4.5	40	37168	28209	43474	1835	[illegible]			2.3
6.0	40	37681	26703	43801	1764				4.3
7.5	40	38202	25197	44188	1754	28536	20860	2258	6.3
9.0	40	38725	23693	44575	1743	29044	21318	2265	9.1
4.5	50	35218	26912	42008	1938	29061	21273	2281	2.3
6.0	50	35740	25406	42390	1949	29569	21734	2296	4.3
7.5	50	36261	23900	42777	1959	30077	22189	2312	6.3
9.0	50	36782	22394	43164	1971	30585	22645	2327	9.1
4.5	60	33277	25615	40592	2144	30692	22688	2243	2.3
6.0	60	33798	24109	40979	2165	31210	23063	2258	4.3
7.5	60	34319	22603	41366	2065	31618	23519	2274	6.3
9.0	60	34841	21097	41753	2026	32126	23974	2289	9.1
4.5	70	31335	24318	39181	2299	32143	23927	2405	2.3
6.0	70	31857	22812	39568	2260	32651	24385	2420	4.3
7.5	70	32378	21306	39955	2221	33159	24848	2436	6.3
9.0	70	32899	19801	40342	2183	33667	25304	2451	9.1
4.5	85	28425	22372	37165	2532	34454	25032	2498	2.3
6.0	85	28944	20867	37552	2493	34962	26387	2513	4.3
7.5	85	29466	19361	37939	2454	35471	26843	2529	6.3
9.0	85	29987	17855	38326	2415	35979	27298	2544	9.1
4.5	90	27452	21724	36359	2630				2.3
6.0	90	27974	20218	36746	2571				4.3
7.5	90	28495	18712	37133	2532				6.3
9.0	90	29016	17206	37520	2492				9.1
4.5	95	26482	21076	35654	2688				2.3
6.0	95	27002	19570	36041	2629				4.3
7.5	95	27524	18064	36428	2610				6.3
9.0	95	28045	16558	36815	2570				9.1
4.5	100	25511	20427	34948	2766				2.3
6.0	100	26032	18912	35335	2727				4.2
7.5	100	26553	17415	35722	2687				6.2
9.0	100	27075	15909	36110	2648				9.1
4.5	110	[illegible]							2.3
6.0	110								4.3
7.5	110	24612	16118	34312	2843				6.3
9.0	110	25133	14612	34699	2803				9.1

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations in Entering Air Temperature

Cooling 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
61	0.845	0.501	1.019	1.250	*	*	0.853
64	0.924	0.688	0.890	1.117	1.334	*	0.935
67	1.000	0.382	0.762	1.000	1.247	1.500	1.000
70	1.035		0.529	0.857	1.027	1.245	1.029
73	1.068		0.302	0.731	0.928	1.129	1.058

Heating Corrections

Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
60	1.109	1.042	0.914
65	1.054	1.019	0.955
70	1.000	1.000	1.000
75	0.945	0.971	1.046
80	0.891	0.945	1.093

For Variations In Entering Air Flow

Cooling Corrections

CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts
825	0.955	0.795	0.955	0.946
850	0.973	0.898	0.972	0.972
1000	1.000	1.000	1.000	1.000

Heating Corrections

Heating Capacity	Heat of Absorption	Power Input Watts
0.966	0.957	1.038
0.984	0.978	1.018
1.000	1.000	1.000

Performance Data

Classroom CCL 36

Rated Air Flow 1150 CFM

		Cooling Performance - EAT 80/67°F (EER = 11.9)				Heating Performance - EAT 70°F (COP = 3.8)			UNIT WATER PRESSURE DROP (FT.)
GPM	EWT °F	TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	TOTAL BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	
6.0	40	42237	29922	49503	2129				4.5
7.5	40	42938	29674	50036	2080				6.9
9.0	40	43639	29825	50571	2032	33826	24512	2730	10.0
10.0	40	44106	30061	50927	1999	34120	24755	2744	12.3
6.0	50	40321	29220	48276	2332	35441	25922	2799	4.5
7.5	50	41022	29472	48813	2283	35852	26240	2811	6.9
9.0	50	41723	29824	49247	2235	36823	26658	2833	10.0
10.0	50	42190	29959	49704	2202	36617	26903	2847	12.3
6.0	60	38405	28518	47065	2535	37938	28067	2863	4.5
7.5	60	39106	28670	47589	2486	38379	28435	2914	6.9
9.0	60	39807	28822	48124	2438	38820	28803	2936	10.0
10.0	60	40274	28857	48480	2408	39134	29048	2951	12.3
6.0	70	36489	27816	45831	2738	40035	30213	2999	4.5
7.5	70	37190	27865	46366	2689	40876	30530	3017	6.9
9.0	70	37891	27920	46909	2641	41317	30948	3039	10.0
10.0	70	38358	27955	47257	2608	41631	31193	3053	12.3
6.0	85	33615	26763	43996	3043	46181	33430	3153	4.5
7.5	85	34316	26815	44531	2994	44621	33798	3172	6.9
9.0	85	35017	26867	45065	2945	45062	34166	3191	10.0
10.0	85	35484	26902	45422	2913	45356	34411	3208	12.3
6.0	90	32657	26413	43385	3144				4.5
7.5	90	33358	26464	43919	3095				6.9
9.0	90	34059	26516	44454	3047				10.0
10.0	90	34526	26551	44819	3014				12.3
6.0	95	31689	26061	42775	3246				4.5
7.5	95	32400	26113	43307	3197				6.9
9.0	95	33101	26165	43842	3148				10.0
10.0	95	33568	26200	44198	3116				12.3
6.0	100	30741	25710	42161	3347				4.5
7.5	100	31442	25762	42696	3298				6.9
9.0	100	32143	25814	43230	3250				10.0
10.0	100	32610	25849	43587	3217				12.3
6.0	110								4.5
7.5	110								6.9
9.0	110	30227	25112	42067	3429				10.0
10.0	110	30694	25147	42362	3420				12.3

Interpolation is permissible. Extrapolation is not.

Bold Face = ARI Conditions

Correction Factors

For Variations In Entering Air Temperature

Cooling Corrections

Entering Air °F WB	Total Cooling Capacity	Sensible Cooling Capacity Entering Dry Bulb 70° DB	75° DB	80° DB	85° DB	90° DB
51	0.908	0.761	1.025	*	*	*
54	0.934	0.612	0.879	1.146	*	*
57	1.000	0.461	0.731	1.000	1.265	*
70	1.045		0.584	0.549	1.116	*
73	1.088		0.436	0.702	0.968	1.396

Heating Corrections

Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
60	1.027	1.048	0.966
65	1.011	1.025	0.979
70	1.000	1.000	1.000
75	0.988	0.969	1.041
80	0.966	0.956	1.097

For Variations In Entering Air Flow

Cooling Corrections

CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection
775	0.947	0.939	0.924
1000	0.971	0.968	0.970
1150	1.000	1.000	1.000

Heating Corrections

Power Input Watts	Heating Capacity	Heat of Absorption	Power Input Watts
0.882	0.947	0.954	1.061
0.958	0.971	0.975	1.032
1.000	1.000	1.000	1.000

Classroom CCL 42

Rated Air Flow 1275 CFM

GPM	EWT °F	Cooling Performance - EAT 80/67°F (EER = 10.5) TOTAL BTUH	SENSIBLE BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	Heating Performance - EAT 70°F (COP = 3.6) TOTAL BTUH	HEAT OF REJECTION BTUH	POWER INPUT WATTS	UNIT WATER PRESSURE DROP (FT.)
7.5	40	49918	35009	59043	2821				6.6
9.0	40	50238	35070	59642	2756				9.5
10.5	40	50358	35131	60242	2692	42916	30569	3629	12.9
12.0	40	50604	35171	60642	2648	43955	31295	3711	16.3
7.5	50	47178	34185	57219	3090	44893	32139	3733	6.6
9.0	50	47096	34249	58318	3025	45936	32888	3824	9.5
10.5	50	48016	34310	58918	2961	46973	33617	3913	12.9
12.0	50	49363	34350	59518	2918	48014	34345	4006	16.3
7.5	60	44924	33166	56305	3359	48956	35210	4029	6.6
9.0	60	45754	33427	56904	3294	49995	35939	4120	9.5
10.5	60	46674	33488	57504	3230	51034	36667	4211	12.9
12.0	60	47721	33529	58103	3187	52073	37396	4301	16.3
7.5	70	42692	32545	55091	3628	53015	38263	4324	6.6
9.0	70	43512	32606	55690	3562	54054	38989	4415	9.5
10.5	70	44333	32667	56290	3499	55092	39718	4506	12.9
12.0	70	44879	32707	56670	3456	56131	40447	4597	16.3
7.5	85	39330	31313	53095	4061	59103	42837	4707	6.6
9.0	85	40150	31374	53694	3967	60142	43565	4858	9.5
10.5	85	41000	31436	54307	3908	61181	44294	4949	12.9
12.0	85	41817	31475	54684	3859	62219	45023	5040	16.3
7.5	90	38209	30962	52423	4166				6.6
9.0	90	39029	30963	53022	4100				9.5
10.5	90	39849	31024	53623	4035				12.9
12.0	90	40366	31065	54022	3994				16.3
7.5	95	37088	30492	51761	4308				6.6
9.0	95	37908	30553	52360	4236				9.5
10.5	95	38728	30614	52960	4171				12.9
12.0	95	39275	30654	53360	4128				16.3
7.5	100	35867	30081	51099	4435				6.6
9.0	100	36787	30142	51698	4370				9.5
10.5	100	37507	30203	52298	4306				12.9
12.0	100	38154	30245	52698	4263				16.3
7.5	110								6.6
9.0	110								9.5
10.5	110	35369	29382	50974	4575				12.9
12.0	110	35972	29422	51374	4532				16.3

Interpolation is permissible. Extrapolation is not.

Bold Face - ARI Conditions

Correction Factors

For Variations In Entering Air Temperature

Cooling 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
61	0.907	0.767	1.033	*	*	*	0.893
64	0.951	0.618	0.883	1.150	*	*	0.948
67	1.000	0.469	0.735	1.000	1.270	*	1.000
70	1.042		0.586	0.855	1.120	*	1.052
72	1.089		0.488	0.764	0.992	1.142	1.111

Heating Corrections

Entering Air °F DB	Heating Capacity	Heat of Absorption	Power Input Watts
60	1.086	1.049	0.967
65	1.043	1.025	0.995
70	1.000	1.000	1.000
75	0.982	0.980	1.042
80	0.963	0.956	1.067

For Variations In Entering Air Flow

Cooling Corrections

CFM	Total Cooling Capacity	Sensible Cooling Capacity	Heat of Rejection	Power Input Watts
1100	0.966	0.950	0.955	0.923
1225	0.986	0.983	0.986	0.969
1375	1.000	1.000	1.000	1.000

Heating Corrections

Heating Capacity	Heat of Absorption	Power Input Watts
0.966	0.950	1.000
0.986	0.988	1.019
1.000	1.000	1.000

Electrical Data

STANDARD EFFICIENCY

SIZE	VOLTAGE	ELECTRICAL SERVICE HZ	PH	COMPRESSOR (EA) RLA	LRA	QTY	UNIT PUMP MAX AMPS	HP	BLOWER MOTOR FLA	QTY	MAX FUSE OR HACR BRKR SIZE	MIN CKT AMPS	MIN. VOLT	MAX CRKT BRKR CSA
24 G	208/230	60	1	9.0	56.0	1	0.9	1/12	.70	2	20	13.4	197	20
H	208/230	60	3	5.8	50.0	1	0.9	1/12	.70	2	15	10.3	187	15
E	265	60	1	7.6	51.0	1	0.9	1/12	.50	2	15	10.4	239	20
F	460	60	3	2.9	25.0	1	0.9	1/12	.30	2	15	5.5	414	15
30 G	208/230	60	1	11.1	71.0	1	0.9	1/6	1.30	2	25	17.5	197	25
H	208/230	60	3	6.6	50.0	1	0.9	1/6	1.30	2	15	11.8	187	15
E	265	60	1	9.5	68.0	1	0.9	1/6	1.00	2	25	13.6	239	25
F	460	60	3	3.4	25.0	1	0.9	1/6	.70	2	15	7.8	414	15
36 G	208/230	60	1	13.9	86.0	1	0.9	1/6	1.30	2	35	21.9	197	35
H	208/230	60	3	9.3	71.0	1	0.9	1/6	1.30	2	20	15.4	187	20
E	265	60	1	12.1	79.0	1	0.9	1/6	1.00	2	30	18.0	239	30
F	460	60	3	4.6	36.0	1	0.9	1/6	.70	2	15	8.0	414	15
42 G	208/230	60	1	19.3	110.0	1	0.9	1/4	1.70	2	45	29.3	197	45
H	208/230	60	3	11.7	78.0	1	0.9	1/4	1.70	2	30	20.3	187	30
F	460	60	3	5.7	39.0	1	0.9	1/4	.90	2	15	11.9	414	15

STANDARD EFFICIENCY

SIZE	VOLTAGE	ELECTRICAL SERVICE HZ	PH	COMPRESSOR (EA) RLA	LRA	QTY	UNIT PUMP MAX AMPS	HP	BLOWER MOTOR FLA	QTY	MAX FUSE OR HACR BRKR SIZE	MIN CKT AMPS	MIN. VOLT	MAX CRKT BRKR CSA
24 G	208/230	60	1	9.0	56.0	1	---	1/12	.70	2	20	13.4	197	20
H	208/230	60	3	5.8	50.0	1	---	1/12	.70	2	15	9.2	187	15
E	265	60	1	7.6	51.0	1	---	1/12	.50	2	15	10.4	239	20
F	460	60	3	2.9	25.0	1	---	1/12	.30	2	15	4.4	414	15
30 G	208/230	60	1	13.1	71.0	1	---	1/6	1.30	2	25	16.1	197	25
H	208/230	60	3	6.6	50.0	1	---	1/6	1.30	2	15	10.9	187	15
E	265	60	1	9.5	68.0	1	---	1/6	1.00	2	25	13.6	239	25
F	460	60	3	3.4	25.0	1	---	1/6	.70	2	15	6.9	414	15
36 G	208/230	60	1	13.9	86.0	1	---	1/6	1.30	2	35	21.0	197	35
H	208/230	60	3	9.3	71.0	1	---	1/6	1.30	2	20	14.5	187	20
E	265	60	1	12.1	79.0	1	---	1/6	1.00	2	30	18.0	239	30
F	460	60	3	4.6	36.0	1	---	1/6	.70	2	15	7.1	414	15
42 G	208/230	60	1	19.3	110.0	1	---	1/4	1.70	2	45	28.4	197	45
H	208/230	60	3	11.7	78.0	1	---	1/4	1.70	2	30	19.4	187	30
F	460	60	3	5.7	39.0	1	---	1/4	.90	2	15	11.0	414	15

Physical Characteristics

General CCL Unit Data

PHYSICAL CHARACTERISTICS	CCL - 24	CCL - 30	CCL - 36	CCL - 42
Blower:				
Motor Horsepower (2 each)	1/12	1/6	1/6	1/4
Wheel Size (D" x W") in. (4 each)	5 3/4 x 8	5 3/4 x 8	5 3/4 x 8	5 3/4 x 8
FILTER SIZE (2 each)	12 x 24 x 1	12 x 24 x 1	12 x 24 x 1	12 x 24 x 1
UNIT WEIGHT (Lbs):				
Shipping	430	440	450	460
Operating	400	410	420	430
REF. TO AIR HEAT EXCHANGER				
Face Area (Sq. Ft.)	3.056	3.333	3.667	4.0
No. of Rows Deep	2	2	3	3
Copper Tube Size (O. D. In.)	3/8	3/8	3/8	3/8
No. of Fins/Inch	11	11	11	11
REFRIG. CHARGE (R-22)/CKT	30	41	44	54
No. of Circuits	1	1	1	1
UNIT W" x H" x D"	84 x 32 x 15.25	84 x 32 x 15.25	84 x 32 x 15.25	84 x 32 x 15.25
WATER IN/OUT SIZE (I. D. Hose)	1"	1"	1"	1"
CONDENSATE SIZE (I.D. Vinyl)	3/4"	3/4"	3/4"	3/4"

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
CCLUnits:
CCL 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

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

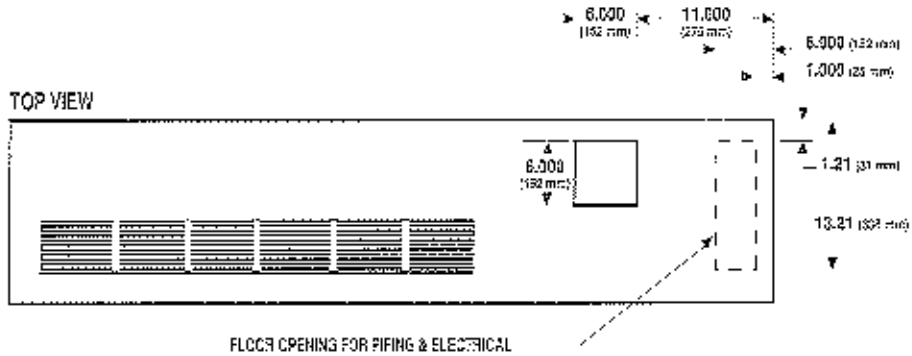
Water Limits

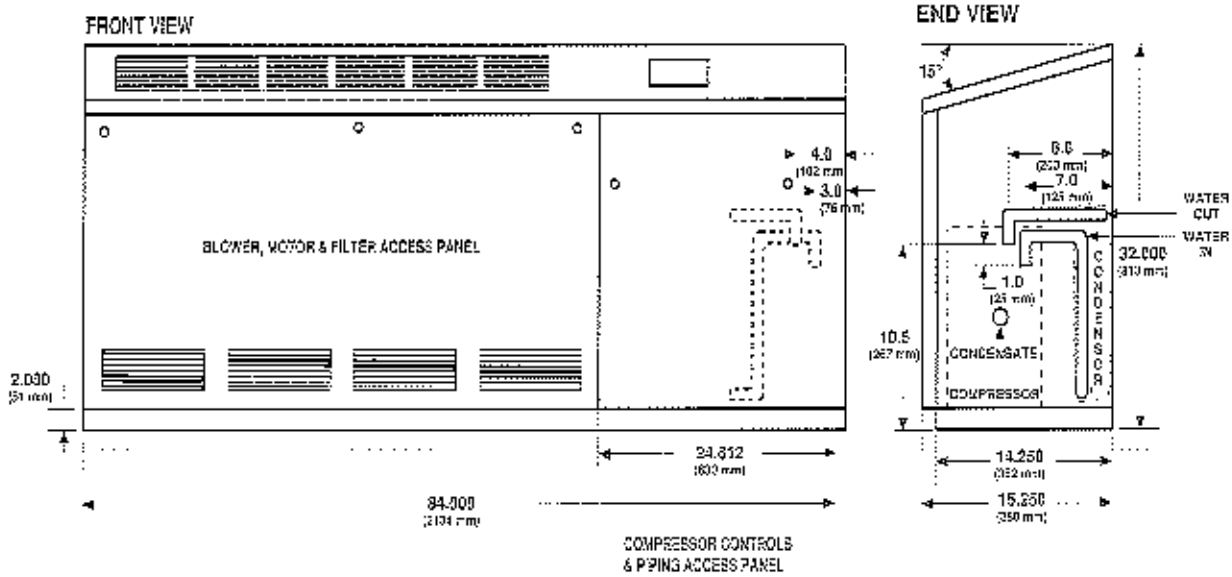
	CCL	
	Cooling	Heating
Min. Entering Water	40°F	40°F
Normal Entering Water	85°F	70°F
Max. Entering Water	110°F	90°F

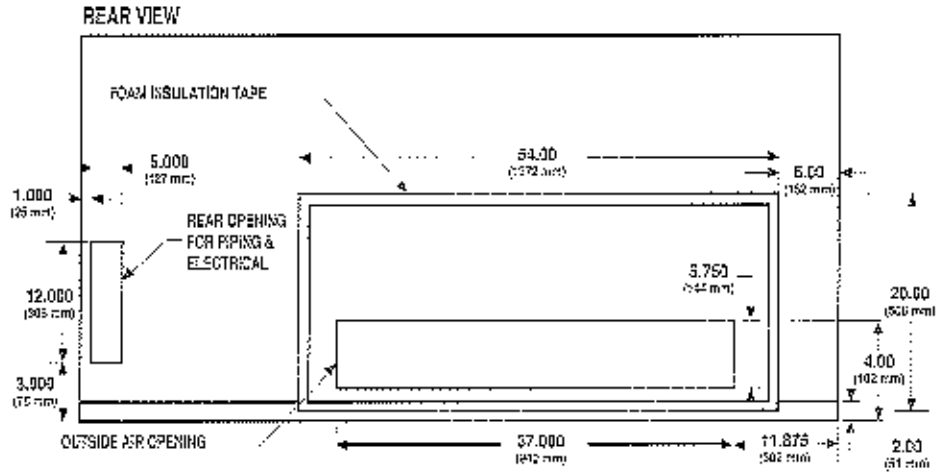
NOTES: (A) Minimum Air and Water conditions are only to be used at ARI flow rates.
(B) Only one maximum or minimum value may be used with CCL Units, all other parameters must be at normal conditions.

Dimensions

Classroom CCL 24, 30, 36, 42







WATER IN - 1" FPT

WATER OUT - 1" FPT

CONDENSATE - .75" I.D.
(Clear Polyviny) Tubing)

Options and Accessories

Factory-Installed Options

Control Door Access

An Access Door is provided to cover the slide out control section. This door may be provided with key access for additional security.

Water Coils

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

Motorized Shut Off Valves

ClimateMaster can provide a motorized shut off valve for field installation. This feature allows variable speed pumping to be utilized and is not necessary with pump mounted units.

Paint

Standard CCL units are factory-painted with Polar Ice baked enamel finish. Custom colors are available.

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.

Direct Digital Control (DDC) Board

ClimateMaster can provide a factory mounted DDC board (CMC-2000 Series) (See pages 27-28). 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.

Stand Alone Unit

The Classroom unit is designed to operate on a closed loop system. However, it can be ordered with a factory installed pump located in the subbase of the unit for stand alone geo-thermal loop operation. The pump is wired and piped so that field piping consists of simply connecting the supply and return piping.

Field-Installed Options

Wall Mount Thermostats

Wall-mounted thermostats are available for both manual and automatic change-over applications.

Automatic change-over thermostats are one-stage heating/one-stage cooling with system "OFF-AUTO" switch and fan "ON-AUTO" switch. An LED service light is available which is activated when service is required.

Manual change-over thermostats are one-stage heating/one-stage cooling with "HEAT-OFF-COOL" system switch and "ON-AUTO" fan switch.

Electronic thermostats can be either automatic change-over or manual change-over. An optional remote sensor is available for this type of thermostat which allows temperature sensing up to 400 feet away.

Programmable electronic thermostats are offered as either automatic change-over or manual 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.

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. The unit should be installed tight against the wall and lined up with the outdoor louver to insure an airtight installation.

3. Provide room for easy access for filter changes.

4. A rubber or cork isomode pad should be placed underneath the unit in order to reduce vibration transmission to the building structure. The entire base of the unit - not just the corners - should rest on the pad.

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 as demanded in the specifications.

6. Connect a condensate drain 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.

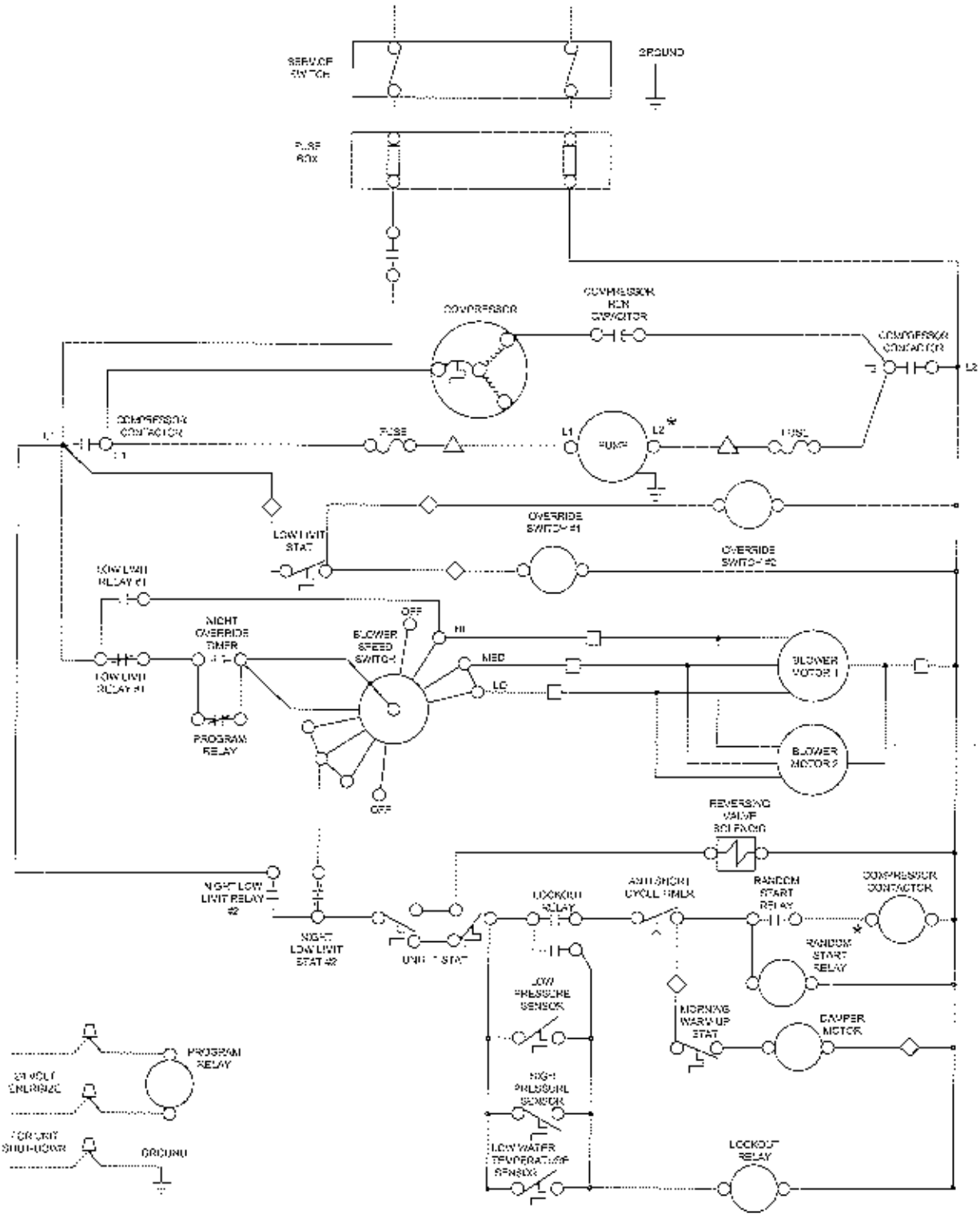
8. All electrical connections must be made in accordance with NEC and local codes.

9. The units must be installed level .

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.

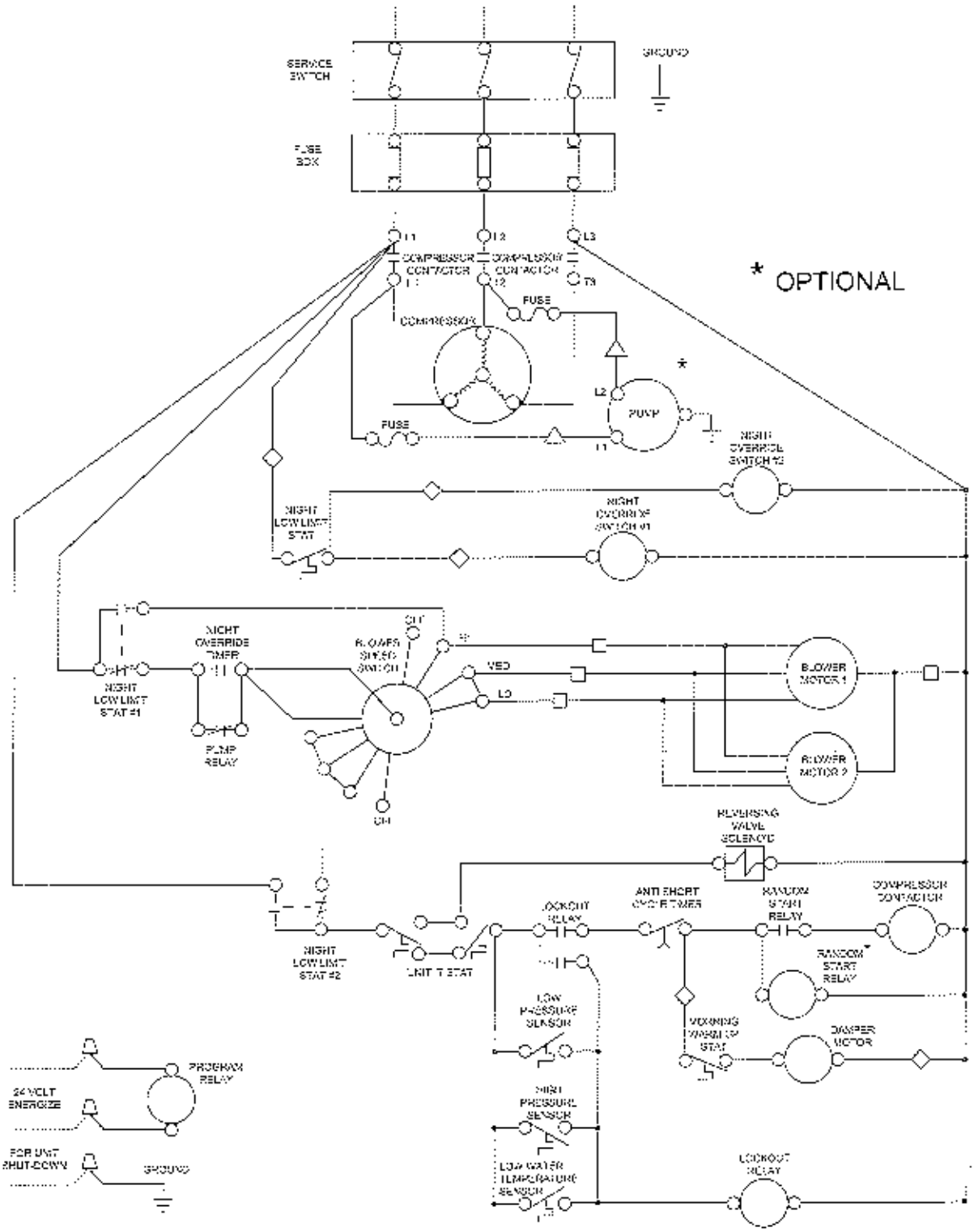
Typical Wiring Diagrams



* OPTIONAL DEVICE

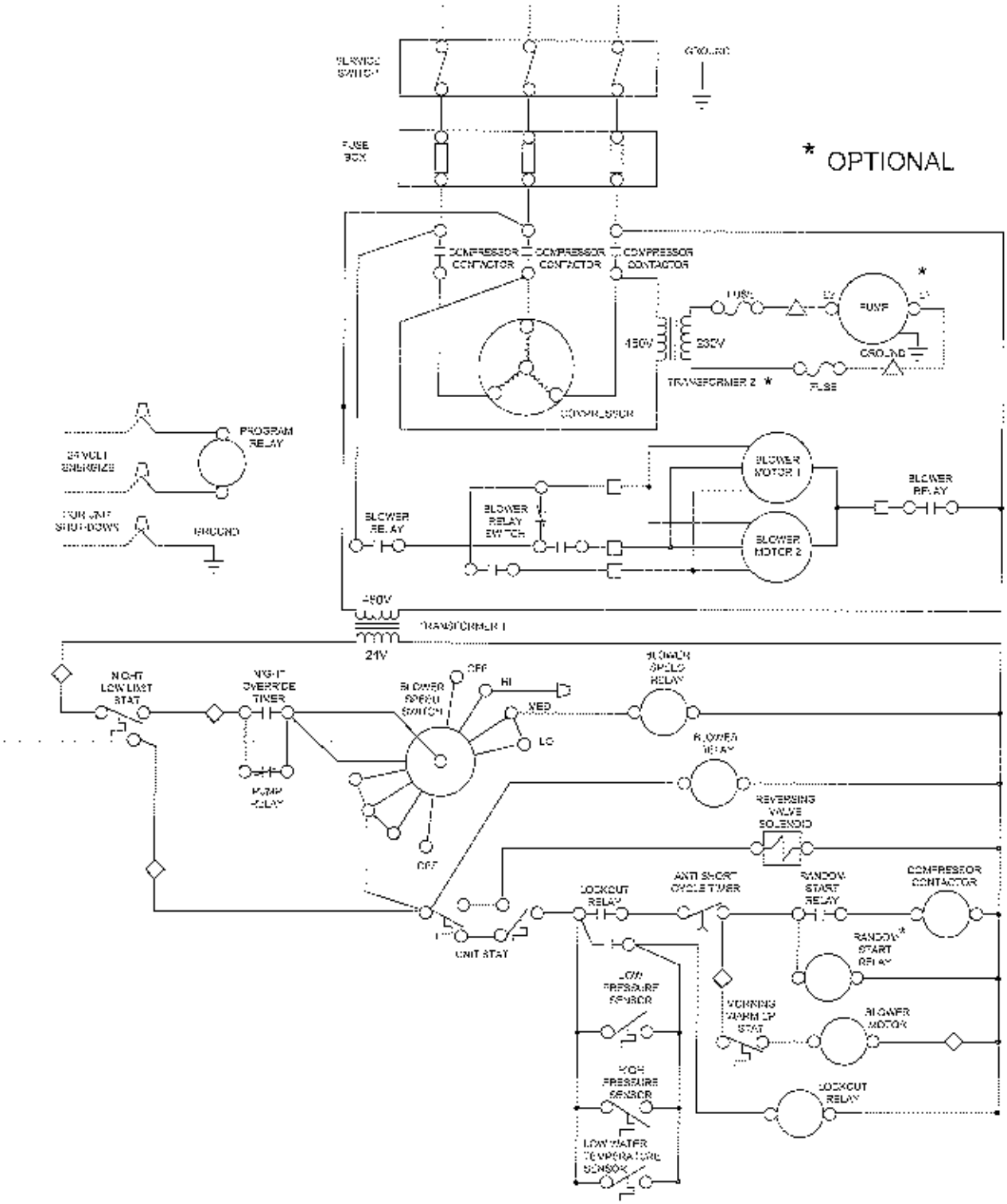
208-230V/1PH/60HZ

Typical Wiring Diagrams



*OPTIONAL

208-230V/3PH/60HZ



*OPTIONAL

430V/3PH/60HZ

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.

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

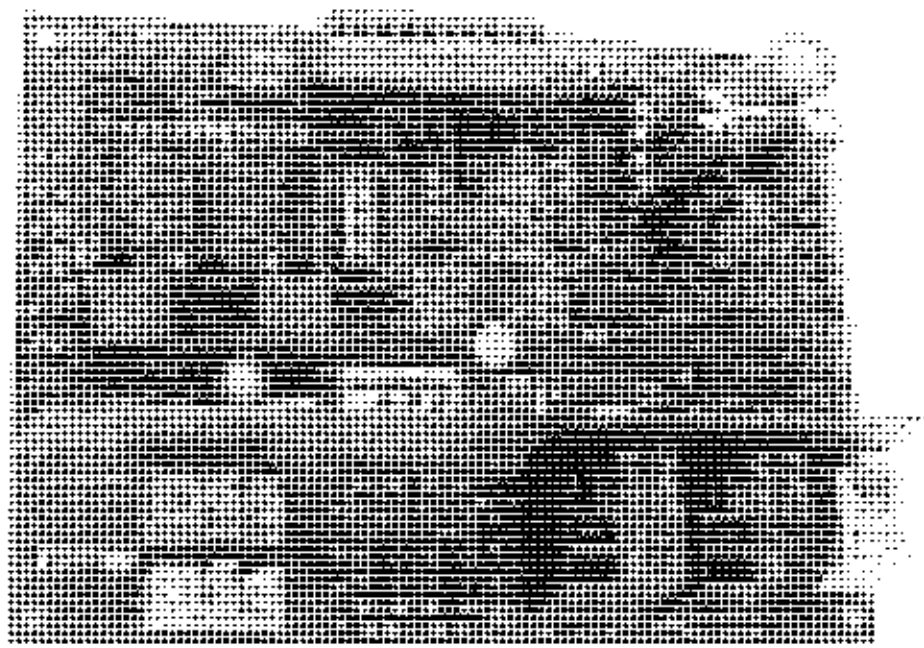
Random-start, demand load-shed, night set-back, demand limit and protective circuits all work to enhance the performance of your system. These features are standard on CMC-2000 Series Electronic Controllers.

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.

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 future. 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.

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

Classroom Console Heat Pumps

General

Furnish and install Water Source Heat Pumps, as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow. Units shall be ClimateMaster model CCL for extended range (40°-110° F). 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.

Basic Construction

Cabinet:

The Cabinet shall be constructed of heavy gauge steel with welded corner bracing. The cabinet shall be painted with Polar Ice oven-baked paint.

OPTION: *Special colors are available.*

A removable front panel shall be held in place by quarter turn fasteners. The front panel shall have a stamped return air grille as part of the panel. The cabinet and chassis shall be supported on a heavy gauge sub-base two inches high, recessed under the front of the unit to provide space and area for return air. Base shall be finished in granite grey and shall be constructed of the same heavy gauge metal as the cabinet.

All interior surface of the cabinet shall be lined with 1-inch acoustic type glass fiber insulation. All glass fiber shall be coated and have exposed edges tucked under flanges to prevent the introduction of glass fiber into the airstream. All insulation must meet NFPA 90A. The cabinet shall have a 15 degree sloped top and shall have an aluminum rigid bar type grille. An access door shall be provided to cover the slide out control section.

OPTION: *The access door shall be held closed by a key lock.*

Units shall have a 1" thick throw-away type fiberglass filter. Contractor shall purchase one spare set of filters for each unit and replace factory shipped filters upon completion of start-up.

The unit shall be provided with a motorized fresh air damper, factory mounted and wired. The morning warm up control shall keep the damper closed until the set point temperature is met. The damper shall be capable of allowing 0-25% CFM of outside air to enter the unit and mix with the return air before filtering.

Fan & Motor Assembly

The fan motors shall be multi-speed permanently lubricated, PSC type (for single phase units), with thermal overload protection. Units supplied without permanently lubricated motors must provide external oiling capability for ease of service. To facilitate field service all units shall have a slide out fan deck and quick electrical disconnect.

Refrigerant Circuit

Units shall have a sealed refrigerant circuit including a hermetic compressor, a refrigerant expansion valve 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 sensor. Access ports shall be factory installed on high and low pressure refrigerant lines to facilitate field service.

Refrigerant to water heat exchanger:

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

OPTION: Coaxial water to refrigerant heat exchanger inner tube shall be cupronickel.

Refrigerant to air heat exchanger:

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

Hermetic compressor:

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 shall have the compressor mounted on isolators to reduce noise and vibration transmission.

Reversing valve:

Reversing valve shall be four way solenoid activated refrigerant valves which shall fail to heating operation. If the unit fails to cooling a low temperature thermostat must be provided to prevent over-cooling of the room.

Safety controls:

Safety controls shall include a high refrigerant pressure switch, a low refrigerant pressure sensor, and a low water temperature sensor set at 33.5° F. 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.

Electrical

Connect power wiring to factory installed 2 pole (3 pole) service switch. Unit fuse protection is factory installed. A control box shall be located within the unit and shall contain controls for compressor, reversing valve and fan motor operation and shall have low voltage field wiring connections if low voltage remote thermostats are used.

Unit Controls

Unit controls shall be located in a box under the control door. The control box shall be able to swing down for easy access for service.

Operating controls shall consist of push button knobs to select off-cool-heat operation and a knob for selecting high-medium-low blower speed. A unit mounted thermostat with a remote bulb measuring return air temperature shall control the compressor for heating and cooling.

Standard controls for the unit are anti-short cycle timer, night low limit T-Stat, 24 V, NC program relay, over-ride switch, and safety controls of high pressure, low pressure and low water temperature switch and operating controls..

OPTION:

a. *Operating controls shall consist of push button-switches to select on-off for automatic change over control. A blower speed selection switch shall allow hi-med-low blower speed. A unit mounted thermostat with a remote bulb measuring return air temperature shall control the compressor for heating or cooling.*

b. *The unit shall be provided with a 24 volt, anticipating type wall thermostat. The thermostat shall be manual change-over type with off-heat-cool selection system and on-auto fan switch.*

c. *The unit shall be provided with a 24 volt, anticipating type wall thermostat. The thermostat shall be an automatic change-over type, with an off-auto system switch and a on-auto fan switch.*

Optional

Stand Alone System

The Classroom Console Heat Pump shall be the same as previously described, except it shall have an individual pump factory installed in the subbase of the unit. The pump shall be piped and wired so that field piping consists of connecting the supply & return water piping. Purge valve shall be supplied by the manufacturer and (field) (factory)installed. No additional field wiring shall be necessary.
When necessary, a transformer for the pump shall be factory installed and wired. The pump wiring shall be factory fused. The compressor and pump shall be interlocked so that when the compressor operates the pump shall also operate, regardless of the selection of the push button controls or 24V remote wall thermostat. The unit with the pump installed will be UL and CSA Listed.

Optional

CMC-2001 Solid-State Control System

Unit shall have a solid state control system. The control shall interface to any type of wall thermostat either 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 shut down.

j. Unit shut down if high or low pressure switches trip.

k. Unit shut down if freeze-stat is actuated.

l. Option to reset unit at thermostat or at disconnect.

Specifications cont.

m. Automatic intelligent reset to automatically reset the unit 30 minutes after trip if the fault has cleared. Should the a fault re-occur within 10 minutes after reset then permanent lockout shall 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 to move the reversing valve only 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 shall be accepted.

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

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 a 24 volt compressor cycling relay for demand load shed control.

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

Optional CMC-2005 Control System

Optional CMC-2005 Control System shall have all 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 shall not open until 30 minutes after the unit comes back from unoccupied mode or the relay shall 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

Optional CMC-2010 Control System shall have all features of the CMC-2001 panel with the following additional features:

a. Control board shall be supplied with an RS-485 interface module to permit all units to be connected by a 2-wire twisted pair shielded cable. This contractor is responsible for all heat pump control wiring. The units shall be segregated into groups of 32. Each group shall be connected to a UCI (unitary controller interface). All UCI's shall be wired together with a 2-wire twisted shielded cable. A TAP interface and an IBM compatible computer shall be supplied.

b. All boards shall 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.

IBM Compatible Computer:

The computer shall utilize a 286 micro-processor chip as a minimum and shall 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 shall provide a minimum of the following:

1. Unoccupied control.
2. Emergency shutdown.
3. Demand limit control (Demand input by others).
4. Individual alarms for each fault if unit fails.
5. Water leaving temperature from each unit.
6. Ability to change room set points.
7. Ability to select high, medium or low fan speed.
8. Graphics of an individual unit or group of units, complete with point readings displayed.
9. Ability to read individual points at fixed intervals for trend tracking.
10. Ability to 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. Graphics are not produced by the manufacturer but may be custom made by the owner. Graphics may be purchased from the WSHP manufacturer under a separate quotation.

Optional

CMC-2001 Through CMC-2010 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 shall not open until 30 minutes after the unit comes back from unoccupied or the relay shall operate a motorized water valve. Damper or valve control to be selectable from a dip switch on the printed circuit board.

c. An electronic room sensor.

d. A digital room thermostat with set point adjustment, sensor and override button.

e. Ability to read leaving water temperature.

f. Ability to read discharge air temperature.

g. Ability to show the number of compressor starts.

h. Ability to show the number of hours of fan operation.

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 of 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, notwithstanding 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 goods(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

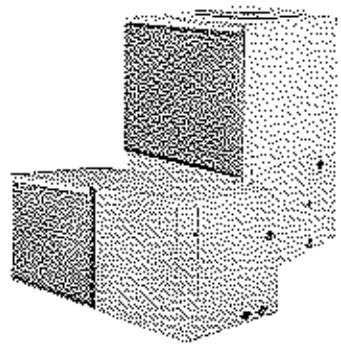
Normally, the contractor or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CM recognized dealer, contractor or service organization. If assistance is required in obtaining warranty performance, write or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

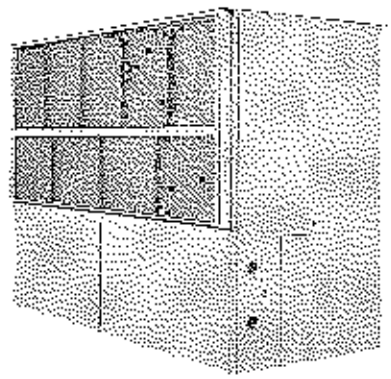
Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Additional Products

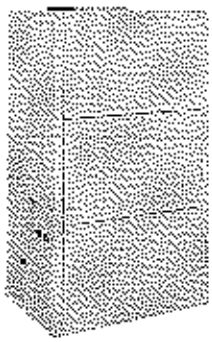


The ClimateMaster **Horizontal** unit is an ideal choice for above-the-ceiling applications in office buildings, schools and dormitories, retirement centers and hotels. These Horizontal units come in a variety of return air configurations, resulting in superior installation versatility. ClimateMaster **Vertical** units are most commonly utilized in condominiums, apartments and core areas of office buildings, but can be installed where any utility closet or room is available. The Vertical unit's configuration creates a significant space savings and can even be installed above the hot water heater.

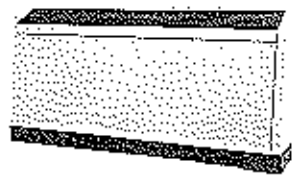
The ClimateMaster **Vertical Stacked** unit features a pre-piped and wired cabinet ready for direct application of drywall. This space saving unit is ideally suited for multi-floor applications such as hotels, apartments and condominiums. The unit's cabinet becomes an integral part of the building with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



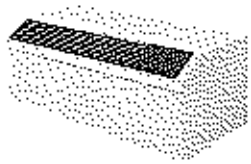
The ClimateMaster **Vari-Master** high-tonnage free-standing units combine the advantages of variable air volume systems with the flexibility and cost savings of a unitary product. Integrity of construction with solid support members and rugged components provide a unit that is quiet and vibration free.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



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.



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.



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.

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!

ClimateMaster

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