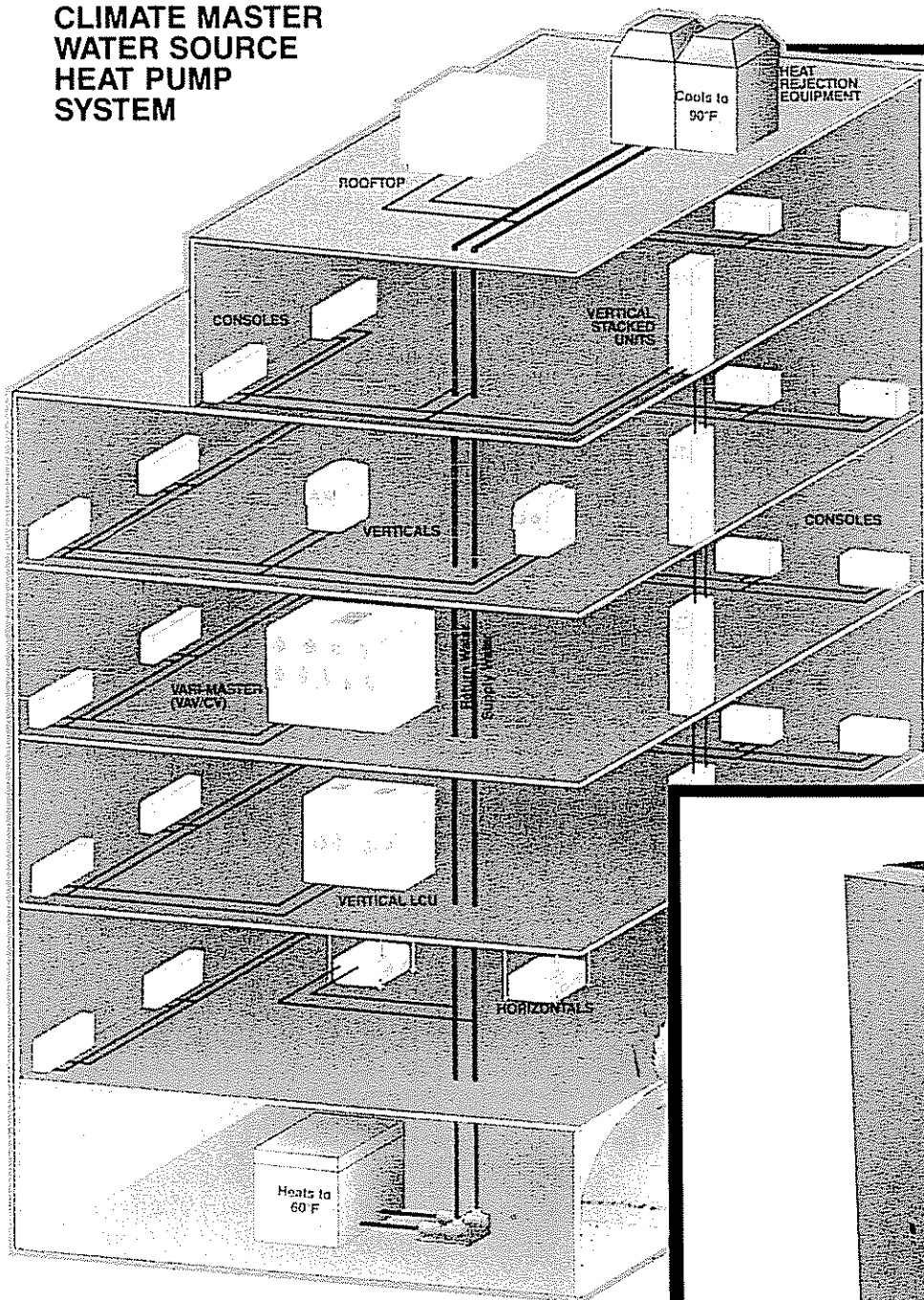


DESIGN GUIDE
VERTICAL LCU
Water-to-Air Heat Pumps
THE V SERIES

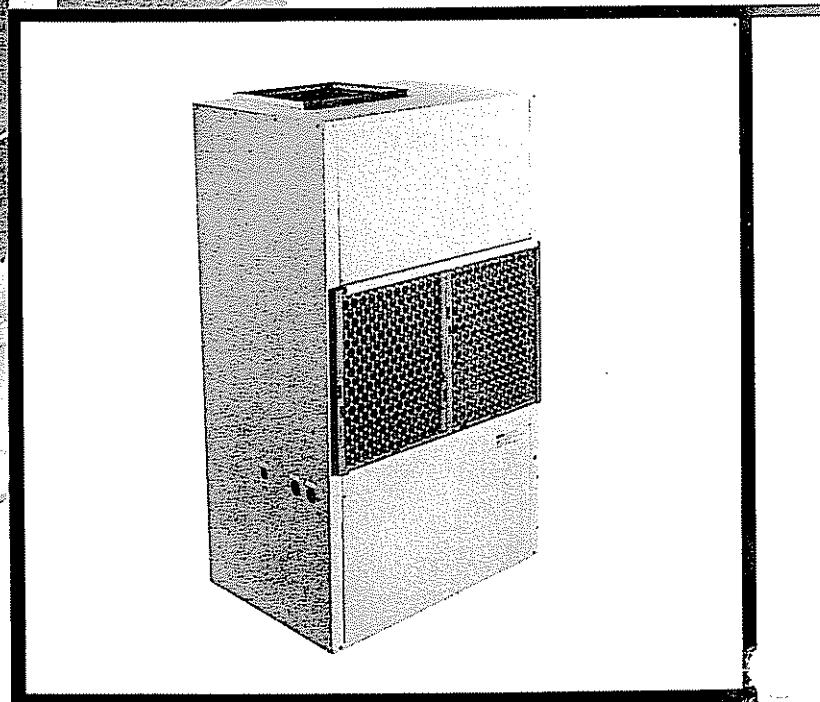
ClimateMaster

THE NATURAL SOLUTION ... USING

CLIMATE MASTER WATER SOURCE HEAT PUMP SYSTEM



Climate Master has experience, equipment, service and support that no one can match. We have the largest selection of units and ship more water source equipment than any other manufacturer in the world. Climate Master is "The world leader in the water source heat pump industry."



VERTICAL LCU'S IN CORE AREAS

A DECENTRALIZED APPROACH

Our equipment is applied at the point of need and thereby provides unparalleled individual comfort control. Our economies of operation are superior because we always operate at peak efficiency with this decentralized approach.

WATER SOURCE HEAT PUMP SYSTEMS

Designed for year around heating and cooling of both new and renovated commercial, industrial and multi-family buildings, our water source heat pump systems offer lower first costs, flexibility of control, and high economies of operation.

A non-insulated two pipe continuous loop system carries moderate temperature water to and from each unit. All units function independently, either adding heat to or removing heat from the water loop. This not only provides independent zone control, it also assures maximum efficiency with the potential of continuous heat recovery.

A typical system includes some type of heat rejection equipment along with a heat adder to maintain the moderate loop temperatures. Optional storage tanks and solar collectors can be added to reduce heater and cooler operation.

V SERIES VERTICAL LCU WATER-TO-AIR HEAT PUMPS

Climate Master V Series vertical LCU (Large Commercial Unit) water-to-air heat pumps meet the most demanding requirements for greater energy efficiencies in new and renovated multi-room structures. Typically concealed, the V Series units are installed in equipment rooms with air ducted into individual comfort areas. Each unit is then separately controlled to maintain a specific comfort zone.

First costs and operating costs are significantly lower than equipment with comparable flexibility. These unitary packaged units require no outside wall penetration. They are part of a decentralized system that provides complete, individualized climate conditioning. While console units are normally applied on the building perimeter, these versatile units typically serve core areas.

Operating efficiencies are excellent for both cooling and heating cycles with EER's as high as 10.4 and COP's up to 3.5. Noise problems are minimized. The units are

quiet with the compressor located in an insulated compartment, totally isolated from the air stream. Each unit is manufactured using top quality components, factory tested and quality assured by Climate Master.

For additional options and product specifications, see page 20.

WARRANTY

Climate Master warrants V Series products to be free from defects in material and workmanship under normal use and maintenance. This limited warranty covers replacement or repair, at our option, of all parts for 12 months from date of installation or 18 months from date of shipment, whichever occurs first. The costs of labor, refrigerant materials, service and transportation are not included. See Terms of Limited Warranty for details.

EXAMPLE SELECTION

EXAMPLE SELECTION

To estimate the performance of a Model V-80 under the following conditions:

COOLING MODE—Return Air of 85° F EDB, 70° F EWB, EWT of 95° F at 14.0 GPM and 2750 CFM.

HEATING MODE—Same conditions, plus Return Air of 75° F EDB and EWT of 45°.

Step 1

COOLING

	From Chart	Correction Factors		
		Air Temp	Air Flow	
Total Capacity BTUH	69700	x 1.045	x .993	= 72327 Total Cooling
Sensible Capacity BTUH	54000	x 1.118	x .992	= 59889 Sensible Cooling
Heat of Rejection	99900	x 1.055	x 1.000	= 105395 Heat of Rejection

HEATING

Total Capacity BTUH	52900	x .960	x .993	= 50429 Total Heating
Heat of Absorption	36100	x .977	x .994	= 35058 Heat of Absorption

Step 2

$$(\text{Heat of Rejection} - \text{Total Cooling}) / 3.41 = \text{Cooling Watts}$$

$$105395 - 72327 = 9697$$

$$(\text{Total Heating} - \text{Heat of Absorption}) / 3.41 = \text{Heating Watts}$$

$$50429 - 35058 = 4508$$

Step 3

$$\begin{array}{lcl} \text{Cooling} & & \text{Heat of Rejection} \\ \text{Entering Water Temp} + & (500 \times \text{GPM}) & = \text{Leaving Water Temp.} \end{array}$$

$$\begin{array}{lcl} & \frac{105395}{(500 \times 14.0)} & = 110.1^\circ \end{array}$$

$$\begin{array}{lcl} \text{Heating} & & \text{Heat of Absorption} \\ \text{Entering Water Temp} + & (500 \times \text{GPM}) & = \text{Leaving Water Temp.} \end{array}$$

$$\begin{array}{lcl} & \frac{35058}{(500 \times 14.0)} & = 39.9^\circ \end{array}$$

**DESIGN
POINT DATA**

Design Point Data is an IBM compatible software package that contains a complete, up-to-date catalog for all Climate Master equipment. By varying the entering conditions, ratings and data are immediately calculated and displayed at the selected design point, then printed and/or saved, DPD saves time and assures calculation accuracy.

Bold Face = ARI Conditions

PERFORMANCE CHARTS

V080

COOLING PERFORMANCE TABLE

Water Flow GPM	Entering Water Temp. °F	Total Cooling BTUH	Sensible Cooling BTUH	Heat of Rejection BTUH	Power Input Watts	Leaving Water Temp. °F
10.0	60°	84300	65300	106700	6597	81.3°
14.0	60°	87200	67600	108100	6118	75.4°
20.7	60°	89700	69600	109200	5722	70.5°
26.0	60°	90700	70400	109700	5551	68.5°
10.0	70°	79300	61500	104400	7371	90.9°
14.0	70°	82200	63700	105700	6902	85.1°
20.7	70°	84700	65700	106900	6515	80.3°
26.0	70°	85700	66500	107300	6347	78.3°
10.0	85°	71700	55600	100800	8529	105.2°
14.0	85°	74700	57900	102200	8078	99.6°
20.7	85°	77000	59700	103300	7703	95.0°
26.0	85°	78100	60600	103800	7541	93.0°
10.0	95°	66800	51800	98500	9303	114.7°
14.0	95°	69700	54000	99900	8862	109.3°
20.7	95°	72000	55800	101000	8496	104.8°
26.0	95°	73100	56700	101500	8338	102.8°
10.0	105°	66900	51900	98600	9289	114.5°
14.0	105°	68000	52700	99100	9134	112.6°

HEATING PERFORMANCE TABLE

Total Heating BTUH	Heat of Absorp BTUH	Power Input Watts	Leaving Water Temp. °F	P.D. Feet. of WATER
64800	45700	5592	50.9°	3.23
67600	47700	5848	53.2°	6.34
70000	49400	6073	55.2°	13.86
71100	50100	6174	56.2°	21.87
74400	52100	6551	59.6°	3.23
77400	54100	6847	62.3°	6.34
80000	55800	7104	64.6°	13.86
81100	56500	7219	65.7°	21.87
88900	61700	7990	72.7°	3.23
92300	63800	8344	75.9°	6.34
94900	65400	8652	78.7°	13.86
95100	66100	8788	79.9°	21.87
98700	68200	8946	81.4°	3.23
102100	70200	9344	85.0°	6.34
104800	71800	9684	88.1°	13.86
106000	72500	9833	89.4°	21.87
108400	74600	9905	90.1°	3.23
111900	76600	10343	94.1°	6.34
114800	78300	10714	97.4°	13.86
116100	79000	10878	98.9°	21.87

OPERATION NOT RECOMMENDED

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR TEMPERATURE

Entering Air °F WB	Total Cooling Capacity	Sensible Capacity Entering Dry Bulb					Heat of Rejection	Entering Air °F DB	Total Heating Capacity	Heat of Absorp	Power Input
		70° DB	75° DB	80° DB	85° DB	90° DB					
57°	.851	.961					.824	55°	1.040	1.070	.940
61°	.955	.815	.881	1.148			.948	65°	1.010	1.023	.965
67°	1.000	.466	.733	1.000	1.267		1.002	70°	.995	1.000	1.015
70°	1.045		.585	.852	1.118		1.055	75°	.980	.977	1.040
75°	1.119		.337	.604	.871	1.405	1.145	80°	.965	.953	1.065

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR FLOW

Total Enter CFM	Total Cool Capacity	Sensible Capacity	Heat of Rejection	Cool Input Watts	Total Heat Capacity	Heat of Absorption	Heat Input Watts
2300	.971	.967	.969	.936	.971	.975	1.033
2600	.986	.983	.989	.968	.986	.988	1.017
2750	.993	.992	1.000	.984	.993	.994	1.008
2900	1.000	1.000	1.010	1.000	1.000	1.000	1.000
3200	1.014	1.017	1.031	1.032	1.014	1.012	.983
3500	1.029	1.033	1.051	1.064	1.029	1.025	.967

ARI RATED: 10.0 EER, 3.3 COP

Bold Face = ARI Conditions

BLOWER PERFORMANCE

SCFM Air Flow		EXTERNAL STATIC PRESSURE													
		.2	.3	.4	.5	.6	.7	.8	.9	1	1.1	1.2	1.3	1.4	1.5
2300	BHP	.44	.48	.52	.56	.60	.65	.69	.74	.79	.83	.88	.93	.99	1.04
	RPM	618	657	694	730	765	799	833	866	898	929	960	990	1020	1049
2500	BHP	.54	.59	.63	.67	.72	.77	.81	.86	.91	.96	1.02	1.07	1.12	1.18
	RPM	657	693	728	762	795	827	859	890	920	950	980	1009	1037	1065
2700	BHP	.67	.71	.76	.81	.86	.91	.96	1.01	1.06	1.11	1.17	1.22	1.28	1.33
	RPM	697	730	763	795	826	857	887	916	945	974	1002	1030	1057	1084
2900	BHP	.81	.86	.91	.96	1.01	1.06	1.11	1.17	1.22	1.28	1.34	1.39	1.45	1.51
	RPM	737	768	799	829	859	888	916	945	972	999	1026	1053	1079	1105
3100	BHP	.97	1.02	1.07	1.13	1.18	1.24	1.29	1.35	1.41	1.47	1.52	1.58	1.64	1.71
	RPM	778	807	836	865	893	920	948	974	1001	1027	1052	1078	1103	1127
3300	BHP	1.15	1.21	1.26	1.32	1.38	1.43	1.49	1.55	1.61	1.67	1.73	1.80	1.86	1.92
	RPM	819	846	874	901	928	954	980	1005	1031	1056	1080	1104	1128	1152
3500	BHP	1.35	1.41	1.47	1.53	1.59	1.65	1.71	1.78	1.84	1.90	1.97	2.03	—	—
	RPM	860	886	912	938	963	989	1013	1038	1062	1086	1109	1133	—	—
	Turns Out	2	1.5	1	0										
	Turns Out	2	1.5	1	0										

- Special sheaves required, RPM above/below RPM range of standard sheaves.
- 2 hp motor required, BHP required is greater than standard motor.
- Special sheaves and 2 hp motor required.

Bold Face = ARI Conditions

PERFORMANCE CHARTS

V120

COOLING PERFORMANCE TABLE

HEATING PERFORMANCE TABLE												
Water Flow GPM.	Entering Water Temp. °F	Total Cooling BTUH	Sensible Cooling BTUH	Heat of Rejection BTUH	Power Input Watts	Leaving Water Temp. °F	Total Heating BTUH	Heat of Absorp BTUH	Power Input Watts	Leaving Water Temp. °F	P.D. Feet. of WATER	
15.0	45°	141200	107800	170100	8481	67.7°	OPERATION NOT RECOMMENDED					6.13
22.0	45°	146600	111900	172500	7604	60.7°						13.18
31.9	45°	150300	114800	174200	7008	55.9°						27.72
40.0	45°	151900	116000	174900	6735	53.7°						43.58
15.0	70°	121900	93100	161000	11462	91.5°	120600	86500	10005	58.5°	6.13	
22.0	70°	127100	97100	163400	10633	84.9°	126800	90800	10566	61.7°	13.18	
31.9	70°	130800	99900	165100	10069	80.4°	131000	93600	10975	64.1°	27.72	
40.0	70°	132300	101000	165800	9810	78.3°	133000	94900	11167	65.3°	43.58	
15.0	85°	110300	84200	155500	13249	105.7°	144300	102700	12202	71.3°	6.13	
22.0	85°	115500	88200	158000	12451	99.4°	150900	107000	12881	75.3°	13.18	
31.9	85°	119000	90900	159600	11905	95.0°	155500	109900	13367	78.1°	27.72	
40.0	85°	120700	92200	160400	11656	93.0°	157600	111200	13594	79.4°	43.58	
15.0	95°	102700	78400	151900	14442	115.3°	160200	113600	13665	79.9°	6.13	
22.0	95°	107800	82300	154400	13663	109.0°	167100	117900	14423	84.3°	13.18	
31.9	95°	111200	84900	156000	13130	104.8°	171700	120700	14962	87.4°	27.72	
40.0	95°	112800	86100	156700	12886	102.8°	173900	122000	15213	88.9°	43.58	
15.0	105°	OPERATION NOT RECOMMENDED					176000	124400	15130	88.4°	6.13	
22.0	105°						183100	128700	15966	93.3°	13.18	
31.9	105°						188100	131600	16556	96.7°	27.72	
40.0	105°						190300	132900	16831	98.4°	43.58	

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR TEMPERATURE

Entering Air °F WB	Total Cooling Capacity	Sensible Capacity Entering Dry Bulb					Heat of Rejection	Entering Air °F DB	Total Heating Capacity	Heat of Absorp	Power Input
		70° DB	75° DB	80° DB	85° DB	90° DB					
57°	.851	.961					.824	55°	1.040	1.070	.940
61°	.910	.763	1.030				.895	60°	1.025	1.047	.965
64°	.955	.615	.881	1.148			.948	65°	1.010	1.023	.990
67°	1.000	.466	.733	1.000	1.267		1.002	70°	.995	1.000	1.015
70°	1.045		.585	.852	1.118		1.055	75°	.980	.977	1.040

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR FLOW

Total Enter CFM	Total Cool Capacity	Sensible Capacity	Heat of Rejection	Cool Input Watts	Total Heat Capacity	Heat of Absorption	Heat Input Watts
3500	.980	.977	.991	.955	.980	.982	1.023
3800	.990	.988	.995	.977	.990	.991	1.012
3950	.995	.994	1.003	.989	.995	.996	1.006
4100	1.000	1.000	1.010	1.000	1.000	1.000	1.000
4400	1.010	1.012	1.025	1.023	1.010	1.009	.988
4700	1.020	1.023	1.039	1.045	1.020	1.018	.977

ARI RATED: 10.0 EER, 3.5 COP

Bold Face = ARI Conditions

BLOWER PERFORMANCE

SCFM Air Flow		EXTERNAL STATIC PRESSURE													
		.2	.3	.4	.5	.6	.7	.8	.9	1	1.1	1.2	1.3	1.4	1.5
3500	BHP	.82	.89	.96	1.04	1.11	1.19	1.27	1.36	1.44	1.53	1.62	1.71	1.80	1.90
	RPM	619	651	682	713	742	772	800	828	856	883	910	936	961	987
3700	BHP	.95	1.02	1.10	1.17	1.25	1.33	1.42	1.50	1.59	1.68	1.77	1.86	1.96	—
	RPM	645	675	705	734	763	791	818	845	872	898	924	949	974	—
3900	BHP	1.09	1.16	1.24	1.32	1.40	1.49	1.57	1.66	1.75	1.84	1.94	2.03	—	—
	RPM	671	700	729	757	784	811	837	863	889	914	939	964	—	—
4100	BHP	1.24	1.32	1.40	1.48	1.57	1.66	1.74	1.84	1.93	2.02	—	—	—	—
	RPM	697	725	752	779	806	832	857	882	907	937	—	—	—	—
4300	BHP	1.40	1.49	1.57	1.66	1.75	1.84	1.93	2.02	—	—	—	—	—	—
	RPM	724	750	776	802	828	853	877	902	—	—	—	—	—	—
4500	BHP	1.59	1.67	1.76	1.85	1.94	2.04	—	—	—	—	—	—	—	—
	RPM	750	776	801	826	850	874	—	—	—	—	—	—	—	—
4700	BHP	1.78	1.87	1.96	—	—	—	—	—	—	—	—	—	—	—
	RPM	777	801	825	—	—	—	—	—	—	—	—	—	—	—
TURNS OUT		5	4.5	4	3.5	2.5	2	1.5	1	—	—	—	—	—	—

Special sheaves required, RPM above/below RPM range of standard sheaves.
Bold Face = ARI Conditions

PERFORMANCE CHARTS

V100

COOLING PERFORMANCE TABLE

Water Flow GPM.	Entering Water Temp. °F	Total Cooling BTUH	Sensible Cooling BTUH	Heat of Rejection BTUH	Power Input Watts	Leaving Water Temp. °F	Total Heating BTUH	Heat of Absorp BTUH	Power Input Watts	Leaving Water Temp. °F	P.D. Feet of WATER
13.0	45°	119700	87900	143100	6853	67.0°	OPERATION NOT RECOMMENDED				4.95
19.0	45°	124100	91100	145100	6164	60.3°	72400	52700	5771	39.5°	10.57
26.8	45°	126800	93100	146300	5718	55.9°	75200	54800	5984	40.9°	21.02
34.0	45°	128300	94200	147000	5486	53.6°	76600	55800	6102	41.7°	33.83
13.0	70°	103600	76200	135500	9290	90.8°	101000	71600	8628	59.0°	4.95
19.0	70°	107900	79200	137400	8637	84.5°	105900	74900	9086	62.1°	10.57
26.8	70°	110700	81300	138700	8217	80.4°	109000	77000	9399	64.3°	21.02
34.0	70°	112000	82200	139300	7996	78.2°	110700	78100	9567	65.4°	33.83
13.0	85°	94200	69200	130900	10751	105.1°	120900	85000	10520	71.9°	4.95
19.0	85°	98400	72200	132900	10123	99.0°	126100	88300	11074	75.7°	10.57
26.8	85°	101000	74200	134100	9715	95.0°	129400	90400	11446	78.3°	21.02
34.0	85°	102400	75200	134800	9503	92.9°	131200	91500	11646	79.6°	33.83
13.0	95°	87800	64500	127800	11725	114.7°	134100	93900	11783	80.6°	4.95
19.0	95°	91900	67500	129800	11112	108.7°	139500	97200	12399	84.8°	10.57
26.8	95°	94600	69500	131100	10715	104.8°	143000	99300	12812	87.6°	21.02
34.0	95°	95900	70400	131700	10507	102.7°	144800	100400	13032	89.1°	33.83
13.0	105°	OPERATION NOT RECOMMENDED					147300	102800	13045	89.2°	4.95
19.0	105°						152900	106100	13725	93.8°	10.57
26.8	105°	88100	64700	128000	11714	114.6°	156500	108200	14178	96.9°	21.02
34.0	105°	89300	65600	128600	11511	112.6°	158500	109300	14418	98.6°	33.83

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR TEMPERATURE

Entering Air °F WB	Total Cooling Capacity	Sensible Capacity Entering Dry Bulb					Heat of Rejection	Entering Air °F DB	Total Heating Capacity	Heat of Absorp	Power Input
		70° DB	75° DB	80° DB	85° DB	90° DB					
57°	.851	.961					.824	55°	1.040	1.070	.940
61°	.910	.763	1.030				.895	60°	1.025	1.047	.965
64°	.955	.615	.881	1.148			.948	65°	1.010	1.023	.990
67°	1.000	.466	.733	1.000	1.267		1.002	70°	.995	1.000	1.015
70°	1.045		.585	.852	1.118		1.055	75°	.980	.977	1.040

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR FLOW

Total Enter CFM	Total Cool Capacity	Sensible Capacity	Heat of Rejection	Cool Input Watts	Total Heat Capacity	Heat of Absorption	Heat Input Watts
3000	.977	.973	.977	.948	.977	.980	1.027
3300	.988	.987	.993	.974	.988	.990	1.013
3450	.994	.993	1.002	.987	.994	.995	1.007
3600	1.000	1.000	1.010	1.000	1.000	1.000	1.000
3900	1.012	1.013	1.027	1.026	1.012	1.010	.987
4200	1.023	1.027	1.043	1.052	1.023	1.020	.973

ARI RATED: 10.4 EER, 3.4 COP

Bold Face = ARI Conditions

BLOWER PERFORMANCE

SCFM Air Flow		EXTERNAL STATIC PRESSURE													
		.2	.3	.4	.5	.6	.7	.8	.9	1	1.1	1.2	1.3	1.4	1.5
3000	BHP	.52	.58	.65	.71	.78	.85	.92	1.00	1.07	1.15	1.24	1.32	1.41	1.50
	RPM	534	571	607	641	675	708	740	771	802	832	861	890	918	946
3200	BHP	.61	.68	.74	.81	.88	.95	1.03	1.11	1.19	1.27	1.35	1.44	1.53	1.62
	RPM	558	593	627	660	692	724	754	784	814	843	871	899	926	953
3400	BHP	.71	.78	.85	.92	.99	1.07	1.15	1.23	1.31	1.39	1.48	1.57	1.66	1.75
	RPM	582	615	647	679	710	740	770	799	827	855	883	910	936	962
3600	BHP	.82	.89	.97	1.04	1.12	1.20	1.28	1.36	1.44	1.53	1.62	1.71	1.80	1.89
	RPM	606	638	669	699	729	758	786	814	842	868	895	921	947	972
3800	BHP	.95	1.02	1.10	1.17	1.25	1.33	1.42	1.50	1.59	1.68	1.77	1.86	1.95	2.05
	RPM	630	661	690	719	748	776	803	830	857	883	908	934	959	983
4000	BHP	1.08	1.16	1.24	1.32	1.40	1.48	1.57	1.66	1.75	1.84	1.93	2.01	2.10	2.19
	RPM	655	684	713	740	768	795	821	847	873	898	923	948	973	998
4200	BHP	1.23	1.31	1.39	1.48	1.56	1.65	1.74	1.83	1.92	2.01	2.10	2.19	2.28	2.37
	RPM	680	708	735	762	788	814	840	865	890	914	938	962	986	1010

Special sheaves required, RPM above/below RPM range of standard sheaves.
 2 hp motor required, BHP required is greater than standard motor.
 Special sheaves and 2 hp motor required.

Bold Face = ARI Conditions

PERFORMANCE CHARTS

V160

COOLING PERFORMANCE TABLE

Water Flow GPM.	Entering Water Temp. °F	Total Cooling BTUH	Sensible Cooling BTUH	Heat of Rejection BTUH	Power Input Watts	Leaving Water Temp. °F	Total Heating BTUH	Heat of Absorp BTUH	Power Input Watts	Leaving Water Temp. °F	P.D. Feet. of WATER
19.0	45°	182100	141200	219800	11051	68.1°	OPERATION NOT RECOMMENDED				2.93
28.0	45°	189300	146800	223000	9882	60.9°	105900	76200	8697	39.6°	6.37
41.3	45°	194400	150700	225300	9068	55.9°	110300	79500	9047	41.2°	13.86
51.0	45°	196300	152200	226100	8736	53.9°	112200	80800	9197	41.8°	21.14
19.0	70°	157200	121900	208000	14904	91.9°	147800	103500	12994	59.1°	2.93
28.0	70°	164200	127300	211300	13801	85.1°	155000	108300	13689	62.3°	6.37
41.3	70°	169100	131100	213500	13030	80.3°	160000	111600	14201	64.6°	13.86
51.0	70°	171000	132600	214400	12716	78.4°	162100	112900	14416	65.6°	21.14
19.0	85°	142300	110300	201000	17217	106.2°	176800	122800	15845	72.1°	2.93
28.0	85°	149100	115600	204200	16151	99.6°	184500	127600	16683	75.9°	6.37
41.3	85°	154000	119400	206500	15407	95.0°	189900	130900	17294	78.7°	13.86
51.0	85°	155900	120900	207400	15105	93.1°	192000	132200	17547	79.8°	21.14
19.0	95°	132300	102600	196300	18758	115.7°	196100	135600	17748	80.7°	2.93
28.0	95°	139100	107900	199500	17718	109.3°	204200	140500	18679	85.0°	6.37
41.3	95°	143900	111600	201800	16992	104.8°	209700	143700	19355	88.0°	13.86
51.0	95°	145800	113100	202700	16696	102.9°	212000	145000	19636	89.3°	21.14
19.0	105°	OPERATION NOT RECOMMENDED					215500	148500	19648	89.4°	2.93
28.0	105°					114.5°	223800	153300	20677	94.1°	6.37
41.3	105°	133800	103700	197100	18577	112.8°	229600	156600	21417	97.4°	13.86
51.0	105°	135600	105100	198000	18288		232000	157900	21723	98.8°	21.14

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR TEMPERATURE

Entering Air °F WB	Total Cooling Capacity	Sensible Capacity Entering Dry Bulb					Heat of Rejection	Entering Air °F DB	Total Heating Capacity	Heat of Absorp	Power Input
		70° DB	75° DB	80° DB	85° DB	90° DB					
57°	.851	.961					.824	55°	1.040	1.070	.940
61°	.910	.763	1.030				.895	60°	1.025	1.047	.965
64°	.955	.615	.881	1.148			.948	65°	1.010	1.023	.990
67°	1.000	.466	.733	1.000	1.267		1.002	70°	.995	1.000	1.015
70°	1.045		.585	.852	1.118		1.055	75°	.980	.977	1.040

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR FLOW

Total Enter CFM	Total Cool Capacity	Sensible Capacity	Heat of Rejection	Cool Input Watts	Total Heat Capacity	Heat of Absorption	Heat Input Watts
4600	.971	.967	.969	.936	.971	.975	1.033
5200	.986	.983	.989	.968	.986	.988	1.017
5500	.993	.992	1.000	.984	.993	.994	1.008
5800	1.000	1.000	1.010	1.000	1.000	1.000	1.000
6400	1.014	1.017	1.031	1.032	1.014	1.012	.983
7000	1.029	1.033	1.051	1.064	1.029	1.025	.967

ARI RATED: 10.0 EER, 3.3 COP

Bold Face = ARI Conditions

BLOWER PERFORMANCE

SCFM Air Flow		EXTERNAL STATIC PRESSURE													
		.2	.3	.4	.5	.6	.7	.8	.9	1	1.1	1.2	1.3	1.4	1.5
4600	BHP	.87	.95	1.04	1.12	1.21	1.29	1.38	1.48	1.57	1.67	1.77	1.87	1.97	2.08
	RPM TURNS OUT	618	657	694	730	765	799	833	866	898	929	960	990	1020	1049
5000	BHP	1.09	1.17	1.35	1.35	1.44	1.53	1.63	1.73	1.83	1.93	2.03	2.14	2.24	2.35
	RPM TURNS OUT	657	693	728	762	795	827	859	890	920	950	980	1009	1027	1065
5400	BHP	1.33	1.42	1.52	1.61	1.71	1.81	1.91	2.01	2.12	2.22	2.33	2.44	2.55	2.67
	RPM TURNS OUT	697	730	763	795	826	857	887	916	945	974	1002	1030	1057	1084
5800	BHP	1.62	1.71	1.81	1.91	2.02	2.12	2.23	2.34	2.45	2.56	2.67	2.78	2.90	3.02
	RPM TURNS OUT	737	768	799	829	859	888	916	945	972	999	1026	1053	1079	1105
6200	BHP	1.94	2.04	2.15	2.26	2.36	2.47	2.59	2.70	2.81	2.93	—	—	—	—
	RPM TURNS OUT	778	807	836	865	893	920	948	974	1001	1027	—	—	—	—
6600	BHP	2.30	2.41	2.52	2.64	2.75	2.87	2.99	—	—	—	—	—	—	—
	RPM TURNS OUT	819	846	874	901	928	954	980	—	—	—	—	—	—	—
7000	BHP	2.71	2.82	2.94	—	—	—	—	—	—	—	—	—	—	—
	RPM TURNS OUT	860	886	912	—	—	—	—	—	—	—	—	—	—	—

Special sheaves required, RPM above/below RPM range of standard sheaves.
Bold Face = ARI Conditions

PERFORMANCE CHARTS

V200

COOLING PERFORMANCE TABLE

Water Flow GPM.	Entering Water Temp. °F	Total Cooling BTUH	Sensible Cooling BTUH	Heat of Rejection BTUH	Power Input Watts	Leaving Water Temp. °F	Total Heating BTUH	Heat of Absorp BTUH	Power Input Wats	Leaving Water Temp. °F	P.D. Feet. of WATER	
25.0	45°	238500	175100	285800	13882	67.9°	OPERATION NOT RECOMMENDED					4.56
37.0	45°	247700	181900	290000	12412	60.7°					9.98	
53.7	45°	253700	186300	292700	11435	55.9°	150200	109400	11963	40.9°	21.02	
67.0	45°	256500	188300	294000	11000	53.8°	152900	111400	12182	41.7°	32.72	
25.0	70°	206600	151700	270500	18746	91.6°	200600	142200	17137	58.6°	4.56	
37.0	70°	215500	158200	274700	17357	84.8°	211000	149300	18103	61.9°	9.98	
53.7	70°	221500	162600	277500	16433	80.3°	218000	153900	18786	64.3°	21.02	
67.0	70°	224100	164500	278700	16021	78.3°	221000	155900	19102	65.3°	32.72	
25.0	85°	187400	137600	261300	21664	105.9°	240200	168900	20897	71.5°	4.56	
37.0	85°	196300	144100	265600	20324	99.4°	251200	176000	22066	75.5°	9.98	
53.7	85°	202000	148300	268300	19432	95.0°	258600	180600	22881	78.3°	21.02	
67.0	85°	204600	150200	269500	19033	93.0°	261900	182600	23253	79.5°	32.72	
25.0	95°	174700	128300	255200	23610	115.4°	266500	186700	23404	80.1°	4.56	
37.0	95°	183400	134700	259500	22303	109.0°	278100	193800	24708	84.5°	9.98	
53.7	95°	189100	138800	262200	21431	104.8°	285700	198400	25610	87.6°	21.02	
67.0	95°	191600	140700	263400	21042	102.9°	289100	200400	26021	89.0°	32.72	
25.0	105°	OPERATION NOT RECOMMENDED					292900	204500	25911	88.6°	4.56	
37.0	105°						304900	211600	27350	93.6°	9.98	
53.7	105°	176200	129400	256100	23430	114.5°	312800	216200	28339	96.9°	21.02	
67.0	105°	178700	131200	257300	23050	112.7°	316400	218200	28789	98.5°	32.72	

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR TEMPERATURE

Entering Air °F WB	Total Cooling Capacity	Sensible Capacity Entering Dry Bulb					Heat of Rejection	Entering Air °F DB	Total Heating Capacity	Heat of Absorp	Power Input
		70° DB	75° DB	80° DB	85° DB	90° DB					
57°	.851	.961					.824	55°	1.040	1.070	.940
61°	.910	.763	1.030				.895	60°	1.025	1.047	.965
64°	.955	.615	.881	1.148			.948	65°	1.010	1.023	.990
67°	1.000	.466	.733	1.000	1.267		1.002	70°	.995	1.000	1.015
70°	1.045	.585	.852	.852	1.118		1.055	75°	.980	.977	1.040

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR FLOW

Total Enter CFM	Total Cool Capacity	Sensible Capacity	Heat of Rejection	Cool Input Watts	Total Heat Capacity	Heat of Absorption	Heat Input Watts
6000	.977	.973	.977	.948	.977	.980	1.027
6600	.988	.987	.993	.974	.988	.990	1.013
6900	.994	.993	1.002	.987	.994	.995	1.007
7200	1.000	1.000	1.010	1.000	1.000	1.000	1.000
7800	1.012	1.013	1.027	1.026	1.012	1.010	.997
8400	1.023	1.027	1.043	1.052	1.023	1.020	.973

ARI RATED: 10.4 EER, 3.4 COP

Bold Face = ARI Conditions

BLOWER PERFORMANCE

SCFM Air Flow		EXTERNAL STATIC PRESSURE													
		.2	.3	.4	.5	.6	.7	.8	.9	1	1.1	1.2	1.3	1.4	1.5
6000	BHP	.52	.58	.65	.71	.78	.85	.92	1.00	1.07	1.15	1.24	1.32	1.41	1.50
	RPM TURNS OUT	534	571	607	641	675	708	740	771	802	832	861	890	918	946
6400	BHP	.61	.68	.74	.81	.88	.95	1.03	1.11	1.19	1.27	1.35	1.44	1.53	1.62
	RPM TURNS OUT	558	593	627	660	692	724	754	784	814	843	871	899	926	953
6800	BHP	.71	.78	.85	.92	.99	1.07	1.15	1.23	1.31	1.39	1.48	1.57	1.66	1.75
	RPM TURNS OUT	582	615	647	679	710	740	770	799	827	855	883	910	936	962
7200	BHP	.82	.89	.97	1.04	1.12	1.20	1.28	1.36	1.44	1.53	1.62	1.71	1.80	1.89
	RPM TURNS OUT	606	638	669	699	729	758	786	814	842	868	895	921	947	972
7600	BHP	.95	1.02	1.10	1.17	1.25	1.33	1.42	1.50	1.59	1.68	1.77	1.86	1.95	2.05
	RPM TURNS OUT	630	661	690	719	748	776	803	830	857	883	908	934	959	983
8000	BHP	1.08	1.16	1.24	1.32	1.40	1.48	1.57	1.66	1.75	1.84	1.93	2.03	2.12	2.22
	RPM TURNS OUT	655	684	713	740	768	795	821	847	873	898	923	947	971	995
8400	BHP	1.23	1.31	1.39	1.48	1.56	1.65	1.74	1.83	1.92	2.01	—	—	—	—
	RPM TURNS OUT	680	708	735	762	788	814	840	865	890	914	—	—	—	—

- Special sheaves required, RPM above/below RPM range of standard sheaves.
- 2 hp motor required, BHP required is greater than standard motor.
- Special sheaves and 2 hp motor required.

PERFORMANCE CHARTS

V240

COOLING PERFORMANCE TABLE

Water Flow GPM	Entering Water Temp. °F	Total Cooling BTUH	Sensible Cooling BTUH	Heat of Rejection BTUH	Power Input Watts	Leaving Water Temp. °F	Total Heating BTUH	Heat of Absorp BTUH	Power Input Watts	Leaving Water Temp. °F	P.D. Feet of Water
30.0	45°	282300	215600	340100	16960	67.7°	OPERATION NOT RECOMMENDED				6.13
44.0	45°	293100	223800	345000	15208	60.7°					13.18
63.8	45°	300500	229500	348300	14014	55.9°					27.72
79.0	45°	303700	231900	349700	13497	53.9°					42.50
30.0	70°	243800	186200	322000	22923	91.5°	241100	172900	20001	58.5°	6.13
44.0	70°	254400	194300	326900	21267	84.9°	253500	181500	21122	61.8°	13.18
63.8	70°	261400	199600	330100	20137	80.3°	262000	187200	21936	64.1°	27.72
79.0	70°	264500	202000	331500	19647	78.4°	265700	189700	22301	65.2°	42.50
30.0	85°	220700	168500	311100	26501	105.7°	288600	205400	24390	71.3°	6.13
44.0	85°	231100	176500	316000	24903	99.4°	301800	214000	25747	75.3°	13.18
63.8	85°	238000	181700	319200	23811	95.0°	310900	219800	26717	78.1°	27.72
79.0	85°	241000	184000	320600	23337	93.1°	314800	222200	27150	79.4°	42.50
30.0	95°	205300	156800	303800	28885	115.3°	320200	227100	27316	79.9°	6.13
44.0	95°	215500	164600	308700	27326	109.0°	334000	235700	28830	84.3°	13.18
63.8	95°	222500	169900	312000	26260	104.8°	343400	241400	29906	87.4°	27.72
79.0	95°	225300	172000	313300	25797	102.9°	347500	243900	30383	88.8°	42.50
30.0	105°	OPERATION NOT RECOMMENDED					351900	248800	30242	88.4°	6.13
44.0	105°						366200	257400	31913	93.3°	13.18
63.8	105°						376000	263100	33094	96.8°	27.72
79.0	105°						380200	265600	33615	98.3°	42.50

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR TEMPERATURE

Entering Air °F WB	Total Cooling Capacity	Sensible Capacity Entering Dry Bulb					Heat of Rejection	Entering Air °F DB	Total Heating Capacity	Heat of Absorp	Power Input
		70° DB	75° DB	80° DB	85° DB	90° DB					
57°	.851	.961					.824	55°	1.040	1.070	.940
61°	.910	.763	1.030				.895	60°	1.025	1.047	.965
64°	.955	.615	.881	1.148			.948	65°	1.010	1.023	.990
67°	1.000	.466	.733	1.000	1.267		1.002	70°	.995	1.000	1.015
70°	1.045		.585	.852	1.118		1.055	75°	.980	.977	1.040

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR FLOW

Total Enter CFM	Total Cool Capacity	Sensible Capacity	Heat of Rejection	Cool Input Watts	Total Heat Capacity	Heat of Absorption	Heat Input Watts
7000	.980	.977	.981	.955	.980	.982	1.023
7600	.990	.988	.995	.977	.990	.991	1.012
7900	.995	.994	1.003	.989	.995	.996	1.006
8200	1.000	1.000	1.010	1.000	1.000	1.000	1.000
8800	1.010	1.012	1.025	1.023	1.010	1.009	.988
9400	1.020	1.023	1.039	1.045	1.020	1.018	.977

ARI RATED: 10.0 EER, 3.5 COP

Bold Face = ARI Conditions

BLOWER PERFORMANCE

SCFM Air Flow		EXTERNAL STATIC PRESSURE													
		.2	.3	.4	.5	.6	.7	.8	.9	1	1.1	1.2	1.3	1.4	1.5
7000	BHP	.82	.89	.96	1.04	1.11	1.19	1.27	1.36	1.44	1.53	1.62	1.71	1.80	1.90
	RPM TURNS OUT	619	651	682	713	742	772	800	828	856	883	910	936	961	987
7400	BHP	.95	1.02	1.10	1.17	1.25	1.33	1.42	1.50	1.59	1.68	1.77	1.86	1.96	—
	RPM TURNS OUT	645	675	705	734	763	791	818	845	872	898	924	949	974	—
7800	BHP	1.09	1.16	1.24	1.32	1.40	1.49	1.57	1.66	1.75	1.84	1.94	2.03	—	—
	RPM TURNS OUT	671	700	729	757	784	811	837	863	889	914	939	964	—	—
8200	BHP	1.24	1.32	1.40	1.48	1.57	1.66	1.74	1.84	1.93	2.02	—	—	—	—
	RPM TURNS OUT	697	725	752	779	806	832	857	882	907	931	—	—	—	—
8600	BHP	1.40	1.49	1.57	1.66	1.75	1.84	1.93	2.02	—	—	—	—	—	—
	RPM TURNS OUT	724	750	776	802	828	853	877	902	—	—	—	—	—	—
9000	BHP	1.59	1.67	1.76	1.85	1.94	2.04	—	—	—	—	—	—	—	—
	RPM TURNS OUT	750	776	801	826	850	874	—	—	—	—	—	—	—	—
9400	BHP	1.78	1.87	1.96	—	—	—	—	—	—	—	—	—	—	—
	RPM TURNS OUT	777	801	825	—	—	—	—	—	—	—	—	—	—	—

Special sheaves required, RPM above/below RPM range of standard sheaves.
Bold Face = ARI Conditions

PERFORMANCE CHARTS

V300

COOLING PERFORMANCE TABLE

HEATING PERFORMANCE TABLE											
Water Flow GPM	Entering Water Temp. °F	Total Cooling BTUH	Sensible Cooling BTUH	Heat of Rejection BTUH	Power Input Watts	Leaving Water Temp. °F	Total Heating BTUH	Heat of Absorp BTUH	Power Input Watts	Leaving Water Temp. °F	P.D. Feet. of WATER
37.0	45°	354600	267100	439800	24985	68.8°	OPERATION NOT RECOMMENDED				9.98
54.0	45°	370200	278900	446400	22355	61.5°	210700	146800	18732	39.6°	17.74
83.0	45°	382100	287900	451400	20314	55.9°	220300	153600	19548	41.3°	41.60
99.0	45°	385900	290700	453000	19673	54.2°	223300	155700	19817	41.9°	59.61
37.0	70°	301700	227300	416300	33606	92.5°	295300	199700	28032	59.2°	8.33
54.0	70°	316800	238700	422900	31121	85.7°	309200	208700	29483	62.3°	17.74
83.0	70°	328400	247400	427900	29190	80.3°	320000	215400	30677	64.8°	41.60
99.0	70°	331900	250000	429400	28582	78.7°	323400	217500	31063	65.6°	59.61
37.0	85°	270000	203400	402200	38779	106.7°	353400	236800	34185	72.2°	9.98
54.0	85°	284700	214500	408800	36381	100.1°	368300	245800	35935	75.9°	17.74
83.0	85°	296000	223000	413700	34515	95.0°	380000	252600	37353	78.9°	41.60
99.0	85°	299600	225700	415300	33928	93.4°	383600	254700	37809	79.9°	59.61
37.0	95°	248700	187400	392700	42225	116.2°	392100	261500	38287	80.9°	9.98
54.0	95°	263300	198400	399300	39886	109.8°	407700	270500	40236	85.0°	17.74
83.0	95°	274500	206800	404300	38066	104.8°	419900	277300	41805	88.3°	41.60
99.0	95°	278100	209500	405900	37492	103.2°	423700	279400	42307	89.4°	59.61
37.0	105°	OPERATION NOT RECOMMENDED					430800	286300	42387	89.5°	9.98
54.0	105°						447200	295300	44536	94.1°	17.74
83.0	105°	253000	190600	394900	41616	114.6°	459800	302100	46256	97.7°	41.60
99.0	105°	256500	193200	396500	41057	113.0°	463800	304200	46805	98.9°	59.61

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR TEMPERATURE

Entering Air °F WB	Total Cooling Capacity	Sensible Capacity Entering Dry Bulb					Heat of Rejection	Entering Air °F DB	Total Heating Capacity	Heat of Absorp	Power Input
		70° DB	75° DB	80° DB	85° DB	90° DB					
57°	0.851	0.961					0.824	55°	1.040	1.070	0.940
61°	0.91	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

CORRECTION FACTORS FOR VARIATION IN ENTERING AIR FLOW

Total Enter CFM	Total Cool Capacity	Sensible Capacity	Heat of Rejection	Cool Input Watts	Total Heat Capacity	Heat of Absorption	Heat Input Watts
8000	0.984	0.982	0.988	0.956	0.984	0.987	1.018
8500	0.992	0.991	0.999	0.983	0.992	0.993	1.000
8750	0.996	0.996	1.004	0.991	0.996	0.997	1.004
9000	1.000	1.000	1.010	1.000	1.000	1.000	1.000
10000	1.016	1.018	1.032	1.034	1.016	1.013	0.982
11000	1.031	1.036	1.054	1.069	1.031	1.027	0.954

ARI RATED: 8.6 EER, 3.1 COP

Bold Face = ARI Conditions

BLOWER PERFORMANCE

SCFM Air Flow		EXTERNAL STATIC PRESSURE													
		.2	.3	.4	.5	.6	.7	.8	.9	1	1.1	1.2	1.3	1.4	1.5
8000	BHP	1.24	1.32	1.40	1.48	1.57	1.66	1.75	1.84	1.93	2.03	2.12	2.22	2.32	2.42
	RPM	713	740	768	795	821	847	873	898	923	947	971	995	1019	1042
8500	BHP	1.45	1.54	1.62	1.71	1.80	1.89	1.99	2.08	2.18	2.28	2.38	2.48	2.58	2.69
	RPM	747	773	799	825	850	875	900	924	947	971	994	1017	1040	1062
9000	BHP	1.69	1.78	1.87	1.96	2.06	2.15	2.25	2.35	2.45	2.55	2.65	2.76	2.86	2.97
	RPM	782	807	831	856	880	904	927	950	973	996	1018	1040	1062	1083
9500	BHP	1.96	2.05	2.15	2.24	2.34	2.44	2.54	2.64	2.74	2.85	2.96	—	—	—
	RPM	816	840	864	887	910	933	955	978	999	1021	1043	—	—	—
10000	BHP	2.25	2.35	2.45	2.55	2.64	2.75	2.85	2.96	—	—	—	—	—	—
	RPM	851	874	897	919	941	963	984	1006	—	—	—	—	—	—
10500	BHP	2.57	2.67	2.77	2.88	2.98	—	—	—	—	—	—	—	—	—
	RPM	886	908	930	951	972	—	—	—	—	—	—	—	—	—
11000	BHP	2.92	3.02	—	—	—	—	—	—	—	—	—	—	—	—
	RPM	921	942	—	—	—	—	—	—	—	—	—	—	—	—
	Turns Out	3.5	3	—	—	—	—	—	—	—	—	—	—	—	—

Special sheaves required, RPM above/below RPM range of standard sheaves.
Bold Face = ARI Conditions

GENERAL DATA

GENERAL DATA CHART

Model Number	Number of Circuits	Voltages	Phase	Min. CRC Ampacity	Max. Fuse	Comp LRA	Comp RLA	Blower FLA	Total FLA	Blower Wheel Diameter	Blower Wheel Length	Blower HP	Ship Wt. Lbs.
V-080	1	208/230	1	57.4	90	179.0	38.7	9.0	47.7	12	9	1-1/2	610
		208/230	3	33.7	50	135.0	22.1	6.1	28.2				
		460	3	18.0	30	70.0	12.0	3.0	15.0				
		575	3	12.7	20	38.4	8.2	2.4	10.6				
V-100	1	208/230	3	41.2	60	183.0	28.4	6.0	34.4	15	15	1-1/2	695
		460		20.4	30	91.1	14.2	3.3	17.5				
		575		15.8	25	73.3	11.4	2.4	13.8				
V-120	1	208/230	3	47.3	70	193.0	31.8	7.2	39.0	15	15	2	745
		460		23.9	40	96.5	15.9	3.6	19.5				
		575		19.4	30	77.2	13.3	2.8	16.1				
V-160	2	208/230	3	59.2	80	135.0	22.1	9.5	53.7	(2)	(2)	3	1145
		460		31.8	40	70.0	12.0	4.8	28.8	12	9		
		575		22.4	30	38.4	8.2	3.9	20.3				
V-200	2	208/230	3	75.3	100	183.0	28.4	6.0	68.8	(2)	(2)	(2)	1275
		460		37.2	50	91.1	14.2	3.3	35.0	15	15	1-1/2	
		575		30.5	35	73.3	11.4	2.4	27.6				
V-240	2	208/230	3	86.6	110	193.0	31.8	7.2	78.0	(2)	(2)	(2)	1375
		460		43.7	50	96.5	15.9	3.6	39.0	15	15	2	
		575		35.5	45	77.2	13.3	2.8	32.2				
V-300	2	208/230	3	120.7	150	267.0	45.2	9.5	109.4	(2)	(2)	(2)	1475
		460		65.2	80	135.0	22.6	4.8	54.8	15	15	3	
		575		48.8	60	108.0	18.1	3.9	44.0				

PHYSICAL CHARACTERISTICS

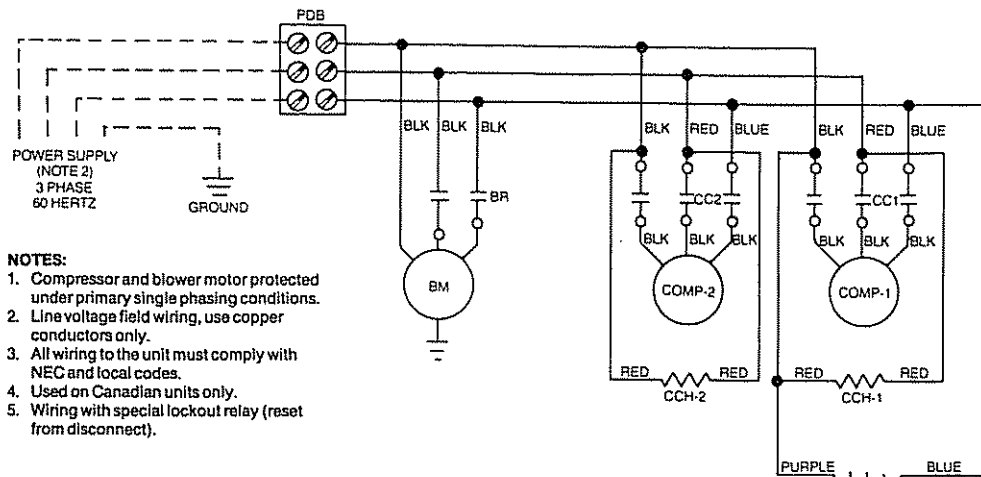
GENERAL LARGE COMMERCIAL UNIT DATA

Physical Characteristics	Model Numbers						
	80	100	120	160	200	240	300
Blower:							
Motor Horsepower/ea.	1.5	1.5	2	3	1.5	2	3
Wheel Size (D" x W") In.	12x9	15x15	15x15	12x9	15x15	15x15	15x15
No. of Wheels	1	1	1	2	2	2	2
No. of Motors	1	1	1	1	2	2	2
Filter Size (In.)	20x25x1	20x25x1	20x25x1	20x25x1	20x25x1	20x25x1	20x25x1
No. of Filters	2	2	2	4	4	4	4
Unit Weight (Lbs.):							
Shipping	610	695	745	1145	1275	1375	1475
Operating	595	685	735	1120	1265	1350	1465
Ref.-to-Air Heat Exchanger:							
Face Area (Sq. Ft.)	8.75	8.75	9.375	17.5	17.5	18.75	18.75
No. of Rows Deep	2	2	3	2	2	3	4
Copper Tube Size (OD In.)	1/2	1/2	1/2	1/2	1/2	1/2	1/2
No. of Fins/Inch	15	15	15	15	15	15	15
No. of Circuits	1	1	1	2	2	2	2
Total Refrig. Charge (R-22)/CKT. oz.	134	118	144	134	118	144	160
Unit W" x H" x D" (1)	41x71-1/2x29			82x71-1/2x29			
Water In/Out Size (FPT)	1-1/4"	1-1/4"	1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-1/2"
Condensate Size (FPT)	1"	1"	1"	1"	1"	1"	1"
Hi Voltage Knockout (In.)	1-3/8", 1-3/4"	1-3/8", 1-3/4"	1-3/8", 1-3/4"	1-3/8", 1-3/4"	1-3/8", 1-3/4"	1-3/8", 1-3/4"	1-3/8, 1-3/4, 2"
Lo Voltage Knockout (In.)	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Return Air Collar Dimension:							
W" x H"	39x25	39x25	39x25	39x25	39x25	39x25	39x25
No. of Openings	1	1	1	2	2	2	2
Supply Air Collar Dimension:							
W" x H" or D"	14-3/4x16	19-16-1/4	19x16-1/4	14-3/4x16	19x16-1/4	19x16-1/4	19x16-1/4
No. of Openings	1	1	1	2	2	2	2

NOTE: 1. Does not include Duct Collar Dimension

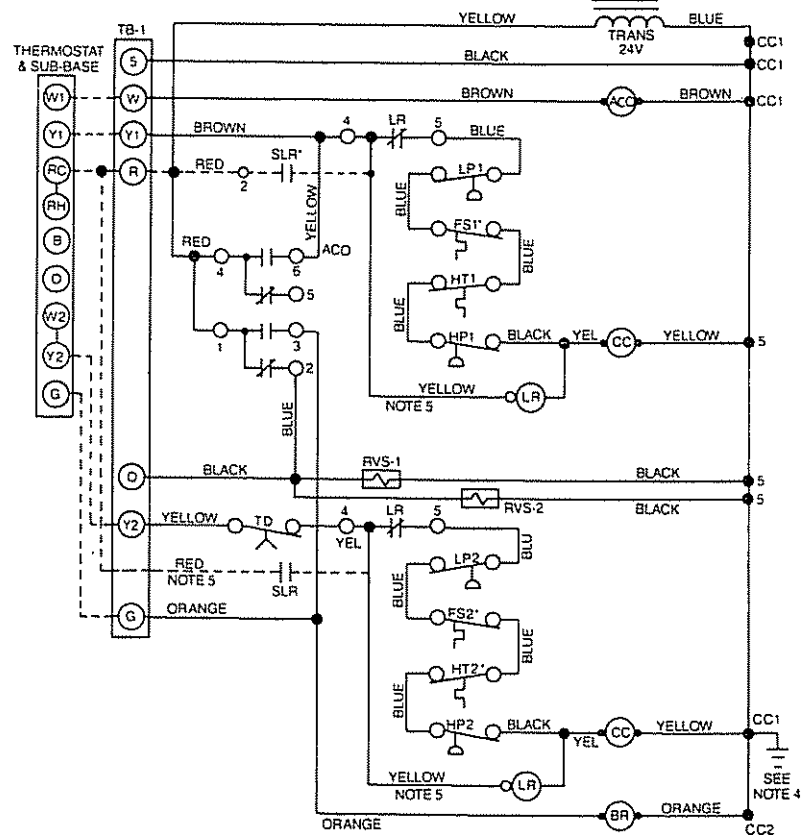
2. V300-32 has 2" Hi Voltage Knockout

TYPICAL WIRING DIAGRAM



NOTES:

1. Compressor and blower motor protected under primary single phasing conditions.
2. Line voltage field wiring, use copper conductors only.
3. All wiring to the unit must comply with NEC and local codes.
4. Used on Canadian units only.
5. Wiring with special lockout relay (reset from disconnect).



LEGEND

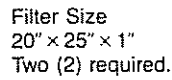
ACO = AUTOMATIC CHANGEOVER RELAY
AS = ANTI-SHORT CYCLE RELAY
BM = BLOWER MOTOR
BMC = BLOWER MOTOR CAPACITOR
BR = BLOWER RELAY
CC = COMPRESSOR CONTACTOR
CCH = CRANKCASE HEATER
COMP = COMPRESSOR
CPC = COMPRESSOR CAPACITOR
CR = CONTROL RELAY

DL = DEMAND LIMIT RELAY
FS = FREEZESTAT
HL = HIGH LEVEL CONDENSATE SWITCH
HP = HIGH PRESSURE SWITCH
HT = HIGH TEMPERATURE SWITCH
LP = LOW PRESSURE SWITCH
LR = LOCKOUT RELAY
OL = OVERLOAD
PR = PROGRAM RELAY
RS = RANDOM START RELAY

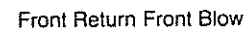
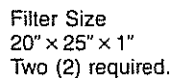
RVR = REVERSING VALVE RELAY
RVS = REVERSING VALVE SOLENOID
SD = SHUTDOWN RELAY
SLR = SPECIAL LOCKOUT RELAY
SSM = SAFETY SHUTDOWN MODULE
TB = 24-VOLT TERMINAL BLOCK
TD = TIME DELAY RELAY
TR = TIMER RELAY
TRANS = LINE VOLTAGE TO 24-VOLT TRANSFORMER
NOTE = * (DENOTES AVAILABLE AS OPTION)

Continuing engineering research results in steady improvements. Therefore, these specifications are subject to change without notice.

Model V-80

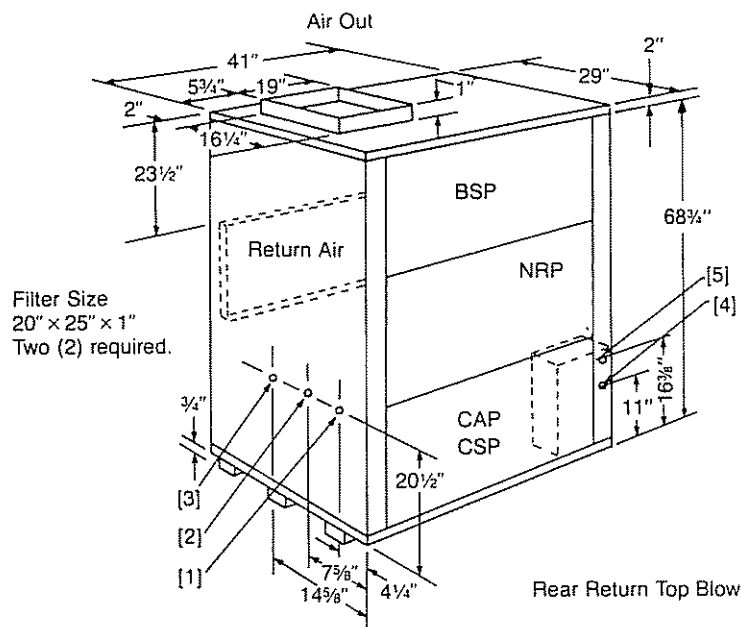


NOTE: All side panels are removable except those identified by NRP (Non-Removable Panel)



***NOTE: Units require 3' clearance for water connections, CAP, CSP and BSP Service access.**

Model V-100 and V-120



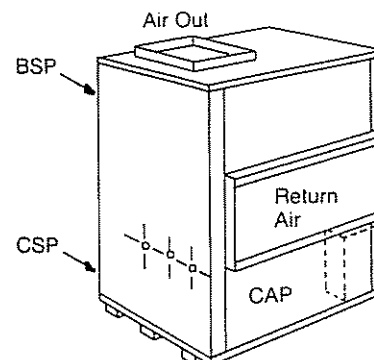
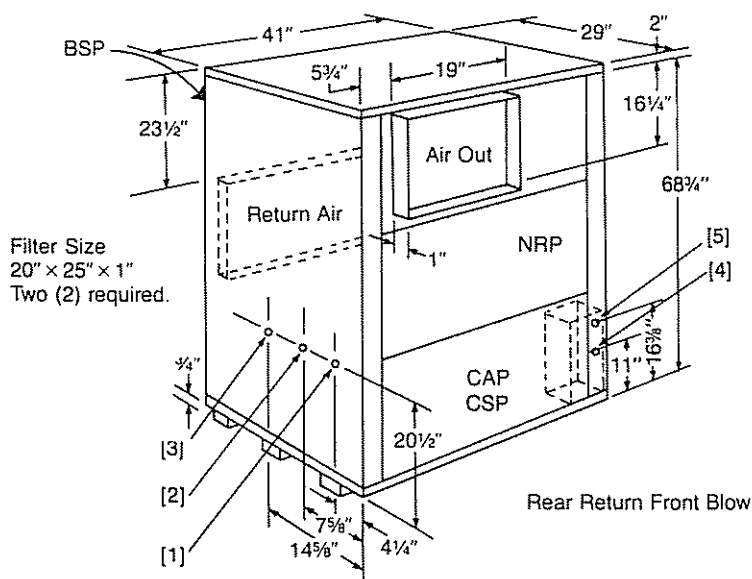
Filter Size
20" x 25" x 1"
Two (2) required.

NOTE: All side panels are removable except those identified by NRP (Non-Removable Panel)

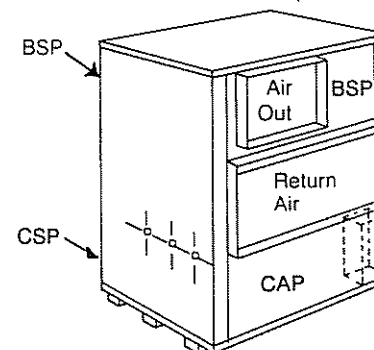
Legend:

[1] Water Inlet	1 1/4" FPT
[2] Water Outlet	1 1/4" FPT
[3] Condensate Drain	1" FPT
[4] High Voltage access	1 1/8"-1 1/4" K.O.
[5] Low Voltage access	1/2" K.O.

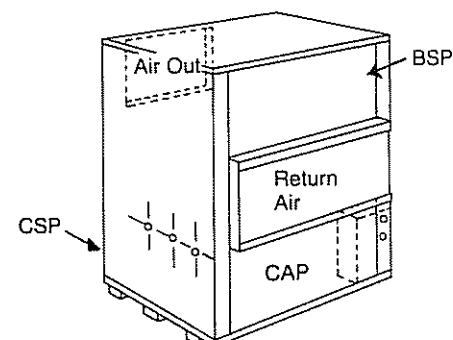
CAP Control Access Panel
BSP Blower Service Panel
CSP Compressor Service Panel
NRP Non-Removable Panel



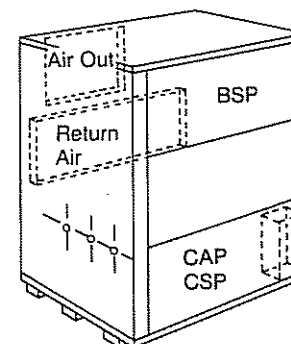
Front Return Top Blow



Front Return Front Blow

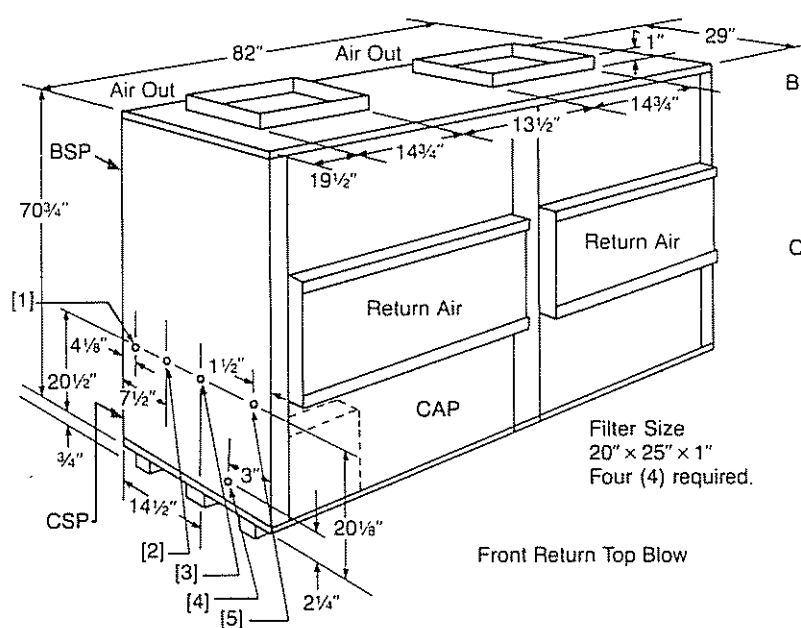


Front Return Rear Blow



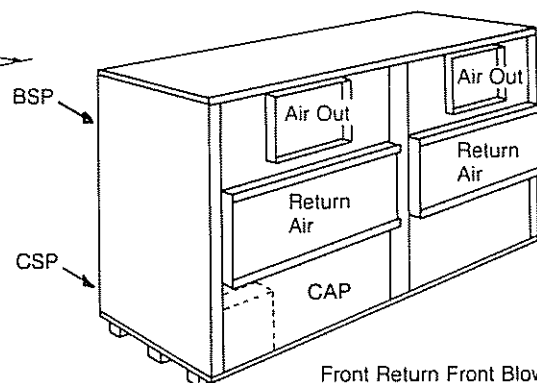
Rear Return Rear Blow

***NOTE: Units require 3' clearance for water connections, CAP, CSP and BSP Service access.**

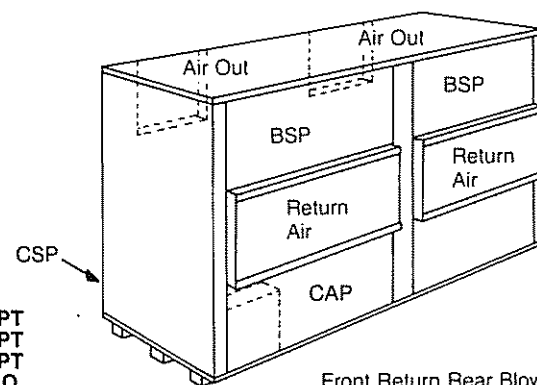


Filter Size
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Four (4) required.

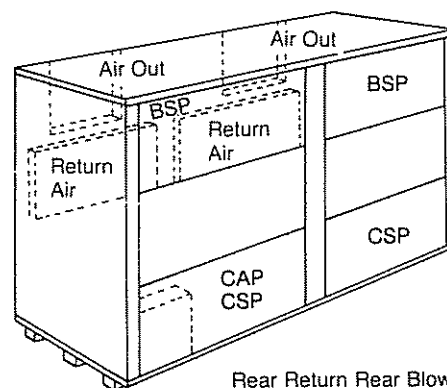
Front Return Top Blow



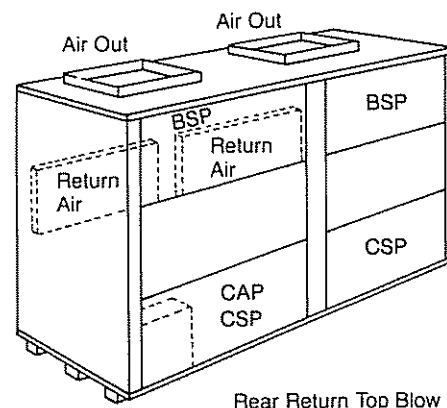
Front Return Front Blow



Front Return Rear Blow



Rear Return Rear Blow



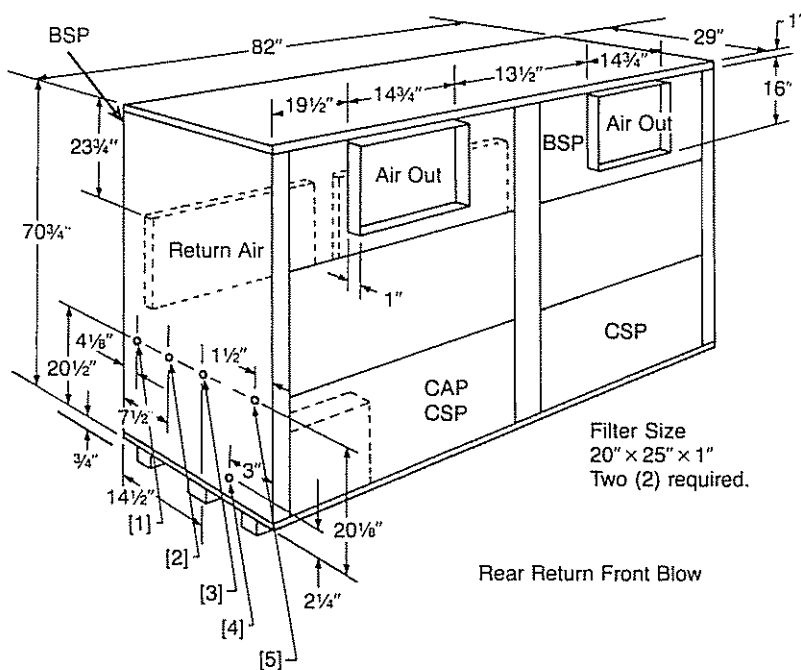
Rear Return Top Blow

Legend:

[1] Water Inlet	1 1/2" FPT
[2] Water Outlet	1 1/2" FPT
[3] Condensate Drain	1" FPT
[4] High Voltage access	1 1/8"-1 1/4" K.O.
[5] Low Voltage access	1/2" Dia.

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

NOTE: All side panels are removable except those identified by NRP (Non-Removable Panel)

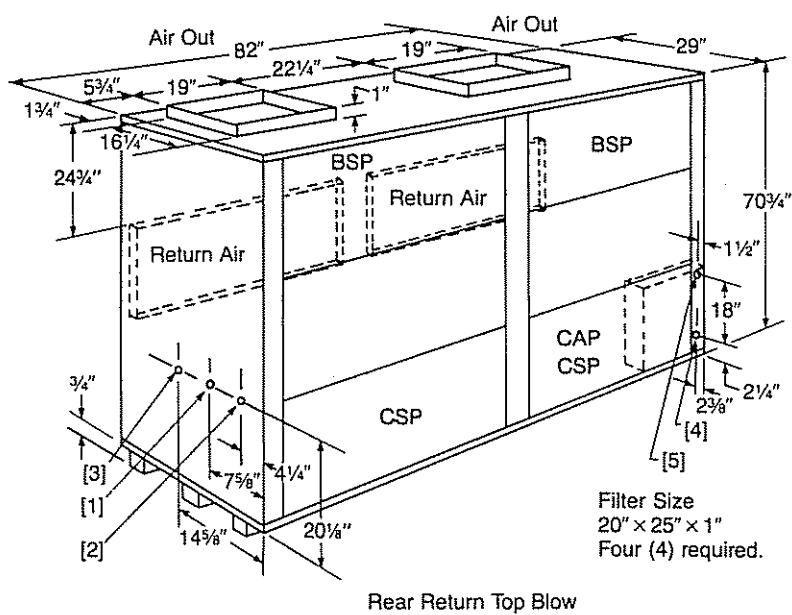


Filter Size
20" x 25" x 1"
Two (2) required.

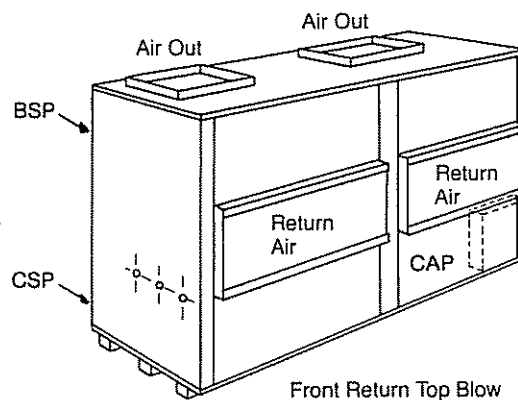
Rear Return Front Blow

***NOTE: Units require 3' clearance for water connections, CAP, CSP and BSP Service access.**

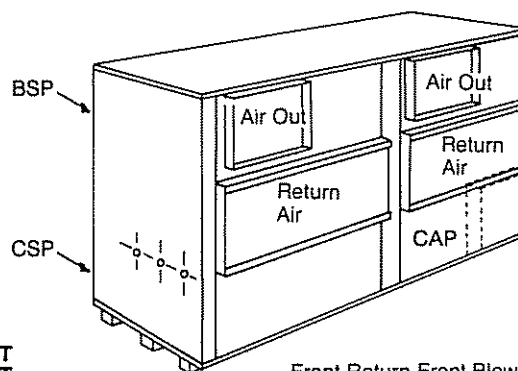
Model V-200 and V-240



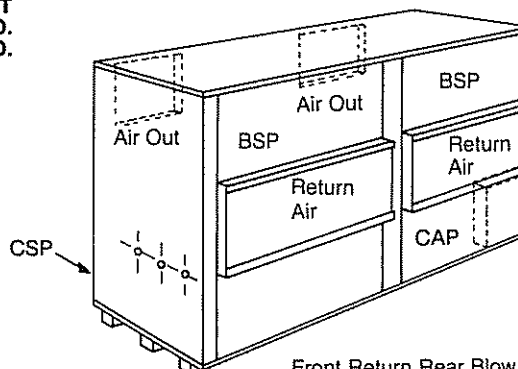
Rear Return Top Blow



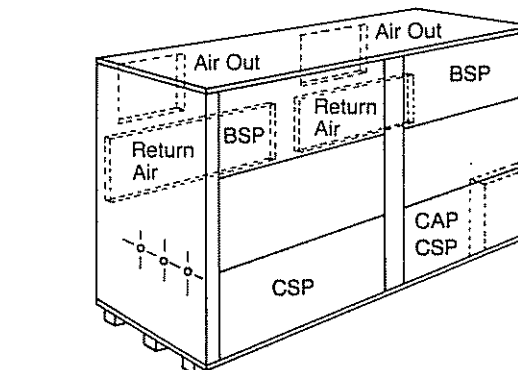
Front Return Top Blow



Front Return Front Blow



Front Return Rear Blow

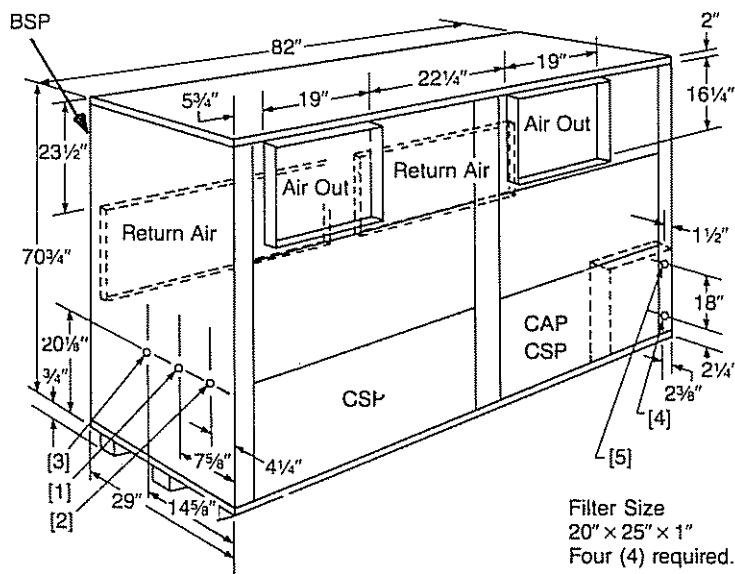


Rear Return Rear Blow

Legend:

- | | |
|------------------------------|--------------|
| [1] Water Inlet | 1½" FPT |
| [2] Water Outlet | 1½" FPT |
| [3] Condensate Drain | 1" FPT |
| [4] High Voltage access .. | 1½"-1¾" K.O. |
| [5] Low Voltage access | ½" K.O. |
- CAP Control Access Panel
 BSP Blower Service Panel
 CSP Compressor Service Panel
 NRP Non-Removable Panel

NOTE: All side panels are removable except those identified by NRP (Non-Removable Panel)



Filter Size
20" x 25" x 1"
Four (4) required.

Rear Return Front Blow

***NOTE: Units require 3' clearance for water connections, CAP, CSP and BSP Service access.**



CSP /

Legend:

[1] Water Inlet	1½" FPT
[2] Water Outlet	1½" FPT
[3] Condensate Drain	1" FPT
[4] High Voltage access	1⅜"-1¾" K.O.
[5] Low Voltage access	½" Dia.

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



***NOTE: Units require 3' clearance for water connections, CAP, CSP and BSP Service access.**

SPECIFICATIONS

CABINET

The reinforced cabinet is made of heavy gauge furniture steel and painted electrostatically to prevent corrosion. The interior of the cabinet is lined with high density, coated insulation with improved thermal insulating and acoustical absorption characteristics. The units have panels for ease of inspection and service to all components.

The control voltage wiring and control box are also accessible from the front of the unit. The supply air opening is provided with a duct collar and the return air opening incorporates a filter rack permitting removal of the filter in any direction. Each unit is provided with a high velocity type disposable filter.

COMPRESSOR

The compressor shall have low noise and vibration characteristics incorporated into the compressor design. In addition, a crankcase heater will provide protection against refrigerant migration to the crankcase during the off cycle.

REVERSING VALVE

The electro-magnetic valve shall be of high quality construction and have an easily replaceable, moisture resistant, external molded electric solenoid coil.

REFRIGERANT-TO-WATER EXCHANGER

The counter flow condensing action refrigerant-to-water heat exchanger shall be a coaxial (tube to tube) type with an enhanced surface to increase heat transfer while offering a low water pressure drop.

The inner water tube shall be made of copper (cupro-nickel) material, designed to withstand water pressure of 350 PSI. The outer refrigerant tube shall be made of primed and painted steel, designed to withstand a working pressure of 450 PSI.

AIR-TO-REFRIGERANT HEAT EXCHANGER

The air-to-refrigerant heat exchanger shall include a large face area made of staggered copper tubes with rippled and corrugated aluminum fins for added heat transfer. The refrigerant circuiting shall be of custom design with high sensible capacity and optimum pressure drops.

REFRIGERANT CONTROL

The refrigerant control shall accurately meter refrigerant flow through a precisely designed and engineered expansion device with multiple distributor tubes designed to improve performance. The refrigerant circuit shall be factory charged and leak tested. Abnormal pressures within the refrigerant circuit shall be prevented with high and low

pressure safety switches. Charging/service ports shall be provided on both the high and low pressure sides as standard equipment.

BLOWER AND MOTOR

The blower shall have a belt driven blower wheel and housing custom designed for quiet operation and efficient air delivery. The blower shall be mounted on permanently lubricated, maintenance free ball bearings. The generously sized ball bearing motor with V-belt and variable pitch pulley shall be mounted on an adjustable motor base for easy belt adjustment and/or speed change. The drive packages shall be designed for external static pressures between .2 and 1.5 inches water gauge.

CONTROLS

The control box shall be easily accessible from the front panel. It shall include a 24 volt control transformer, compressor contactor, blower and lockout relays, and shall be completely factory wired. The circuit shall feature a lockout relay to provide manual reset at the thermostat in case of interrupted operation by the safety controls.

The dual units (all but V-80, V-100, and V-120) shall have a time delay relay which shall delay starting the second compressor until after the first compressor start.

The individual control components shall be designed for ease of inspection and service. A terminal block shall be provided for convenient field wiring.

CONTROL OPTIONS

REMOTE THERMOSTAT The unit shall be provided with a 24 volt heat anticipating type wall thermostat.

a) manual changeover type. The thermostat shall be a manual changeover type with OFF, HEAT, COOL selector switch and a fan OFF, AUTO selector switch.

b) programmable solid state type. The manual changeover type thermostat shall be of solid state microelectronics designed to change temperature up to twice a day, five or seven days a week. The offset temperature difference shall be adjustable from 0 to 15 degrees.

c) auto changeover type. The thermostat shall be an auto changeover type with an OFF, AUTO selector switch and a fan OFF, AUTO selector switch.

THERMOSTAT COVER The thermostat shall be covered with a plastic cover with a tumbler type key lock designed to deter any unauthorized tampering with zone temperature.

PROGRAM RELAY The unit shall have a factory mounted relay that accepts a 24 volt signal from a centrally located

time clock which establishes the occupied/unoccupied modes.

RANDOM START RELAY The unit shall be provided with a factory mounted random start relay which randomly delays the normal start of the compressor.

POWER SUPPLY RESET The unit shall be wired so that the compressor lock-out circuit shall allow reset only from the main power breaker.



Agency approvals vary depending upon model. Continuing engineering research results in steady improvements. Therefore, these ratings and specifications are subject to change without notice.

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ClimateMaster®

P.O. Box 25788
Oklahoma City, OK 73125
(405) 745-6000
FAX (405) 745-6058