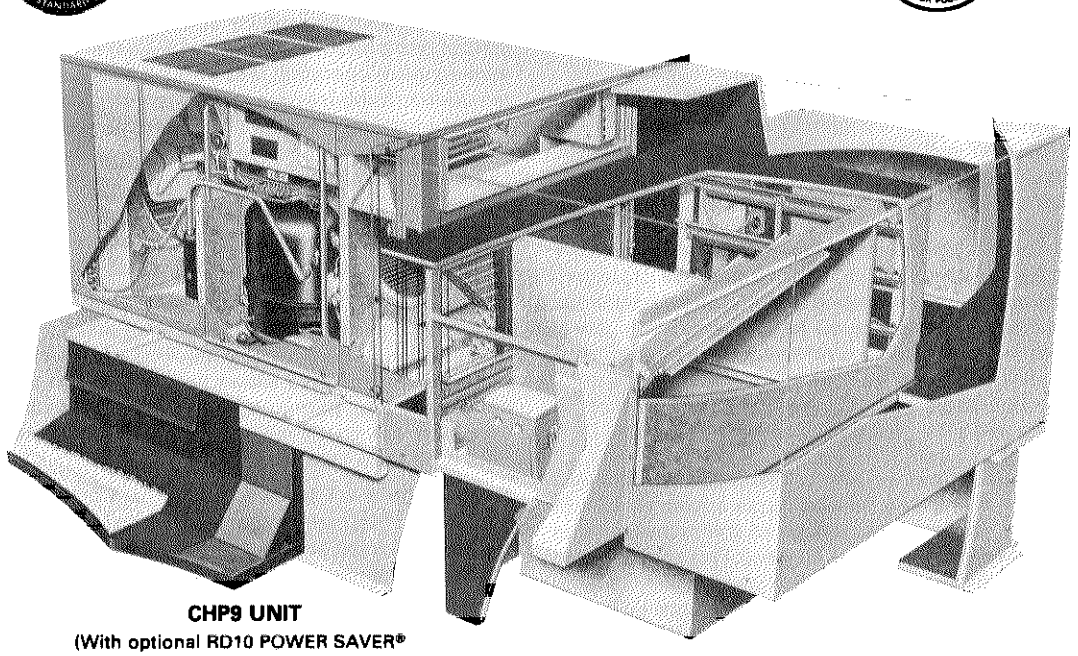
LENNOX® CHP9 SERIES & CHP10-650 — HORIZONTAL SINGLE PACKAGE HEAT PUMPS

***22,800 to 54,000 Btuh Total Cooling Capacity**
***26,200 to 60,000 Btuh Total Heating Capacity**
11,900 to 112,700 Btuh Optional Electric Heat
***ARI Standard 240 Certified Ratings**

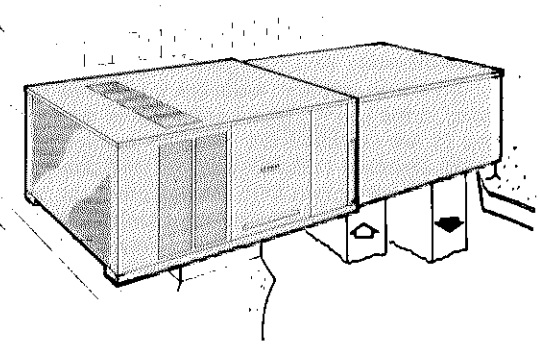


CHP9 UNIT
(With optional RD10 POWER SAVER® and mounting frame)

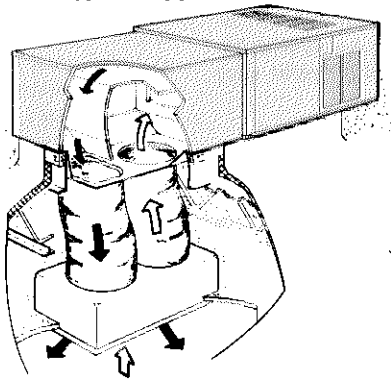
High Performance Heat Pump Units Feature Low Operating Cost And Energy Conservation

Lennox single package heat pump units are designed for residential or small commercial installations. Several models are offered with a wide and varied heating-cooling capacity range. Units can be installed with ducts extended through a wall in a crawl space, basement, utility room or attic. Installation on a slab at grade level or on a rooftop will save valuable interior floor space. Optional accessories available for rooftop installations include duct enclosure, POWER SAVER® and roof mounting frame. The mounting frame mates to the bottom of the unit and duct enclosure and when flashed into the roof permits weatherproof duct connection and entry into the conditioned area. Optional POWER SAVER and controls reduce cooling operating costs. Externally mounted optional minimum fresh air damper (manual) is also available. In addition, a choice of flush or step-down diffusers are available for a combination ceiling supply and return air distribution system. The compact outdoor single package units contain all refrigeration components, air movers, air filters and optional additive electric heat in one complete package. Optional field installed electric heaters are available in several sizes to supplement the heating capacity. Indoor supply and return air openings are both at the same end of the cabinet. Outdoor air outlet is located at the opposite end. Multi-speed indoor blower provides a choice of supply air flow. Large indoor and outdoor coils ensure maximum air contact and heat transfer. Cabinet is constructed of heavy gauge galvanized steel with a baked-on enamel finish. Units are shipped completely factory assembled, ready to install. In addition, units are test operated at the factory. Installer has only to locate the unit, connect duct work, mount thermostat and make power supply connections.

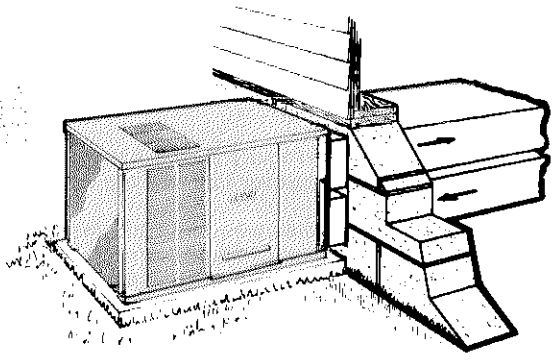
Typical Applications



Rooftop installation with optional RT10 duct enclosure.



Rooftop installation with optional RT10 duct enclosure and combination ceiling supply and return air system.



Unit on slab at grade level.

FEATURES

Rugged Cabinet — Constructed of heavy gauge galvanized steel. A five station wash metal preparation assures a perfect bonding surface for the finish coat of baked-on outdoor enamel. Conditioned air section of cabinet is lined with thick fiberglass insulation. Supply and return air openings have flanges for ease of duct connection. Compressor and control box are located in a separate compartment. Removable panels permit complete service access to interior of cabinet. Heavy gauge steel support rails under the base elevates unit above mounting surface away from damaging moisture. Indoor coil drain pan is constructed of heavy gauge galvanized steel with a galvanized pipe (mpt) drain outlet. Drainage outlets are furnished in the outdoor coil section of the base. Electrical inlets are furnished in cabinet for wiring entry. Optional coil guard LB-34491B (3 per unit) is available with CHP10-650 model only.

Refrigeration System — Complete factory sealed refrigeration system consists of: compressor, condenser coil and fan(s), evaporator coil and blower, suction and discharge line service gauge ports, liquid line strainer, low pressure switch-automatic reset (CHP9-460, 510 & CHP10-650 models) and a full operating charge of refrigerant.

Dependable and Quiet Compressor — Rugged and reliable compressor is hermetically sealed. Suction cooled, overload protected, and equipped with internal pressure relief valve. Internally protected from excessive current and temperature. The entire running gear is spring mounted within the sealed housing. In addition, the compressor is installed on resilient rubber mounts in the unit, assuring quiet and vibration free operation. A crankcase heater is furnished as standard equipment and provides protection from slugging.

Large Indoor and Outdoor Coils — Lennox designed and fabricated coils are constructed of precisely spaced ripple-edged aluminum fins machine fitted to copper tubes. Design of coil provides large surface and contact area for maximum efficiency. Fins are equipped with collars that grip tubing for maximum contact area. Flared shoulder tubing joints and silver soldering provide tight leakproof joints. Copper tubing construction provides maximum coil life and ease of service. Coil is thoroughly tested under pressure to insure leakproof construction.

Efficient Outdoor Coil Fan(s) — Powerful direct drive fan(s) moves large air volumes uniformly through the entire coil resulting in high refrigerant cooling capacity. CHP9-261, 311 & 410 models are equipped with a single fan. CHP9-460 and 510 models employ dual fans. Air enters unit through louvered top and both side panels and is discharged out through the coil.

The CHP10-650 model is equipped with a single direct drive fan. Air is drawn through the coil at both sides and end of the unit and discharged out vertically through top panel. Corrosion resistant PVC coated steel wire fan guard is furnished as standard.

Powerful Indoor Blower — Units are equipped with quiet operating direct drive blowers that deliver large air volumes with low power consumption. Each blower is statically and dynamically balanced as an assembly before it is installed in the unit. Multispeed motor is isolated on rubber mounts. A choice of blower speeds is available on each blower. See blower performance charts. Change in blower speed is easily accomplished by a change in wiring.

Cleanable Air Filter — One inch frame filters are furnished. Media is washable or vacuum cleanable polyurethane, coated with oil for increased efficiency. Use RP products filter coating no. 418 (Order No. 30165) for reoiling. Separate filter access panel provides easy removal for servicing.

Reversing Valve — Factory installed and piped. Heavy duty valve permits quick changeover from cooling to heating and vice versa.

Suction Line Accumulator — Factory installed and piped. Traps and prevents large amounts of liquid refrigerant from flooding directly into the compressor and causing damage on start-ups.

Flow Control Valve — Factory installed check valve by-passing tubing permits full refrigerant flow during a cooling cycle. On the reverse or heating cycle, the flow is by-passed through the by-pass tubing, thereby increasing the restriction to the flow.

High and Low Pressure Switches — Factory installed and wired. Protects system against abnormal operating conditions. Low pressure reset is automatic, high pressure is manual.

Defrost Control — Solid-state defrost control is factory set and calibrated. It initiates and controls the defrost cycle of the unit by simultaneously sensing the temperature of the coil and the ambient air by means of thermistors. When the coil temperature is reduced, due to frost on the coil, the control initiates a defrost cycle. If weather conditions do not produce frost on the coil, unit operation will not be interrupted by an unnecessary defrost cycle.

Thermostat — A deluxe wall mounted combination heating-cooling thermostat with emergency subbase is furnished. Separate bulbs control compressor operation and auxiliary heating operation. Reversing valve operation is controlled by manual Heat-Cool-Off system switch. Subbase permits auxiliary electric heat only to operate in case of compressor malfunction. Equipped with light to call attention to inoperative unit. Emergency heat relay (P-8-3251) is required for use with outdoor thermostat. Relay must be ordered extra.

Outdoor Thermostat (Optional) — Maintains the heating load on the heat pump as long as possible before allowing the auxiliary electric heat to come on the line. Order no. M-1595 thermostat box and LB-29740BA outdoor thermostat.

Timed-Off Control (Optional) — Timed-off control (77A24) is available as optional equipment for field installation. Prevents compressor short-cycling and also allows time for suction and discharge pressure to equalize, permitting the compressor to start in an unloaded condition. Automatic reset control will shut the compressor off and hold it off for 5 minutes.

Start Controls — Furnished as standard on the CHP9-461, 511 and CHP10-651. Start controls are not furnished on CHP9-261, 311, 411 models and must be ordered extra if required. Provides assistance for compressor start under loaded conditions or in the event of low voltage. Specify complete unit model number when ordering.

Low Ambient Control (Optional) — Units will operate satisfactorily down to 50°F-55°F outdoor air temperature without any additional controls. For cases where operation below 50°F-55°F is required a Low Ambient Control Kit (LB-44961BA) can be added in the field, enabling the unit to operate down to 0°F.

Additive Electric Heat (Optional) — Available for field installation in 3.5 thru 33.0 kW sizes. See Electric Heat tables. The helix wound nichrome heating elements are exposed directly in the air stream resulting in instant heat transfer, lower coil temperatures and long service life. The elements are accurately located and insulated from the heavy gauge steel support frame by high quality insulators. Heaters, except 440/480 volt models, are equipped with circuit breakers to provide overload and short circuit protection. Must be reset manually. Each set of heating elements is equipped with a accurately located limit control with fixed temperature off setting and automatic reset. In addition, elements have supplemental thermal cutoff safety fuses providing positive protection in case of hazardous overheating. Thermal time delay relay brings the heating elements on and off the line, in sequence and equal increments, with a time delay between each element. Control box and access cover are constructed of heavy gauge galvanized steel. Electrical inlet holes are provided in the box. Electric heaters are completely factory assembled with all controls installed and wired.

Completely Tested and Certified — Units have been thoroughly tested in the Lennox Research Laboratory environmental test room and accurately rated according to U.S. Department of Energy (DOE) test procedures and Air-Conditioning And Refrigeration Institute (ARI) Standard 240-77 conditions. In addition, units are U.L. Listed and have been sound tested in the Lennox reverberant sound test room and rated according to ARI Standard 270-75. Units coming within the scope of the ARI standard (135,000 Btuh or less) are Certified under the ARI Certification Program. DOE covered products are rated under 65,000 Btuh with single phase power input. Units and components within are bonded for grounding to meet safety standards for servicing required by U.L. and N.E.C. Optional electric heaters are U.L. Listed and rated and tested according to DOE test procedures and Federal Trade Commission (FTC) labeling regulations. Blower data is from unit tests conducted in the Lennox Laboratory air test chamber.

FEATURES

Optional Duct Enclosure — The RT10-65 duct enclosure is required for installation of the unit with the RMF9-65 roof mounting frame. Duct enclosure is completely insulated with a baked-on enamel finish and is shipped knocked down for field assembly. Supply and return air openings are located in the bottom of the enclosure. Field assembled return air plenum is furnished with enclosure. Insulated plenum connects to unit return air opening segregating return air within the enclosure.

Optional POWER SAVER® — The complete RD10-65 POWER SAVER and control system is shipped factory assembled and wired. The Lennox POWER SAVER system consists of: duct enclosure, mechanically linked outdoor air and recirculated air dampers with pressure operated exhaust air dampers. The positioning of these dampers is accomplished by a 24 volt 3 position spring return damper motor with adjustable minimum damper positioner and controlled by the room thermostat, adjustable mixed air controller, adjustable compressor monitor and adjustable enthalpy control. The enthalpy control allows 0 to 100% outdoor air to be used for "free cooling" when outdoor humidity and temperature are acceptable. The Lennox POWER SAVER will co-operate with any heating-cooling thermostat. A outdoor air intake hood is furnished and field installs over the outdoor air dampers. Shipped knocked down, it is easily field assembled. A cleanable polyurethane media frame filter is furnished with the hood providing extra air filtering and bird screen protection.

Optional RT10 Adapter Kit — Adapter kit (LB-29475BB) includes filler panels and securing brackets to mate the duct enclosure and roof mounting frame to CHP9-261, CHP9-311 and CHP9-410 models.

Optional Roof Mounting Frame — The RMF9-65 roof mounting frame mates to the unit and duct enclosure providing an automatic weather sealed installation. A mounting frame deck enclosure is furnished to provide a weatherproof deck for mounting the unit on the roof mounting frame. Approved by National Roofing Contractors Association.

Optional Minimum Fresh Air Damper — OAD3-46/65 minimum fresh air damper mounts external to the RT10-65 duct enclosure. Equipped with manually operated damper and fittings for installing.

Optional SP11 Remote Status Panel — The operation of the unit can be checked on the Remote Status Panel (12F83) located within the conditioned area. Signal lights on the panel indicate "Cool Mode," "Heat Mode," "Compressor 1," "Compressor 2," "No Heat" and "Filter." The cool mode signal light is green when lit and indicates cooling operation. Heat Mode light is green and reflects heating operation and will turn red if there is an operational mulfunction. Compressor 2 light is not required and should be disregarded. The No Heat and Filter lights will show red and indicate a requirement for service. Additional controls are required for use with the Status Panel and must be specified when ordering. Filter switch kit (97C85) is used in conjunction with the Filter light. Operation of No Heat light requires an additional control, see Price Book. Wiring Junction Box (14F92) is required to interface status panel with unit operation. Box field installs in unit.

SPECIFICATIONS

Model No.		CHP9-261	CHP9-311	CHP9-411 CHP9-413	CHP9-461 CHP9-463	CHP9-511 CHP9-513	CHP10-651 CHP10-653
★ARI Standard 270 SRN		19	20	20	21	21	22
*ARI Certified Cooling Capacity	Cooling Capacity (Btuh)	22,800	27,800	34,200	41,000	46,000	54,000
	Total unit watts cooling	3685	4390	5475	6266	7340	8238
	†SEER (Btuh/Watts) — 1 ph. models only	6.40	6.50	6.25	6.65	6.40	6.55
	††EER (Btuh/Watts) — 3 ph. models only	----	----	6.25	6.55	6.25	6.55
	Dehumidifying capacity	28%	25%	29%	27%	27%	28%
*ARI Certified High Temperature Heating Capacity	Total Capacity (Btuh)	26,200	31,200	38,500	42,500	50,000	60,000
	Total unit watts	3196	3788	4806	5458	6390	7078
	†††HSPF (1 ph. models only)	5.80	5.60	5.75	5.50	5.60	5.85
	C.O.P. (3 ph. models only)	----	----	2.35	2.30	2.30	2.50
*ARI Certified Low Temperature Heating Capacity	Total Capacity (Btuh)	15,400	17,900	22,200	26,800	30,000	36,400
	Total unit watts	2726	3246	4082	4796	6033	5902
	C.O.P. (3 ph. models only)	----	----	1.60	1.65	1.60	1.80
Refrigerant charge (R-22)		3 lbs. 11 oz.	4 lbs. 5 oz.	4 lbs. 9 oz.	7 lbs. 4 oz.	7 lbs. 0 oz.	8 lbs. 9 oz.
Indoor Coil	Net face area (sq. ft.)	3.0	3.0	3.0	4.5	4.5	4.5
	Tube diameter (in.) & No. of rows	3/8 — 2	3/8 — 3	3/8 — 3	3/8 — 3	3/8 — 3	3/8 — 4
	Fins per inch	16	16	16	16	16	14
Indoor Coil Blower	Wheel nominal diam. x width (in.)	9 x 9	10 x 9	11 x 9	10 x 10	12 x 12	10 x 10
	Motor horsepower	1/4	1/3	1/2	1/2	3/4	1
Outdoor Coil	Net face area (sq. ft.)	4.5	4.5	4.5	6.75	6.75	15.3
	Tube diameter (in.) & No. of rows	3/8 — 2	3/8 — 3	3/8 — 3	3/8 — 3	3/8 — 3	3/8 — 2
	Fins per inch	16	15	15	15	15	15
Outdoor Coil Fan	Diameter (in.) and No. of blades	(1) 20 — 4	(1) 20 — 4	(1) 20 — 5	(2) 18 — 5	(2) 18 — 5	(1) 24 — 4
	Air Volume (factory setting)	2300	2500	2800	3200	3500	5400
	Rpm (factory setting)	1040	1080	1045	1050	1050	1060
	Motor horsepower	(1) 1/6	(1) 1/4	(1) 1/3	(2) 1/6	(2) 1/4	(1) 1/2
	Motor watts (factory setting)	290	420	555	570	710	600
Condensate drain size mpt (in.)		3/4	3/4	3/4	3/4	3/4	3/4
No. & size of filters (in.)		(1)16x25x1	(1)16x25x1	(1)16x25x1	(2)16x20x1	(2)16x20x1	(2)16x20x1
Net weight of basic unit (lbs.) (1 package)		290	320	325	460	480	525
Optional Combination Ceiling Supply And Return Step-Down Diffuser (net weight)		RTD9-65 (67 lbs.)			RTD9-65 (67 lbs.)		
Optional Combination Ceiling Supply And Return Flush Diffuser (net weight)		FD9-65 (33 lbs.)			FD9-65 (33 lbs.)		
Optional Comb. Supply & Return Transition (net wt.)		SRT10-65 (20 lbs.)					
Optional Roof Mounting Frame (net weight)		RMF9-65 (110 lbs.)					
Optional Duct Enclosure (net weight)		RT10-65 (85 lbs.)					
Optional POWER SAVER (net wt.) — No. & size of filter		RD10-65 (180 lbs.) (1 — 20 x 25 x 1)					
RT10/RD10 Adaptor Kit CHP9-261-311-410 (net wt.)		LB-29475BB (4 lbs.)			---		
Optional Minimum Fresh Air Damper (net wt.)		OAD3-46/65 (7 lbs.)					

★Rated in accordance with ARI Standard 270.

*Rated in accordance with ARI Standard 240: At 450 cfm (maximum) indoor air volume per ton of cooling capacity.

Cooling Ratings — 95F outdoor air temperature and 80F db/67F wb entering indoor coil air.

High Temperature Heating Ratings — 47F db/43F wb outdoor air temperature and 70F db entering indoor coil air.

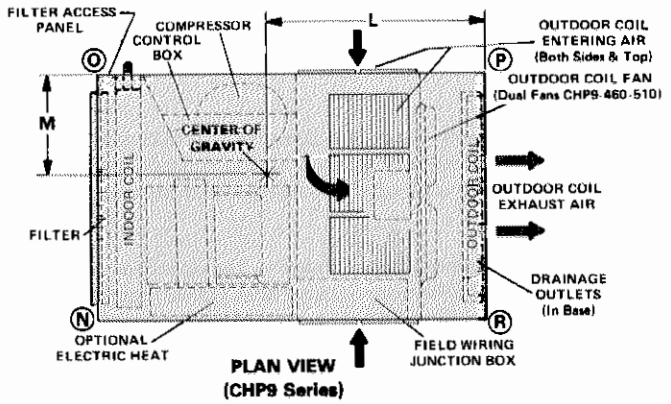
Low Temperature Heating Ratings — 17F db/15F wb outdoor air temperature and 70F db entering indoor coil air.

†Seasonal Energy Efficiency Ratio based on DOE test procedures.

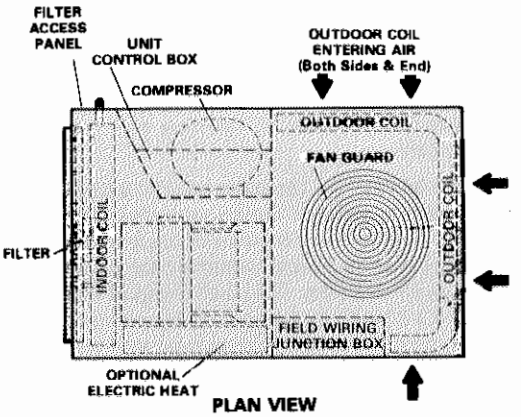
††Energy Efficiency Ratio in accordance with ARI Standard 240.

†††Heating Seasonal Performance Factor based on DOE test procedures.

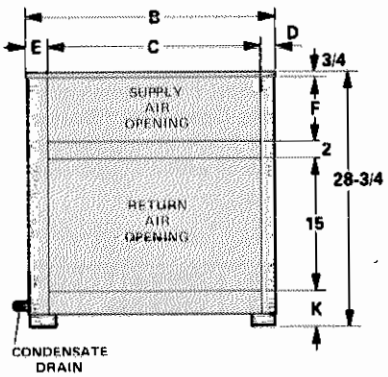
DIMENSIONS (inches)



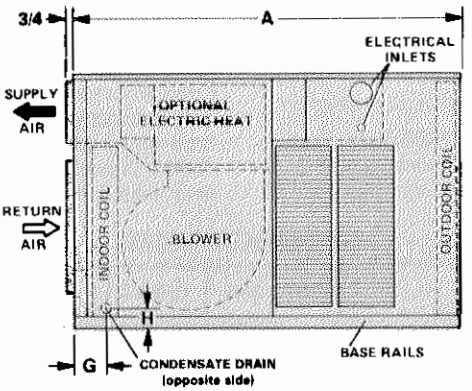
PLAN VIEW (CHP9 Series)



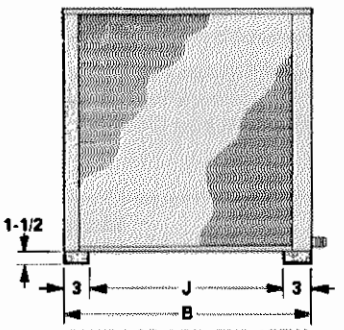
PLAN VIEW (CHP10-650)



INDOOR COIL END VIEW



SIDE VIEW



OUTDOOR COIL END VIEW

Model No.	A	B	C	D	E	F	G	H	J	K
CHP9-261, 311, 411 & 413	42-3/4	28	24	1-13/16	2-3/16	7	4-7/8	2-3/8	22	4
CHP9-461, 463, 511 & 513	49-3/4	40-3/4	34	2-3/4	4	8	6	2-1/2	34-3/4	3
CHP10-651 & 653	59-15/16	40-3/4	34	2-3/4	4	8	6	2-1/2	34-3/4	3

CENTER OF GRAVITY (in.)

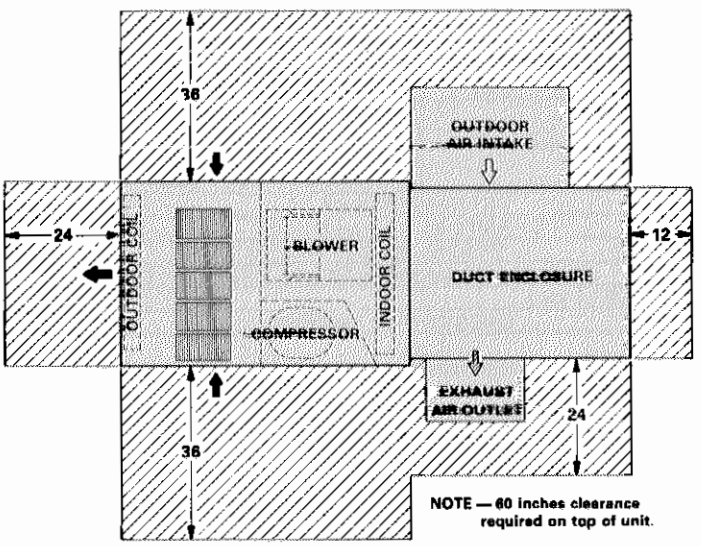
Model No.	L	M
CHP9-261-311-410	22½	11¾
CHP9-460-510	29	18¼
CHP10-650	34⅝	27½

CORNER WEIGHTS (lbs.)

Model No.	N	O	P	R
CHP9-261	66	92	85	62
CHP9-311	73	101	93	68
CHP9-410	75	103	94	69
CHP9-460	127	157	111	93
CHP9-510	132	164	116	96
CHP10-650	138	181	133	101

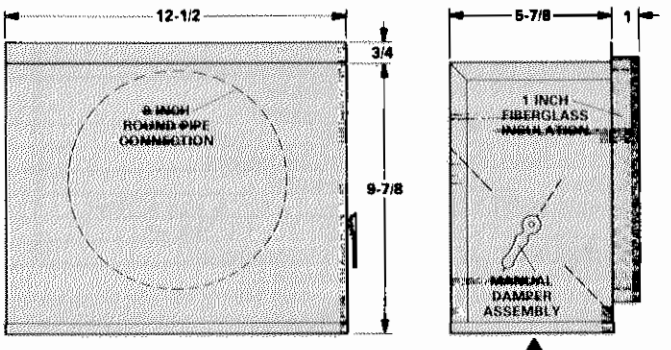
NOTE — Corner weight of basic unit with electric heat.

INSTALLATION CLEARANCES (inches)



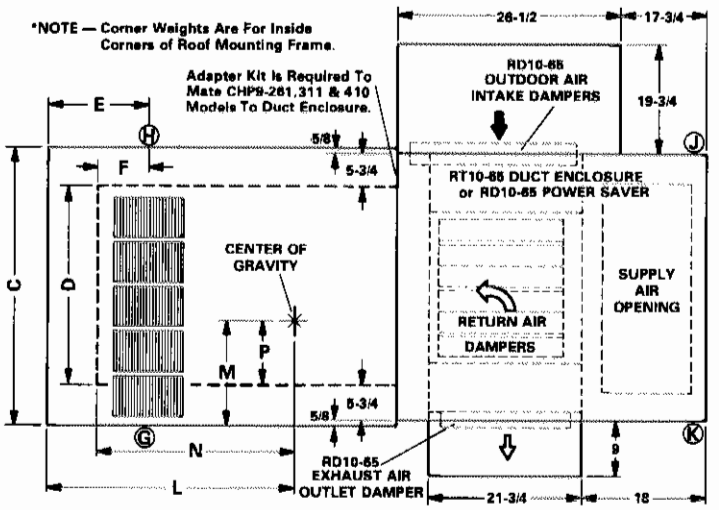
NOTE — 60 inches clearance required on top of unit.

OPTIONAL OAD3-46/65 MINIMUM FRESH AIR DAMPER



FRONT VIEW **SIDE VIEW**

OPTIONAL ROOFTOP ACCESSORIES — DIMENSIONS (inches)



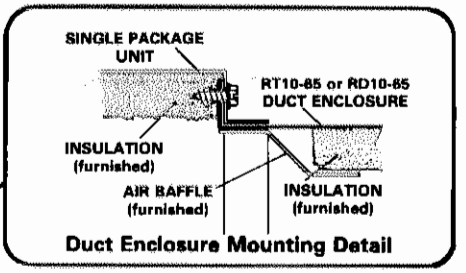
CORNER WEIGHTS (lbs.)

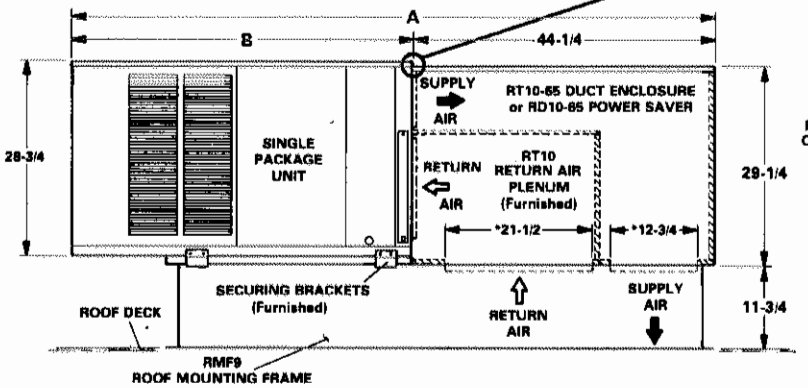
Model No.	G	H	J	K
CHP9-261	200	184	111	120
CHP9-311	208	193	117	127
CHP9-410	210	195	118	128
CHP9-460	330	224	98	146
CHP9-510	338	230	101	149
CHP10-650	376	256	91	140

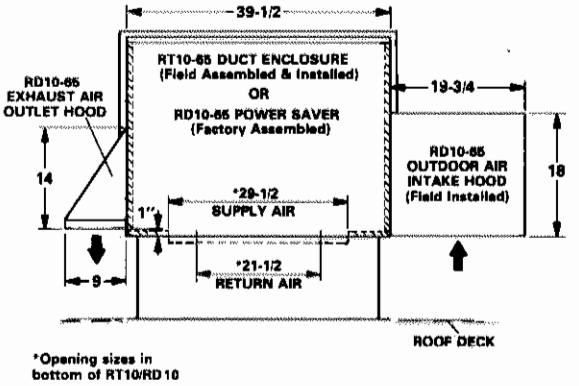
NOTE — Corner weight of basic unit with SRT10-65, RD10-65, RMF9-65 and electric heat.

CENTER OF GRAVITY (in.)

Model No.	L	M	N	P
CHP9-261	----	----	37½	13¼
CHP9-311	----	----	37½	13¼
CHP9-410	----	----	37½	13¼
CHP9-460	38	17	----	----
CHP9-510	38	17	----	----
CHP10-650	45⅛	16⅝	----	----





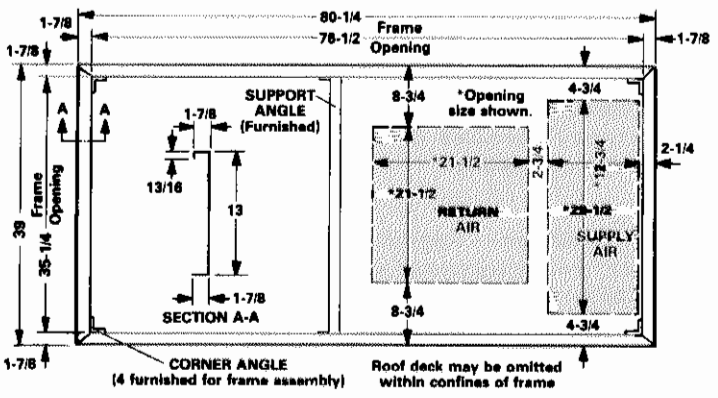


*Opening sizes in bottom of RT10/RD10

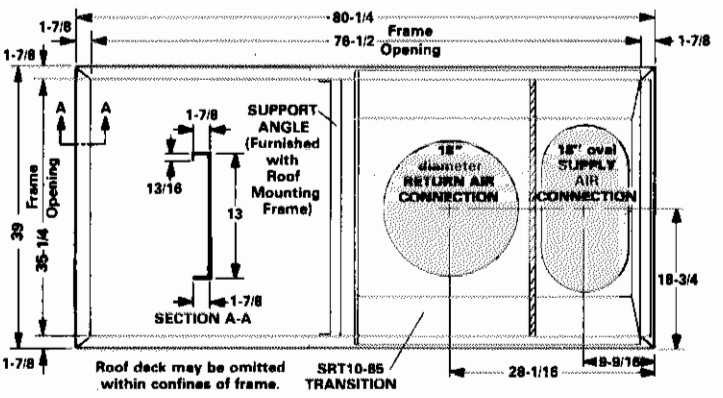
Model No.	A	B	C	D	E	F
CHP9-261-311-410	87	42-3/4	---	28	---	8
CHP9-460-510	94	49-3/4	40-3/4	---	14	---
CHP10-650	104-3/16	59-15/16	40-3/4	---	24	---

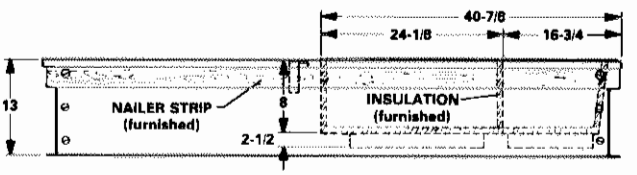
RMF9-65 ROOF MOUNTING FRAME

ROOF MOUNTING FRAME WITH DOUBLE DUCT OPENING

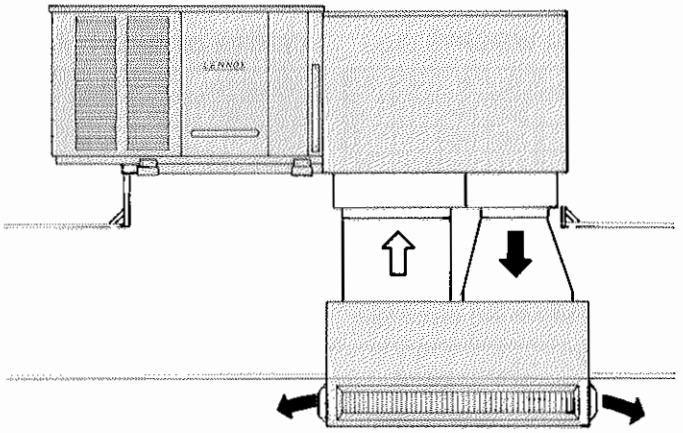


ROOF MOUNTING FRAME WITH COMBINATION CEILING SUPPLY AND RETURN

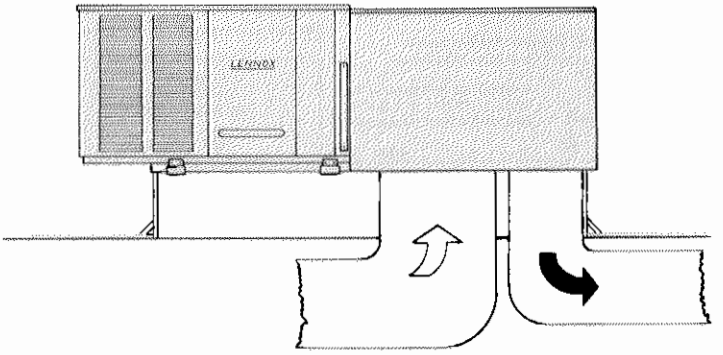




AIR PATTERN



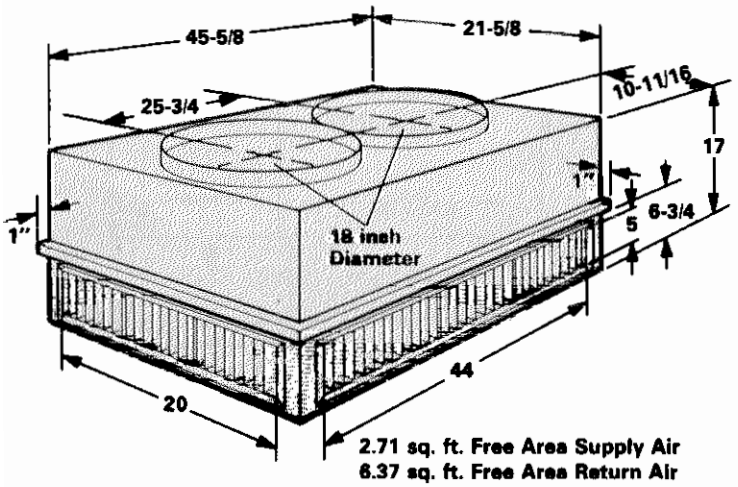
Combination Supply and Return Air Ceiling Step-Down or Flush Diffuser



Separate Supply and Return (Double) Duct

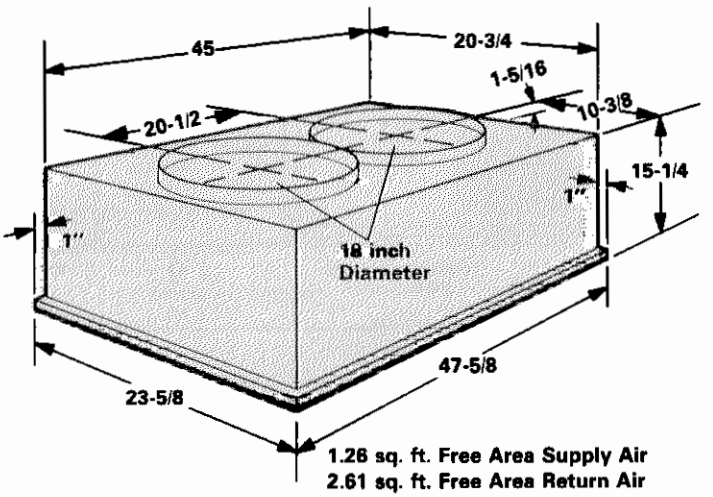
COMBINATION CEILING SUPPLY AND RETURN AIR DIFFUSERS

RTD9-65 STEP-DOWN CEILING DIFFUSER



2.71 sq. ft. Free Area Supply Air
6.37 sq. ft. Free Area Return Air

FD9-65 FLUSH CEILING DIFFUSER



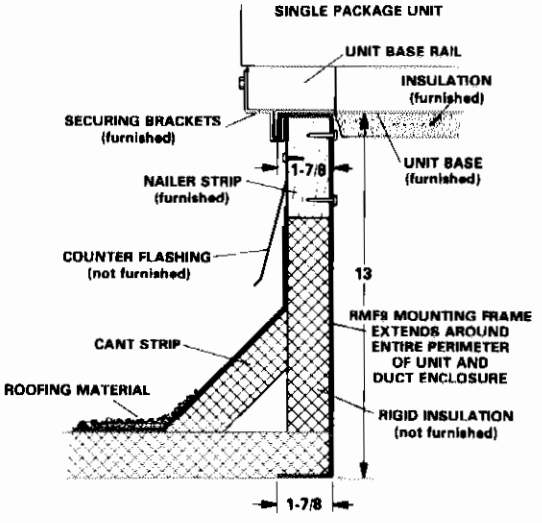
1.26 sq. ft. Free Area Supply Air
2.61 sq. ft. Free Area Return Air

Optional RTD9-65 Combination Ceiling Supply and Return Diffuser Assembly — RTD9-65 step-down mount diffuser extends slightly below ceiling level when installed and discharges conditioned air out through grilles on all four sides. Aluminum grilles are fitted with double deflection louvers for precise directional control of air flow. Return air enters through the large center grille. Assembly also includes insulated diffuser box with connection collars for round duct connection, hanging rings for suspending, molded fiberglass interior transition to insure low static and even air flow on all four sides. Transition is sealed internally to prevent recirculation. Diffuser assembly is completely factory assembled. Diffuser readily adapts to T-bar ceiling grids and plaster ceilings.

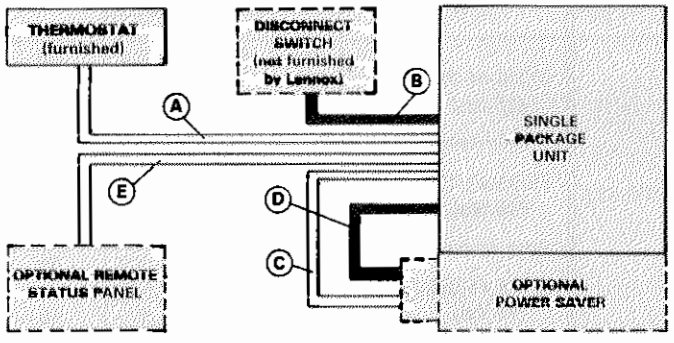
Optional FD9-65 Combination Ceiling Supply and Return Diffuser Assembly — FD9-65 flush mount diffuser installs almost flush with the ceiling level and discharges conditioned air out through fixed blade louvers on all four sides. Fixed blade louvers insure that air flow will be evenly distributed. Return air enters through large center grille. Assembly also includes insulated diffuser box with connection collars for round duct connection, support hanger eyelets at the top corners for secure installation, molded fiberglass interior transition to insure low static and even air flow on all four sides. Transition is sealed internally to prevent recirculation. Diffuser assembly is completely factory assembled. Diffuser readily adapts to T-bar ceiling grids and plaster ceilings.

Optional SRT10-65 Supply and Return Transitions — Transitions field install in the roof mounting frame and provide segregated and simple duct connections to supply and return diffuser. Completely insulated galvanized steel transitions have collars for round duct connection. Round duct from the transitions to the diffuser is not furnished and must be provided by the installer. Transitions are completely factory assembled and easily field install in the roof mounting frame with minimum costs and labor requirement.

TYPICAL FLASHING FOR RMF9 ROOF MOUNTING FRAME



FIELD WIRING



A — Five wire low voltage (18 ga. minimum)
Seven wire low voltage (with Em. Heat application)
B — Two or Three wire power (See electrical data tables)
C — Five wire low voltage (Power Saver installation)
D — Three wire power (All season Power Saver installation)
E — Seven wire low voltage (SP11 installation)

NOTE — All wiring must conform to NEC and local electrical codes.

– Field wiring not furnished –

ELECTRICAL DATA

CHP9-261, CHP9-311, CHP9-410 and CHP9-460 MODELS

Model No.		CHP9-261	CHP9-311	CHP9-411	CHP9-413	CHP9-461	CHP9-463
Line voltage data		†208/230v 60hz — 1ph	†208/230v 60hz — 1ph	†208/230v 60hz — 1ph	††208/230v 60hz — 3ph	†208/230v 60hz — 1ph	††208/230v 60hz — 3ph
Compressor	Rated load amps	14.9	17.3	23.9	15.4	25.1	15.4
	Locked rotor amps	74.0	85.0	102.0	77.0	114.0	93.0
Outdoor Coil Fan	Full load amps	1.4	2.6	3.0	3.0	3.2	3.2
	Locked rotor amps	2.9	5.4	6.3	6.3	5.8	5.8
Indoor Coil Blower	Full load amps	2.2	2.3	3.9	3.9	3.9	3.9
	Locked rotor amps	4.5	5.4	9.5	9.5	9.5	9.5
Recommended maximum fuse size (amps)		35	45	60	35	60	40
Unit power factor		.94	.96	.95	.86	.97	.87
*Minimum circuit ampacity		23.1	26.5	36.8	26.2	38.5	26.4

*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.
†Extremes of operating range are plus 10% and minus 5% of line voltage.
††Extremes of operating range are plus and minus 10% of line voltage.

CHP9-510 and CHP10-650 MODELS

Model No.		CHP9-511	CHP9-513	CHP10-651	CHP10-653	
Line voltage data		†208/230v 60hz — 1ph	††208/230v 60hz — 3ph	†208/230v 60hz — 1ph	††208/230v 60hz — 3ph	††460v 60hz — 3ph
Compressor	Rated load amps	29.2	18.3	32.2	21.0	10.3
	Locked rotor amps	132.0	103.0	175.0	132.0	66.0
Outdoor Coil Fan	Full load amps	5.2	5.2	3.0	3.0	**3.0
	Locked rotor amps	10.8	10.8	6.2	6.2	**6.2
Indoor Coil Blower	Full load amps	6.0	6.0	7.1	7.1	**7.1
	Locked rotor amps	14.7	14.7	13.6	13.6	**13.6
Recommended maximum fuse size (amps)		70	50	80	50	25
Unit power factor		.98	.89	.98	.89	.89
*Minimum circuit ampacity		47.7	34.0	50.4	36.4	17.9

*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.
†Extremes of operating range are plus 10% and minus 5% of line voltage.
††Extremes of operating range are plus and minus 10% of line voltage.
**Motors are rated at 230 volts. FLA shown are for step-down transformer output.

ELECTRIC HEAT DATA

ELECTRIC HEAT RATINGS

Model Number	†Output Btuh	†A.F.U.E.
ECH9-41-161	15,000	98.7
ECH9-41-261	24,000	99.2
ECH9-41-311	29,000	99.3
ECH9-41-471	43,000	99.5
ECH9-41-631	56,000	99.6
ECH9-46-381	36,000	99.1
ECH9-46-561	52,000	99.4
ECH9-46-751	68,000	99.5
ECH9-46-941	85,000	99.6
ECH9-65-381	37,000	99.2
ECH9-65-561	53,000	99.4
ECH9-65-751	70,000	99.5
ECH9-65-941	86,000	99.6
ECH9-65-1131	102,000	99.7

†Annual Fuel Utilization Efficiency based on D O E test procedures and F T C labeling regulations.

CHP9-261 ELECTRIC HEAT DATA

Model No.	Optional Electric Unit Model No. & Net Weight	No. of Steps	Volts Input	Electric Heat Kw Input	Electric Heat Btuh Input	*Minimum Circuit Ampacity
CHP9-261	ECH9-41-161 (14 lbs.)	1	208	3.5	11,900	44
			220	3.9	13,300	47
			230	4.2	14,300	
			240	4.6	15,700	
	ECH9-41-261 (14 lbs.)	1	208	5.7	19,500	57
			220	6.4	21,900	63
			230	7.0	23,900	
			240	7.6	25,900	
	ECH9-41-311 (14 lbs.)	1	208	6.9	23,600	65
			220	7.7	26,300	71
			230	8.4	28,700	
			240	9.2	31,400	
	ECH9-41-471 (15 lbs.)	1	208	10.4	35,500	86
			220	11.6	39,600	95
			230	12.7	43,400	
			240	13.8	47,100	

*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.

CHP9-311 ELECTRIC HEAT DATA

Model No.	Optional Electric Unit Model No. & Net Weight	No. of Steps	Volts Input	Electric Heat Kw Input	Electric Heat Btuh Input	*Minimum Circuit Ampacity
CHP9-311	ECH9-41-161 (14 lbs.)	1	208	3.5	11,900	49
			220	3.9	13,300	52
			230	4.2	14,300	
			240	4.6	15,700	
	ECH9-41-261 (14 lbs.)	1	208	5.7	19,500	62
			220	6.4	21,900	68
			230	7.0	23,900	
			240	7.6	25,900	
	ECH9-41-311 (14 lbs.)	1	208	6.9	23,600	70
			220	7.7	26,300	76
			230	8.4	28,700	
			240	9.2	31,400	
	ECH9-41-471 (15 lbs.)	1	208	10.4	35,500	91
			220	11.6	39,600	100
			230	12.7	43,400	
			240	13.8	47,100	

*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.

CHP9-411-413 ELECTRIC HEAT DATA

Model No.	Optional Electric Unit Model No. & Net Weight	No. of Steps	Volts Input	Electric Heat Kw Input	Electric Heat Btuh Input	*Minimum Circuit Ampacity
CHP9-411	ECH9-41-161 (14 lbs.)	1	208	3.5	11,900	58
			220	3.9	13,300	61
			230	4.2	14,300	
			240	4.6	15,700	
	ECH9-41-261 (14 lbs)	1	208	5.7	19,500	71
			220	6.4	21,900	76
			230	7.0	23,900	
			240	7.6	25,900	
	ECH9-41-311 (14 lbs)	1	208	6.9	23,600	78
			220	7.7	26,300	85
			230	8.4	28,700	
			240	9.2	31,400	
	ECH9-41-471 (15 lbs)	1	208	10.4	35,500	99
			220	11.6	39,600	109
			230	12.7	43,400	
			240	13.8	47,100	
	ECH9-41-631 (16 lbs)	2	208	13.8	47,100	119
			220	15.5	52,900	133
			230	16.9	57,700	
			240	18.4	62,800	
CHP9-413	ECH9-41-313 (15 lbs)	1	208	6.8	23,200	50
			220	7.6	25,900	53
			230	8.3	28,300	
			240	9.0	30,700	
	ECH9-41-473 (15 lbs)	1	208	10.4	35,500	62
			220	11.6	39,600	68
			230	12.7	43,400	
			240	13.8	47,100	
	ECH9-41-563 (15 lbs)	1	208	12.4	42,300	69
			220	13.9	47,500	76
			230	15.2	51,900	
			240	16.5	56,300	

*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.

CHP9-461-463 ELECTRIC HEAT DATA

Model No.	Optional Electric Unit Model No. & Net Weight	No. of Steps	Volts Input	Electric Heat Kw Input	Electric Heat Btuh Input	*Minimum Circuit Ampacity
CHP9-461	ECH9-46-381 (20 lbs.)	1	208	8.3	28,300	92
			220	9.2	31,400	99
			230	10.1	34,500	
			240	11.0	37,600	
	ECH9-46-561 (23 lbs)	1	208	12.4	42,300	117
			220	13.9	47,500	128
			230	15.2	51,900	
			240	16.5	56,300	
	ECH9-46-751 (24 lbs)	2	208	16.5	56,300	142
			220	18.5	63,200	156
			230	20.2	69,000	
			240	22.0	75,100	
CHP9-463	ECH9-46-313 (23 lbs)	1	208	6.8	23,200	55
			220	7.6	25,900	57
			230	8.3	28,300	
			240	9.0	30,700	
	ECH9-46-563 (23 lbs)	1	208	12.4	42,300	74
			220	13.9	47,500	80
			230	15.2	51,900	
			240	16.5	56,300	
	ECH9-46-783 (28 lbs)	2	208	17.1	58,400	91
			220	19.2	65,500	99
			230	20.9	71,400	
			240	22.8	77,800	

*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.

ELECTRIC HEAT DATA

CHP9-511-513 ELECTRIC HEAT DATA

Model No.	Optional Electric Unit Model No. & Net Weight	No. of Steps	Volts Input	Electric Heat Kw Input	Electric Heat Btuh Input	*Minimum Circuit Ampacity
CHP9-511	ECH9-46-381 (20 lbs.)	1	208	8.3	28,300	101
			220	9.2	31,400	108
			230	10.1	34,500	
			240	11.0	37,600	
	ECH9-46-561 (23 lbs.)	1	208	12.4	42,300	126
			220	13.9	47,500	136
			230	15.2	52,000	
			240	16.5	56,300	
	ECH9-46-751 (24 lbs.)	2	208	16.5	56,300	151
			220	18.5	63,200	165
			230	20.2	69,000	
			240	22.0	75,100	
	ECH9-46-941 (26 lbs.)	2	208	20.7	70,700	175
			220	23.1	78,900	194
			230	25.3	86,400	
			240	27.5	93,900	
	ECH9-46-313 (23 lbs.)	1	208	6.8	23,200	58
			220	7.6	26,000	61
			230	8.3	28,300	
			240	9.0	30,700	
CHP9-513	ECH9-46-563 (23 lbs.)	1	208	12.4	42,300	78
			220	13.9	47,500	83
			230	15.2	51,900	
			240	16.5	56,300	
	ECH9-46-783 (28 lbs.)	2	208	17.1	58,400	94
			220	19.2	65,600	102
			230	20.9	71,400	
			240	22.8	77,900	
	ECH9-46-943 (28 lbs.)	2	208	20.7	70,700	107
			220	23.2	79,200	117
			230	25.3	86,400	
			240	27.6	94,200	

*Refer to National Electric Code manual to determine wire, fuse and discount size requirements. Use wires suitable for at least 75°C (167°F).

CHP10-651-653 ELECTRIC HEAT DATA

Model No.	Optional Electric Unit Model No. & Net Weight	No. of Steps	Volts Input	Electric Heat Kw Input	Electric Heat Btuh Input	*Minimum Circuit Ampacity
CHP10 -651	ECH9-65-381 (20 lbs)	1	208	8.3	28,300	100.0
			220	9.2	31,400	107.6
			230	10.1	34,500	
			240	11.0	37,600	
	ECH9-65-561 (23 lbs)	1	208	12.4	42,300	125.0
			220	13.9	47,500	136.4
			230	15.2	52,000	
			240	16.5	56,300	
	ECH9-65-751 (24 lbs)	2	208	16.5	56,300	149.7
			220	18.5	63,200	165.0
			230	20.2	69,000	
			240	22.0	75,100	
	ECH9-65-941 (26 lbs)	2	208	20.7	70,700	174.5
			220	23.1	78,900	193.6
			230	25.3	86,400	
			240	27.5	93,900	
	ECH9-65-1131 (28 lbs)	2	208	24.8	84,700	199.4
			220	27.7	94,600	222.3
			230	30.3	103,500	
			240	33.0	112,700	
CHP10 -653	ECH9-65-313 (23 lbs)	1	208	6.8	23,200	59.9
			220	7.6	26,000	63.5
			230	8.3	28,300	
			240	9.0	30,700	
	ECH9-46/65-313 (23 lbs)	2	440	7.6	26,000	31.4
			460	8.3	28,300	
			480	9.0	30,700	
	ECH9-65-563 (23 lbs)	1	208	12.4	42,300	79.4
			220	13.9	47,500	86.0
			230	15.2	51,900	
			240	16.5	56,300	
	ECH9-46/65-563 (28 lbs)	2	440	13.9	47,500	42.7
			460	15.2	51,900	
			480	16.5	56,300	
	ECH9-65-783 (28 lbs)	2	208	17.1	58,400	95.7
			220	19.2	65,600	105.0
			230	20.9	71,400	
			240	22.8	77,900	
	ECH9-46/65 783 (28 lbs)	3	440	19.2	65,600	52.2
			460	20.9	71,400	
			480	22.8	77,900	
	ECH9-65-943 (28 lbs)	2	208	20.7	70,700	108.2
			220	23.2	79,200	119.4
			230	25.3	86,400	
			240	27.6	94,200	
	ECH9-46/65-943 (28 lbs)	3	440	23.2	79,200	59.4
			460	25.3	86,400	
			480	27.6	94,200	
	ECH9-65-1133 (28 lbs)	2	208	24.8	84,700	122.4
			220	27.7	94,600	135.6
			230	30.3	103,500	
			240	33.0	112,700	
	ECH9-65-1133 (28 lbs)	3	440	27.7	94,600	67.6
			460	30.3	103,500	
			480	33.0	112,700	

*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 75°C (167°F).

NOTE – To determine sensible capacity, leaving wet bulb and dry bulb temperatures not shown in the cooling tables, see Miscellaneous Engineering Data section, Page 9.

CHP9-261 COOLING CAPACITY

Enter. Wet Bulb (°F)	Total Air Vol. (cfm)	Outdoor Air Temperature Entering Outdoor Coil (F)																			
		85					95					105					115				
		Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)		
				76	80	84			76	80	84			76	80	84			76	80	84
63	600	22,200	2700	.69	.79	.88	20,900	2860	.71	.81	.91	19,700	3020	.73	.83	.94	18,500	3180	.75	.86	.96
	800	23,300	2790	.75	.86	.96	22,000	2950	.77	.89	.96	20,800	3120	.79	.92	.95	19,600	3270	.82	.95	.96
	1000	24,200	2840	.81	.94	.96	22,800	3000	.83	.96	.96	21,600	3190	.86	.96	.96	20,400	3360	.89	.96	.96
67	600	23,800	2820	.55	.64	.73	22,400	2980	.56	.66	.75	21,100	3150	.57	.67	.77	19,800	3310	.58	.69	.80
	800	24,900	2890	.59	.70	.80	23,400	3060	.60	.72	.83	22,000	3220	.61	.74	.86	20,600	3380	.63	.76	.89
	1000	25,500	2930	.62	.75	.87	24,000	3100	.64	.77	.91	22,500	3270	.66	.80	.94	21,100	3430	.68	.83	.96
71	600	25,500	2930	.43	.51	.60	24,000	3100	.43	.52	.61	22,600	3280	.43	.53	.62	21,200	3440	.44	.54	.64
	800	26,500	3000	.44	.54	.65	25,000	3170	.44	.53	.66	23,400	3340	.45	.57	.69	22,000	3510	.46	.58	.71
	1000	27,200	3040	.46	.58	.70	25,500	3210	.46	.59	.72	23,900	3390	.47	.61	.75	22,400	3550	.48	.63	.78

CHP9-311 COOLING CAPACITY

Enter. Wet Bulb (°F)	Total Air Vol. (cfm)	Outdoor Air Temperature Entering Outdoor Coil (F)																			
		85					95					105					115				
		Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)		
				76	80	84			76	80	84			76	80	84			76	80	84
63	750	27,800	3050	.71	.82	.92	26,300	3280	.73	.84	.94	24,800	3500	.75	.86	.96	23,300	3680	.77	.89	.96
	1000	29,200	3130	.79	.91	.96	27,700	3370	.81	.94	.96	26,000	3580	.83	.96	.96	24,600	3760	.86	.96	.96
	1250	30,400	3190	.86	.96	.96	28,900	3440	.88	.96	.96	27,400	3660	.91	.96	.96	25,800	3840	.95	.96	.96
67	750	29,600	3150	.57	.66	.76	28,000	3390	.57	.68	.78	26,400	3600	.59	.70	.80	24,700	3770	.60	.72	.83
	1000	30,800	3220	.61	.73	.85	29,100	3450	.62	.75	.88	27,400	3660	.64	.78	.91	25,600	3830	.66	.81	.95
	1250	31,600	3260	.65	.80	.94	29,900	3500	.67	.83	.96	28,100	3700	.69	.86	.96	26,200	3860	.72	.89	.96
71	750	31,600	3260	.43	.52	.62	29,900	3500	.43	.53	.63	28,100	3700	.44	.54	.65	26,300	3870	.45	.56	.67
	1000	32,700	3320	.45	.57	.68	30,900	3550	.46	.58	.70	29,000	3750	.46	.60	.72	27,100	3920	.47	.61	.75
	1250	33,500	3360	.47	.61	.75	31,600	3590	.48	.63	.77	29,600	3780	.49	.65	.80	27,600	3940	.50	.67	.83

CHP9-261 HEATING CAPACITY

Indoor Coil Air Volume (cfm) 70F db	Air Temperature Entering Outdoor Coil (F)							
	65		45		25		5	
	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input
600	29,300	3080	21,900	2740	15,700	2320	9,300	1920
800	31,500	2930	23,900	2630	17,300	2250	10,500	1900
1000	33,900	2790	25,900	2520	18,900	2180	11,700	1870

NOTE — Heating capacities include the effect of defrost cycles in the temperature range where they occur.

CHP9-311 HEATING CAPACITY

Indoor Coil Air Volume (cfm) 70F db	Air Temperature Entering Outdoor Coil (F)							
	65		45		25		5	
	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input
750	38,100	3310	26,600	3040	19,900	2560	12,900	2130
1000	38,900	3220	27,300	2940	20,500	2500	13,300	2100
1250	39,700	3120	28,000	2860	21,000	2440	13,600	2060

NOTE — Heating capacities include the effect of defrost cycles in the temperature range where they occur.

CHP9-261 HEATING PERFORMANCE at 800 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	Compressor Motor Watts Input	Total Output (Btuh)
65	2930	31,500
60	2850	29,800
55	2760	28,000
50	2670	26,300
47	2640	25,200
45	2630	23,900
40	2530	22,200
35	2440	20,600
30	2350	19,000
25	2250	17,300
20	2160	15,700
17	2100	14,700
15	2070	14,000
10	1980	12,300
5	1900	11,200
0	1800	10,100

*Outdoor temperature at 70% relative humidity. Indoor temperature at 70°.

CHP9-311 HEATING PERFORMANCE at 1000 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	Compressor Motor Watts Input	Total Output (Btuh)
65	3220	38,900
60	3120	36,700
55	3030	34,500
50	2960	32,300
47	2880	31,000
45	2860	27,300
40	2840	25,600
35	2730	23,900
30	2620	22,200
25	2500	20,500
20	2390	18,800
17	2320	17,700
15	2280	16,900
10	2190	14,700
5	2100	13,300
0	2000	12,200

*Outdoor temperature at 70% relative humidity. Indoor temperature at 70°.

NOTE – To determine sensible capacity, leaving wet bulb and dry bulb temperatures not shown in the cooling tables, see Miscellaneous Engineering Data section, Page 9.

CHP9-411-413 COOLING CAPACITY

Enter. Wet Bulb (°F)	Total Air Vol. (cfm)	Outdoor Air Temperature Entering Outdoor Coil (F)																		
		85				95				105				115						
		Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)		
				76	80	84			76	80	84			76	80	84			76	80	84
63	900	34,100	3870	.68	.78	.87	32,400	4050	.70	.80	.89	30,600	4220	.71	.82	.92	28,800	4370	.73	.85	.93
	1200	35,900	3930	.74	.86	.93	34,000	4130	.76	.89	.93	32,200	4320	.79	.91	.93	30,200	4480	.81	.93	.93
	1500	37,000	3970	.81	.93	.93	35,300	4190	.83	.93	.93	33,500	4400	.86	.93	.93	31,700	4600	.89	.93	.93
67	900	36,300	3950	.54	.63	.72	34,500	4150	.55	.65	.74	32,500	4340	.56	.66	.76	30,600	4510	.57	.68	.79
	1200	37,900	4000	.58	.69	.80	35,900	4220	.59	.71	.83	33,800	4420	.61	.73	.85	31,700	4600	.62	.76	.89
	1500	38,800	4040	.62	.75	.88	36,800	4260	.64	.78	.91	34,600	4470	.65	.80	.93	32,500	4660	.68	.83	.93
71	900	38,800	4030	.42	.50	.59	36,800	4260	.42	.51	.60	34,700	4480	.42	.52	.61	32,600	4670	.43	.53	.63
	1200	40,200	4090	.43	.54	.65	38,100	4330	.44	.55	.66	35,900	4550	.44	.56	.68	33,700	4740	.45	.58	.71
	1500	41,100	4120	.45	.58	.70	38,900	4370	.46	.59	.72	36,600	4590	.47	.61	.75	34,300	4790	.48	.63	.78

CHP9-461-463 COOLING CAPACITY

Enter. Wet Bulb (°F)	Total Air Vol. (cfm)	Outdoor Air Temperature Entering Outdoor Coil (F)																		
		85				95				105				115						
		Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)		
				76	80	84			76	80	84			76	80	84			76	80	84
63	1050	40,700	4330	.70	.79	.89	38,600	4580	.71	.81	.91	36,300	4880	.73	.84	.94	34,000	5210	.75	.86	.96
	1400	43,000	4480	.76	.88	.96	40,700	4740	.78	.90	.96	38,300	5050	.80	.93	.96	35,600	5410	.83	.96	.96
	1750	45,000	4570	.82	.95	.96	42,300	4860	.85	.96	.96	40,000	5210	.88	.96	.96	37,600	5610	.91	.96	.96
67	1050	43,600	4520	.55	.65	.74	41,300	4790	.56	.66	.75	38,800	5100	.57	.67	.78	36,200	5460	.59	.70	.80
	1400	45,600	4640	.59	.70	.82	43,100	4920	.60	.72	.84	40,400	5250	.62	.75	.87	37,600	5620	.64	.78	.91
	1750	46,900	4720	.63	.77	.89	44,300	5000	.65	.79	.92	41,400	5340	.67	.82	.96	38,500	5720	.69	.85	.96
71	1050	46,700	4700	.43	.51	.60	44,100	5000	.43	.52	.61	41,400	5340	.43	.53	.63	38,600	5730	.44	.54	.65
	1400	48,600	4820	.44	.55	.65	45,900	5120	.45	.56	.67	42,900	5470	.45	.58	.70	39,900	5870	.46	.59	.72
	1750	49,800	4890	.46	.59	.71	46,900	5200	.47	.60	.74	43,800	5550	.48	.62	.76	40,700	5960	.49	.65	.80

CHP9-411-413 HEATING CAPACITY

Indoor Coil Air Volume (cfm) 70F db	Air Temperature Entering Outdoor Coil (F)							
	65		45		25		5	
	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input
900	47,000	4120	34,600	3400	25,400	3070	16,000	2630
1200	48,000	4050	35,400	3340	26,000	3020	16,400	2590
1500	49,000	3980	36,200	3280	26,600	2970	16,800	2560

NOTE — Heating capacities include the effect of defrost cycles in the temperature range where they occur.

CHP9-461-463 HEATING CAPACITY

Indoor Coil Air Volume (cfm) 70F db	Air Temperature Entering Outdoor Coil (F)							
	65		45		25		5	
	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input
1050	50,400	4660	33,700	3860	28,300	3570	21,100	3160
1400	51,300	4580	34,500	3800	28,900	3540	21,500	3140
1750	52,300	4500	35,300	3740	29,500	3500	21,800	3130

NOTE — Heating capacities include the effect of defrost cycles in the temperature range where they occur.

CHP9-411-413 HEATING PERFORMANCE at 1200 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	Compressor Motor Watts Input	Total Output (Btuh)
65	4050	48,000
60	3930	45,300
55	3810	42,600
50	3690	39,900
47	3620	38,300
45	3340	35,400
40	3260	33,000
35	3180	30,700
30	3100	28,300
25	3020	26,000
20	2930	23,600
17	2890	22,200
15	2840	21,100
10	2720	18,600
5	2590	16,400
0	2470	14,900

*Outdoor temperature at 70% relative humidity. Indoor temperature at 70°.

CHP9-461-463 HEATING PERFORMANCE at 1400 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	Compressor Motor Watts Input	Total Output (Btuh)
65	4580	51,300
60	4460	48,800
55	4340	46,200
50	4220	43,600
47	4150	42,100
45	3800	34,500
40	3730	33,100
35	3670	31,700
30	3600	30,300
25	3540	28,900
20	3470	27,500
17	3430	26,700
15	3380	25,700
10	3260	23,200
5	3140	21,500
0	3020	19,900

*Outdoor temperature at 70% relative humidity. Indoor temperature at 70°.

NOTE – To determine sensible capacity, leaving wet bulb and dry bulb temperatures not shown in the cooling tables, see Miscellaneous Engineering Data section, Page 9.

CHP9-511-513 COOLING CAPACITY

Enter. Wet Bulb (°F)	Total Air Vol. (cfm)	Outdoor Air Temperature Entering Outdoor Coil (F)																		
		85					95				105				115					
		Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)		
				76	80	84			76	80	84			76	80	84			76	80	84
63	1200	46,800	4880	.70	.79	.89	44,200	5160	.71	.81	.91	41,500	5490	.73	.84	.94	38,700	5880	.75	.87	.96
	1600	49,200	5060	.76	.88	.96	46,400	5360	.78	.90	.96	43,600	5710	.81	.94	.96	40,500	6120	.84	.96	.96
	2000	50,500	5180	.82	.96	.96	48,100	5520	.85	.96	.96	45,400	5910	.88	.96	.96	42,500	6370	.92	.96	.96
67	1200	49,900	5110	.56	.65	.74	47,100	5420	.56	.66	.76	44,100	5780	.58	.68	.78	41,100	6180	.59	.70	.81
	1600	52,000	5270	.59	.71	.82	48,900	5590	.61	.73	.85	45,800	5960	.62	.75	.88	42,500	6380	.64	.78	.92
	2000	53,300	5380	.63	.77	.90	50,200	5700	.65	.79	.93	46,900	6070	.67	.83	.96	43,500	6500	.70	.86	.96
71	1200	53,100	5360	.43	.51	.60	50,100	5690	.43	.52	.61	47,000	6080	.43	.53	.63	43,700	6520	.44	.55	.65
	1600	55,100	5510	.44	.55	.66	51,900	5850	.45	.56	.68	48,500	6250	.46	.59	.70	45,000	6700	.47	.60	.73
	2000	56,400	5600	.46	.59	.72	53,000	5950	.47	.61	.74	49,400	6350	.48	.63	.77	45,800	6800	.49	.65	.81

CHP9-651-653 COOLING CAPACITY

Enter. Wet Bulb (°F)	Total Air Vol. (cfm)	Outdoor Air Temperature Entering Outdoor Coil (F)																		
		85					95				105				115					
		Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)			Total Cool Cap. (Btuh)	Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb (°F)		
				76	80	84			76	80	84			76	80	84			76	80	84
63	1500	56,100	5340	.71	.81	.91	53,000	5740	.72	.83	.93	49,800	6200	.74	.86	.96	46,500	6720	.77	.89	.97
	2000	59,100	5550	.77	.90	.97	55,800	5960	.80	.92	.97	52,500	6430	.82	.96	.97	49,000	6960	.85	.97	.97
	2500	61,100	5690	.84	.97	.97	58,000	6140	.87	.97	.97	54,800	6640	.90	.97	.97	51,500	7210	.94	.97	.97
67	1500	59,900	5620	.56	.66	.75	56,600	6030	.57	.67	.77	53,100	6500	.58	.69	.80	49,600	7020	.60	.71	.82
	2000	62,500	5800	.60	.72	.84	58,900	6210	.62	.74	.86	55,200	6670	.63	.77	.89	51,400	7200	.65	.80	.93
	2500	64,100	5910	.65	.78	.92	60,400	6320	.66	.81	.95	56,600	6790	.68	.84	.97	52,700	7320	.71	.88	.97
71	1500	64,000	5900	.43	.52	.61	60,400	6320	.44	.53	.62	56,800	6800	.44	.54	.64	53,000	7340	.45	.55	.66
	2000	66,400	6060	.45	.56	.67	62,700	6480	.46	.57	.69	58,700	6960	.46	.59	.71	54,700	7500	.47	.61	.74
	2500	67,900	6160	.47	.60	.73	64,000	6580	.48	.62	.76	59,900	7060	.49	.64	.78	55,700	7600	.50	.66	.82

CHP9-511-513 HEATING CAPACITY

Indoor Coil Air Volume (cfm) 70F db	Air Temperature Entering Outdoor Coil (F)							
	65		45		25		5	
	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input
1200	61,000	5420	40,500	4240	32,200	3930	21,500	3390
1600	62,100	5290	41,500	4140	32,900	3860	22,000	3360
2000	63,200	5160	42,400	4040	33,600	3790	22,400	3320

NOTE — Heating capacities include the effect of defrost cycles in the temperature range where they occur.

CHP10-651-653 HEATING CAPACITY

Indoor Coil Air Volume (cfm) 70F db	Air Temperature Entering Outdoor Coil (F)							
	65		45		25		5	
	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input	Total Heating Capacity (Btuh)	Comp. Motor Watts Input
1500	72,400	5960	44,500	4940	38,100	4230	26,900	3440
2000	74,500	5740	46,200	4760	39,200	4110	27,400	3370
2500	76,500	5520	47,800	4580	40,300	3990	27,800	3300

NOTE — Heating capacities include the effect of defrost cycles in the temperature range where they occur.

CHP9-511-513 HEATING PERFORMANCE at 1600 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	Compressor Motor Watts Input	Total Output (Btuh)
65	5290	62,100
60	5130	58,700
55	4970	55,300
50	4810	51,900
47	4710	49,800
45	4140	41,500
40	4070	39,300
35	4000	37,200
30	3930	35,000
25	3860	32,900
20	3790	31,500
17	3740	29,400
15	3680	28,100
10	3520	24,700
5	3360	22,000
0	3190	20,000

*Outdoor temperature at 70% relative humidity. Indoor temperature at 70°.

CHP10-651-653 HEATING PERFORMANCE at 2000 cfm Indoor Coil Air Volume

*Outdoor Temperature (Degree F)	Compressor Motor Watts Input	Total Output (Btuh)
65	5740	74,500
60	5540	70,500
55	5340	66,600
50	5150	62,600
47	5030	60,200
45	4760	46,200
40	4600	44,400
35	4440	42,700
30	4270	41,000
25	4110	39,200
20	3940	37,500
17	3850	36,400
15	3770	34,900
10	3570	30,900
5	3370	27,400
0	3180	24,500

*Outdoor temperature at 70% relative humidity. Indoor temperature at 70°.

BLOWER DATA

CHP9-261 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds		
	High	Medium-Low	Low
0	1175	960	770
.05	1150	930	750
.10	1120	900	725
.15	1085	865	700
.20	1050	830	675
.25	1000	800	650
.30	950	760	625
.40	850	680	570
.50	740	595	500
.60	620	505	----

NOTE — All cfm is measured external to the unit with the air filter in place.

NOTE — Unit should not be operated in heating cycle at air volumes within the shaded areas.

CHP9-261 ELECTRIC HEAT AIR RESISTANCE

Air Volume (cfm)	Total Resistance (inches water gauge)		
	Electric Heaters		
	ECH-41-161	ECH9-41-261 ECH9-41-311	ECH9-41-313 ECH9-41-471 ECH9-41-473 ECH9-41-563
600	.03	.04	.06
700	.04	.06	.07
800	.06	.07	.09
900	.07	.09	.11
1000	.08	.11	.13
1100	.10	.13	.15
1200	.12	.15	.18
1300	.14	.18	.21

CHP9-311 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
0	1390	1325	1175	1040
.05	1355	1295	1150	1015
.10	1325	1265	1125	995
.15	1295	1235	1100	970
.20	1265	1205	1075	950
.25	1235	1175	1050	925
.30	1200	1145	1025	905
.40	1140	1085	970	860
.50	1070	1020	895	----

NOTE — All cfm is measured external to the unit with the air filter in place.

NOTE — Unit should not be operated in heating cycle at air volumes within the shaded areas.

CHP9-311 ELECTRIC HEAT AIR RESISTANCE

Air Volume (cfm)	Total Resistance (inches water gauge)		
	Electric Heaters		
	ECH9-41-161	ECH9-41-261 ECH9-41-311	ECH9-41-313 ECH9-41-471 ECH9-41-473 ECH9-41-563
800	.06	.07	.09
900	.07	.09	.11
1000	.08	.11	.13
1100	.10	.13	.15
1200	.12	.15	.18
1300	.14	.18	.21
1400	.17	.21	.24

CHP9-411-413 BLOWER PERFORMANCE

External Static Pressure (In. wg)	Air Volume (cfm) @ Various Speeds		
	High	Medium-Low	Low
0	1630	1365	1080
.05	1600	1345	1070
.10	1570	1320	1060
.15	1540	1300	1050
.20	1510	1275	1035
.25	1475	1250	1020
.30	1440	1230	1006
.40	1360	1175	965
.50	1265	1115	925
.60	1170	1060	----
.70	1050	----	----

NOTE — All cfm is measured external to the unit with the air filter in place.

NOTE — Unit should not be operated in heating cycle at air volumes within the shaded areas.

CHP9-411-413 ELECTRIC HEAT AIR RESISTANCE

Air Volume (cfm)	Total Resistance (inches water gauge)			
	Electric Heaters			
	ECH9-41-161	ECH9-41-261 ECH9-41-311	ECH9-41-313 ECH9-41-471 ECH9-41-473 ECH9-41-563	ECH9-41-631
900	.07	.09	.11	.12
1000	.08	.11	.13	.14
1100	.10	.13	.15	.17
1200	.12	.15	.18	.20
1300	.14	.18	.21	.24
1400	.17	.21	.24	.28

BLOWER DATA

CHP9-461-463 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds		
	High	Medium-Low	Low
0	1945	1630	1305
.05	1905	1610	1305
.10	1870	1585	1300
.15	1825	1565	1290
.20	1780	1540	1280
.25	1745	1510	1260
.30	1695	1485	1240
.40	1610	1420	1190
.50	1525	1335	1125
.60	1435	1240	1040
.70	1340	1130	----

NOTE — All cfm is measured external to the unit with the air filter in place.

NOTE — Unit should not be operated in heating cycle at air volumes within the shaded areas.

CHP9-461-463 ELECTRIC HEAT AIR RESISTANCE

Air Volume (cfm)	Total Resistance (Inches water gauge) Electric Heaters			
	ECH9-46-381	ECH9-46-561 ECH9-46-313 ECH9-46-563	ECH9-46-751	ECH9-46-783
1000	.09	.12	.14	.19
1100	.10	.13	.16	.21
1200	.11	.14	.17	.23
1300	.12	.16	.19	.26
1400	.13	.17	.21	.28
1500	.13	.18	.23	.31
1600	.14	.20	.25	.34
1700	.15	.22	.27	.37

CHP9-511-513 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds				
	High	Med-High	Medium	Med-Low	Low
0	2480	2340	2150	1885	1630
.05	2435	2300	2120	1850	1600
.10	2395	2265	2085	1820	1570
.15	2355	2225	2045	1785	1535
.20	2315	2190	2010	1755	1500
.25	2275	2150	1975	1720	1470
.30	2235	2110	1940	1685	1435
.40	2155	2035	1860	1620	1360
.50	2055	1955	1785	1545	1290
.60	1955	1865	1705	1470	1215
.70	1860	1770	1620	1380	1135

NOTE — All cfm is measured external to the unit with the air filter in place.

NOTE — Unit should not be operated in heating cycle at air volumes within the shaded areas.

CHP9-511-513 ELECTRIC HEAT AIR RESISTANCE

Air Volume (cfm)	Total Resistance (inches water gauge) Electric Heaters				
	ECH9-46 -381	ECH9-46-561 ECH9-46-313 ECH9-46-563	ECH9-46 -751	ECH9-46 -941	ECH9-46-783 ECH9-46-943
1200	.11	.14	.17	.21	.23
1300	.12	.16	.19	.23	.26
1400	.13	.17	.21	.26	.28
1500	.13	.18	.23	.28	.31
1600	.14	.20	.25	.30	.34
1700	.15	.22	.27	.33	.37
1800	.16	.24	.29	.35	.40
1900	.17	.25	.32	.38	.43
2000	.18	.27	.34	.41	.47

CHP10-651-653 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds	
	High	Medium
0	2350	2070
.05	2325	2050
.10	2305	2030
.15	2285	2015
.20	2265	1995
.25	2245	1975
.30	2220	1955
.40	2180	1920
.50	2140	1880
.60	2095	1840
.70	2050	1800
.80	2010	1760
.90	1960	1675

NOTE — All cfm measured external to unit with air filter in place.

NOTE — Unit should not be operated in heating cycle at air volumes within the shaded areas.

CHP10-651-653 ELECTRIC HEAT AIR RESISTANCE

Air Volume (cfm)	Total Resistance (inches water gauge) Electric Heaters				
	ECH9-65 -381	ECH9-65-313 ECH9-65-561 ECH9-65-563 ECH9-46/65 -313 ECH9-46/65 -563	ECH9-65 -751	ECH9-65 -941	ECH9-65-783 ECH9-65-943 ECH9-65-1131 ECH9-65-1133 ECH9-46/65 -783 ECH9-46/65 -943
1500	.13	.18	.23	.28	.31
1600	.14	.20	.25	.30	.34
1700	.15	.22	.27	.33	.37
1800	.16	.24	.29	.35	.40
1900	.17	.25	.32	.38	.43
2000	.18	.27	.34	.41	.47
2100	.20	.29	.37	.44	.50
2200	.22	.32	.39	.47	.53
2300	.23	.34	.42	.51	.57

ACCESSORY AIR RESISTANCE

Model No.	Air Volume (cfm)	Total Resistance (inches water gauge)				
		RD10 Power Saver	RTD9-65 Diffuser			FD9-65 Diffuser
			2 Sides Open	3 Sides Open	4 Sides Open	
CHP9-261	600	.09	.11	.10	.09	.09
	700	.10	.13	.11	.10	.10
	800	.12	.15	.13	.11	.11
	900	.13	.17	.14	.12	.12
	1000	.14	.19	.16	.14	.14
	1100	.15	.22	.18	.15	.15
	1200	.16	.25	.20	.17	.17
CHP9-311	800	.12	.15	.13	.11	.11
	900	.13	.17	.14	.12	.12
	1000	.14	.19	.16	.14	.14
	1100	.15	.22	.18	.15	.15
	1200	.16	.25	.20	.17	.17
	1300	.17	.29	.22	.18	.18
	1400	.18	.33	.25	.20	.20
CHP9-410	900	.13	.17	.14	.12	.12
	1000	.14	.19	.16	.14	.14
	1100	.15	.22	.18	.15	.15
	1200	.16	.25	.20	.17	.17
	1300	.17	.29	.22	.18	.18
	1400	.18	.33	.25	.20	.20
	1500	.20	.38	.28	.22	.22
	1600	.21	.43	.32	.24	.24

NOTE — RT10 Duct Enclosure has no appreciable air resistance.

ACCESSORY AIR RESISTANCE

Model No.	Air Volume (cfm)	Total Resistance (inches water gauge)				
		RD10 Power Saver	RTD9-65 Diffuser			FD9-65 Diffuser
			2 Sides Open	3 Sides Open	4 Sides Open	
CHP9-460	1000	.14	.19	.16	.14	.14
	1100	.15	.22	.18	.15	.15
	1200	.16	.25	.20	.17	.17
	1300	.17	.29	.22	.18	.18
	1400	.18	.33	.25	.20	.20
	1500	.20	.38	.28	.22	.22
	1600	.21	.43	.32	.24	.24
	1700	.23	.49	.36	.27	.27
CHP9-510	1200	.16	.25	.20	.17	.17
	1300	.17	.29	.22	.18	.18
	1400	.18	.33	.25	.20	.20
	1500	.20	.38	.28	.22	.22
	1600	.21	.43	.32	.24	.24
	1700	.23	.49	.36	.27	.27
	1800	.24	.56	.40	.30	.30
	1900	.25	.64	.45	.33	.33
	2000	.27	.73	.50	.36	.36
CHP10-650	1500	.20	.38	.25	.22	.22
	1600	.21	.43	.32	.24	.24
	1700	.23	.49	.36	.27	.27
	1800	.24	.56	.40	.30	.30
	1900	.25	.64	.45	.33	.33
	2000	.27	.73	.50	.36	.36
	2100	.28	.83	.56	.40	.40
	2200	.30	.95	.63	.44	.44
	2300	.32	1.08	.71	.48	.48

NOTE — RT10 Duct Enclosure has no appreciable air resistance.

RTD9-65 DIFFUSER GRILLE AIR THROW DATA

Sides Open	Air Volume (Cfm)	*Effective Throw (ft.)		
		Horizontal Vanes 180° Straight	Horizontal Vanes 22° Down	Horizontal Vanes 45° Down
Two Sides Open	600	21	19	14
	800	22	21	15
	1000	24	22	16
	1200	25	23	17
	1400	27	25	18
	1600	29	26	19
	1800	31	27	20
	2000	33	28	21
	2200	35	30	22
	2400	38	34	23
Three Sides Open	600	15	14	8
	800	16	15	9
	1000	17	16	10
	1200	18	17	11
	1400	19	18	12
	1600	20	18	12
	1800	21	19	13
	2000	23	20	14
	2200	25	22	16
	2400	27	24	17
Four Sides Open	600	11	10	7
	800	12	11	8
	1000	13	12	8
	1200	14	13	9
	1400	15	14	9
	1600	16	14	10
	1800	17	15	10
	2000	18	16	11
	2200	19	17	12
	2400	20	18	12

*Effective throw is terminated at a point where conditioned air velocity has decreased to 50 fpm.

FD9-65 DIFFUSER GRILLE AIR THROW DATA

Air Volume (Cfm)	*Effective Throw (ft.)
600	7
800	8
1000	8
1200	9
1400	9
1600	10
1800	11
2000	12
2200	12
2400	13

*Terminated at the point where conditioned air velocity has decreased to 50 fpm.

GUIDE SPECIFICATIONS

Prepared for the guidance of architects, consulting engineers and mechanical contractors.

General — *Furnish and install a single package heat pump unit complete with automatic controls. The single package unit shall be a standard product of a firm regularly engaged in the manufacture of heating-cooling equipment. The manufacturer shall have parts and service available throughout the United States.*

The installed weight shall not be more than . . . . . lbs. Entire unit shall have a width of not more than . . . . . inches , a depth of not more than . . . . . inches and an overall height of not more than . . . . . inches. The equipment shall be shipped completely factory assembled, precharged, piped and wired internally ready for field connections. In addition, manufacturer shall test operate system at the factory before shipment.

Roof Mounting Frame — *Furnish and install a steel roof mounting frame. It shall mate to the bottom perimeter of the equipment. When flashed into the roof it shall make a unit mounting curb and provide weatherproof duct connection and entry into the conditioned area. Flashing shall be the responsibility of a roofing contractor. Frame shall be approved by National Roofing Contractors Association.*

Air Distribution — *Equipment shall be capable of end or bottom handling of conditioned air. All air distribution ducts shall be fiberglass or . . . . . ga. galvanized steel insulated with . . . . . inch thick . . . . . lb. density fiberglass or equivalent.*

Furnish and install a (flush or stepdown) optional combination ceiling supply and return air grille. It shall be capable of not less than . . . . . ft. radius of effective throw.

DX Cooling System — *The total certified cooling capacity shall not be less than . . . . . Btuh with an indoor coil air volume of . . . . . .cfm, an entering wet bulb air temperature of . . . . . F, an entering dry bulb air temperature of . . . . . F, and an outdoor coil entering temperature of . . . . . F. The compressor power input shall not exceed . . . . . Kw at these conditions.*

Heating System — *The total certified heating capacity shall not be less than . . . . . Btuh with an indoor coil air volume of . . . . . cfm,an entering wet bulb air temperature of . . . . . F, an entering dry bulb temperature of . . . . . F and an outdoor coil entering air temperature of . . . . . F. The total compressor power input shall not exceed . . . . . Kw at the above conditions.*

The coils shall be non-ferrous construction with aluminum fins mechanically bonded to durable copper tubes. Coils shall be pressure leak tested. Coil face area shall be not less than . . . . . .sq. ft. (indoor) and . . . . . sq. ft. (outdoor).

The compressor shall be resiliently mounted, have overload protection, internal pressure relief and crankcase heater. The refrigeration system shall have reversing valve, hi-capacity drier, suction and discharge line service gauge ports, high and low pressure switch, suction line accumulator, check valve, solid-state defrost control, low temperature control and full refrigerant charge. Control options available shall consist of timed-off control, low ambient control, outdoor thermostat and start controls. Shall comply with ARI standard 240 test conditions and DOE test procedures.

Supplementary Electric Heating System — *The certified total heating capacity output shall be . . . . . Btuh with . . . . . Kw input at. . . . . volts power supply.*

Optional electric heaters shall be field installed. Heating elements shall be nichrome bare wired exposed directly to the air stream. Thermal time delay relay shall bring the elements on and off in sequence with a time delay between each element. Circuit breakers shall provide overload and short circuit protection. Safety devices shall consist of limit controls and thermal cutoff safety fuses. Heaters shall be U.L. Listed.

Cabinet — *Shall be of galvanized steel with a baked-on outdoor enamel paint finish. Cabinet panels where conditioned air is handled shall be fully insulated to prevent sweating and minimize sound. Openings shall be provided for power connection entry. Base shall have drainage holes in outdoor coil section. Base support rails shall elevate unit off mounting surface.*

Service Access — *All components, wiring and inspection areas shall be completely accessible through removable panels.*

Air Movers — *Centrifugal conditioned air blower shall be direct driven by a multi-speed motor and be capable of delivering . . . . . cfm at an extenal static pressure of . . . . . inches water gauge requiring not more than . . . . . bhp and . . . . . rpm. Blowers shall be statically and dynamically balanced.*

Propeller type outdoor fan shall be direct driven by a . . . . . hp motor. Fan motor shall be permanently lubricated and inherently protected.

Air Filters — *Cleanable filters furnished shall have not less than . . . . . .sq. ft. of free area.*

Duct Enclosure — *Furnish and install an optional field assembled duct enclosure. Enclosure shall attach to the single package unit and mate to the roof mounting frame providing weatherproof duct connection and entry into the conditioned area. Brackets shall be provided to secure unit to frame. Enclosure shall be of galvanized steel with a baked-on outdoor enamel paint finish and shall be completely insulated.*

POWER SAVER — *Furnish and install complete with controls an optional duct enclosure with air mixing damper assembly including outdoor air and recirculated air dampers with pressure operated exhaust air dampers. The assembly shall mount within the confines of the duct enclosure and provide for the introduction of outside air for minimum ventilation and free cooling. Outdoor air intake hood shall include air filter. Damper motor shall be 24 volt, 3 position spring return. Controls shall include adjustable mixed air controller, adjustable compressor monitor and adjustable enthalpy control.*

Minimum Fresh Air Damper — *Optional fresh air damper shall be available to provide outdoor air requirements. Damper box field installs external to duct enclosure and shall be manually operated.*

Remote Status Panel — *Shall be available for installation within the conditioned area to observe equipment operation. The panel shall include signal lights for Cool Mode, Heat Mode, Compressor, No Heat and Filter.*

Approvals — *All electrical components shall have U.L. Listing. All wiring shall be in compliance with NEC.*