

HEAT PUMPS
PACKAGED

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Oct. 1, 1967

Supersedes 4-1-67

LENNOXSINGLE PACKAGE HEAT PUMP
CHP6-411 AND CHP6-413**CONVENIENT DUCT CONNECTION**

Supply and return air openings are located side by side on one end of the cabinet. This arrangement simplifies installation of down stream electric heaters, mixing dampers and combination supply and return grilles.

DEPENDABLE COMPRESSOR

Sturdiest and most reliable available in its size range. Suction cooled and resiliently mounted. Equipped with suction and liquid line valves which have gauge ports. Overload protected and equipped with effective slugging protection against liquid refrigerant pumping. Compressor carries a full five year warranty.

COMBINATION UNITS

Lennox POWER SAVER™ filler sections, insulated duct enclosure and combination supply and return grille accessories make a compact rooftop heating-cooling installation. Adapter for mounting auxiliary electric duct heaters is provided in the insulated duct enclosure. See stacking arrangements and application sketches.

OUTDOOR COIL

Lennox designed and built. Almost two sq. ft. of face area per ton of rated capacity. Circuited to give up to 20F sub-cooling. Coil guard is furnished. Outdoor coil end of cabinet is raised and holes are provided under the coil for defrost drainage.

EFFICIENT POWER PROP®

Pulls large air volumes uniformly through the entire outdoor coil resulting in high refrigerant cooling capacity.

INDOOR COIL

Lennox designed and fabricated. Three rows. Over one square ft. of net face area per ton of rated capacity.

INDOOR COIL BLOWER

Lennox designed and built direct drive model. Quality high performance PSC motor gives same performance as split phase motors. See blower performance charts. Transformer speed controller gives a choice of four blower speeds. Factory wired for high speed. Easily changed to give choice of three remaining speeds. See blower performance chart.

FACTORY CHARGED & WIRED

Equipment is completely assembled, plumbed, pre-wired and pre-charged ready to install. Installer only has to make duct connections, install thermostat and make power supply connection to complete installation.

WASHABLE FILTER

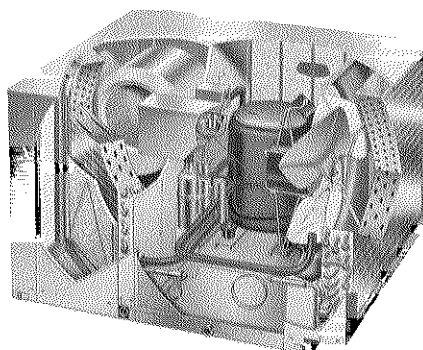
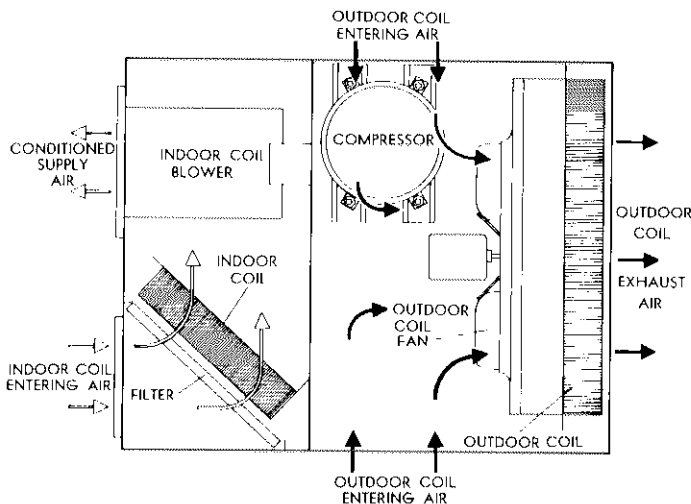
Washable high velocity aluminum frame type. One inch thick. Large dirt holding capacity. Easily accessible for servicing.

WEATHERPROOF FINISH

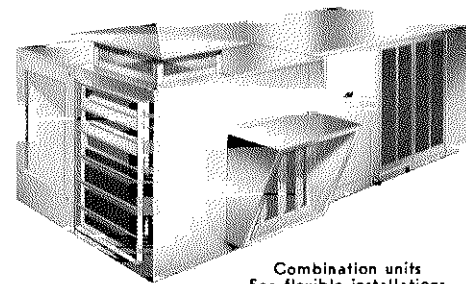
All exterior panels are 20 gauge hot dipped galvanized finished with baked acrylic enamel. 5-station metal preparation assures perfect bonding of the outdoor enamel.

DUAL PRESSURE CONTROL

Factory installed and wired. Protects system in event of abnormal operating conditions.



Cutaway View

Combination units
See flexible installations**FLOW CONTROL VALVE**

Magnetic check valve with bypass tubing. Factory installed. Permits full refrigerant flow during a cooling cycle. On the reverse or heating cycle, the flow is by-passed through the bypass tubing, thereby increasing the restriction to the flow. Built-in 80 mesh monel strainer.

THERMAL INSULATION

Indoor section completely lined with 1 inch thick 1 1/2 lb density fiberglass insulation.

DEFROST CONTROL

A clock timer defrost control is standard equipment. It gives a defrost cycle (if needed) for every 90 minutes of compressor "on" time. A thermostat mounted on the outdoor coil terminates a defrost cycle.

REVERSING VALVE

Time proven and tested valve. Used by Lennox in heat pump equipment for many years. Factory wired and plumbed.

THERMOSTAT FURNISHED

Deluxe wall mounted model. 4 bulb heating-cooling. Separate bulbs control cooling cycle, first stage heating, second stage heating and reversing valve operation.

MILD WEATHER CONTROL

Optional equipment. Allows operation of equipment during mild weather when heating cycle is required. Ordering number M-2374.

OUTDOOR THERMOSTAT

Recommended equipment. Mounting holes provided in outdoor section. Keeps heating load on heat pump as long as possible before allowing auxiliary heat to operate. Ordering number P-8-2361.

ACCUMULATOR-DRIER

Factory installed and plumbed. Serves as refrigerant reservoir during heating cycle.

HOISTING LUGS

Lugs project from 14 gauge steel base.

AUXILIARY ELECTRIC HEAT

Lennox designed and built electric duct heaters are available as optional equipment. Capacity range is 2 to 16 kw per unit. They can be installed in the supply air duct or within the insulated duct enclosure, if used.

ACCESSIBLE CONTROL BOX

Large size and conveniently located for easy service access. All internal wiring from control box to component parts are enclosed in conduit.

ACCURATE RATINGS

Ratings shown in Specification are from Lennox calorimeter room testing procedures according to ARI Standard 240 U.L. listed.

CONDENSATE DRAIN PAN

16 ga. steel. Pan is treated to resist corrosion. 1 1/2 inches deep with 3/4 inch (mpt) galvanized pipe drain connections.

SPECIFICATIONS

Model No.		CHP6-411 CHP6-413
ARI Std. 240 Certified Ratings	Cooling Rating, Btuh	34,000
	Heating Rating, Btuh	37,000
	Heating Application Rating, Btuh	21,000
	Compressor Watts (cooling)	4140
	Compressor Watts (heating)	3400
	Compressor watts (htg. appl.)	2680
Dehumidifying Capacity % of total cooling capacity		31%
Refrigerant Type		R-22
Refrigerant Charge Furnished		6 lb. 13 oz.
Outdoor Coil	Net face area (sq. ft.)	5.64
	Tube diameter (in.)	1/2
	Number rows of tubes	3
	Fins per inch	10
Outdoor Coil Fan	Diameter (in.) and No. of blades	22-4
	Air Volume (factory setting)	3000
	Rpm (factory setting)	820
	Motor horsepower	1/3
	Motor watts (factory setting)	500
Indoor Coil	Net face area (sq. ft.)	3.34
	Tube diameter (in.)	1/2
	Number rows of tubes	3
	Fins per inch	10
	*No. & size of filters	(1) 20 x 25
Indoor Coil Blower	Wheel nominal diameter x width (in.)	10 x 8
	Motor horsepower	1/3
Condensate drain size mpt (in.)		3/4
Number of packages		1
Approximate Unit Weight (lbs)	Shipping weight	520
	Net weight (without crate)	495

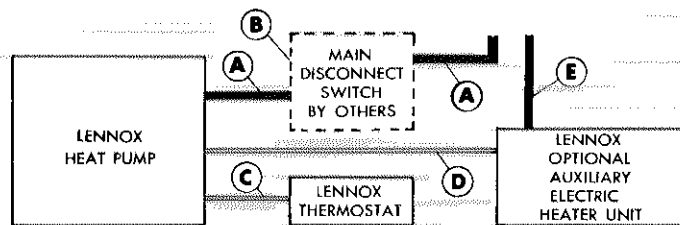
NOTE—Ratings are at 450 cfm indoor coil air per ton of cooling capacity.
*Washable aluminum frame type filter.

ELECTRICAL DATA

Model No.		CHP6-411	CHP6-413	
Line voltage data		208-230V 60cy-1φ	208-240V 60cy-3φ	440-480V 60cy-3φ
Unit operating range (volts)		197/253	187/264	400/528
Compressor	Full load amps	19.6	13.8	6.5
	Power factor	.92	.85	.85
	Locked rotor amps	92.5	66.0	30.0
Outdoor Coil Fan	Full load amps	3.2	3.2	3.2
	Locked rotor amps	6.6	6.6	6.6
Indoor Coil Blower	Full load amps	3.0	3.0	3.0
	Locked rotor amps	6.3	6.3	6.3
Maximum unit amps		25.8	20.0	9.6
AWG wire Size for var- ious lengths of run	1' to 100'	8	10	14
	101' to 200'	6	8	12
Time delay fuse, fusetron (amps)		40	30	15
Maximum allowable fuse (amps)		50	35	15
Disconnect rating (hp)		5	7 1/2	7 1/2

NOTE—All fuses, disconnects and wiring must conform to NEC and local codes.

FIELD WIRING



- A—Three wire Power Supply (see Electrical Data for size)
- B—Main Disconnect Switch (not furnished)
(see Electrical Data for size)
- C—†Five wire low voltage
- D—†Two wire low voltage
- E—Three wire Power Supply

All wiring to conform to NEC and local electrical codes.
†If local electrical code permits may be Class 2 wiring.

NOTE: Additional wiring required when using Power Saver mixing dampers.
See Engineering Data Sheet on Power Saver Control Systems.

RATINGS

CHP6-411 & 413 SINGLE PACKAGE HEAT PUMP COOLING CAPACITY

Indoor Coil 80F Dry Bulb		Air Temperature Entering Outdoor Coil (F)											
		85			95			105			115		
Entering Wet Bulb (F)	Total Air Volume (cfm)	Total Cooling Capacity (Btuh)	Sensible To Total Ratio (S/T)	Comp. Motor Watts Input	Total Cooling Capacity (Btuh)	Sensible To Total Ratio (S/T)	Comp. Motor Watts Input	Total Cooling Capacity (Btuh)	Sensible To Total Ratio (S/T)	Comp. Motor Watts Input	Total Cooling Capacity (Btuh)	Sensible To Total Ratio (S/T)	Comp. Motor Watts Input
64	1200	35,300	.80	3890	32,700	.83	3950	29,800	.90	3920	25,800	.94	3680
	1350	36,100	.82	3920	33,400	.85	3980	30,600	.89	3960	26,700	.97	3790
	1500	36,800	.84	3940	34,200	.87	4020	31,300	.91	4020	27,400	.99	3880
67	1200	36,900	.67	4020	34,300	.70	4090	31,500	.72	4100	27,600	.78	7930
	1350	37,100	.69	4040	35,300	.71	4150	32,500	.74	4190	28,500	.80	4020
	1500	38,400	.71	4090	35,800	.73	4160	33,100	.76	4220	29,300	.81	4130
70	1200	38,700	.56	4180	36,100	.58	4260	33,300	.60	4300	29,500	.63	4190
	1350	39,600	.57	4210	36,900	.59	4300	34,100	.61	4350	30,200	.65	4260
	1500	40,300	.58	4250	37,700	.60	4350	34,900	.62	4420	31,000	.66	4350

CHP6-411 & 413 SINGLE PACKAGE HEAT PUMP 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		46,800	4480	36,600	3640	24,100	2840	15,100	2070
1350		47,500	4470	37,000	3630	24,300	2800	15,300	2050
1500		48,200	4390	37,400	3480	24,500	2740	15,500	1920

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

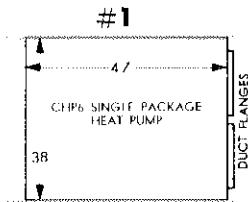
CHP6-411-413 Heating Performance at 1350 Cfm Coil Air Volume

*Outdoor Temperature (Degree F)	Comp. Motor Watts Input	Total Output (Btuh)
65	4420	47,500
60	4260	45,000
55	4060	42,400
50	3840	39,700
45	3630	37,000
40	3420	34,400
35	3180	28,800
30	2990	26,500
25	2800	24,300
20	2620	21,000
15	2430	19,800
10	2240	17,600
5	2050	15,300
0	1860	13,000

*Outdoor temperature at 85% relative humidity.
Indoor temperature at 70°

FLEXIBLE INSTALLATIONS

NOTE— See mounting detail sketch showing combination supply and return grille arrangement. Connection duct work required.



Determine total duct resistance and select appropriate blower speed using blower performance chart.

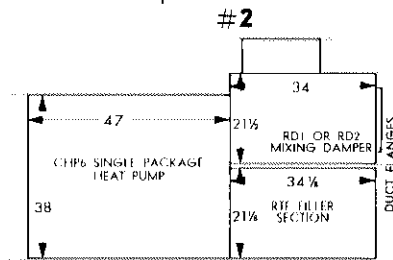


CHART 1

BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Controller Speeds			
	High ₁	High ₂	Medium	Low
.05	1665	1455	1250	975
.10	1645	1445	1245	980
.15	1620	1430	1240	980
.20	1600	1415	1230	985
.25	1575	1395	1220	980
.30	1550	1380	1210	975
.40	1500	1340	1185	965
.50	1435	1295	1150	940
.60	1365	1240		
.70	1285			

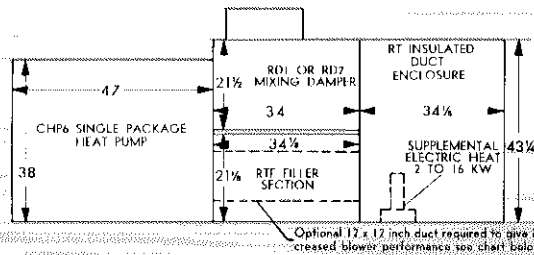
Shaded area denotes factory setting

CHART 2

Air Volume (cfm)	Pressure Drop Through Accessories (in. wg)
1050	.10
1200	.12
1350	.14

Pressure drop shown in chart is added to duct system pressure drop when selecting appropriate blower speed for given air volume required. See blower performance chart. Equipment arranged as shown in sketch above.

#4



Optional 12 x 12 inch duct required to give increased blower performance see chart below.

#3

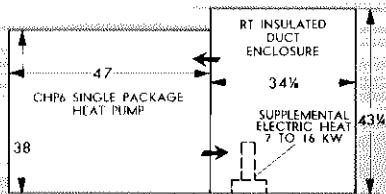


CHART 3

Blower Speed Controller Setting	Air Volume (cfm) At Various Discharge Grille Arrangements		
	2 Sides Open	3 Sides Open	4 Sides Open
High ₁	1370	1440	1470
High ₂	1280	1325	1345
Medium	1160	1195	1205
Low	970	980	980

Set speed controller to appropriate setting for given air volume shown in chart. Equipment arranged as shown in sketch above.

CHART 4

STANDARD BLOWER PERFORMANCE

Blower Speed Controller Setting	Air Volume (cfm) At Various Discharge Grille Arrangements		
	2 Sides Open	3 Sides Open	4 Sides Open
High ₁	1200	1265	1295
High ₂	1150	1195	1215
Medium	1085	1115	1125
Low	910	940	950

Set speed controller to appropriate setting for given air volume shown in chart. Equipment arranged as shown in sketch above.

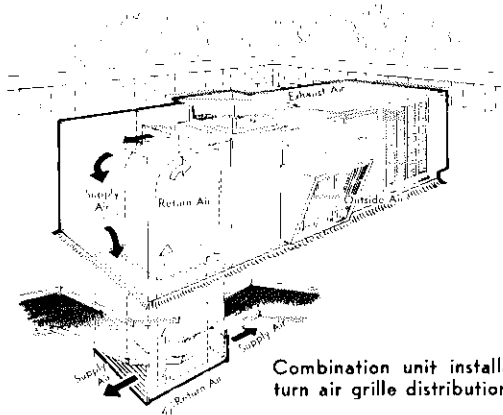
CHART 4

**OPTIONAL BLOWER PERFORMANCE
(With 12 x 12 duct added see sketch)**

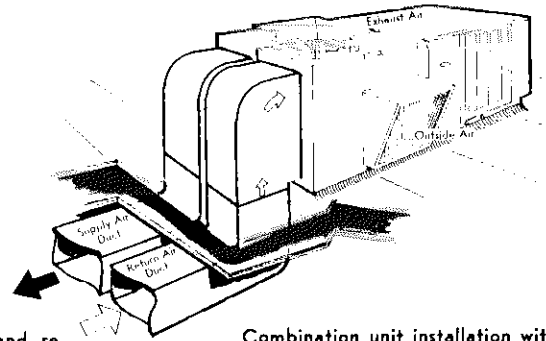
Blower Speed Controller Setting	Air Volume (cfm) At Various Discharge Grille Arrangements		
	2 Sides Open	3 Sides Open	4 Sides Open
High ₁	1380	1450	1480
High ₂	1285	1330	1350
Medium	1160	1195	1205
Low	970	980	980

Set speed controller to appropriate setting to give air volume shown in chart. Equipment arranged as shown in sketch above except a 12 x 12 duct shown by dotted lines is required. This duct is not furnished and is field installed.

APPLICATIONS

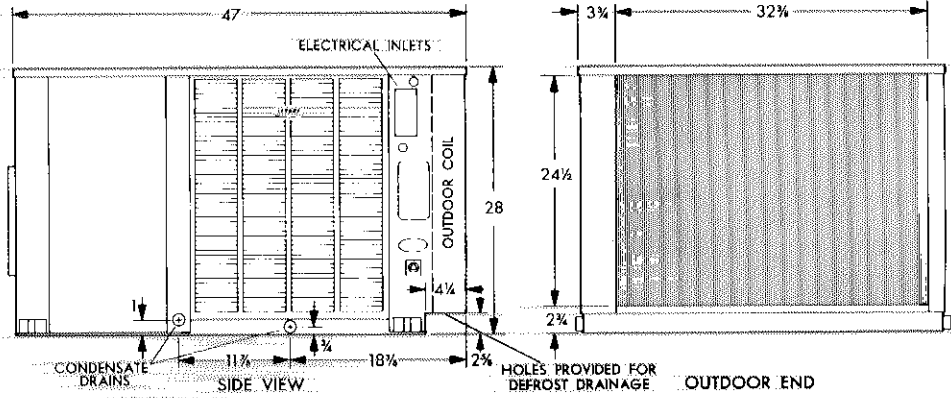
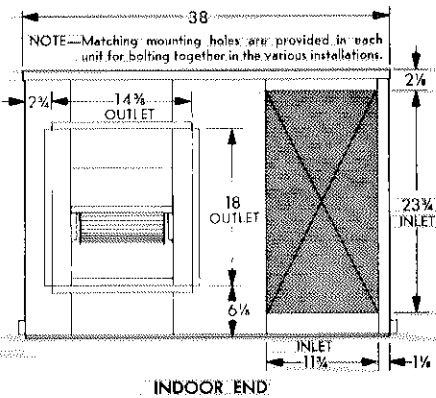


Combination unit installation with combination supply and return air grille distribution system. Connecting ductwork required.



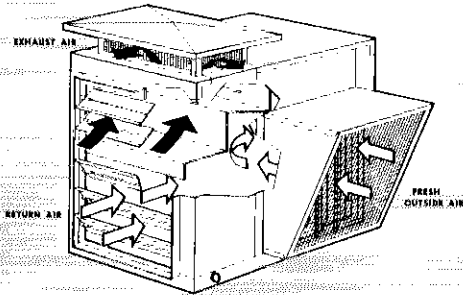
Combination unit installation with extended ductwork distribution system.

DIMENSIONS (in.)



ACCESSORIES

POWER SAVER MIXING DAMPER



Model No.	RD1-41	RD2-41
Maximum air volume (cfm)	1500	1500
No. of packages in shipment	1	*2
Approx. shipping weight (lbs)	100	100
Damper motor used	White 3P-23	MH-M905E

*Mixed air temperature controller shipped with RD2 series dampers.

MH-M905E Motor

Crank arm—Adjustable radius 1¹/₁₆" to 2¹/₁₆"
 Maximum load—17¹/₄ lb at shortest radius, 10 lb at longest radius.
 Timing—60 seconds per cycle.

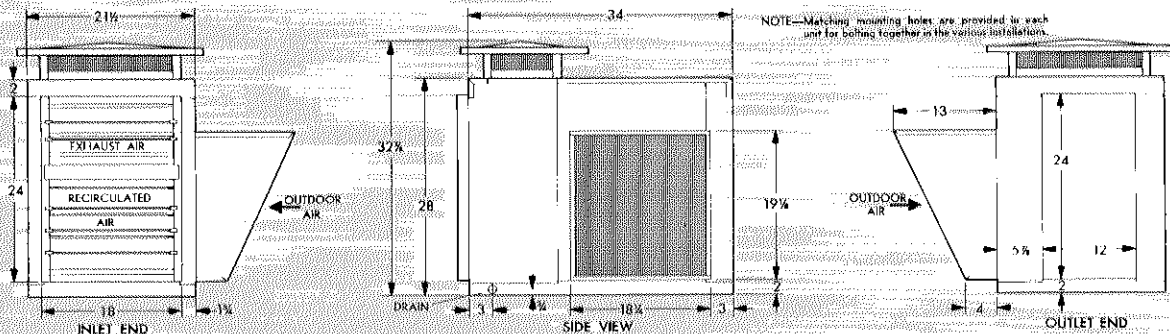
Angular stroke—160 degrees
 Linear stroke—Short radius 3 inches, Long radius 5¹/₄ inches.
 Rated voltage—24v at 22 watts driving; 8.5 watts holding, 60 cycles.

White 3P-23 Motor

Positioning—Closed (or 0°) in any quadrant. Intermediate 0-90° adjustable. Full Open—180° from Closed.
 Timing—40 seconds per one-half cycle.

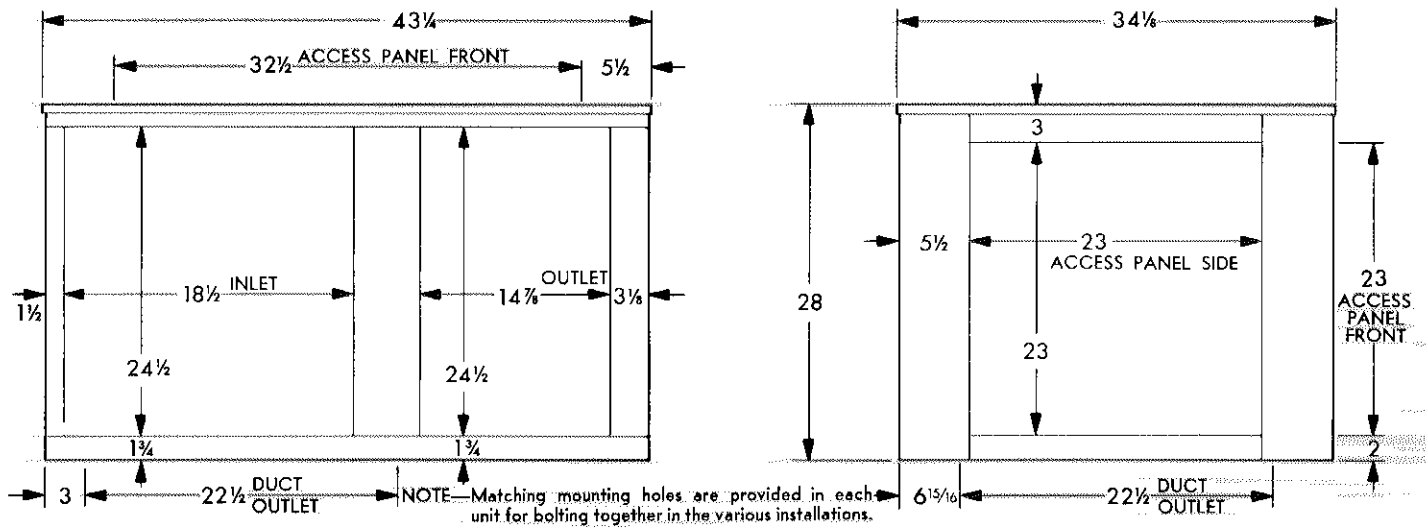
Stroke—Adjustable 1" - 5"
 Load—20 inch pounds recommended maximum.
 Rated voltage—24v at 20 Watts, 60 cycles.

DIMENSIONS (in.)



ACCESSORIES

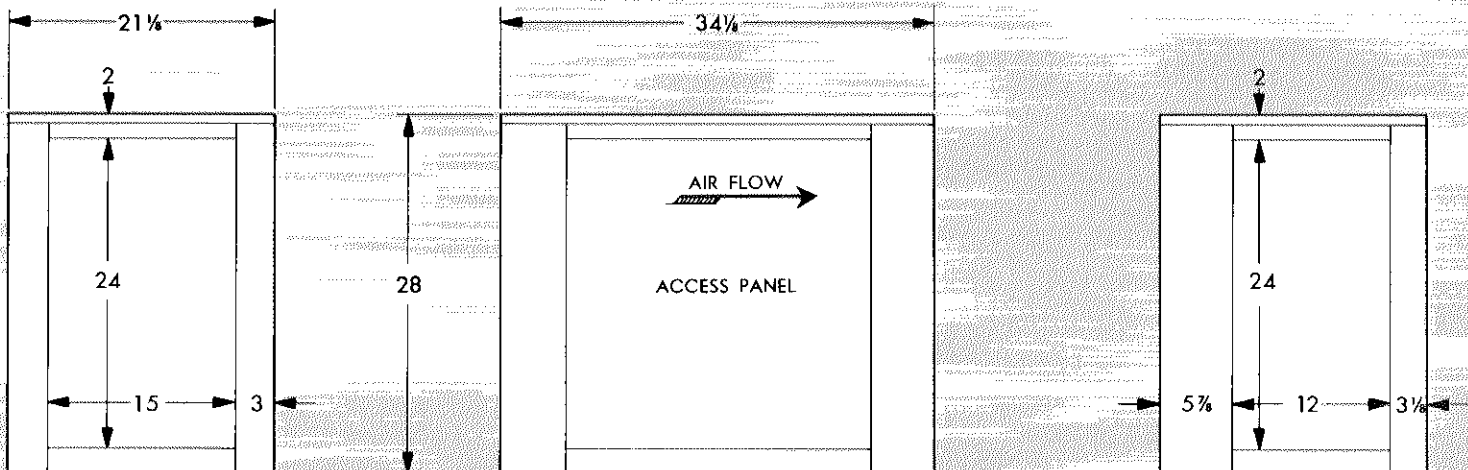
INSULATED DUCT ENCLOSURE RT-41



Approximate Shipping Weight (lbs)—150

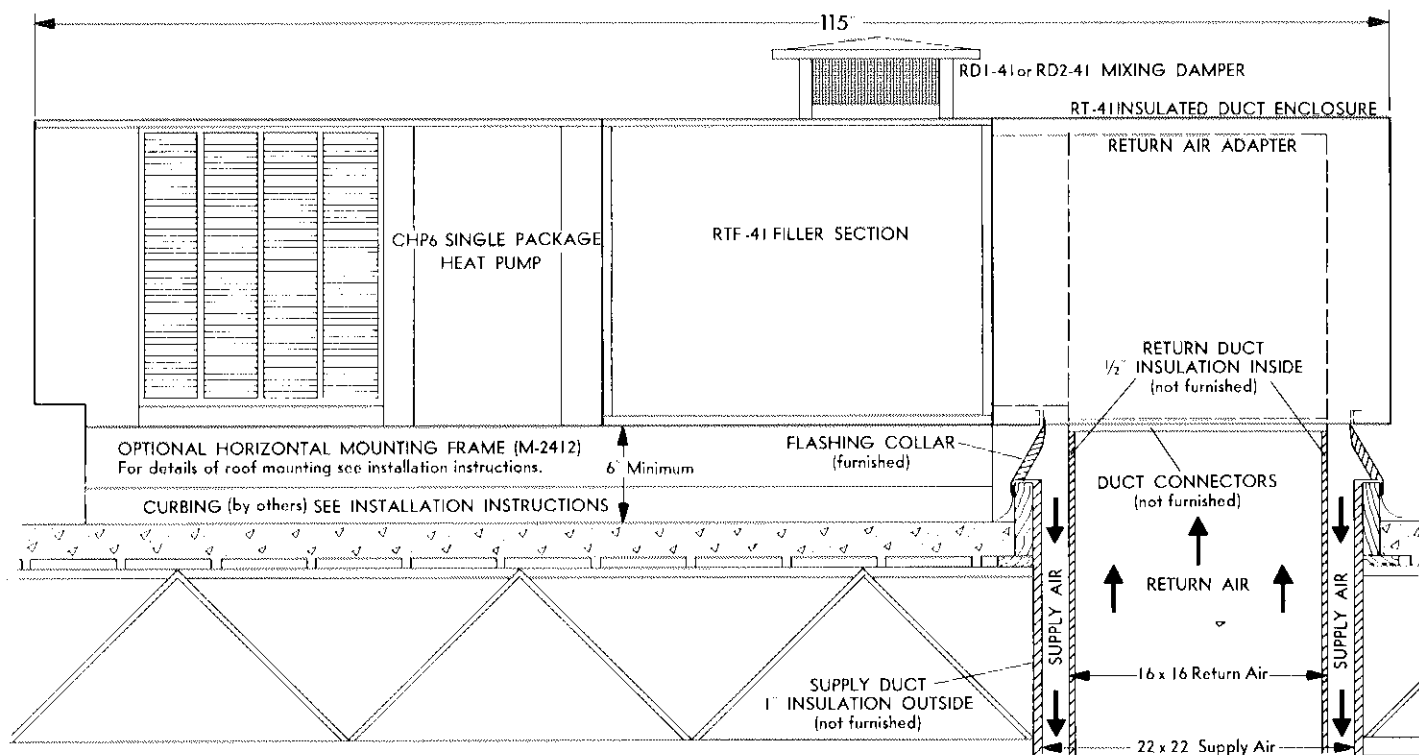
FILLER SECTION RTF-41

Use When POWER SAVER Mixing Damper Is Used



Approximate Shipping Weight (lbs)—75

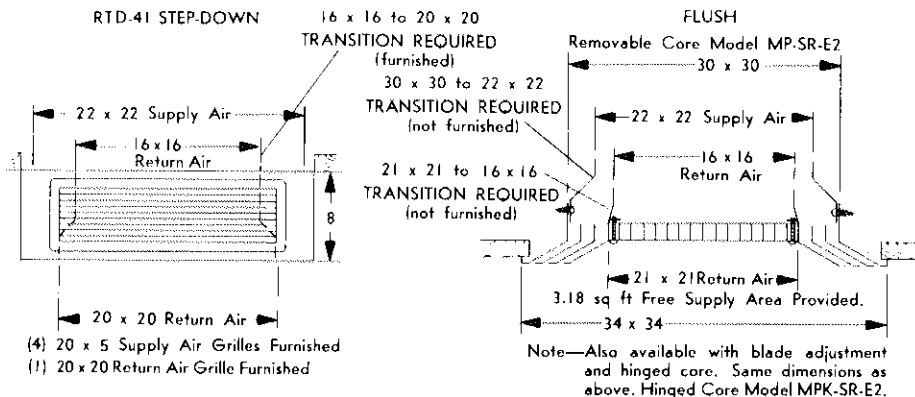
MOUNTING DETAIL



NOTE—Dimensions are in inches.

SEE DRAWINGS BELOW FOR CHOICE OF COMBINATION SUPPLY AND RETURN AIR GRILLES

Ceiling Supply & Return Air Grille Selection



ORDERING DATA

(Check All Items Required)

Single Package Heat Pumps:

- CHP6-411
- CHP6-413

Electrical Characteristics:

- 230/1/60
- 208/3/60
- 220/3/60

***Insulated Duct Enclosure:**

- RT-41

*Includes flashing collar.

POWER SAVER Dampers:

- RD1-41
- RD2-41

POWER SAVER Controls:

- Three way
- Six way

Filler Section:

- RTF-41

Horizontal Support Frame

- Ordering No. M-2412

Ceiling Supply & Return Grilles:

- RTD step-down
- Flush mounted
(Removable core model MP-SR-E2)
- Flush mounted
(Hinged core model MPK-SR-E2)

Mild Weather Control:

- Ordering No. M-2374

Outdoor Thermostat:

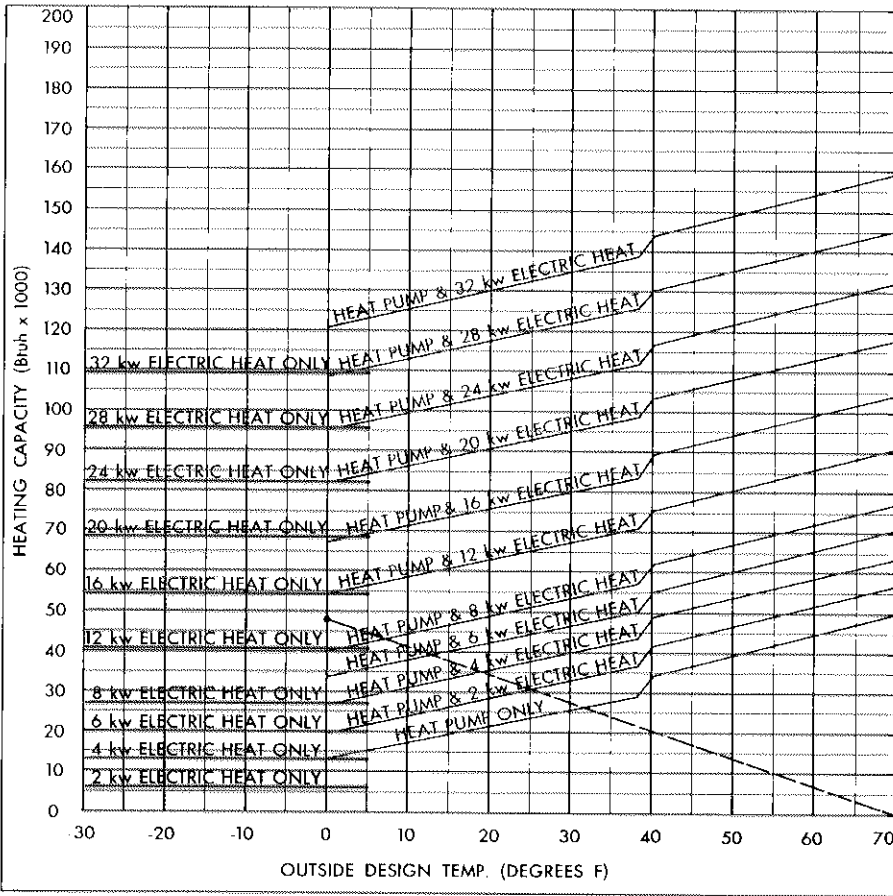
- Ordering No. M-1595

Cell Guard

- 8-6-2315B

CHP6-411-413 HEATING CAPACITY CHART

(1350 Cfm indoor unit air; 70F entering air temp.)



How to Find Balance Point

Balance point is the outdoor temperature at which the capacity of the heat pump alone offsets the heat loss of the structure. To find it, you must first plot the heat loss of the structure on the chart at the left.

The dashed line already drawn on the chart is an example of a structure having a heat loss of 48,000 Btuh at zero degrees Fahrenheit. The line was drawn between this point and zero Btuh at 70F.

(To locate the two sample points on the chart, read 48,000 Btuh at the left side of the chart, and 0F., at the bottom of the chart. Read the 70F., directly at the bottom line of the chart. The 70F point is selected because that is the indoor design temperature normally used for heat pump calculations. Thus, there is no heat loss at 70F. outdoor temperature.)

Balance Point

Balance point, then, is the point at which the plotted heat loss line crosses the "Heat Pump Only" capacity curve. In the example given, balance point occurs at 32F., outdoor temperature. At this point, the capacity of the heat pump alone is 26,000 Btuh. This is also the heat loss of the structure at 32F.

Auxiliary Heating Needed

The shaded area denotes the approximate point at which pressure controls cut out the heat pump. Below this range the system would be operating on auxiliary resistance heating alone. In the example, the first capacity curve above the sample heat loss line at design temperature (zero degree F.) is labeled "16 kw Electric Heat Only." Thus, the structure in this example requires 16 kw of auxiliary electric heat.

NOTE—Chart shows Electric Heat up to 32 kw. These kw capacities can be arrived at by several different combinations of ED3 and ED4 Duct Heaters. It is also possible to have capacities above 32 kw, if desired, depending on the number and combination of Duct Heaters required. See ED3 & ED4 series bulletin in section HEATING UNITS—ELECTRIC.

LENNOX Industries Inc.

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