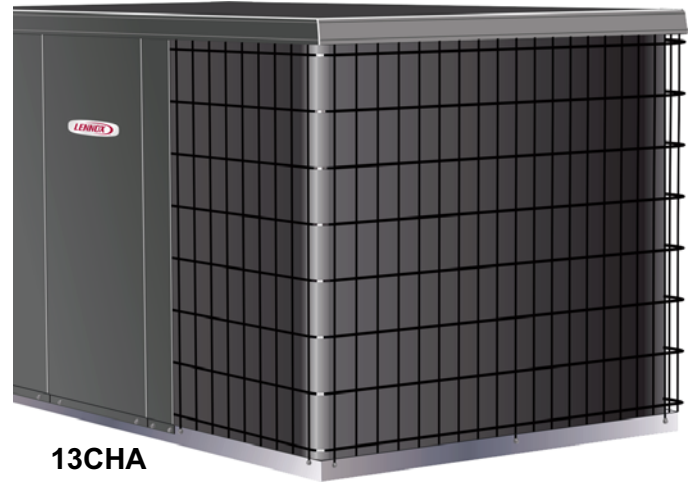


**13CHA(X) SERIES UNITS**

The 13CHA(X) packaged heat pump units are available in sizes ranging from 2 through 5 tons (7.0 through 17.6 kW). 13CHA(X) units are designed for both, R-22 and R-410A refrigerant and for outdoor residential use only. Units can be installed at ground level or rooftop applications. Optional field installed supplemental electric heat is available in 5, 7, 10, 15 and 20 kW.

The 13CHA(X) units utilize a scroll compressor. It operates much like a standard compressor, but the scroll compressor is unique in the way that it compresses refrigerant. The compressor has overload protection.

Information contained in this manual is intended for use by qualified service technicians only. All specifications are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes.



**13CHA**



**13CHAX**

**⚠ IMPORTANT**

Operating pressures of a R-410A unit are higher than pressures in R-22 units. Always use service equipment rated for R-410A.

**⚠ WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

**⚠ WARNING**

Refrigerant can be harmful if it is inhaled. Refrigerant must be used and recovered responsibly. Failure to follow this warning may result in personal injury or death.

**ELECTROSTATIC DISCHARGE (ESD)  
Precautions and Procedures**

**⚠ CAUTION**

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface before performing any service procedure.

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**SPECIFICATIONS 13CHA**
**2-5 TON**

General Data		Model No.	13CHAA-24	13CHAA-30	13CHAA-36	13CHAA-42	13CHAA-48	13CHAA-60	
Nominal Tonnage			2	2.5	3	3.5	4	5	
<b>Cooling Performance</b>	Total cooling capacity - Btuh (kW)		23,000 (6.7)	28,800 (8.4)	36,000 (10.5)	41,000 (12.0)	47,000 (13.8)	55,500 (16.3)	
	Total unit watts		2000	2500	3130	3570	4090	5020	
	<sup>1</sup> SEER (Btuh/Watt)		13.00	13.00	13.00	13.00	13.00	13.00	
	EER (Btuh/Watt)		11.50	11.50	11.50	11.50	11.50	11.05	
	<sup>2</sup> Sound Rating Number (dB)		81	81	81	79	79	79	
Refrigerant Type			R-22	R-22	R-22	R-22	R-22	R-22	
Refrigerant Charge			6 lbs. 8 oz. (2.95 kg)	6 lbs. 2 oz. (2.78 kg)	6 lbs. 5 oz. (2.86 kg)	7 lbs. 10 oz. (3.46 kg)	9 lbs. 2 oz. (4.14 kg)	10 lbs. 5 oz. (4.68 kg)	
<b>Condensate drain size (fpt) - in. (mm)</b>			3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	
<b>Outdoor Coil Fan</b>	Motor horsepower (W)		1/5 (149)	1/5 (149)	1/5 (149)	1/4 (187)	1/4 (187)	1/4 (187)	
	Diameter - in. (mm) & No. of blades		22 (559) - 2	22 (559) - 2	22 (559) - 2	26 (660) - 3	26 (660) - 3	26 (660) - 3	
<b>Indoor Blower</b>	Blower wheel size dia. x width - in. (mm)		10 x 6 (254 x 152)	10 x 6 (254 x 152)	10 x 8 (254 x 203)	10 x 10 (254 x 254)	10 x 10 (254 x 254)	10 x 10 (254 x 254)	
	Motor horsepower (W)		1/2 (373)	1/2 (373)	1/2 (373)	3/4 (560)	3/4 (560)	3/4 (560)	
<b>Net weight of basic unit</b>			390 (177)	390 (177)	415 (188)	560 (254)	570 (259)	595 (270)	
<b>Shipping weight of basic unit (1 Pkg.)</b>			435 (197)	435 (197)	460 (209)	615 (279)	625 (283)	650 (295)	
<b>Electrical characteristics (60 hz)</b>			208/230V-1ph-60hz						
<b>OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA</b>									
<b>Compressor Crankcase Heater</b>			93M04	93M04	93M04	93M04	93M04	93M04	
<b>Compressor Hard Start Kit</b>			10J42	10J42	10J42	10J42	10J42	81J69	
<b>Compressor Timed-Off Control</b>			47J27	47J27	47J27	47J27	47J27	47J27	
<b>Electric Heat Size 208/240V-1ph</b>	5 kW		PHK05BP (10W47)						
	7.5 kW		PHK07BP (10W48)						
	10 kW		PHK10BP (10W49)						
	15 kW	---	---	---	PHK15CP (10W50)				
	20 kW	---	---	---	PHK20CP (10W51)				
<b>Internal Filter Kit</b>			92M54	92M54	92M54	92M55	92M55	92M55	
	<sup>3</sup> Number and size of filters in. mm		(1) 20 x 25 508 x 635	(1) 20 x 25 508 x 635	(1) 20 x 25 508 x 635	(2) 16 x 25 406 x 635	(2) 16 x 25 406 x 635	(2) 16 x 25 406 x 635	
<b>Lifting Brackets</b>			92M51	92M51	92M51	92M51	92M51	92M51	
<b>Low Ambient Kit</b>			24H77	24H77	24H77	24H77	24H77	24H77	
<b>Roof Curbs</b>	8 inch (203 mm) height		92M99	92M99	92M99	93M01	93M01	93M01	
	14 inch (356 mm) height		93M00	93M00	93M00	93M02	93M02	93M02	
<b>Single Point Power Kits</b>	For 5 kW Electric Heat		ASPWR813-01 (13W88)						
	For 7.5 kW Electric Heat		ASPWR814-01 (13W89)						
	For 10 kW Electric Heat		ASPWR815-01 (13W90)						
	For 15-20 kW Electric Heat		---	---	---	ASPWR816-01 (13W91)			

<sup>1</sup> Rated in accordance with ARI Standard 210/240; 95°F (35°C) outdoor air temperature, 80°F (27°C) db / 67°F (19°C) wb entering evaporator air.

<sup>2</sup> Sound Rating Number rated in accordance with test conditions included in ARI Standard 270.

<sup>3</sup> Filters are not furnished and must be field provided. 1, 2 or 4 inch (25, 51 or 102 mm) width filters can be used.

**SPECIFICATIONS 13CHAX**
**2-5 TON**

<b>General Data</b>		<b>Model No.</b>	<b>13CHAXA-24</b>	<b>13CHAXA-30</b>	<b>13CHAXA-36</b>	<b>13CHAXA-42</b>	<b>13CHAXA-48</b>	<b>13CHAXA-60</b>	
Nominal Tonnage			2	2.5	3	3.5	4	5	
<b>Cooling Performance</b>	Total cooling capacity - Btuh (kW)		22,800	28,600	34,000	41,500	47,500	57,500	
	Total unit watts		1940	2440	3040	3710	4200	5200	
	<sup>1</sup> SEER (Btuh/Watt)		13.00	13.00	13.00	13.00	13.00	13.00	
	EER (Btuh/Watt)		11.75	11.70	11.20	11.20	11.30	11.05	
	<sup>2</sup> Sound Rating Number (dB)		81	81	81	79	79	79	
Refrigerant Type			R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	
Refrigerant Charge			7 lbs. 8 oz. (3.40 kg)	6 lbs. 10 oz. (3.00 kg)	7 lbs. 13 oz. (3.54 kg)	11 lbs. 5 oz. (5.13 kg)	11 lbs. 13 oz. (5.36 kg)	11 lbs. 12 oz. (5.33 kg)	
<b>Condensate drain size (fpt) - in. (mm)</b>			3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	
<b>Outdoor Coil Fan</b>	Motor horsepower (W)		1/5 (149)	1/5 (149)	1/5 (149)	1/4 (187)	1/4 (187)	1/4 (187)	
	Diameter - in. (mm) & No. of blades		22 (559) - 2	22 (559) - 2	22 (559) - 2	26 (660) - 3	26 (660) - 3	26 (660) - 3	
<b>Indoor Blower</b>	Blower wheel size dia. x width - in. (mm)		10 x 6 (254 x 152)	10 x 6 (254 x 152)	10 x 8 (254 x 203)	10 x 10 (254 x 254)	10 x 10 (254 x 254)	10 x 10 (254 x 254)	
	Motor horsepower (W)		1/2 (373)	1/2 (373)	1/2 (373)	3/4 (560)	3/4 (560)	3/4 (560)	
<b>Net weight of basic unit</b>			370 (168)	370 (168)	390 (177)	500 (227)	510 (231)	510 (231)	
<b>Shipping weight of basic unit (1 Pkg.)</b>			415 (188)	415 (188)	435 (197)	555 (252)	565 (256)	565 (256)	
<b>Electrical characteristics (60 Hz)</b>			208/230V-1ph-60hz						
<b>OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA</b>									
<b>Compressor Crankcase Heater</b>			<b>93M04</b>	<b>93M04</b>	<b>93M04</b>	<b>93M04</b>	<b>93M04</b>	<b>93M04</b>	
<b>Compressor Hard Start Kit</b>			<b>10J42</b>	<b>10J42</b>	<b>10J42</b>	<b>10J42</b>	<b>10J42</b>	<b>81J69</b>	
<b>Compressor Timed-Off Control</b>			<b>47J27</b>	<b>47J27</b>	<b>47J27</b>	<b>47J27</b>	<b>47J27</b>	<b>47J27</b>	
<b>Electric Heat Size 208/240V-1ph</b>	5 kW					PHK05BP (10W47)			
	7.5 kW					PHK07BP (10W48)			
	10 kW					PHK10BP (10W49)			
	15 kW		---	---			PHK15CP (10W50)		
	20 kW		---	---	---		PHK20CP (10W51)		
<b>Internal Filter Kit</b>			<b>92M54</b>	<b>92M54</b>	<b>92M54</b>	<b>92M55</b>	<b>92M55</b>	<b>92M55</b>	
<sup>3</sup> Number and size of filters - in. mm			(1) 20 x 25 508 x 635	(1) 20 x 25 508 x 635	(1) 20 x 25 508 x 635	(2) 16 x 25 406 x 635	(2) 16 x 25 406 x 635	(2) 16 x 25 406 x 635	
<b>Lifting Brackets</b>			<b>92M51</b>	<b>92M51</b>	<b>92M51</b>	<b>92M51</b>	<b>92M51</b>	<b>92M51</b>	
<b>Low Ambient Kit</b>			<b>34M72</b>	<b>34M72</b>	<b>34M72</b>	<b>34M72</b>	<b>34M72</b>	<b>34M72</b>	
<b>Roof Curbs</b>	8 inch (203 mm) height		<b>92M99</b>	<b>92M99</b>	<b>92M99</b>	<b>93M01</b>	<b>93M01</b>	<b>93M01</b>	
	14 inch (356 mm) height		<b>93M00</b>	<b>93M00</b>	<b>93M00</b>	<b>93M02</b>	<b>93M02</b>	<b>93M02</b>	
<b>Single Point Power Kits</b>	For 5 kW Electric Heat					ASPWR813-01 (13W88)			
	For 7.5 kW Electric Heat					ASPWR814-01 (13W89)			
	For 10 kW Electric Heat					ASPWR815-01 (13W90)			
	For 15-20 kW Electric Heat		---	---			ASPWR816-01 (13W91)		

NOTE - Extremes of operating range are plus and minus 10% of linevoltage.

<sup>1</sup> Rated in accordance with ARI Standard 210/240; 95°F (35°C) outdoor air temperature, 80°F (27°C) db / 67°F (19°C) wb entering evaporator air.

<sup>2</sup> Sound Rating Number rated in accordance with test conditions included in ARI Standard 270.

<sup>3</sup> Filters are not furnished and must be field provided. 1, 2 or 4 inch (25, 51 or 102 mm) width filters can be used.

**ELECTRICAL/ELECTRIC HEAT DATA 13CHA**

Model No.		13CHAA-24	13CHAA-30	13CHAA-36	13CHAA-42	13CHAA-48	13CHAA-60	
Line voltage data - 60hz 1 phase		208/230V	208/230V	208/230V	208/230V	208/230v	208/230v	
<b>Compressor</b>	Rated Load Amps	10.4	14.1	14.4	19.2	19.2	19.9	
	Locked Rotor Amps	54	68	77	104	97	137	
<b>Outdoor Fan Motor</b>	Full Load Amps	1.1	1.1	1.1	1.7	1.7	1.7	
	Locked Rotor Amps	2.2	2.2	2.2	4	4	4	
<b>Indoor Blower Motor</b>	Rated Load Amps	2.2	2.2	2.2	3.6	3.6	3.6	
	Locked Rotor Amps	3.8	3.8	3.8	11	11	11	
<b><sup>1</sup> Maximum Overcurrent Protection</b>	Unit only, no electric heat	25	30	35	45	45	45	
	Electric Heat & Blower Motor	5 kW	35	35	35	35	35	35
		7.5 kW	45	45	45	50	50	50
		10 kW	60	60	60	60	60	60
	Circuit	15 kW Circuit 1	---	---	60	60	60	60
		Circuit 2	---	---	30	30	30	30
	20 kW	Circuit 1	---	---	---	60	60	60
		Circuit 2	---	---	---	60	60	60
<b><sup>2</sup> Minimum Circuit Ampacity</b>	Unit only, no electric heat	19	23	23	31	31	32	
	Electric Heat & Blower Motor	5 kW	31.3	31.3	31.3	33.0	33.0	33.0
		7.5 kW	44.3	44.3	44.3	46.1	46.1	46.1
		10 kW	57.3	57.3	57.3	59.1	59.1	59.1
	Circuit	15 kW Circuit 1	---	---	57.3	59.1	59.1	59.1
		Circuit 2	---	---	26.0	26.0	26.0	26.0
	20 kW	Circuit 1	---	---	---	59.1	59.1	59.1
		Circuit 2	---	---	---	52.1	52.1	52.1

**ELECTRICAL/ELECTRIC HEAT DATA 13CHAX**

Model No.		13CHAXA-24	13CHAXA-30	13CHAXA-36	13CHAXA-42	13CHAXA-48	13CHAXA-60	
Line voltage data - 60hz 1 phase		208/230V	208/230V	208/230V	208/230V	208/230v	208/230v	
<b>Compressor</b>	Rated Load Amps	13.4	14.1	14.1	17.7	21.8	26.4	
	Locked Rotor Amps	58	73	77	112	117	134	
<b>Outdoor Fan Motor</b>	Full Load Amps	1.1	1.1	1.1	1.7	1.7	1.7	
	Locked Rotor Amps	2.2	2.2	2.2	4	4	4	
<b>Indoor Blower Motor</b>	Rated Load Amps	2.2	2.2	2.2	3.6	3.6	3.6	
	Locked Rotor Amps	3.8	3.8	3.8	11	11	11	
<b><sup>1</sup> Maximum Overcurrent Protection</b>	Unit only, no electric heat	30	30	30	40	50	60	
	Electric Heat & Blower Motor	5 kW	35	35	35	35	35	35
		7.5 kW	45	45	45	50	50	50
		10 kW	60	60	60	60	60	60
	Circuit	15 kW Circuit 1	---	---	60	60	60	60
		Circuit 2	---	---	30	30	30	30
	20 kW	Circuit 1	---	---	---	60	60	60
		Circuit 2	---	---	---	60	60	60
<b><sup>2</sup> Minimum Circuit Ampacity</b>	Unit only, no electric heat	22	23	23	30	35	40	
	Electric Heat & Blower Motor	5 kW	31.3	31.3	31.3	33.0	33.0	33.0
		7.5 kW	44.3	44.3	44.3	46.1	46.1	46.1
		10 kW	57.3	57.3	57.3	59.1	59.1	59.1
	Circuit	15 kW Circuit 1	---	---	57.3	59.1	59.1	59.1
		Circuit 2	---	---	26.0	26.0	26.0	26.0
	20 kW	Circuit 1	---	---	---	59.1	59.1	59.1
		Circuit 2	---	---	---	52.1	52.1	52.1

NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

<sup>1</sup> HACR type breaker or fuse.

<sup>2</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

## ELECTRIC HEAT CAPACITIES 13CHA(X)

Input Voltage	5 kW			7.5 kW			10 kW			15 kW			20 kW		
	No of Steps	kW input	Btuh Output	No of Steps	kW input	Btuh Output	No of Steps	kW input	Btuh Output	No of Steps	kW input	Btuh Output	No of Steps	kW input	Btuh Output
208	1	3.8	12,800	1	5.6	19,200	1	7.5	17,900	1	11.2	38,200	1	15.0	51,200
220	1	4.2	14,300	1	6.3	21,500	1	8.4	20,100	1	12.6	43,000	1	16.8	57,300
230	1	4.6	15,700	1	6.9	23,500	1	9.2	21,900	1	13.8	47,000	1	18.4	62,700
240	1	5.0	17,100	1	7.5	25,600	1	10.0	23,900	1	15.0	51,200	1	20.0	68,200

## BLOWER DATA 13CHA(X)

### 13CHAXA-24-30 BLOWER PERFORMANCE

#### <sup>1</sup> Horizontal Air Flow

External Static Pressure		Air Volume at Various Blower Speeds					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
.20	50	1470	695	1070	505	880	415
.30	75	1420	670	1060	500	870	410
.40	100	1360	640	1020	480	850	400
.50	125	1290	610	1000	470	820	385
.60	150	1220	575	950	450	790	375
.70	175	1140	540	900	425	740	350
.80	200	1050	495	830	390	690	325

NOTE - All air data is measured external to unit without air filters.

<sup>1</sup> For down-flow air volume, add 0.05 in. w.g. (12 Pa) to duct static.

### 13CHAXA-36 BLOWER PERFORMANCE

#### <sup>1</sup> Horizontal Air Flow

External Static Pressure		Air Volume at Various Blower Speeds					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
.20	50	1510	715	1060	500	870	410
.30	75	1460	690	1050	495	860	405
.40	100	1400	660	1030	485	840	395
.50	125	1330	630	990	465	820	385
.60	150	1250	590	950	450	790	375
.70	175	1180	555	900	425	750	355
.80	200	1100	520	850	400	680	320

NOTE - All air data is measured external to unit without air filters.

<sup>1</sup> For down-flow air volume, add 0.05 in. w.g. (12 Pa) to duct static.

### 13CHAXA-42-48-60 BLOWER PERFORMANCE

#### <sup>1</sup> Horizontal Air Flow

External Static Pressure		Air Volume at Various Blower Speeds					
		High		Medium		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s
.20	50	2090	985	1820	860	1520	715
.30	75	2000	945	1780	840	1480	700
.40	100	1930	910	1730	815	1450	685
.50	125	1820	860	1650	780	1440	680
.60	150	1710	805	1570	740	1410	665
.70	175	1590	750	1480	700	1360	640
.80	200	1480	700	1370	645	1260	595

NOTE - All air data is measured external to unit without air filters.

<sup>1</sup> For down-flow air volume, add 0.05 in. w.g. (12 Pa) to duct static.

# 13CHA(X) PARTS ARRANGEMENT

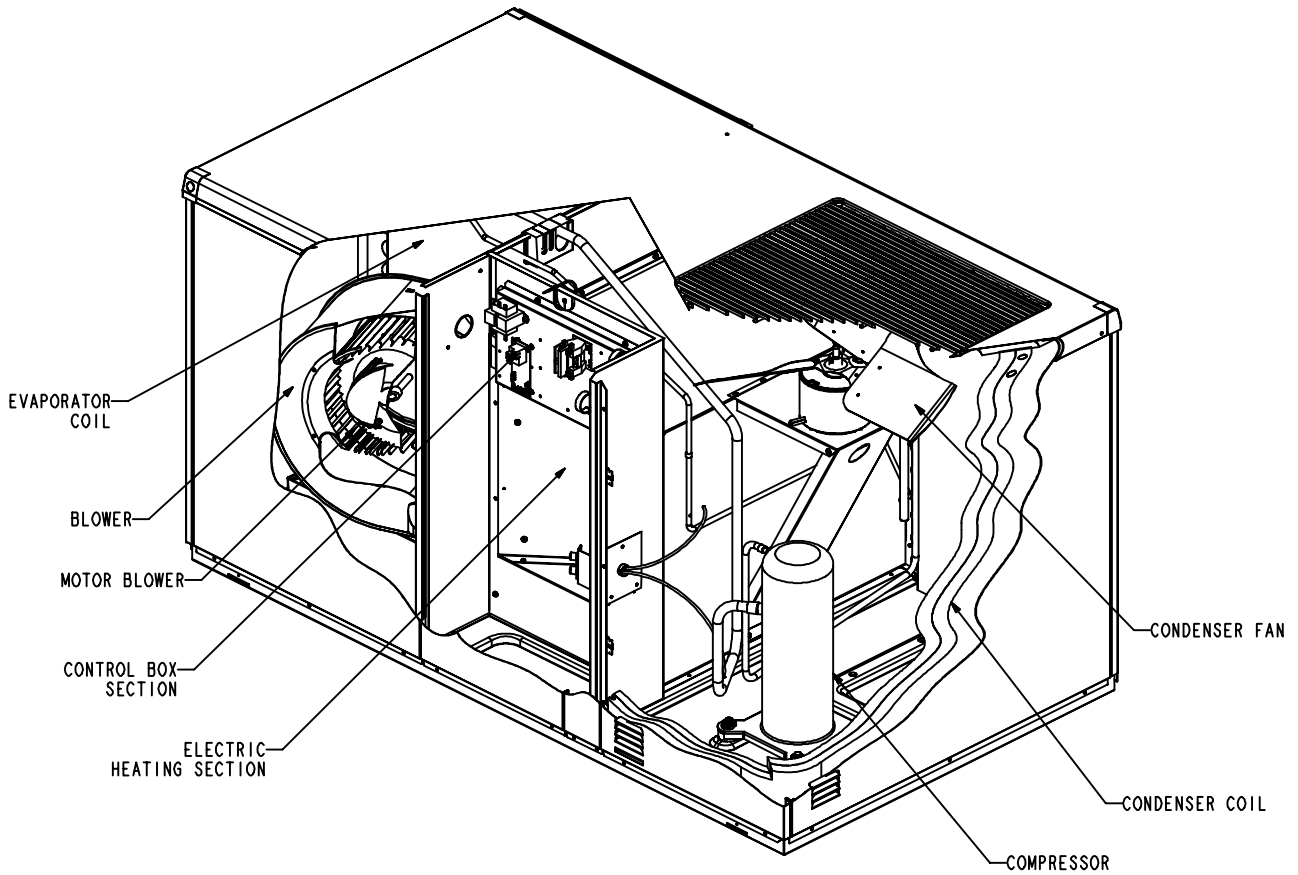


FIGURE 1

# 13CHA(X) CONTROL BOX

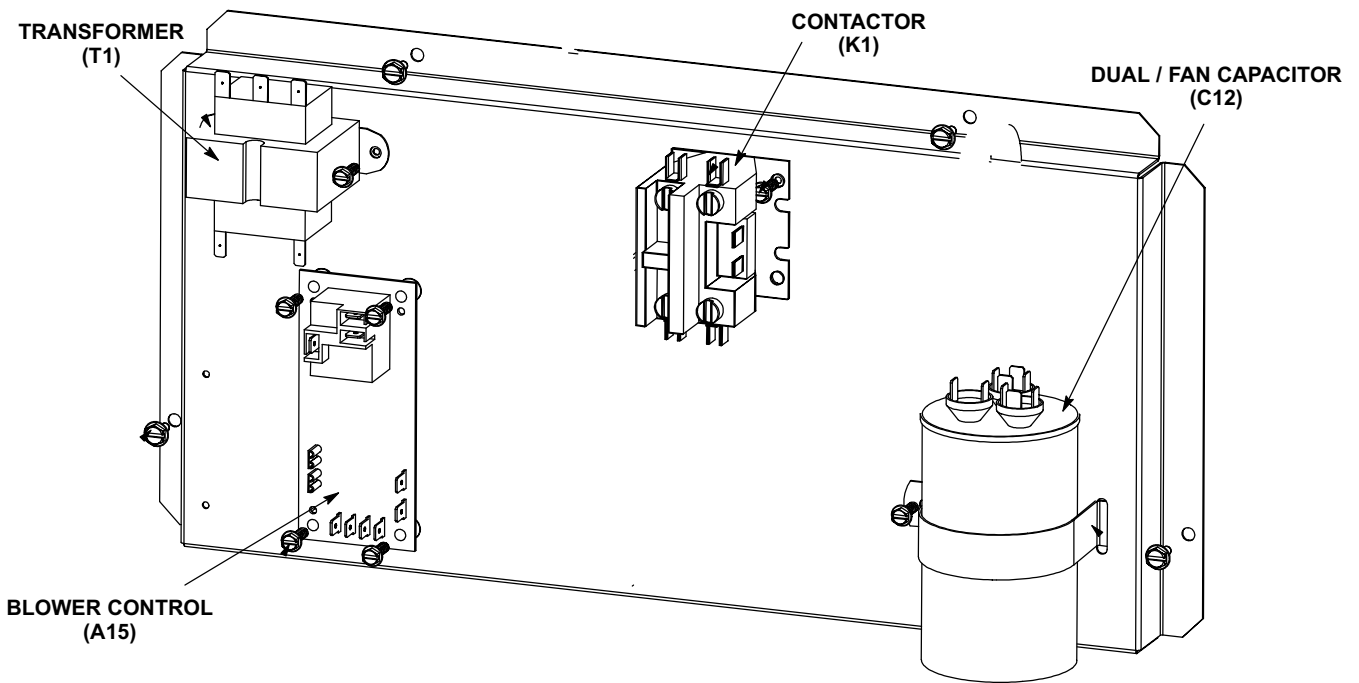


FIGURE 2

## I-APPLICATION

13CHA(X) 2 through 5 ton (7.0 through 17.6kW) model units are single phase packaged heat pump units designed for outdoor installation on a slab or rooftop. The units are available in two cabinet sizes. Electric heat can be factory or field installed if required. Refer to the Engineering Handbook for more specific application data.

## II-UNIT COMPONENTS

13CHA(X) components are shown in figure 1. Control box components are shown in figure 2.

### A-Control Box Components

#### 1-Compressor Contactor K1

K1 is a 24VAC to line voltage single pole double break contactor, which energizes the compressor in response to thermostat demand.

#### 2-Control Transformer T1

All 13CHA(X) series units use line voltage to 24VAC transformer mounted in the control box. The transformer supplies power to control circuits in the unit. Transformers use two primary voltage taps as shown in figure 3.

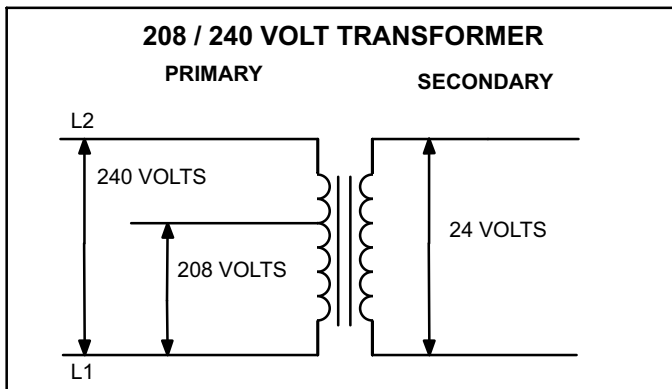


FIGURE 3

#### 3-Dual Capacitor C12

The compressor and condenser fan in the 13CHA(X) series units use permanent split capacitor motors. The capacitor is located in the control box. A dual rated capacitor is used for both the condenser fan motor and the compressor (see unit wiring diagram per respective unit). The fan side and the compressor side of the capacitor have different MFD ratings. See side of capacitor for ratings.

#### 4- Blower Control A15

Blower control A15 is found in the control box of all 13CHA(X) units. The control is responsible for energizing the blower in response to thermostat demand. Blower operation is NOT delayed after a call for either heating or cooling. A blower "off" delay of 90 seconds begins when the thermostat demand is satisfied. This delay is not adjustable. See figure 4.

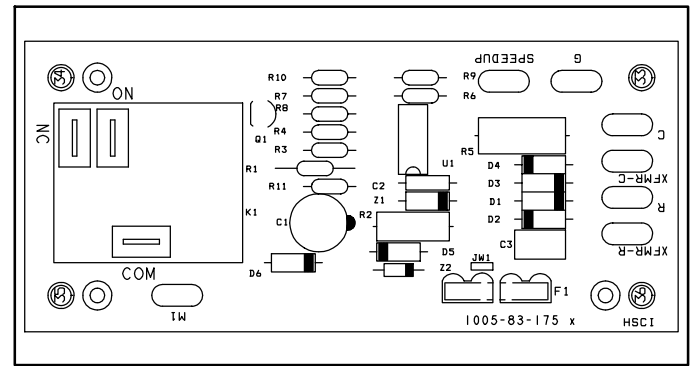


FIGURE 4

### B-Evaporator Blower B3 and Capacitor C4

All 13CHA(X) model units use single-phase motors. A single run permanent split capacitor is mounted on the blower housing. See wiring diagram for factory-set speed tap. See SPECIFICATIONS and ELECTRICAL DATA sections for more information. See motor nameplate for capacitor ratings.

### C-Cooling Components

#### 1-Compressor B1

All 13CHA(X) units utilize a scroll compressor. Compressors are energized by contactors found in unit control box. Compressor specifications are found in the "ELECTRICAL DATA" section in this manual.

## WARNING

Electrical shock hazard. Compressor must be grounded. Do not operate without protective cover over terminals. Disconnect power before removing protective cover. Discharge capacitors before servicing unit. Failure to follow these precautions could cause electrical shock resulting in injury or death.

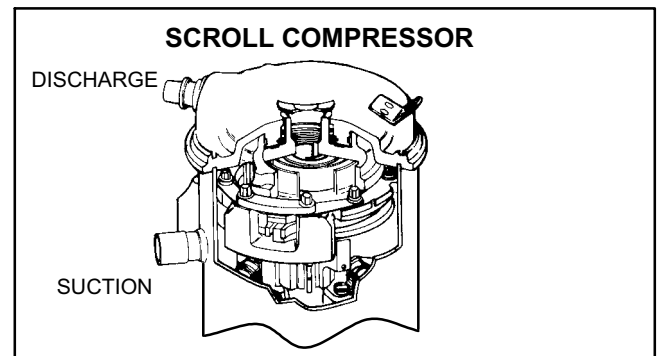
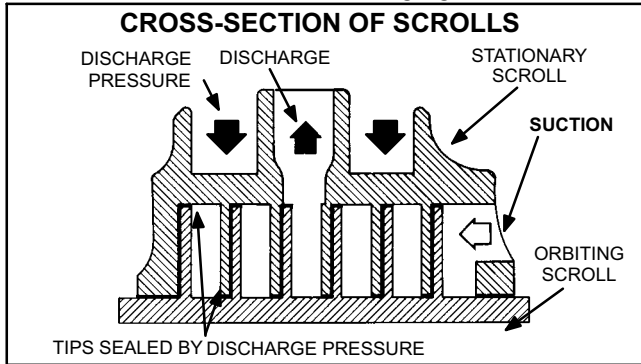


FIGURE 5

The scroll compressor design is simple, efficient and requires few moving parts. A cutaway diagram of the scroll compressor is shown in figure 5. The scrolls are located in the top of the compressor can and the motor is located in the bottom of the compressor can. The oil level is immediately below the motor.

The scroll is a simple compression concept centered around the unique spiral shape of the scroll and its inherent properties. Two identical scrolls are mated together forming concentric spiral shapes (figure 6). One scroll remains stationary, while the other is allowed to "orbit" (figure 7). Note that the orbiting scroll does not rotate or turn but merely orbits the stationary scroll.

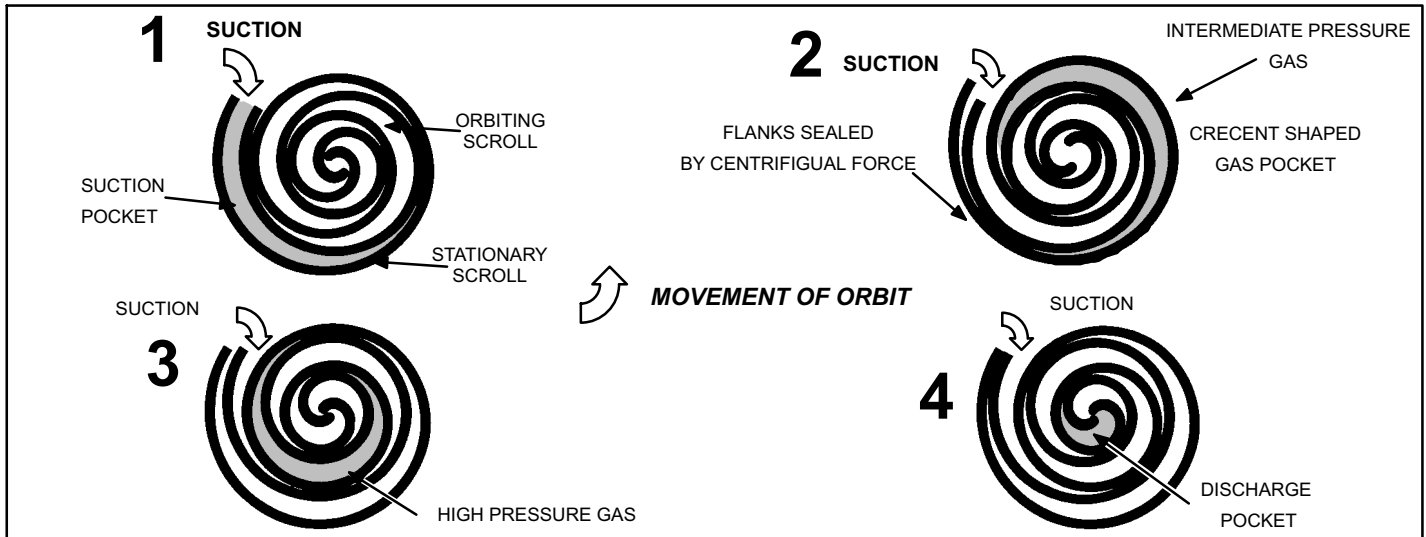
*NOTE - The head of a scroll compressor may be hot since it is in constant contact with discharge gas.*



**FIGURE 6**

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure (figure 7 - 1). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 7 - 2). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 7 - 3). When the compressed gas reaches the center, it is discharged vertically into a chamber and discharge port in the top of the compressor (figure 5). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 6). During a single orbit, several pockets of gas are compressed simultaneously providing smooth continuous compression.

The scroll compressor is tolerant to the effects of liquid return. If liquid enters the scrolls, the orbiting scroll is allowed to separate from the stationary scroll. Continued slugging of liquid will cause damage to the scroll and replacement will be necessary. The liquid is worked toward the center of the scroll and is discharged. If the compressor is replaced, conventional Lennox cleanup practices must be used.



**FIGURE 7**

## 2-Condenser Fan

All 13CHA(X) units use single phase condenser fans. Specifications for the condenser fans are at the front of this manual. See figure 8 for fan and motor replacment.

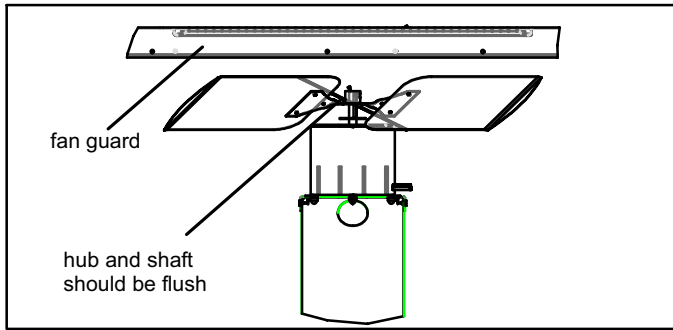


FIGURE 8

## 3-High Pressure Switch S4 (option)

S4 is a N.C. auto-reset high pressure switch located on the liquid line. The switch shuts off the compressor when liquid pressure rises above the factory setting. The switch on 13CHAX units is set to open at  $590 \pm 10$  psi and close at  $418 \pm 10$  psi. The switch on 13CHA units is set to open at  $410 \pm 10$  psi and close at  $210 \pm 10$  psi. S4 is not adjustable.

## III-Electric Heat

### A-Matchups and Ratings

Matchups and ratings are listed with "ELECTRICAL DATA" See table of contents.

### B-Electric Heat Components

See figure 9 for electric heat parts arrangement.

#### 1- Limit Switches 1, 2, 3 and 4

Limit switches 1, 2, 3 and 4 are N.C. auto-reset high temperature limits located on the electric heat vest panel. Each heating element is wired in series with a high temperature limit. When the limit opens the corresponding heating element is de-energized. All other heating elements remain energized. The limits will automatically close when temperatures return to normal. Limit rating will be on front side.

#### 2-Heating Element HE1 through HE4

Heating elements are composed of helix-wound bare nichrome wire exposed directly to the air stream. The elements are supported by insulators mounted to the wire frame. Each element is energized independently by a corresponding relay located on the heat vest panel. Once energized, heat transfer is instantaneous.

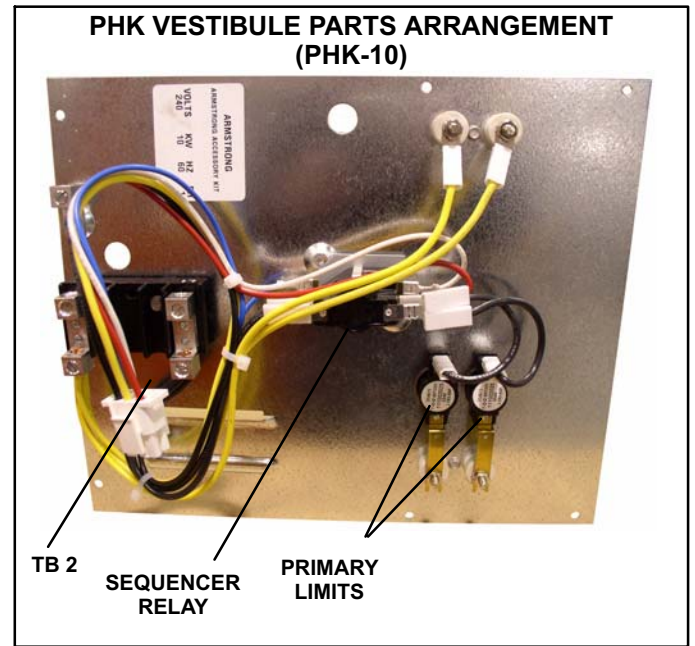


FIGURE 9

#### 3-Terminal Strip TB2 PHK-05, -07, -10

For electric heat sections without circuit breakers or fuses, line voltage connections are made to terminal strip TB2.

#### 4- Sequencer Relays 1 and 2

Relays 1 and 2 are N.O. sequencer relays with a resistive element for a coil and bi-metal disk which actuates the contacts. The relays are located on the electric heat vest panel and are energized by a 24V heating demand (W1 and W2) via jack/plug P2 which is used to connect electric heat to the blower control circuit. When energized, the internal resistance heats the bi-metal disk causing the contacts to close. When the relay is de-energized the disk cools and the contacts open. The relays energize different stages of heat, as well as the blower. The blower is always first on and last off.

#### 5-Circuit Breaker CB1 and CB2 (option) PHK-15, -20,

Line voltage connections are made to circuit breakers CB1 and CB2 in electric heat sections with circuit breakers. Table 1 shows amp rating for each circuit breaker used. Two-pole circuit breakers are used.

TABLE 1

UNIT	Circuit Breakers	
	CB1 AMPS	CB2 AMPS
PHK15CP	60 AMPS	30 AMPS
PHK20CP	60 AMPS	60 AMPS

## IV-Charging

### System Performance

For maximum performance of this cooling system, the operating temperatures and pressure should be checked and superheat determined at Standard ARI test conditions of 82° F outdoor temperature / 80° F indoor dry bulb / 67° F indoor wet bulb. If superheat measured deviates from values in table 2 (R-22) or 3 (R-410A), refrigerant charge should be adjusted accordingly for maximum performance.

Verify system performance using table 4 (R-22) or 5 (R-410A) as a general guide. Tables 4 and 5 should not be used for charging unit. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system.

Used carefully, these tables could serve as a useful service guide. Data is based on 80°F dry bulb / 67°F wet bulb return air. Allow unit operation to stabilize before taking pressure readings.

**TABLE 2**  
**R-22 Suction Superheat Values**

Unit Model No.	Suction Superheat 82° F OD / 80° F IDDB / 67° F IDWB
13CHA-24	22°F
13CHA-30	20°F
13CHA-36	20°F
13CHA-42	20°F
13CHA-48	20°F
13CHA-60	20°F

**TABLE 3**  
**R-410A Suction Superheat Values**

Unit Model No.	Suction Superheat 82° F OD / 80° F IDDB / 67° F IDWB
13CHAX-24 13CHAX-30	15°
13CHAX-36 13CHAX-42	12°
13CHAX-48 13CHAX-60	10°

**TABLE 4**  
**R-22 Normal Operating Pressures**

80°F db / 67°F wb RETURN AIR		Air Temperature Entering Outdoor Coil (°F)												
UNIT	PRESSURE	65	70	75	80	82	85	90	95	100	104	105	110	115
13CHA-24	Suction	78	80	82	84	85	86	88	90	91	92	92	93	94
13CHA-30		78	79	81	82	83	84	85	87	87	88	88	89	90
13CHA-36		79	80	81	83	83	84	85	86	87	88	88	89	90
13CHA-42		75	76	78	79	80	81	83	84	87	89	89	90	91
13CHA-48		76	77	79	80	81	82	83	85	85	86	86	88	91
13CHA-60		78	79	81	82	83	84	85	87	88	89	89	91	92
13CHA-24		Liquid	131	146	161	176	182	191	207	221	238	250	250	268
13CHA-30	132		148	164	181	187	197	213	229	246	259	259	277	295
13CHA-36	146		161	176	191	197	206	221	236	250	262	262	280	298
13CHA-42	129		144	159	175	181	190	205	221	236	248	248	267	286
13CHA-48	131		146	161	177	183	193	208	223	240	253	253	272	291
13CHA-60	143		159	175	191	197	206	221	238	252	264	264	283	302


**TABLE 5**  
**R-410A Normal Operating Pressures**

80°F db / 67°F wb RETURN AIR		Air Temperature Entering Outdoor Coil (°F)											
UNIT	PRESSURE	65	70	75	80	82	85	90	95	100	105	110	115
13CHAX-24	Suction	133	136	138	141	142	143	146	149	150	152	155	157
13CHAX-30		133	135	138	140	141	142	144	147	148	149	151	153
13CHAX-36		140	142	144	146	147	148	150	152	154	155	157	159
13CHAX-42		124	127	130	133	134	135	138	142	142	144	147	149
13CHAX-48		139	140	142	143	144	145	146	148	148	149	150	152
13CHAX-60		142	143	144	146	146	147	148	149	151	152	154	156
13CHAX-24		Liquid	222	245	267	290	299	312	335	358	379	397	429
13CHAX-30	232		255	277	300	309	323	345	368	390	408	440	467
13CHAX-36	241		265	288	312	321	336	360	382	409	429	461	488
13CHAX-42	223		247	270	294	303	317	339	364	384	402	434	461
13CHAX-48	239		261	284	306	315	328	349	373	391	408	440	467
13CHAX-60	258		281	303	326	335	349	373	394	420	439	471	498

## V-Maintenance

Periodic inspection and maintenance normally consists of changing or cleaning filters and (under some conditions) cleaning the coils.

**⚠ WARNING**



**Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.**

### FILTERS

Inspect once a month. Replace disposable or clean permanent type as necessary. DO NOT replace permanent type with disposable.

Filters are not factory-supplied with the unit; however, optional internally installed filter kits are available. Filter kit 92M54 is used with 2, 2-1/2 and 3-ton units. Filter kit 92M55 is used with 3-1/2, 4 and 5-ton units. The filter kits accommodate the use of 1", 2" or 4" filters. If the optional filter kit is not used, a filter must be field-installed.

Filters must always be installed ahead of evaporator coil and must be kept clean or replaced. Dirty filters will reduce the airflow of the unit. Filter sizes are shown in table 6.

**TABLE 6**  
**Unit Filter Size**

Unit Model	Filter Size	Filter Quantity
-24, -30, -36	20 in. X 25 in.	1
-42, -48, -60	16 in. X 25 in.	2

### MOTORS

Indoor and outdoor fan motors are permanently lubricated and require no maintenance.

### OUTDOOR COIL 13CHAX

Dirt should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep coil clean. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean coil, be sure power to the unit is shut off prior to cleaning.

*NOTE - Care should be used when cleaning the coil so that the coil fins are not damaged.*

### OUTDOOR COIL 13CHA

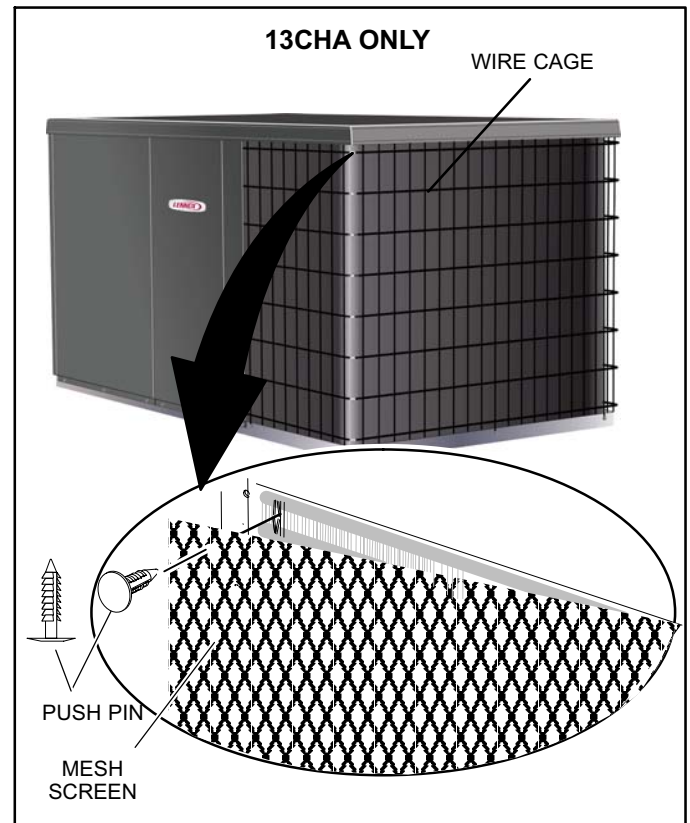
Clean and inspect outdoor coil. The coil may be flush with a water hose. Make sure power is off before cleaning. The outdoor coil is protected by an inner mesh screen and a wire cage. If debris has collected between the mesh screen

and the coil and cannot be dislodged by spraying unpressurized water from inside coil surface to the outside, the mesh may be removed (see figure 10) by first removing the wire cage. **The top of the unit does not have to be removed.**

Then, using pliers to grip the head of the push pins, pull straight out to extract the push pins along one side of the coil. If necessary, remove the push pins along the back of the unit; it is usually unnecessary to fully remove the inner mesh screen.

Drape the mesh screen back and wash the coil. When all the debris has been removed from the coil, reinstall the mesh screen by positioning it in its original position and re-inserting the push pin. No tool is required to push the pin back into the same slot in the fins. If the push pin is loose and tends not to stay in place, brush the fins with a fin brush. Line up the push pin a couple fins to the right or left of the original hole and re-insert the pin.

*NOTE - Care should be used when cleaning the coil so that the coil fins are not damaged.*



**FIGURE 10**

# VI-Wiring Diagram and Sequence of Operation

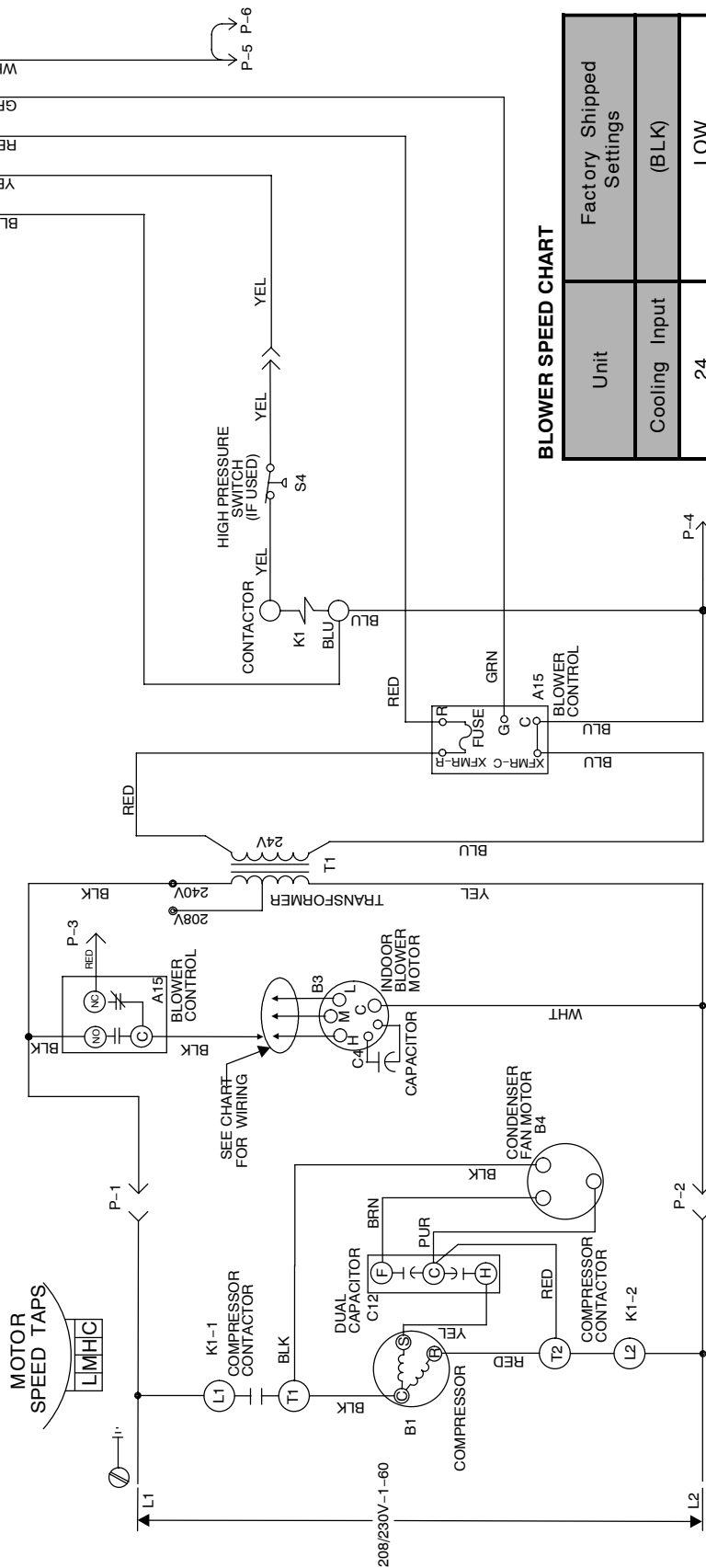
## A-Unit Diagram

**WARNING-** ELECTRIC SHOCK HAZARD. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

**NOTE:** IF ANY OF THE ORIGINAL WIRE IS REPLACED, THE SAME SIZE AND TYPE WIRE MUST BE USED. USE COPPER CONDUCTOR ONLY, MIN 75°C WIRE.

W1 & W2 CAN BE USED TO STAGE ELECTRIC HEAT ACCESSORY ON 15 & 20KW MODELS. 5, 7.5 & 10KW HEATER ACCESSORIES FUNCTION OFF W1 ONLY.

LINE VOLTAGE FIELD INSTALLED.



**BLOWER SPEED CHART**

Unit	Factory Shipped Settings
Cooling Input	(BLK)
24	LOW
30	MED
36	HIGH
42	LOW
48	MED
60	HIGH

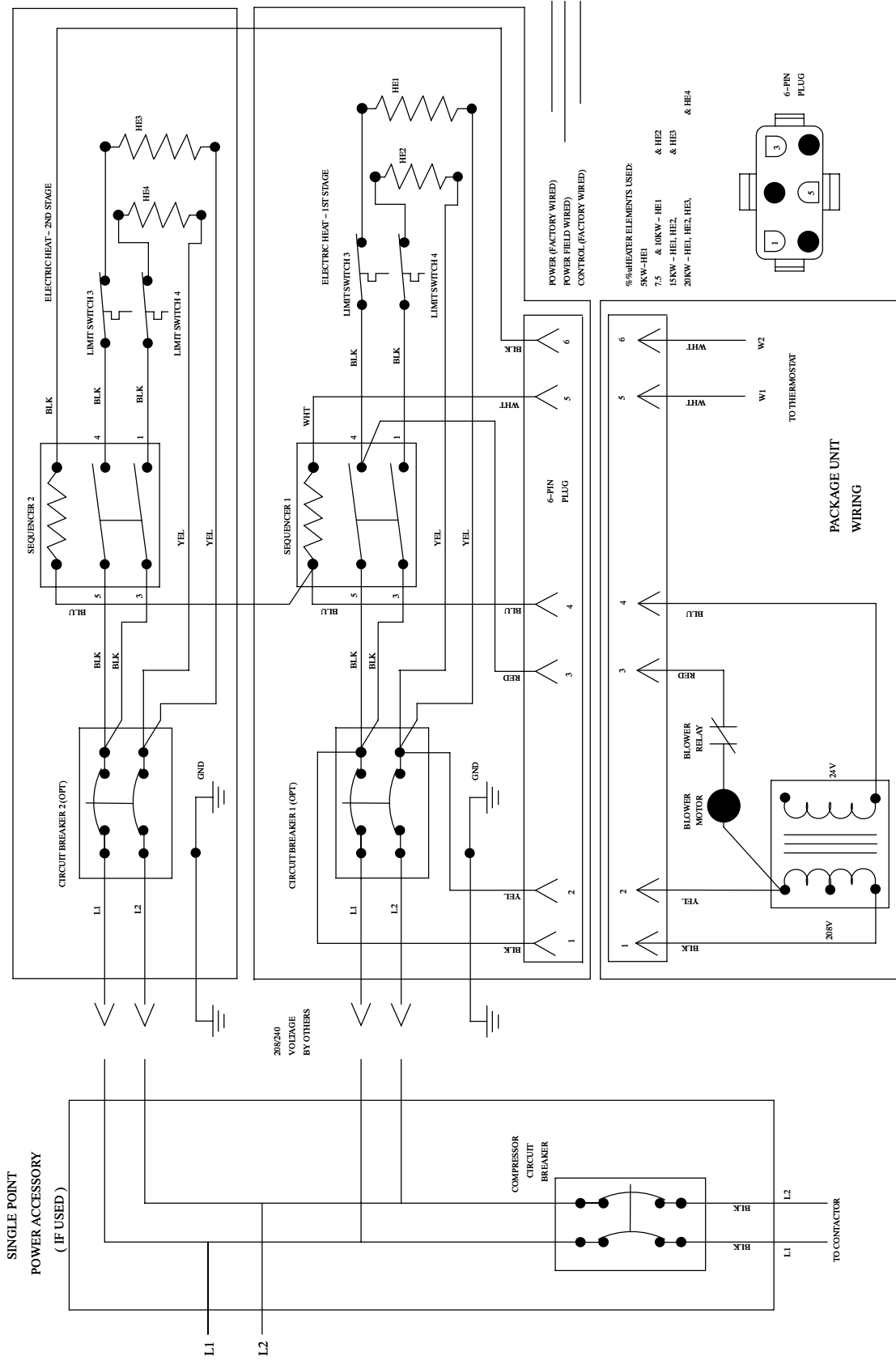
### Cooling

- 1- Cooling demand initiates Y1 in the indoor thermostat.
- 2- 24VAC from Y1 energizes compressor contactor K1.
- 3- K1-1 de-energizes compressor B1 and outdoor fan motor B4.
- 4- Compressor B1 and outdoor fan B4 begin immediate operation.
- 5- Evaporator blower B3 begins operation.
- 6- When cooling demand is satisfied, "Y1" in the indoor thermostat de-energizes K1 contactor. K1-1 open de-energizes compressor B1 and outdoor fan B4. Evaporator blower B3 de-energizes after 90 second soft time delay.

**Heating**  
See Electric Heat

# B-PHK Electric Heat

Wiring Diagram – Electric Heat



## Second Stage Heat

- 1- When there is a call for heat, W1 of the thermostat energizes electric heat relay sequencer relay 1.
- 2- Assuming limit switch 1 and 2 are closed, sequencer relay 1 energizes HE1 and HE2.
- 3- Indoor blower is energized without a delay.

## Third Stage Heat

- 4- W2 in the thermostat energizes sequencer relay 2.
- 5- Assuming limit switch 3 and 4 are closed, sequencer relay energizes HE3 and HE4.

## NOTES

## NOTES