LENNOX®
Service Literature

UNIT INFORMATION
Corp. 0003-L3
Revised 06-2004

12GCS/12CHP
2 to 5 Ton (7.0 to 17.6 kW)

12GCS/12CHP ELITE SERIES UNITS

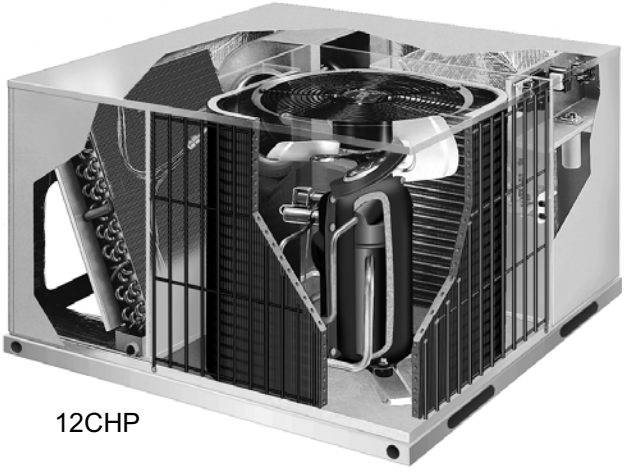
The **12GCS** packaged heat/cool units, are available in sizes ranging from 2 through 5 tons (7.0 through 17.6 kW). 12GCS series units are designed for outdoor residential use only. Units can be installed at ground level or roof top applications. Gas heat sections are available with Lennox S-curve heat exchangers in 50,000, 75,000, 100,000 and 125,000 Btuh input sizes.

The **12CHP** packaged heat pump units are available in sizes ranging from 2 through 5 tons (7.0 through 17.6 kW). 12CHP units are designed 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.

Both the 12GCS and 12CHP 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 and its own cover for reducing operating sound levels.

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.

12GCS



12CHP

⚠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.

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 12GCS

Model No.		12GCS024-50 12GCSX024-50	12GCS24-75 12GCSX024-75	12GCS030-50 12GCSX030-50	12GCS030-75 12GCSX030-75	12GCS036-50 12GCSX036-50	12GCS036-75 12GCSX036-75	12GCS036-100 12GCSX036-100
Heating capacity input- Btuh (kW)		50,000 (14.7)	75,000 (22.0)	50,000 (14.7)	75,000 (22.0)	50,000 (14.7)	75,000 (22.0)	100,000 (29.3)
Heating capacity output- Btuh (kW)		40,000 (11.7)	60,000 (17.6)	40,000 (11.7)	60,000 (17.6)	40,000 (11.7)	60,000 (17.6)	80,000 (23.4)
[1]A.F.U.E.		80.0%						
Temperature Rise - °F (°C)		30-60 (17-33)	45-75 (25-42)			30-60 (17-33)	45-75 (25-42)	40-70 (22-39)
Gas Supply Connections fpt - in. (mm)		1/2 (13)						
Recommended Gas Supply Pressure - in. w.g. (Pa)		7 (1.7) Natural Gas, 11 (2.7) LPG/Propane						
[2]ARI Standard 210/240 Ratings	Total cooling capacity - Btuh (kW)	23,000 (6.7)		29,000 (8.5)		35,600 (10.4)		
	Total unit watts	2145		2775		3330		
	SEER (Btuh/Watt)	12.00						
	EER (Btuh/Watt)	10.73		10.45		10.70		
Sound Rating Number (db)		76				80		
Refrigerant Charge (HCFC-22)		4 lbs 8 oz. (2.04 kg)		5 lbs. 5 oz. (2.51 kg)		6 lbs. 14 oz. (3.24 kg)		
Evaporator Blower	Blower wheel size dia. x width in. (mm)	10 x 8 (254 x 203)						
	Motor horsepower (W)	1/2 (373)						
Evaporator Coil	Net face area - sq. ft. (m^2)	3.6 (0.33)						
	Tube diameter - in. (mm) & No. of rows	5/16 (7.9) - 3				3/8 (9.5) - 3		
	Fins per inch (m)	14 (551)						
Condenser Coil	Net face area - sq. ft. (m^2)	10.3 (0.96)				12.33 (1.15)		
	Tube diameter - in. (mm) & No. of rows	5/16 (7.9) - 2						
	Fins per inch (m)	18 (709)						
Condenser Coil Fan	Diameter - in. (mm) & No. of blades	18 (457) - 3		18 (457) - 4				
	Air Volume - cfm (L/s)	2000 (945)		2200 (1040)				
	Motor horsepower (W)	1/8 (93)		1/4 (187)				
	Motor watts	170		250				
Condensate drain size fpt - in. (mm)		(1) 3/4 (19)						
[3]No. & size of filters - in. (mm)		(1) 24 x 25 x 1 (610 x 635 x 25)						
Net weight of basic unit - lbs. (kg)		280 (132)	290 (137)	295 (134)	300 (142)	350 (165)	320 (151)	330 (156)
Ship. wt. basic unit - lbs. (kg) (1 Pkg)		295 (139)	305 (144)	310 (141)	315 (149)	365 (172)	335 (158)	345 (163)
Electrical characteristics		208/230v-1ph-60hz						
Optional Accessories - Must Be Ordered Extra								
LPG/Propane Kit		**42K91**						
Low Ambient Control Kit		**42K88**						
Timed-Off Control		**42K90**						
High Pressure Switch		**42K89**						

[1]Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations.
[2]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.
[3]Filters are not furnished and must be field provided.

SPECIFICATIONS 12GCS

Model No.		12GCS042-75 12GCSX042-75	12GCS042-100 12GCSX042-100	12GCS048-100 12GCSX048-100	12GCS048-125 12GCSX048-125	12GCS060-100 12GCSX060-100	12GCS060-125 12GCSX060-125
Heating capacity input- Btuh (kW)		75,000 (22.0)	100,000 (29.3)	100,000 (29.3)	125,000 (36.6)	100,000 (29.3)	125,000 (36.6)
Heating capacity output- Btuh (kW)		60,000 (17.6)	80,000 (23.4)	80,000 (23.4)	100,000 (29.3)	80,000 (23.4)	100,000 (29.3
[1]A.F.U.E.		80.0%					
Temperature Rise - °F (°C)		45-75 (14-30)	40-70 (22-39)		45-75 (14-30)	40-70 (22-39)	45-75 (14-30)
Gas Supply Connections fpt - in. (mm)		1/2 (13)					
Recommended Gas Supply Pressure - in. w.g. (Pa)		7 (1.7) Natural Gas, 11 (2.7) LPG/Propane					
[2]ARI Standard 210/240 Ratings	Total cooling capacity - Btuh (kW)	41,500 (12.2)		48,000 (14.1)		58,000 (17.0)	
	Total unit watts	3925		4530		5420	
	SEER (Btuh/Watt)	12.00					
	EER (Btuh/Watt)	10.57		10.60		10.70	
Sound Rating Number (db)		80					
Refrigerant Charge (HCFC-22)		8 lbs 5 oz. (3.8 kg)		10 lbs 4 oz. (4.73 kg)		9 lbs. 15 oz. (4.69 kg)	
Evaporator Blower	Blower wheel size dia. x width in. (mm)	10 x 9 (254 x 229)		10 x 10 (254 x 254)			
	Motor horsepower (W)	1/2 (373)		3/4 (560)			
Evaporator Coil	Net face area - sq. ft. (m^2)	4.2 (0.39)		6.1 (0.57)			
	Tube diameter - in. (mm) & No. of rows	3/8 (9.5) - 3					
	Fins per inch (m)	14 (551)		15 (591)			
Condenser Coil	Net face area - sq. ft. (m^2)	14.39 (1.34)		17.5 (1.63)			
	Tube diameter - in. (mm) & No. of rows	3/8 (9.5) - 1					
	Fins per inch (m)	18 (709)				21 (827)	
Condenser Coil Fan	Diameter - in. (mm) & No. of blades	18 (457) - 4		20 (508) - 4			
	Air Volume - cfm (L/s)	2200 (1040)		2800 (1320)			
	Motor horsepower (W)	1/4 (187)					
	Motor watts	250		325		330	
Condensate drain size fpt - in. (mm)		(1) 3/4 (19)					
[3]No. & size of filters - in. (mm)		(1) 28 x 25 x 1 (711 x 635 x 25)		(1) 30 x 30 x 1 (762 x 762 x 25)			
Net weight of basic unit - lbs. (kg)		350 (165)	360 (170)	420 (198)	430 (230)	430 (230)	440 (207)
Shipping wt. of basic unit - lbs. (kg) (1 Pkg)		365 (172)	375 (177)	435 (205)	445 (210)	445 (210)	455 (215)
Electrical characteristics		208/230v-1ph-60hz					
OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA							
LPG/Propane Kit		**42K91**					
Low Ambient Control Kit		**42K88**					
Timed-Off Control		**42K90**					
High Pressure Switch		**42K89**					

[1]Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations.
[2]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.
[3]Filters are not furnished and must be field provided.

ELECTRICAL 12GCS

Model No.		12GCS024	12GCS030	12GCS036	12GCS042	12GCS048	12GCS060
Line voltage data - 60hz 1 phase		208/230v					
[1]Recommended maximum fuse size or circuit breaker size (amps)		30	30	35	40	50	
[2]Minimum Circuit Ampacity		17.3	21.6	24.9	29.4	35.4	37.4
Compressor	Rated load amps	10.9	13.6	16.2	19.2	24	25.6
	Locked rotor amps	54	72.5	88	137	129	170
Condenser Coil Fan Motor	Full load amps	0.9	1.8				
	Locked rotor amps	1.7	3.8				
Evaporator Coil Blower Motor	Full load amps	2.8			3.4	3.6	
	Locked rotor amps	5.5			8.3	10.0	
Unit power factor		.97	.96	.98	.95	.98	

[1]Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only).
[2]Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE - Extremes of operating range are plus and minus 10% of line voltage.

BLOWER DATA 12GCS

12GCS024 BLOWER PERFORMANCE
[1]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	1350	635	1140	540	1050	495
.30	75	1280	605	1090	515	1010	475
.40	100	1220	575	1050	495	970	455
.50	125	1140	540	980	460	900	425
.60	150	1060	500	920	435	850	400
.70	175	960	455	820	385	760	360
.80	200	850	400	750	355	700	330

[1]For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

12GCS042 BLOWER PERFORMANCE
[1]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	1590	750	1520	715	1470	695
.30	75	1540	725	1470	695	1420	670
.40	100	1460	690	1430	675	1350	635
.50	125	1380	650	1340	630	1270	600
.60	150	1300	615	1250	590	1200	565
.70	175	1220	575	1190	560	1130	535
.80	200	1130	535	1100	520	1050	495

[1]For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

12GCS030 AND 12GCS036 BLOWER PERFORMANCE
[1]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	1420	670	1170	550	1060	500
.30	75	1360	640	1140	540	1040	490
.40	100	1300	615	1100	520	1020	480
.50	125	1220	575	1050	495	970	460
.60	150	1140	540	990	465	920	435
.70	175	1050	495	910	430	850	400
.80	200	940	445	800	380	770	360

[1]For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

12GCS048 AND 12GCS060 BLOWER PERFORMANCE
[1]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	1900	895	1690	800	1530	720
.30	75	1800	850	1620	765	1490	700
.40	100	1720	810	1560	735	1430	675
.50	125	1610	760	1480	700	1360	640
.60	150	1503	710	1390	655	1290	610
.70	175	1420	670	1260	595	1180	555
.80	200	1270	600	1100	520	1030	485

[1]For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

HIGH ALTITUDE DERATE

Units may be installed at altitudes up to 4500 feet (1372 m) above sea level without any modification. At altitudes above 4500 feet (1372 m), units must be derated 4% for every 1000 feet (470 m) above 4500 feet (1372 m). (Example - At an altitude of 6500 feet (1981 m) the unit would require a derate of 8%.)

NOTE — This is the only permissible derate for these units.

SPECIFICATIONS 12CHP

Model No.		12CHP024	12CHP030	12CHP036	12CHP042	12CHP048	12CHP060
[1]ARI Cooling Ratings	Cooling Capacity — Btuh (kW)	23,800 (7.0)	28,000 (8.2)	35,000 (10.2)	42,000 (12.3)	48,000 (14.0)	57,000 (16.7)
	Total unit watts	2160	2550	3210	3930	4510	5230
	SEER (Btuh/Watts)	12.00	12.00	12.00	12.00	12.00	12.00
	EER (Btuh/Watts)	11.00	11.00	10.90	10.70	10.65	10.90
[1]ARI Certified High Temperature Heating Ratings	Total Capacity — Btuh (kW)	24,000 (7.0)	29,400 (8.6)	35,000 (10.2)	42,000 (12.3)	48,000 (14.0)	57,000 (16.7)
	Total unit watts	2230	2610	3150	3850	4690	5220
	C.O.P (Coefficient of Performance)	3.16	3.30	3.26	3.20	3.00	3.20
	HSPF — Region IV	7.00	7.00	7.20	7.20	7.00	7.00
[1]ARI Certified Low Temperature Heating Ratings	Total Capacity — Btuh (kW)	14,800 (4.3)	17,500 (5.1)	21,800 (6.4)	25,600 (7.5)	31,000 (9.1)	37,300 (10.9)
	Total unit watts	2100	2420	2960	3570	4330	5200
	C.O.P (Coefficient of Performance)	2.06	2.12	2.16	2.10	2.10	2.10
Sound Rating Number (db)		76		80			
Refrigerant Charge (HCFC-22)		7 lbs. 5 oz. (3.32 kg)	7 lbs. 4 oz. (3.29 kg)	11 lbs. 0 oz. (4.99 kg)	10 lbs. 12 oz. (4.59 kg)	12 lbs. 3 oz. (5.53 kg)	10 lbs. 13 oz. (4.90 kg)
Indoor Coil Blower	Blower wheel size D x W in. (mm)	10 x 7 (254 x 178)		10 x 8 (254 x 203)		10 x 10 (254 x 254)	
	Motor horsepower (W)	1/2 (373)				3/4 (559)	
Indoor Coil	Net face area - sq. ft. (m^2)	3.6 (0.33)	4.2 (0.39)	6.1 (0.57)			
	Tube dia. - in. (mm) & No. of rows	5/16 (7.9) - 3	3/8 (9.5) - 3				
	Fins per inch (m)	14 (552)		15 (591)			
Outdoor Coil	Net face area - sq. ft. (m^2)	12.3 (1.14)	14 (1.3)	14.3 (1.33)		17.5 (1.63)	
	Tube dia. - in. (mm) & No. of rows	5/16 (7.9) - 2		3/8 (9.5) - 2			
	Fins per inch (m)	18 (709)	14 (552)	12 (473)		16 (630)	
Outdoor Coil Fan	Diameter - in. (mm) & No. of blades	18 (457) - 4		20 (508) - 4			
	Air Volume - cfm (L/s)	2300 (1085)		3000 (1415)			
	Motor horsepower (W)	1/4 (187)					
	Motor watts	250		325			
Condensate drain size fpt - in. (mm)		(1) 3/4 (19)					
[2]No. & size of filters - in. (mm)		(1) 24 x 25 x 1 (610 x 635 x 25)	(1) 28 x 25 x 1 (711 x 635 x 25)	(1) 30 x 30 x 1 (762 x 762 x 25)			
Net weight of basic unit - lbs. (kg)		275 (125)	310 (141)	420 (191)	425 (193)	435 (197)	455 (206)
Shipping weight of basic unit - lbs. (kg) (1 Package)		290 (132)	325 (147)	435 (197)	440 (200)	450 (204)	470 (213)
Electrical characteristics		208-230v, 1ph, 60hz					
OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA							
Supplemental Electric Heat - kW range		05,07,10		05,07,10,15		10,15,20	
Timed-Off Control		42K90					
Outdoor Thermostat Kit	Thermostat Kit	LB-29740BA (56A87)					
	Mounting Box	M-1595 (31461)					
High Pressure Switch		42K89					

[1]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.
[2]Filters are not furnished and must be ordered extra.

ELECTRICAL 12CHP

Model No.		12CHP024	12CHP030	12CHP036	12CHP042	12CHP048	12CHP060
Line voltage data - 60hz 1 phase		208/230v					
[1]Recommended maximum fuse size or circuit breaker size (amps)		25	30	30	35	40	50
[2]Minimum Circuit Ampacity		18.2	19.8	23.6	27.6	29.4	36.7
Compressor	Rated load amps	10.9	12.2	14.7	17.9	19.2	25.0
	Locked rotor amps	54	67	83	104	137	169
Outdoor Coil Fan Motor	Full load amps	1.8					
	Locked rotor amps	3.8					
Indoor Coil Blower Motor	Full load amps	2.7		3.4		3.6	
	Locked rotor amps	5.5		8.3		11	7.3
Unit power factor		.96	.97	.95	.97	.99	1.00

[1]Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only).
[2]Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirement
NOTE - Extremes of operating range are plus and minus 10% of line voltage.

BLOWER DATA 12CHP

12CHP024 BLOWER PERFORMANCE
[1] 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	1150	545	990	465	930	440
.30	75	1120	530	980	460	900	425
.40	100	1070	505	950	450	870	410
.50	125	1040	490	890	420	820	385
.60	150	960	455	790	375	740	350
.70	175	810	380	680	320	660	310
.80	200	700	330	600	285	590	280

[1] For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

12CHP036 AND 12CHP042 BLOWER PERFORMANCE
[1] 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	1520	715	1460	690	1400	660
.30	75	1500	710	1440	680	1370	645
.40	100	1430	675	1410	665	1320	625
.50	125	1400	660	1340	630	1290	610
.60	150	1320	625	1310	620	1270	600
.70	175	1300	615	1270	600	1220	575
.80	200	1220	575	1170	550	1110	525

[1] For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

12CHP030 BLOWER PERFORMANCE
[1] 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	1210	570	1010	475	920	435
.30	75	1180	555	1000	470	910	430
.40	100	1150	545	990	465	900	425
.50	125	1110	525	950	450	850	400
.60	150	1040	490	890	420	800	380
.70	175	950	450	800	380	720	340
.80	200	860	405	710	335	630	295

[1] For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

12CHP048 BLOWER PERFORMANCE
[1] 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	2150	1015	1920	905	1750	825
.30	75	2100	990	1870	880	1720	810
.40	100	2030	960	1790	845	1650	780
.50	125	1950	920	1730	815	1600	755
.60	150	1875	885	1650	780	1550	730
.70	175	1750	825	1580	745	1480	700
.80	200	1650	780	1500	710	1400	660

[1] For down-flow air volume, add 0.10 in. w.g. (25 Pa) to duct static.
NOTE — All air data is measured external to unit without air filters.

12CHP060 BLOWER PERFORMANCE
[1] Horizontal Air Flow

External Static Pressure		Air Volume at Various Blower Speeds			
		Normal		High	
in. w.g.	Pa	cfm	L/s	cfm	L/s
.20	50	1900	895	2000	945
.30	75	1900	895	2000	945
.40	100	1900	895	2000	945
.50	125	1900	895	2000	945
.60	150	1900	895	2000	945
.70	175	1900	895	2000	945
.80	200	1900	895	2000	945

12GCS PARTS ARRANGEMENT

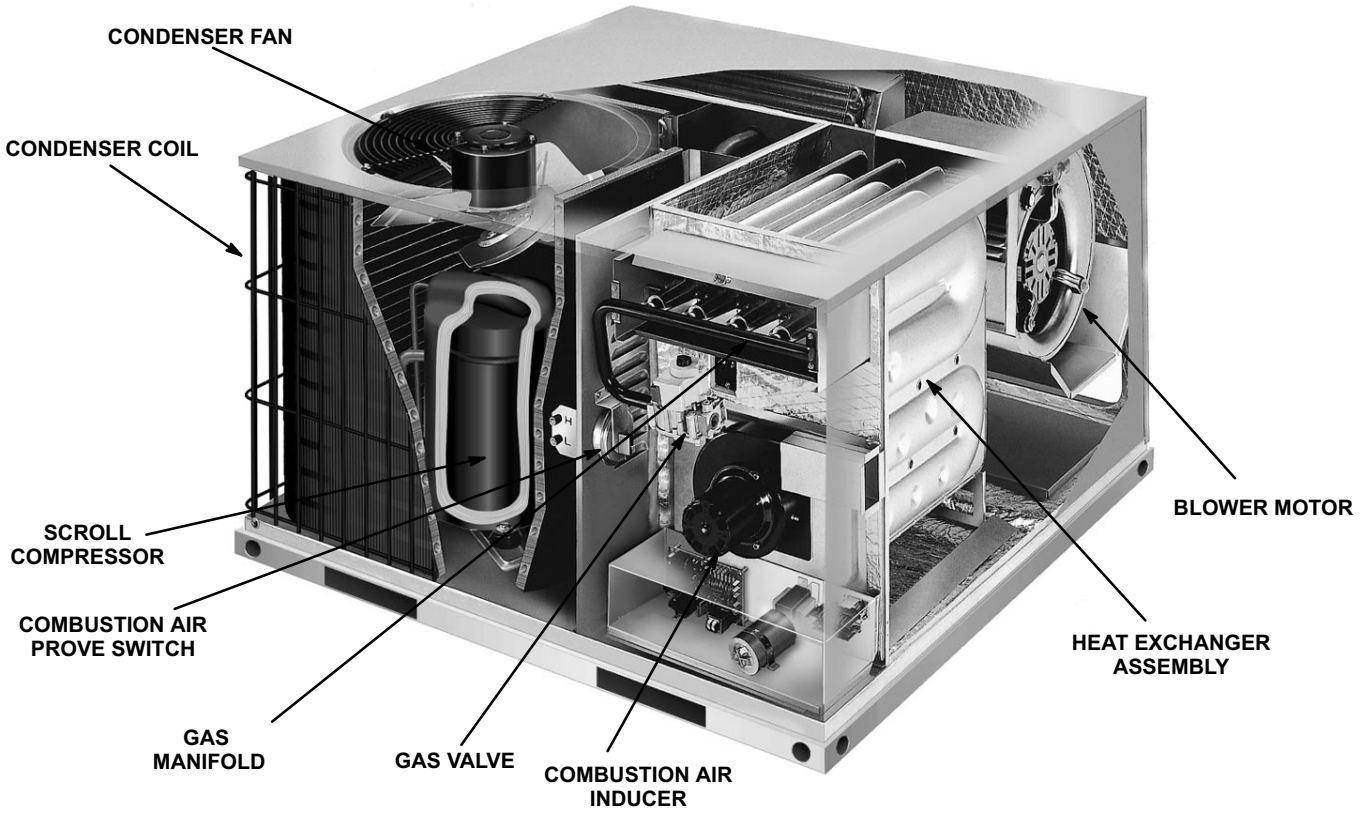


FIGURE 1

12CHP PARTS ARRANGEMENT

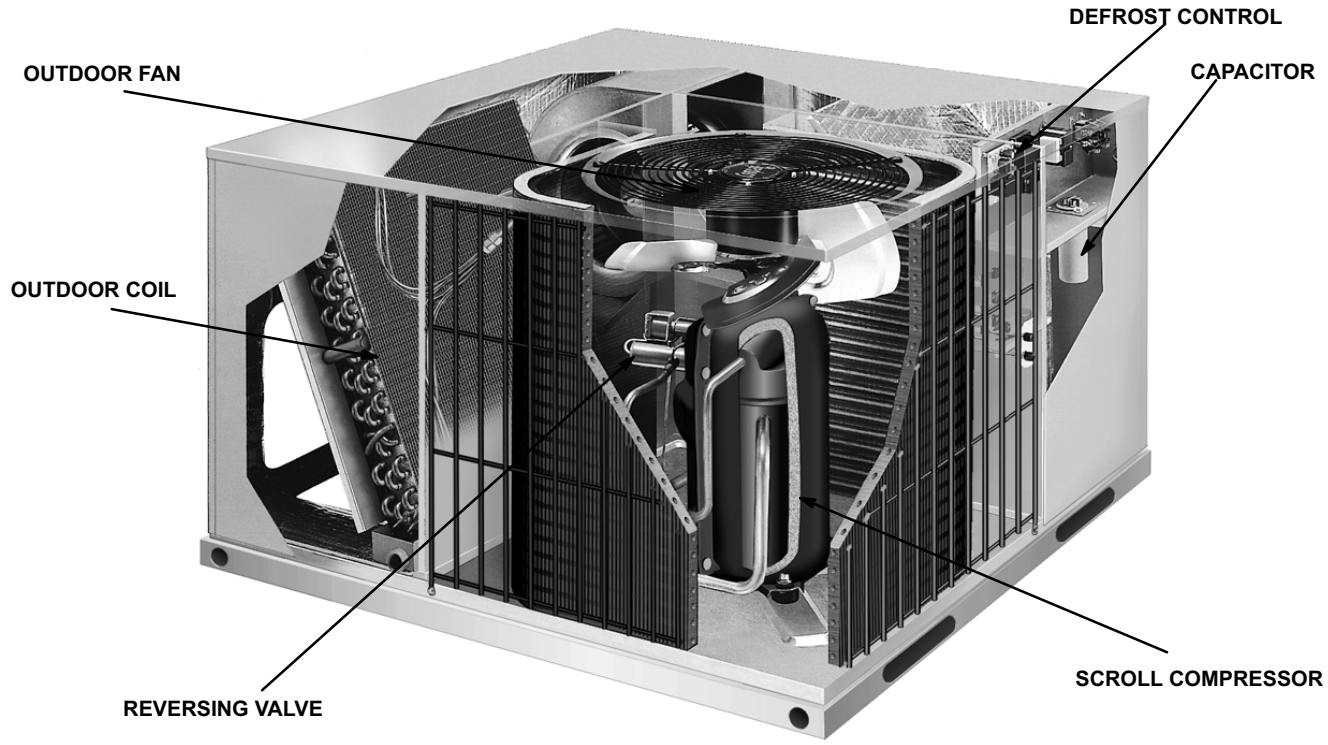


FIGURE 2

12GCS CONTROL BOX

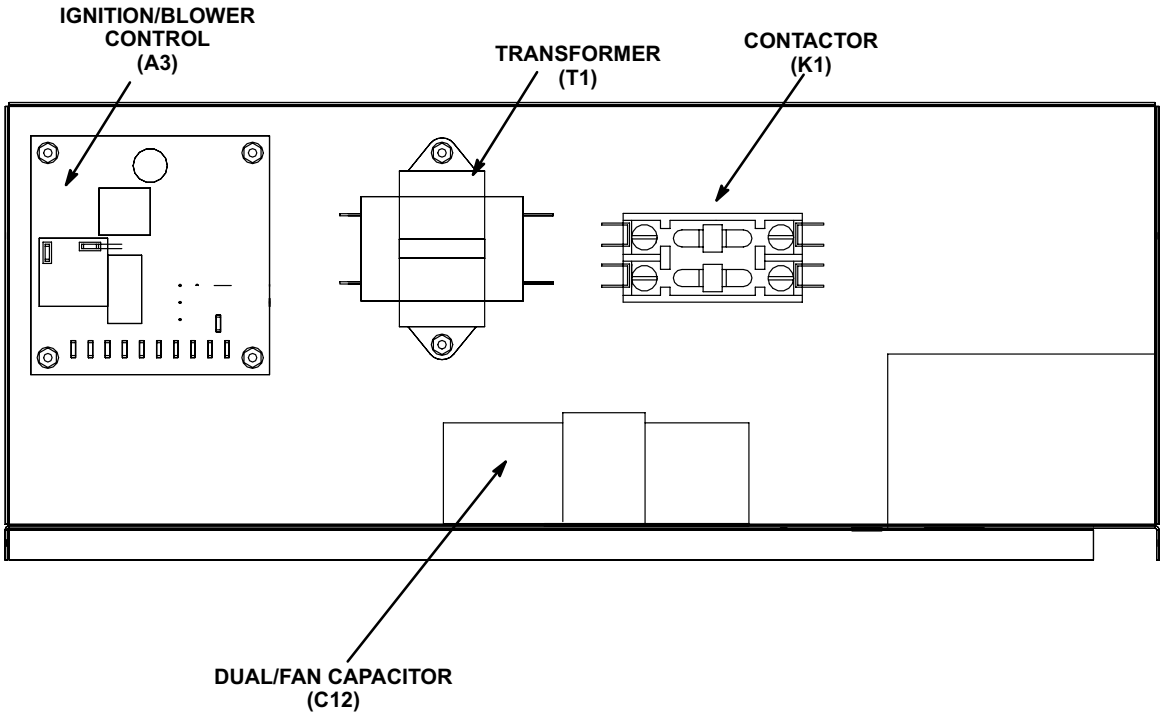


FIGURE 3

12CHP CONTROL BOX

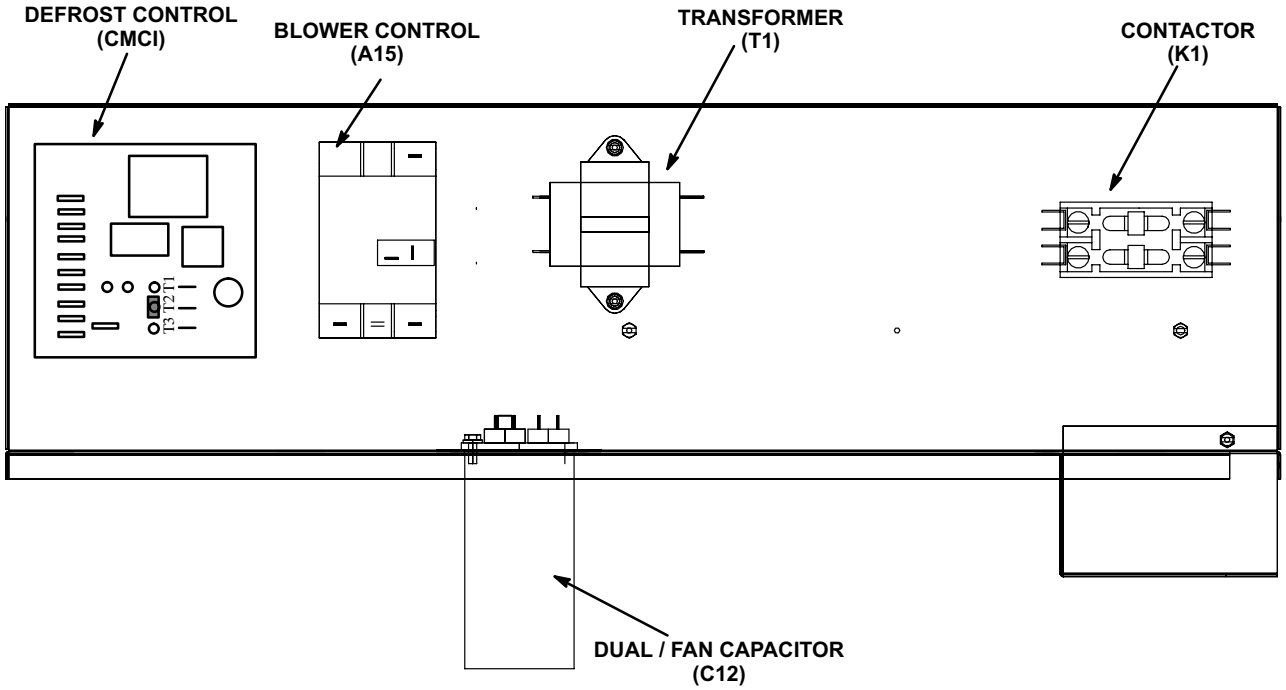


FIGURE 4

I-APPLICATION

12GCS 2 through 5 ton (7.0 through 17.6kW) model units are single packaged heat/cool units designed for outdoor installation on a slab or rooftop.The units are available in three cabinet sizes. 12CHP 2 through 5 ton (7.0 through 17.6kW) model units are available in three cabinet sizes and are designed for outdoor installation on a slab or rooftop. Electric heat can be factory or field installed if required. 12GCS/12CHP units are single-phase and residential only. Refer to the Engineering Handbook for more specific application data.

II-UNIT COMPONENTS

12GCS components are shown in figure 1. 12CHP components are in figure 2. Component description will be broken down into three categories: Control box, Gas and Cooling. Some control box and cooling components will be shared by both 12GCSmodel units and 12CHP model units. These components will be identified as " all models ". Other components will be identified as either "GCS only" or "CHP only"

A-Control Box Components

12GCS control box components are shown in figure 3. 12CHP control box components are shown in figure 4.

1-Compressor Contactor K1 (all models)

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

2-Control Transformer T1 (all models)

All 12GCS/12CHP 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 5.

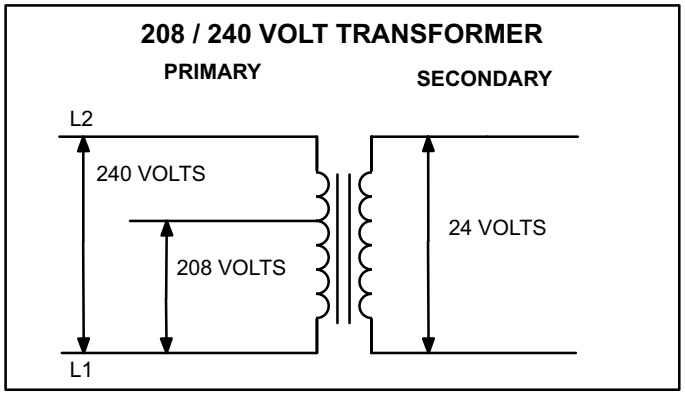


FIGURE 5

3-Dual Capacitor C12 (all models)

The compressor and condenser fan in the 12GCS/12CHP 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-Ignition/Blower Control A3 (GCS only)

All 12GCS series units are equipped with an integrated ignition / blower board (A3) which controls ignition, safety circuits, blower operation and fan off timing. See figure 6. Table 1 shows jack plug terminal designations.

Ignition control

All 12GCS units use direct spark ignition which is controlled by an integrated ignition control board. On a call for heat the control monitors the combustion air prove switch. The control will not begin the heating cycle if the prove switch is closed (bypassed). Once the prove switch is determined to be open, the combustion air inducer blower is energized. When the differential in the prove switch is great enough, the switch closes and a 30-second pre-purge begins. After the pre-purge period, the gas valve opens and ignition (spark) is attempted for 10 seconds. If the initial attempt for ignition fails, the sequence is repeated two more times. After a total of three failed attempts, the board goes into Watchguard. During watchguard mode, the board is de-energized for one hour. After one hour the control will repeat the ignition sequence. Watchguard may be manually reset by breaking and remaking thermostat demand.

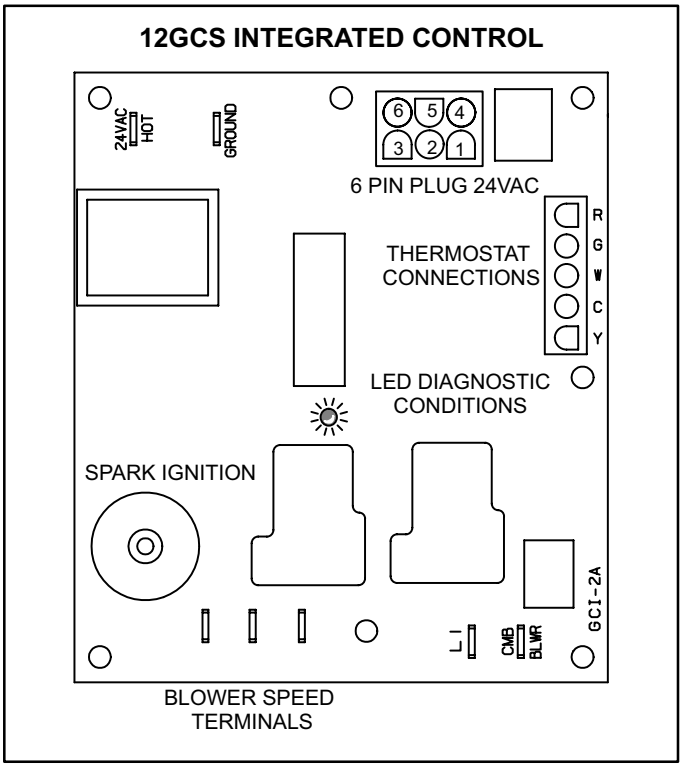


FIGURE 6

Safety Circuits

During the heating cycle the control monitors the safety circuits. If the primary or secondary heating limits open, the control de-energizes the gas valve and combustion air inducer blower while the indoor blower remains energized. When the limit automatically resets the ignition sequence also resets.

If the rollout switch opens, the control de-energizes the gas valve and the combustion air inducer blower. The unit will remain de-energized until the rollout switch is manually reset.

Blower Operation / Fan Off Time

Fan off timing (time that the blower operates after the heat /cool demand is satisfied) is factory set at 120 seconds for heat and 90 seconds for cool. These times are not adjustable. Fan on time is factory set at 30 seconds for heat demand, following the opening of the gas valve and 5 seconds for cool demand. These times are not adjustable.

TABLE 1

IGNITION CONTROL JACK/PLUG TERMINAL DESIGNATIONS	
PIN #	**FUNCTION**
1	Rollout Switch Out
2	Pressure Switch
3	Gas Valve Out
4	Gas Valve Common
5	Secondary Limti Out
6	Rollout Switch Return

Thermostat Connection

Thermostat jackjplug connections are found on the control board. The terminals are clearly marked with the corresponding thermostat designation. (See figure 6)

Troubleshooting

The control board is equipped with a diagnostic green LED to indicate mode of unit. The codes are given in table 2.

TABLE 2

IGNITION CONTROL DIAGNOSTIC CODES	
Slow Flash	Normal operation no call for heat
Fast Flash	Normal operation call for heat
2 Flashes	Lockout-failed to detect or sustain flame
3 Flashes	Pressure switch open or closed / or auxilary limit open*.
4 Flashes	High limit or Rollout switch open
5 Flashes	Flame sensed and gas valve not energized
Steady Flash	Circuit board self-check failure or ignition/ blower control wired incorrectly

NOTE-This LED code will not appear until after the indoor blower has been de-energized for approximately 120 seconds.

5- Blower Control A15 (CHP Only)

Blower control A15 is found in the control box of all 12CHP units. The control is responsible for energizing the blower in response to thermostat demand. The control has a **set** on delay timing of 5 seconds and a set off timing of 90 seconds. These timings are not adjustable.

6-Defrost Control CMCI (CHP Only)

If outdoor ambient conditions are such that frost forms on the outdoor coil, the defrost control monitors the need for and initiates and terminates defrost cycles as necessary to maintain system performance. The defrost control is time/ temperature initiated and temperature terminated with a maximum defrost time (time-out) of 10 minutes. Time between defrost cycles is pre-set at 60-minute intervals at the factory, but can be field adjusted between 30, 60 or 90 minutes. See figure 7 for field adjustment of defrost timing.

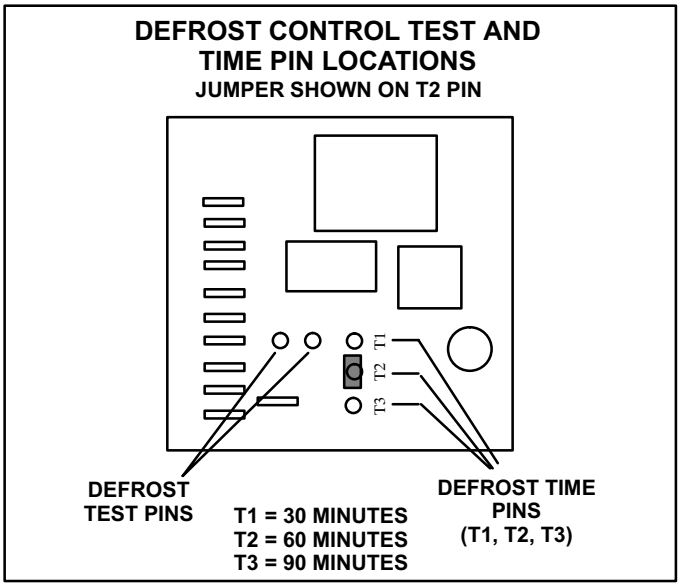


FIGURE 7

The defrost control will initiate a defrost cycle if time period has elapsed and the defrost sensor detects a temperature below freezing. At the start of defrost cycle, the defrost control will energize the reversing valve solenoid, shifting the reversing valve and de-energizing the outdoor fan. The defrost relay will also close energizing optional electric heat for increased comfort during defrost. The unit will remain in the defrost mode until the defrost sensor has determined that the frost has been removed from the coil or a 10-minute time period has elapsed.

The defrost control is also equipped with a set of test pins to aid in troubleshooting of the defrost system. The following is a brief outline of the testing of the defrost system.

Defrost sensor will be closed at 32°F(0°C) or below. If temperatures are such that switch is not closed, jumper between defrost sensor terminals on defrost control. The defrost sensor terminals are side by side and are labeled ”DFS.”

Start System in Heating Operation.

Jumper test pins. A 1/4” quick connect terminal crimped onto a solid wire or brazing rod works well for test jumper. Jumping test pins speeds up time interval by a factor of 256.

DEFROST CONTROL DEFROST TEST CYCLE TIME

T1-30 minutes	7 seconds
T2-60 minutes	14 seconds
T3-90 minutes	21 seconds

After test pins are jumpered and appropriate cycle time has elapsed, the reversing valve should shift to defrost mode and outdoor fan should stop. After 2 seconds of defrost operation, reversing valve should shift back to heating operation and outdoor fan should start.

B-Gas Components (GCS Only)

1-Primary Limit S10

All 12GCS units are equipped with a closed face, auto reset, high temperature limit. S10 protects the unit from high temperature operation. It is located on the heating vest panel just below the burner box. The N.C. contacts are actuated by a bi-metal shim when temperature in the heating compartment is high enough. When the N.C. contacts open, the ignition control and gas valve are de-energized shutting down the unit except for the main blower. The limit will automatically reset when unit temperature returns to normal. All limits are 3" in length with varying setpoints. Limit setpoints will be printed on side of switch.

⚠ IMPORTANT

Limit replacement must be of exact length and setpoint. Different length or setpoint can result in unsafe operation of unit.

2-Rollout Switch S47

Rollout switch S47 is a high temperature limit located on the burner box. The switch is a N.C. manual reset switch connected in series with limit S10 and ignition control A3. When S47 senses flame rollout (opens), ignition control and gas valve are de-energized. The switch is factory set at 400° F and cannot be adjusted. S47 can be manually reset when temperatures allow.

3- Secondary Limit S21

S21 is a high temperature limit located on the blower scroll (see figure 8). The switch is an automatic reset disc with a bi-metal shim that actuates on temperature rise. S21 is wired in series with primary limit S10. When the N.C. contacts open the ignition control and gas valve are de-energized. The switch is a safety feature should the circulating blower B3 fail. The switch will automatically reset when temperatures in the blower housing return to normal. Limit setpoints will be printed on side of switch.

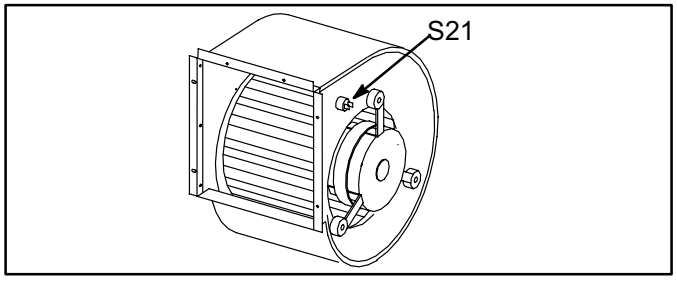


FIGURE 8

4-Combustion Air Prove Switch S18

The combustion air prove switch S18 is a SPST N.O. differential prove switch, used to monitor combustion air inducer blower operation. The switch is wired in series with limit S21 and ignition board A3. When the combustion air inducer begins operation and pressure drop reaches .17"wc. across the switch, the contacts close and ignition can be initiated.

5-Combustion Air Inducer B6

Combustion air inducer B6 provides fresh air to the burners while clearing the heat exchanger of exhaust gases. The inducer begins operating immediately upon receiving a thermostat demand (provided switch is open and not by-passed) and is de-energized immediately when thermostat demand is satisfied. All combustion air inducer motors are sealed and cannot be oiled.

6-Gas Valve GV1

The 12GCS uses a gas valve manufactured by Honeywell. The valves are internally redundant to assure safety shutoff. If the valve must be replaced, the same valve type must be used. For natural gas units, line pressure should be 7.0"w.c. and manifold pressure should be 3.5" w.c. For LP units, line pressure should be 11.0"w.c. and manifold pressure should be 10.0" w.c.

24VAC terminals and gas control knob are located on top of the valve. All terminals on the gas valve are connected by wires to the ignition board A3. 24VAC applied to the "MV"on the valve opens the valve. A regulator adjustment screw is located on the valve. See figure 9 .

An LP changeover kit (Lennox part #42K91) is available. The kit includes burner orifices and a regulator conversion kit. Follow kit instructions when converting unit to LP.

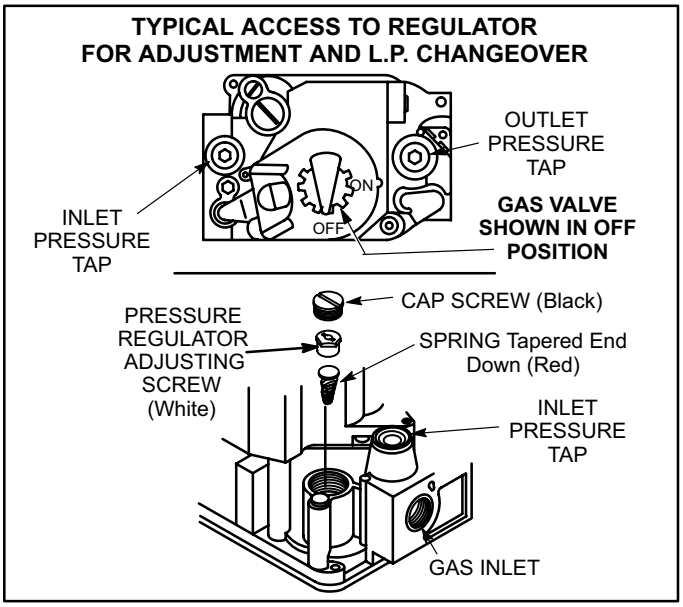


FIGURE 9

7-Clamshell Heat Exchanger

The 12GCS units use an aluminized steel tapered S-curve heat exchanger. Heat is transferred to the air stream from all surfaces of the heat exchanger. The combustion air inducer blower pulls fresh air through the burner box. This air is mixed with gas in the burner Venturi. The gas/air mixture is then burned at the entrance of each clam shell. Combustion gases are then pulled through the heat exchanger and exhausted out the vent.

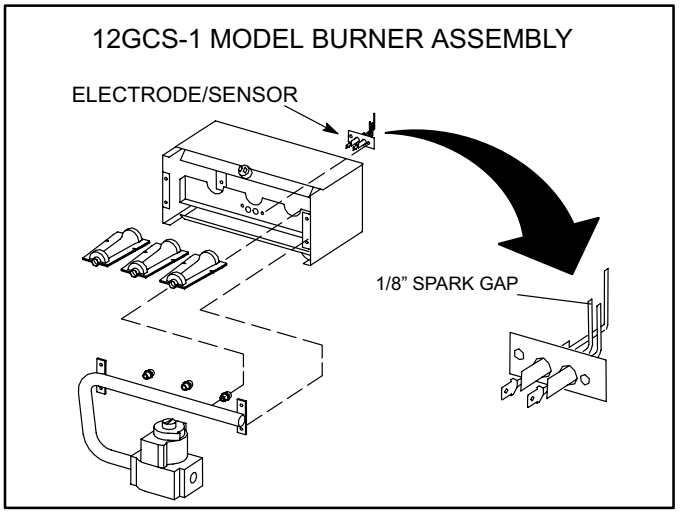


FIGURE 10

8-Burners/Orifices

All 12GCS units use inshot burners. A flame retention ring located in the burner end keeps flame from lifting off the burner. All 12GCS units use orifices that are precisely matched to the burner's input (see figure 10 for burner box assembly.) Each burner is supported by the orifice but can easily be removed for service. If service is necessary, the following instructions apply.

1. Close main manual shut-off valve and shut off all power to the unit.
2. Open the union fitting in the gas supply line just upstream of the unit gas valve and downstream from the manual shut-off valve.
3. Remove the four screws, two on the side and two on the bottom, that mount the burner rack assembly to the burner plate.
4. Disconnect wiring to the gas valve and the electrode/flame sensor. Remove the burner rack assembly from the unit by pulling back. Burners and gas orifices are now accessible to service.
5. Reverse the above procedure to replace the assembly. Make sure that burners are level and centered into each burner's corresponding heat exchanger tube.

9-Electrode/Flame Sensor

The electrode/sensor is used for ignition and is located in the left hand mounting hole. 12GCS -1 models will have a single electrode/sensor on the same bracket (see figure 10). 12GCS-2 models will have a split electrode/sensor. See figure 11. The spark gap is 1/8" and is the same for both type electrodes used. The electrode tip protrudes into the flame envelope of the adjacent burner. If the blower/ignition control A3 does not receive signal from the electrode/flame sensor indicating that the burners have established flame, the main gas valve GV1 will close after the 10-second sensing interval built into the ignition A3. To measure flame current follow the procedure below:

1- Disconnect power to unit.

2- Remove lead from sensing electrode and install a microamp meter in series between the sensing electrode and sensing lead.

3- Reconnect power and adjust thermostat for heating demand.

4- When flame is established, meter reading should be between 1 and 5 microamps. Drop-out signal is .45 amps.

5- Disconnect power to unit before disconnecting meter. Make sure sensor wire is securely reconnected before reconnecting power to unit.

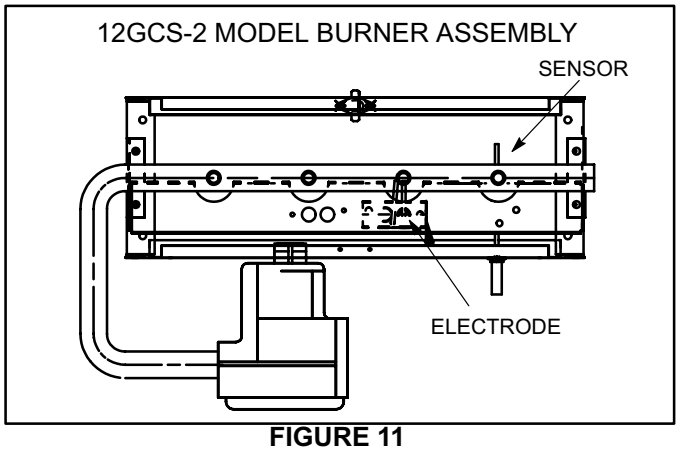


FIGURE 11

C-Evaporator Blower B3 and Capacitor C4

All 12GCS and 12CHP 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.

TABLE 3

12CHP060 with Variable Speed Motor

Mode of Operation	Common	W1	Common	R	O	R	R	R	Y	G	Ramp up	Ramp up	Ramp down	Ramp down
											25 Sec	After 7.5 Min	2 Sec	90 Sec
Motor Plug in Terminals	Pin 1	Pin 2	Pin 3	Pin 5	Pin 9	Pin 10	Pin 11	Pin 12	Pin 14	Pin 15	CFM	CFM	CFM	CFM
24 V motor wire	Blue	White	Lt Blue	Violet	Orange	Tan	Pink	Red	Yellow	Green	82%	100%	94%	0%
Cooling	X		X	X	X	X	X	X	X	X	1558	1900	1786	0
Continuous Fan	X		X	X		X	X	X		X	590	590	590	0
Heat Pump	X		X	X		X	X	X	X	X	1558	1900	1786	0
Aux Heat (stage two)	X	X	X	X		X	X	X	X	X	1558	1900	1786	0
Aux Heat (stage two)	X	X	X	X		X	X	X		X	1558	1900	1786	0
Emergency Heat	X	X	X	X		X	X	X		X	1558	1900	1786	0
Defrost Tempering Heat	X	X	X	X	X	X	X	X	X	X				

NOTES:
Pins not used 4, 6, 7, 8, 13, 16
All motor times are approximate.
At start up, the motor runs at 82% of air flow for 7.5 minutes, then ramps up to 100%
At shut down, the motor runs at 94%of air for 60 seconds before a 30 second ramp off.
Continuous fan is 31% of total CFM-transition time from continuois fan to heat/cool air flow is 20 seconds.

SPEED CHANGES:
To increase ***COOLING CFM*** by 5%: Cut violet wire (PIN 5) to motor and tape off ends.
To increase ***HEATING CFM*** by 5%: Cut pink wire (PIN 11) to motor and tape off ends.
The above changes will increase the continuous fan speed to 620 CFM.

HUMIDITY CONTROL
The CFM of the motor can be reduced by 15% by wiring a standard humidity contol in series with the TAN (PIN 10) wire. The humidity control must be closed when the humidity is below its setpoint and open when the humidity is above its setpoint. When the humidity control opens, R is interupted to PIN 10 and the CFM is reduced 15% from full speed.

D-Cooling Components

1-Compressor B1 (all models)

All 12GCS/12CHP 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.

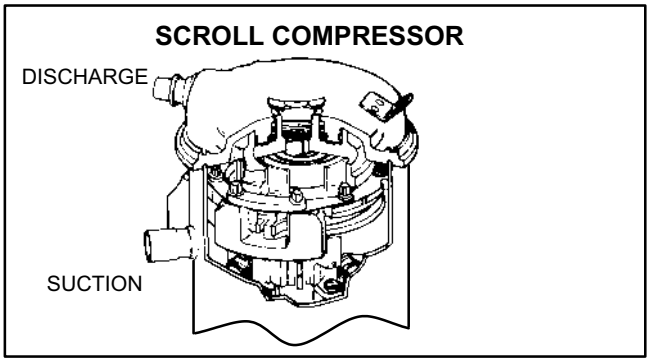


FIGURE 12

The scroll compressor design is simple, efficient and requires few moving parts. A cutaway diagram of the scroll compressor is shown in figure 12. 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 13). One scroll remains stationary, while the other is allowed to ”orbit” (figure 14). 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.

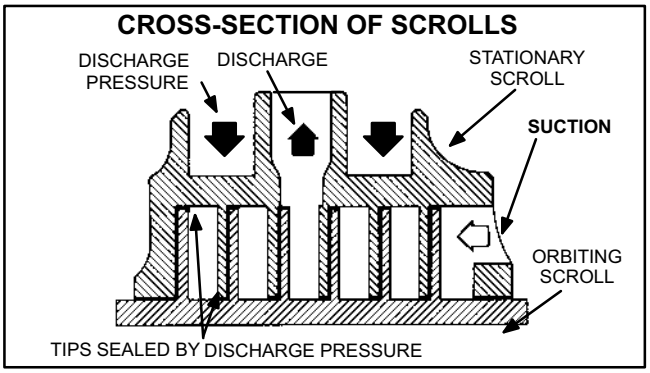


FIGURE 13

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure (figure 14 - 1). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 14 - 2). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 14 - 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 12). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 13). 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.

2-Condenser Fan

All 12GCS/CHP units use single phase condenser fans. Specifications for the condenser fans are at the front of this manual. See table of contents.

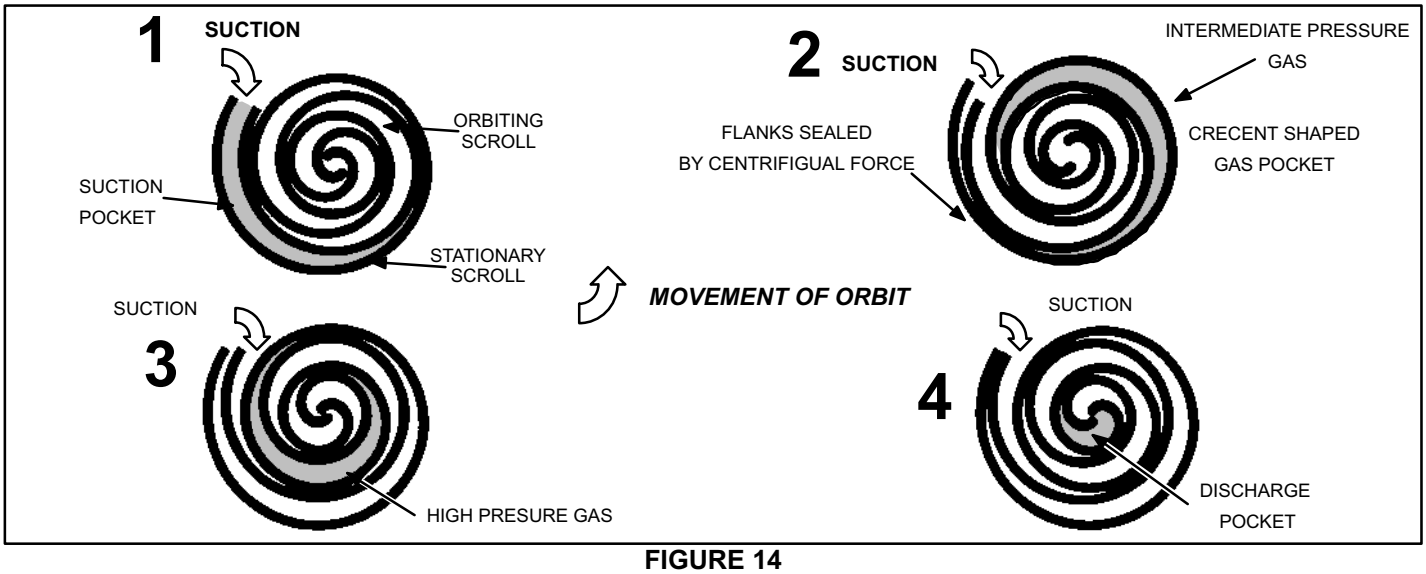


FIGURE 14

3-Reversing Valve L1 (CHP only)

Reversing valve L1 has a 24 volt solenoid coil which reverses refrigerant flow during unit operation in all 12CHP units. The reversing valve is in the refrigerant circuit vapor line.The reversing valve coil is energized during cooling demand and during defrost.

4-Accumulator (CHP only)

All 12CHP units have an accumulator. The accumulator traps and evaporates all liquid refrigerant and prevents liquid refrigerant from entering the compressor.

5-Defrost Thermostat Switch S6 (CHP only)

Defrost thermostat S6 is a S.P.ST. N.O. switch which closes on temperature fall (initiating defrost). The switch is located on the distributor assembly at the inlet of the outdoor coil.The switch monitors the outdoor coil suction temperature to determine when defrost is needed. When the outdoor coil suction temperature falls to 32°F± 4°F (0°C± 2.2°C) the switch closes (initiating defrost after minimum run times of 30, 60, or 90 minutes). The switch will open when the temperature rises to 55°F ± 5°F (12.7°C ± 2.8°C).

6-Filter Drier (CHP only)

All 12CHP units have a filter drier in the liquid line. The drier removes contaminants and moisture from the system.

7-High Pressure Switch (optional all models)

The high pressure switch is an auto-reset N.C. switch that opens on pressure rise. This switch is an optional feature for all models.The switch is wired in series with the compressor contactor K1 and is located on the discharge line. When discharge pressure rises to 450 psig (3102 kPa) the switch opens and the compressor is de-energized. When discharge pressure drops to 250 psig (1723 kPa) the pressure switch will close.

III-Electric Heat (optional 12CHP only)

A-Matchups and Ratings

Table 5 shows all approved ECH26 matchups and ratings.

B-Electric Heat Components

See figure 15 for electric heat parts arrangement.

1-Primary Limit S15

S15 is a N.C. auto-reset high temperature limit located on the electric heat vest panel. Each heating element is wired in series with a high temperature limit. When S15 opens, the corresponding heating element is de-energized. All other heating elements remain energized. S15 will automatically close when temperatures return to normal. Limit rating will be on front side.

ECH26 VESTIBULE PARTS ARRANGEMENT (ECH26-20 SHOWN)

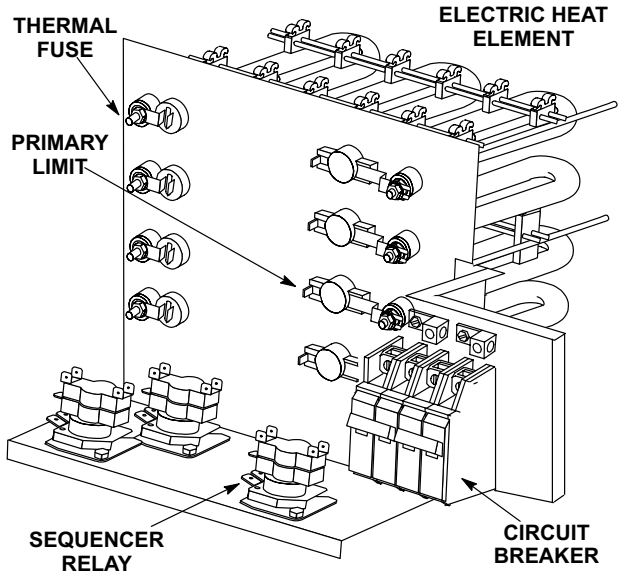


FIGURE 15

2-Thermal Fuse F5

All ECH29 series units use a thermal fuse connected in series with each element.The thermal fuse provides secondary high temperature protection to each element. The thermal fuses are non-resettable fusible links which must be replaced after being tripped. Fuse rating will be on front side.

3-Electric Heat Sequencer Relays K32, K33, K34

Relays K32, K33 and K34 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.

4-Terminal Strip TB2 ECH29-05, -07, -10

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

5-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.

6-Circuit Breaker CB1 and CB2

ECH26-15, -20,

Line voltage connections are made to circuit breakers CB1 and CB2 in electric heat sections with circuit breakers. Table 4 shows amp rating for each circuit breaker used. Two-pole circuit breakers are used.

TABLE 4

ECH29 Circuit Breakers		
UNIT	CB1 AMPS	CB2 AMPS
ECH29-15-1-P	60 AMPS	30 AMPS
ECH29-20-1-P	60 AMPS	60 AMPS

TABLE 5
ELECTRIC HEAT 12CHP UNITS

Packaged Unit Model No.	Electric Heater Model No. & Net Weight	kW Input	No. of Steps & Phase	Volts Input	Electric Heat kW Input	Electric Heat Btuh Input	Heater Only [1] Minimum Circuit Ampacity	
							Circuit 1	Circuit 2
12CHP024 12CHP030	ECH29-05 (**71K18**) 4 lbs. (2 kg.)	5	1 step (1 phase)	208	3.8	12,800	26	- - -
				220	4.2	14,300	27.2	- - -
				230	4.6	15,700	28.3	- - -
				240	5.0	17,100	29.5	- - -
	ECH29-07 (**71K64**) 5 lbs. (2 kg.)	7	1 step (1 phase)	208	5.3	17,900	35	- - -
				220	5.9	20,100	36.7	- - -
				230	6.4	21,900	38.3	- - -
				240	7.0	23,900	39.9	- - -
	ECH29-10 (**71K19**) 5 lbs. (2 kg.)	10	1 step (1 phase)	208	7.5	25,600	48.6	- - -
				220	8.4	28,700	51.1	- - -
				230	9.2	31,300	53.2	- - -
				240	10.0	34,100	55.5	- - -
	ECH29-15 (**71K20**) 17 lbs. (8 kg.)	15	1 step (1 phase)	208	11.3	38,400	48.6	22.6
				220	12.6	43,000	51.1	23.9
				230	13.8	47,000	53.2	25
				240	15.0	51,200	55.5	26.1
12CHP036 12CHP042 12CHP048 12CHP060	ECH29-05 (**71K18**) 4 lbs. (2 kg.)	5	1 step (1 phase)	208	3.8	12,800	27.1	- - -
				220	4.2	14,300	28.1	- - -
				230	4.6	15,700	29.2	- - -
				240	5.0	17,100	30.3	- - -
	ECH29-07 (**71K64**) 5 lbs. (2 kg.)	7	1 step (1 phase)	208	5.3	17,900	36.1	- - -
				220	5.9	20,100	37.6	- - -
				230	6.4	21,900	39.1	- - -
				240	7.0	23,900	40.7	- - -
	ECH29-10 (**71K19**) 5 lbs. (2 kg.)	10	1 step (1 phase)	208	7.5	25,600	49.4	- - -
				220	8.4	28,700	51.9	- - -
				230	9.2	31,300	54.1	- - -
				240	10.0	34,100	56.4	- - -
	ECH29-15 (**71K20**) 17 lbs. (8 kg.)	15	1 step (1 phase)	208	11.3	38,400	49.4	22.9
				220	12.6	43,000	51.9	23.9
				230	13.8	47,000	54.1	25
				240	15.0	51,200	56.4	26.1
12CHP048 12CHP060	ECH29-20 (**71K21**) 20 lbs. (9 kg.)	20	1 step (1 phase)	208	15.0	51,200	49.6	45.1
				220	16.8	57,300	52.2	47.8
				230	18.4	62,700	54.4	50
				240	20.0	68,200	56.6	52.1
12CHP060	ECH29-25 (**71K22**) 20 lbs. (9 kg.)	25	1 step (1 phase)	208	18.8	64,100	49.6	45.1
				220	21.0	71,700	52.2	47.8
				230	23.0	78,300	54.4	50
				240	25.0	85,300	56.6	52.1

[1] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).

IV-Charging

⚠ 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.

A-12CHP

For maximum performance of this heat pump system, the operating temperatures and pressures should be checked and superheat determined at Standard ARI test conditions of 82°F outdoor - 80°F indoor dry bulb/67°F wet bulb. If superheat measured deviates from values in table 6, refrigerant charge should be adjusted accordingly for maximum performance.

Verify system performance using table 7 or table 8 as a general guide. These tables should not be used for charging the 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, this table could serve as a useful service guide. Table 7 should be used when unit is charged during the heating mode. If outdoor ambient is below 45°F, run unit through defrost cycle first, wait 15 minutes for system pressures to stabilize, then take pressures. Data in table 7 is based on 70°F dry bulb return air. Data in table 8 is based on 80°F dry bulb / 87°F wet bulb return air. Allow unit operation to stabilize before taking pressure readings.

TABLE 6
12CHP SUCTION SUPERHEAT TABLE

UNIT MODEL NO.	SUCTION SUPERHEAT 82°F OD - 80°F IDDB / 67°F IDWB
12CHP-024	18 - 20°
12CHP-030	
12CHP-036	
12CHP-042	
12CHP-048	
12CHP-060	

TABLE 7
NORMAL OPERATING PRESSURES -- HEATING MODE

70°F db RETURN AIR		AIR TEMPERATURE ENTERING OUTDOOR COIL (°F)												
MODEL	PRESSURE	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
12CHP-024	SUCTION	17	20	24	28	33	38	43	49	55	62	69	74	81
12CHP-030		14	17	21	25	29	34	39	45	51	56	63	70	78
12CHP-036		14	17	21	25	29	34	39	45	51	56	63	70	78
12CHP-042		16	19	23	27	31	36	41	45	51	55	62	68	76
12CHP-048		15	18	22	26	30	35	40	45	51	55	62	68	76
12CHP-060		14	17	21	25	29	34	39	44	50	54	61	67	75
12CHP-024	LIQUID	181	191	200	209	219	228	237	247	256	265	275	284	293
12CHP-030		168	173	179	184	189	195	200	205	211	216	221	227	232
12CHP-036		165	172	178	184	191	197	203	210	216	222	229	235	241
12CHP-042		167	174	181	187	194	201	207	214	221	227	234	241	247
12CHP-048		203	211	220	229	237	246	255	263	272	281	289	298	307
12CHP-060		163	170	177	183	190	197	203	210	217	223	230	237	243

TABLE 8
NORMAL OPERATING PRESSURES -- COOLING MODE

80°F db / 67°F wb RETURN AIR		AIR TEMPERATURE ENTERING OUTDOOR COIL (°F)												
MODEL	PRESSURE	65°	70°	75°	80°	82°	85°	90°	95°	100°	105°	110°	115°	125°
12CHP-024	SUCTION	78	79	81	82	83	84	85	87	89	90	92	93	96
12CHP-030		78	79	81	82	83	84	85	87	89	90	92	93	96
12CHP-036		75	77	80	82	83	84	87	89	91	94	96	98	103
12CHP-042		80	81	82	84	84	85	86	87	88	89	90	92	94
12CHP-048		78	79	80	82	82	83	84	85	86	87	88	90	92
12CHP-060		78	79	80	82	82	83	84	85	86	87	88	90	92
12CHP-024	LIQUID	140	155	170	184	190	199	213	228	243	257	272	286	316
12CHP-030		145	159	173	187	193	202	216	230	244	258	273	287	315
12CHP-036		146	161	176	191	197	206	221	236	251	266	281	296	326
12CHP-042		155	170	185	200	206	215	230	245	260	275	290	305	335
12CHP-048		164	180	196	213	219	229	245	261	277	293	309	326	358
12CHP-060		166	182	198	214	220	229	245	261	277	293	308	324	356

B-12GCS

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 9, refrigerant charge should be adjusted accordingly for maximum performance.

Verify system performance using table 10 as a general guide. Table 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, this table could serve as a useful service guide. Data in table 10 is based on 80°F dry bulb / 87°F wet bulb return air. Allow unit operation to stabilize before taking pressure readings.

TABLE 9
12GCS SUCTION SUPERHEAT TABLE

UNIT MODEL NO.	SUCTION SUPERHEAT 82°F OD - 80°F IDDB / 67°F IDWB
12GCS-024	18 - 20°
12GCS-030	18 - 20°
12GCS-036	13 - 15°
12GCS-042	13 - 15°
12GCS-048, -060	14 - 16°

TABLE 10
NORMAL OPERATING PRESSURES

80°F db / 67°F wb RETURN AIR		AIR TEMPERATURE ENTERING OUTDOOR COIL (°F)											
MODEL	PRESSURE	65°	70°	75°	80°	82°	85°	90°	95°	100°	105°	110°	115°
12GCS-024	SUCTION	75	77	80	82	83	84	87	88	90	90	91	92
12GCS-030		67	70	73	76	80	78	82	85	86	86	87	88
12GCS-036		73	75	78	80	82	82	85	87	88	89	91	92
12GCS-042		77	78	80	81	81	82	84	85	87	88	89	90
12GCS-048		71	74	75	79	81	81	84	88	87	87	88	89
12GCS-060		74	77	80	81	82	84	85	88	96	96	87	88
12GCS-024	LIQUID	149	164	178	193	195	208	222	237	254	271	289	306
12GCS-030		145	161	178	192	195	207	223	238	254	270	288	305
12GCS-036		156	172	187	203	207	219	234	260	267	284	303	322
12GCS-042		159	175	190	208	209	222	237	253	270	298	306	326
12GCS-048		152	168	185	198	209	215	230	246	254	281	298	316
12GCS-060		155	190	205	211	215	230	244	269	276	293	311	332

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.

MOTORS

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

OUTDOOR COIL

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.

TO CLEAN BURNERS (12GCS only)

Remove from the unit as explained in burner description in GAS COMPONENTS section. Vacuum and/or brush as required.

VENT OUTLET (12GCS only)

Visually inspect vent outlet periodically to make sure that the buildup of soot and dirt is not excessive. If necessary, clean to maintain adequate opening to discharge flue products.

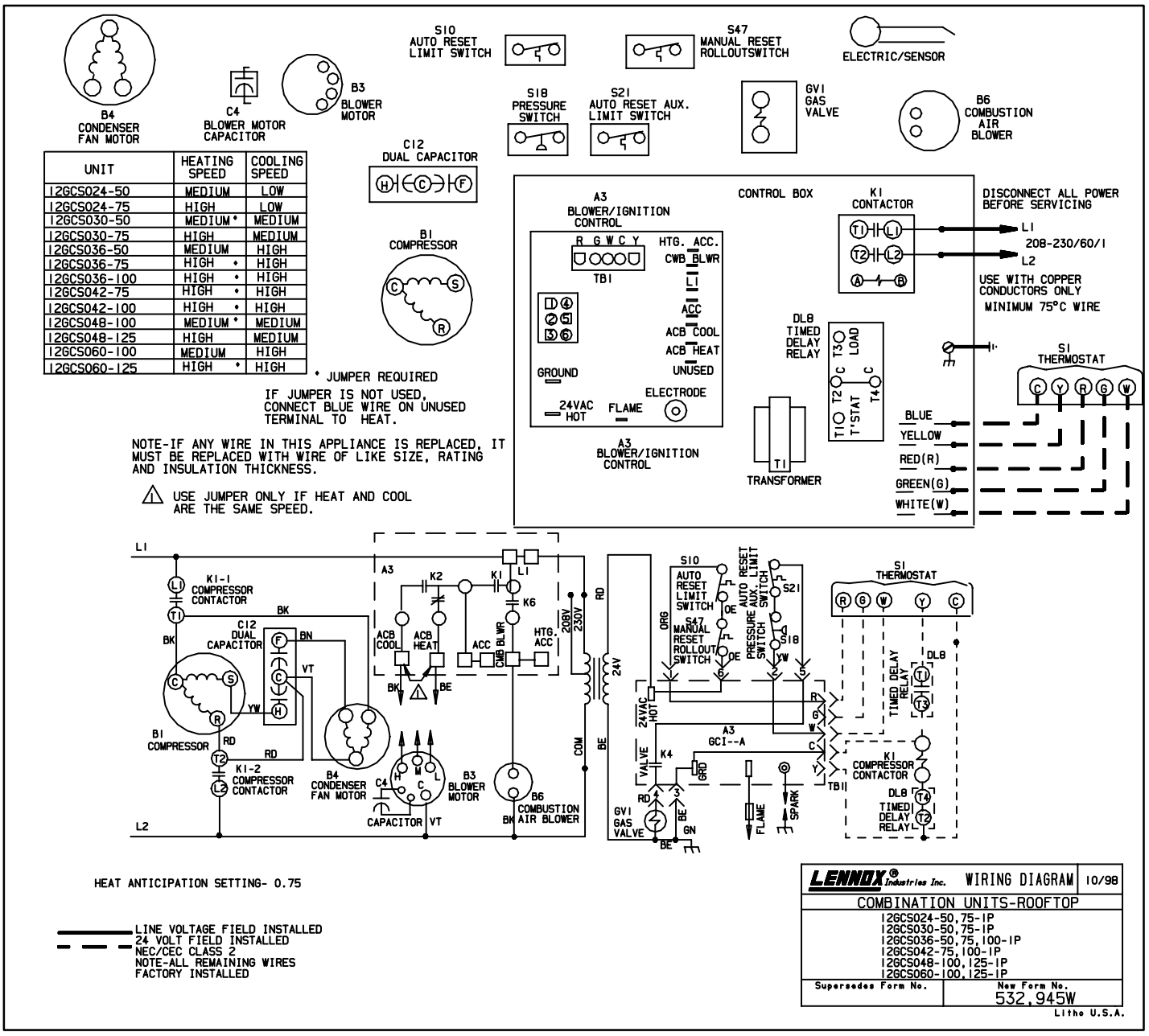
CLEANING FLUE PASSAGES & HEATING ELEMENTS

With proper combustion adjustment the heat exchanger of a gas fired furnace will seldom need cleaning. If the heat exchanger should become sooted, it can be cleaned as follows:

1 - Remove the burner assembly as outlined in Gas Components section.
2 - Remove the combustion blower.
3 - At the bottom of the heat section, remove the screws holding the flue collector box. Carefully remove the flue collector box without ripping the adjacent insulation.
4 - Using a wire brush on a flexible wand, brush out the inside of each heat exchanger from the burner inlet and flue outlet ends.
5 - Brush out the inside of the flue collector box.
6 - If soot build-up is excessive, remove the vent motor and clean the wheel and housing. Run the wire brush down the flue extension at the outlet of the vent housing.
7 - After brushing is complete, blow all brushed areas with air. Vacuum as needed.
8 - Replace parts in the reverse order they were removed in steps 1 to 3.
9 - When replacing the flue collector box, be careful not to tear the adjoining insulation.
10 - Assure that all joints on the vent side of the combustion system are air tight. Apply a high temperature (+500°F) sealing compound where needed.

VI-Wiring Diagram and Sequence of Operation

A-12GCS-024/060-1-P



Cooling

1- Cooling demand initiates at Y1 in the indoor thermostat.

2- 24VAC from Y1 energizes time delay DL8, which energizes compressor contactor K1 if 5-minute delay has been satisfied (DL8 is an optional component. If unit is not equipped with DL8, 24VAC will go straight to K1.)

3- K1-1 and K1-2 close energizing compressor B1 and outdoor fan motor B4.

4- Compressor B1 and outdoor fan B4 begin immediate operation. Evaporator blower B3 begins after 5 second delay.

5- When cool demand is satisfied, "Y1" in the indoor thermostat de-energizes K1 contactor. K1-1 and K1-2 open de-energizing compressor B1 and outdoor fan B4. Evaporator blower B3 de-energizes after 90 second delay.

Heating

1- Heating demand initiates at "W1" in the indoor thermostat.

2- Assuming all safety circuits are closed, A3 energizes the combustion air inducer blower B6. When the N.O. combustion air inducer prove switch closes, a prepurge period of 30 seconds will follow.

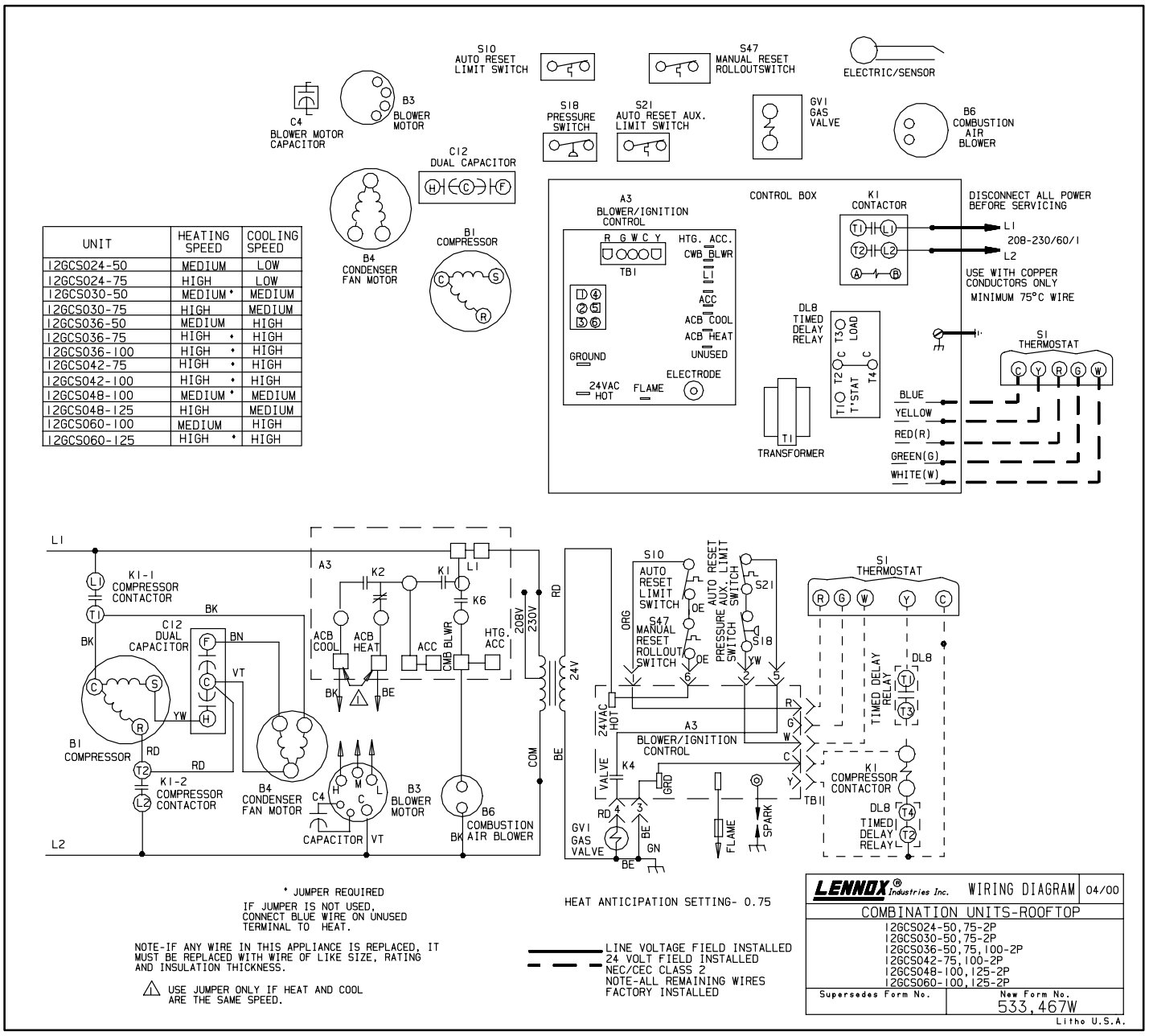
3- Ignition control A3 begins spark and energizes the gas valve for 10 seconds.

4- When flame is sensed, spark stops.

5- After 30 seconds blower control A3 energizes evaporator blower B3.

6- When heat demand is satisfied, "W1" in the indoor thermostat de-energizes control A3 which de-energizes the gas valve and combustion air inducer blower B6. Evaporator blower B3 runs for a designated period of 120 seconds.

B-12GCS-024/060-2-P



UNIT	HEATING SPEED	COOLING SPEED
12GCS024-50	MEDIUM	LOW
12GCS024-75	HIGH	LOW
12GCS030-50	MEDIUM *	MEDIUM
12GCS030-75	HIGH	MEDIUM
12GCS036-50	MEDIUM	HIGH
12GCS036-75	HIGH *	HIGH
12GCS036-100	HIGH *	HIGH
12GCS042-75	HIGH *	HIGH
12GCS042-100	HIGH *	HIGH
12GCS048-100	MEDIUM *	MEDIUM
12GCS048-125	HIGH	MEDIUM
12GCS060-100	MEDIUM	HIGH
12GCS060-125	HIGH *	HIGH

Cooling

1- Cooling demand initiates at Y1 in the indoor thermostat.

2- 24VAC from Y1 energizes time delay DL8, which energizes compressor contactor K1 if 5-minute delay has been satisfied (DL8 is an optional component. If unit is not equipped with DL8, 24VAC will go straight to K1.)

3- K1-1 and K1-2 close energizing compressor B1 and outdoor fan motor B4.

4- Compressor B1 and outdoor fan B4 begin immediate operation. Evaporator blower B3 begins after 5 second delay.

5- When cool demand is satisfied, "Y1" in the indoor thermostat de-energizes K1 contactor. K1-1 and K1-2 open de-energizing compressor B1 and outdoor fan B4. Evaporator blower B3 de-energizes after 90 second delay.

Heating

1- Heating demand initiates at "W1" in the indoor thermostat.

2- Assuming all safety circuits are closed, A3 energizes the combustion air inducer blower B6. When the N.O. combustion air inducer prove switch closes, a prepurge period of 30 seconds will follow.

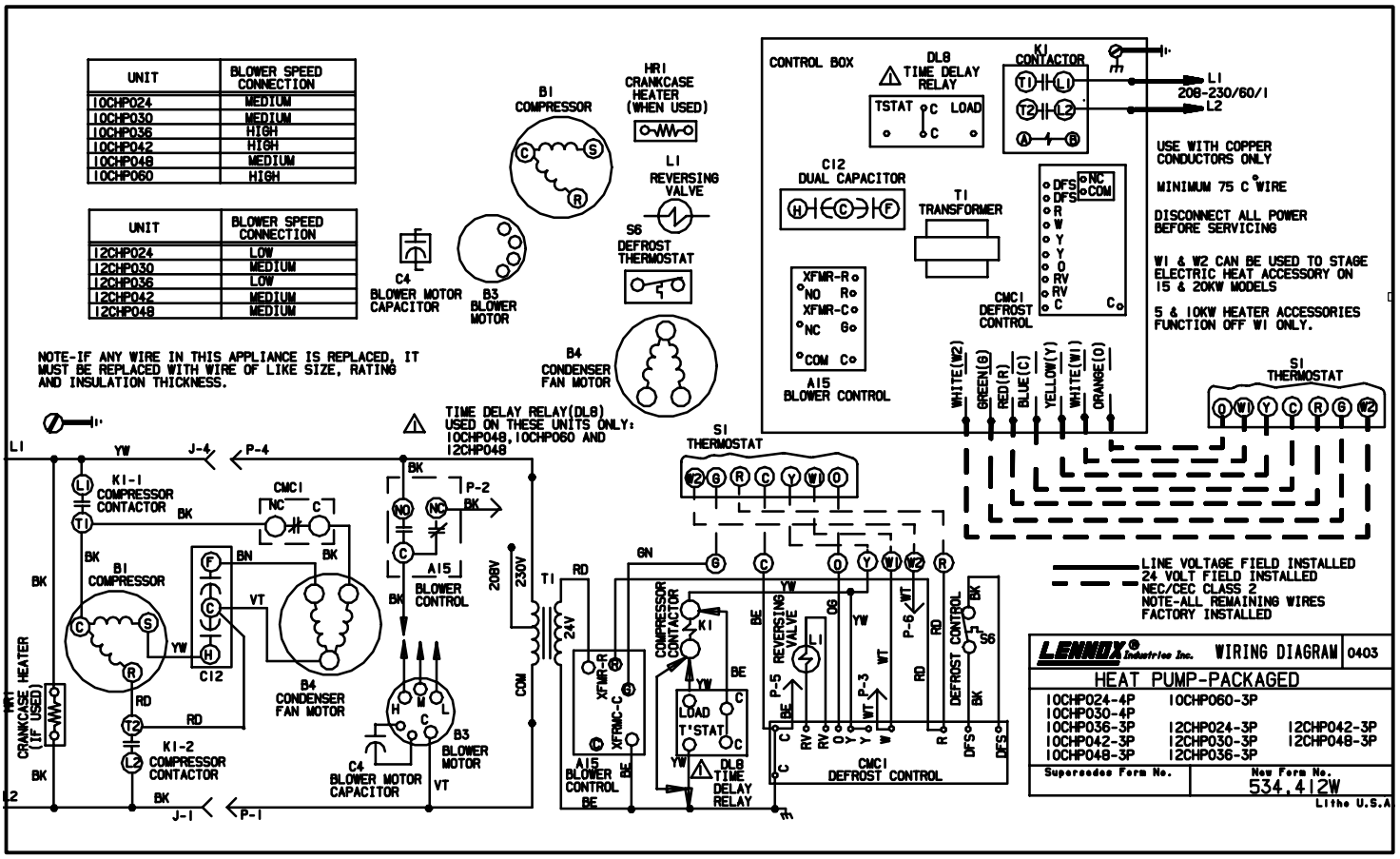
3- Ignition control A3 begins spark and energizes the gas valve for 10 seconds.

4- When flame is sensed, spark stops.

5- After 30 seconds blower control A3 energizes evaporator blower B3.

6- When heat demand is satisfied, "W1" in the indoor thermostat de-energizes control A3 which de-energizes the gas valve and combustion air inducer blower B6. Evaporator blower B3 runs for a designated period of 120 seconds.

C-12CHP-024/048



Cooling

1- Internal thermostat wiring energizes terminal "O" by cooling mode selection, energizing reversing valve L1.

2- Cooling demand initiates at Y1 in the indoor thermostat.

3- 24VAC from Y1 energizes compressor cpntactor K1. (12CHP048 only, Y1 energizes time delay DL8, which energizes compressor contactor K1 if 5-minute delay has been satisfied).

4- K1-1 and K1-2 close energizing compressor B1 and outdoor fan motor B4.

5- Compressor B1 and outdoor fan B4 begin immediate operation.

6- Evaporator blower B3 begins operation after 5-second delay.

7- When cool demand is satisfied, "Y1" in the indoor thermostat de-energizes K1 contactor. K1-1 and K1-2 open de-energizing compressor B1 and outdoor fan B4. Evaporator blower B3 de-energizes after 90 seconds off time delay.

8- Terminal "O" is de-energized when internal thermostat is out of cool mode, de-energizing reversing valve L1.

First Stage Heat

9- Heating demand initiates at "Y1" in the thermostat.

10- 24VAC energizes compressor contactor K1. (12CHP048 only, Y1 energizes time delay DL8, which energizes compressor contactor K1 if 5-minute delay has been satisfied).

11- K1-1 and K1-2 close, energizing compressor B1 and outdoor fan B4.

12- Evaporator blower B3 energizes after 5 seconds.

13- When heat demand is satified, Y1 in the indoor thermostat de-energizes K1. K1-1 and K1-2 open and de-energizes compressor B1 and outdoor fan B4.

14- Evaporator blower B3 de-energizes after 90 seconds.

Defrost Mode

14- During heating operation when outdoor coil temperature drops below 32°F (0°C) defrost switch S6 closes.

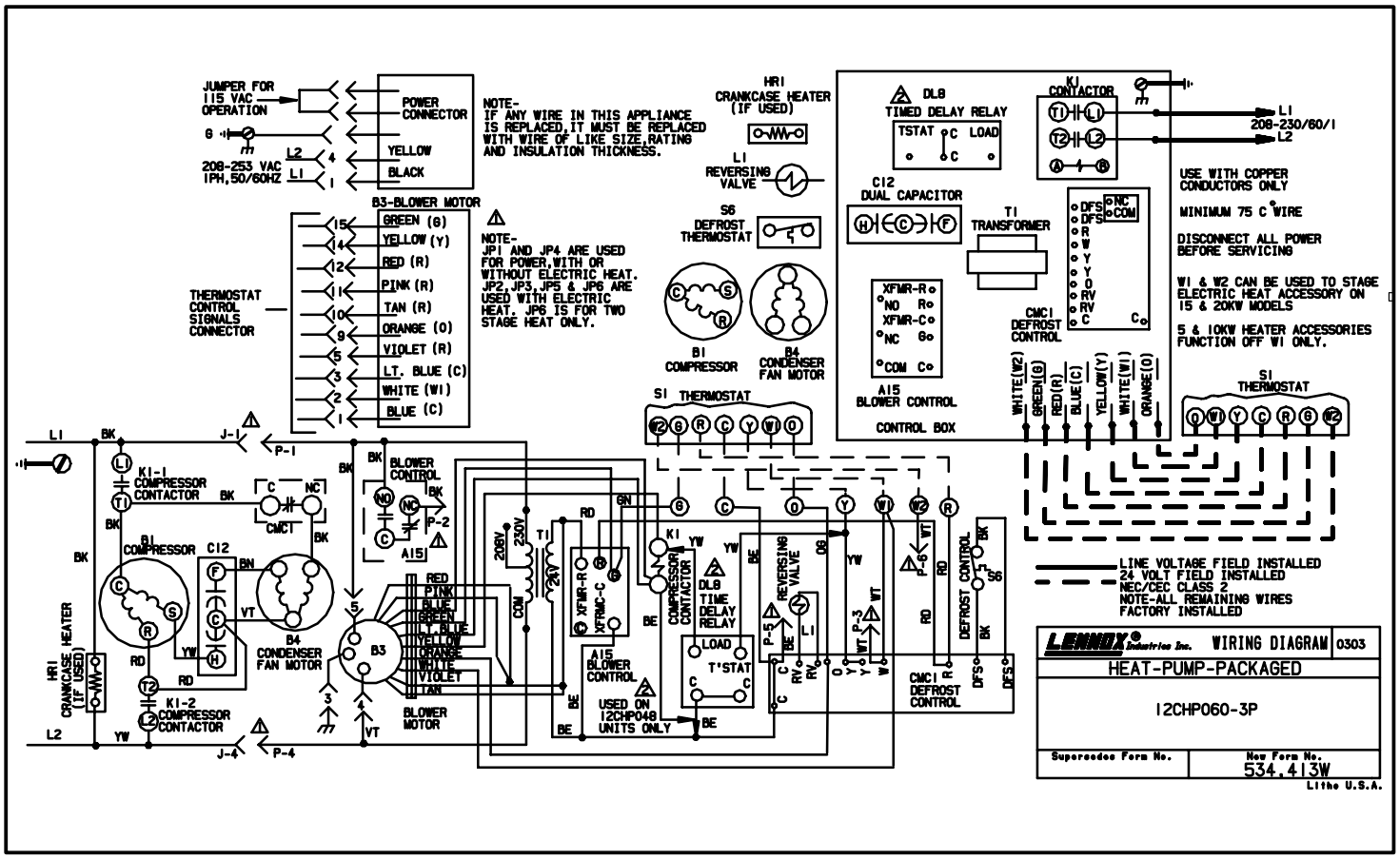
15- Defrost control CMC1 begins timing. If defrost thermostat S6 remains closed at the end of 30, 60 or 90 minute period, defrost control energizes and defrost begins

16- During defrost CMC1 energizes the reversing valve L1 and de-energizes the outdoor fan B4.

17- Defrost continues 10 minutes or until defrost thermostat switch S6 opens. When defrost thermostat switch opens, defrost control CMC1 loses power and resets.

18- When CMC1 resets, reversing valve L1 is de-energized while outdoor fan B4 is energized.

D-12CHP060-1-P



Cooling

1- Internal thermostat wiring energizes terminal ”O” by cooling mode selection, energizing reversing valve L1.

2- Cooling demand initiates at Y1 in the indoor thermostat.

3- 24VAC from Y1 energizes compressor contactor K1.

4- K1-1 and K1-2 close energizing compressor B1 and outdoor fan motor B4.

5- Compressor B1 and outdoor fan B4 begin immediate operation.

6- Evaporator blower B3 begins operation after 5-second delay.

7- When cool demand is satisfied, ”Y1” in the indoor thermostat de-energizes K1 contactor. K1-1 and K1-2 open de-energizing compressor B1 and outdoor fan B4. Evaporator blower B3 de-energizes after 90 second delay.

8- Terminal ”O” is de-energized when internal thermostat is out of cool mode, de-energizing reversing valve L1.

First Stage Heat

9- Heating demand initiates at ”Y1” in the thermostat.

10- 24VAC energizes compressor contactor K1.

11- K1-1 and K1-2 close, energizing compressor B1 and outdoor fan B4.

12- Compressor B1 and outdoor fan B4 begin operation.

13- Evaporator blower B3 begins operation after 5 second delay..

14- When heat demand is satified, Y1 in the indoor thermostat de-energizes K1. K1-1 and K1-2 open de-energizing compressor B1 and outdoor fan B4. Evaporator blower B3 de-energizes after 90 second delay.

Defrost Mode

15- During heating operation when outdoor coil temperature drops below 32°F (0°C) defrost switch S6 closes.

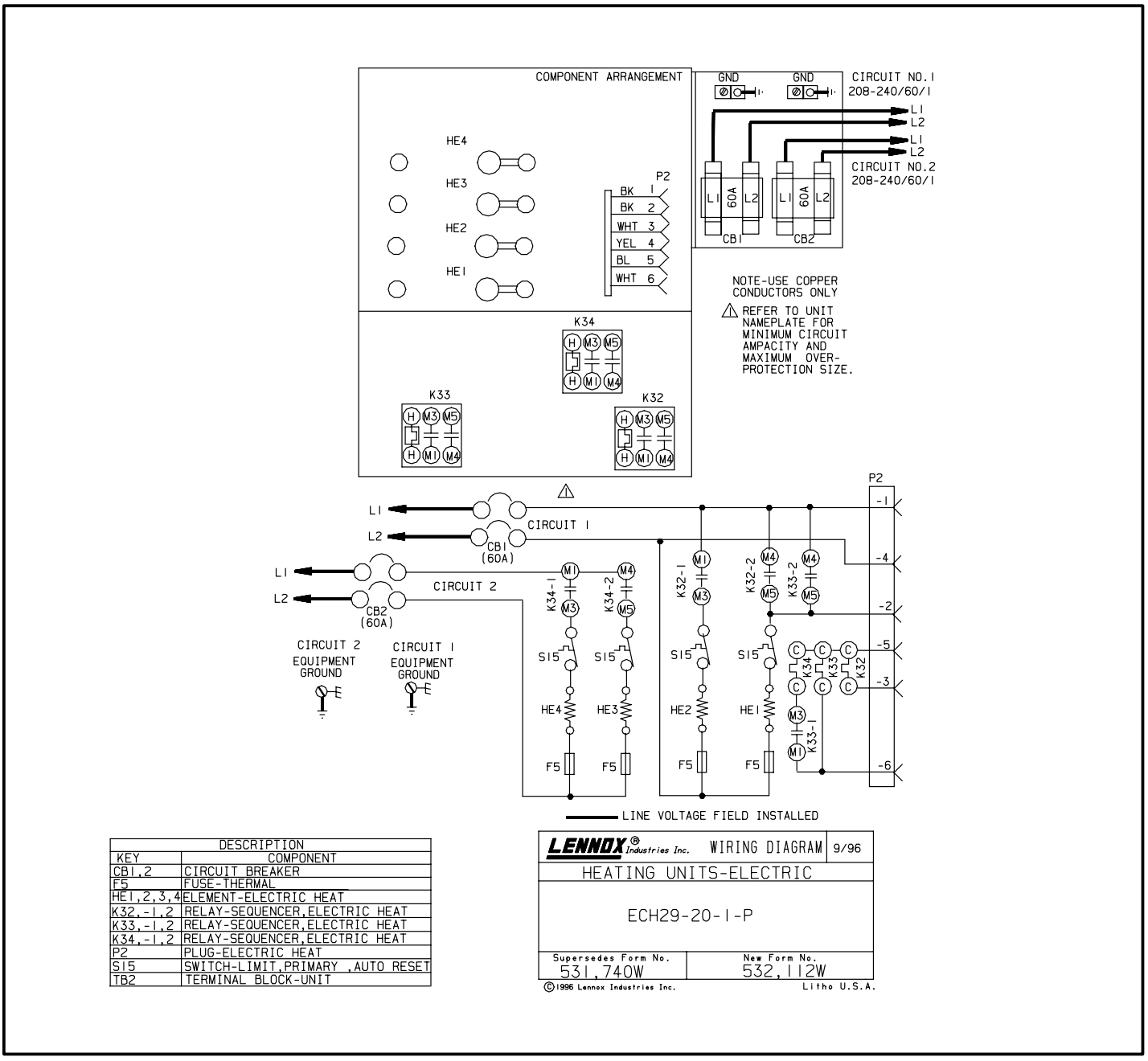
16- Defrost control CMC1 begins timing. If defrost thermostat S6 remains closed at the end of 30, 60 or 90 minute period, defrost control energizes and defrost begins

17- During defrost CMC1 energizes the reversing valve L1 and de-energizes the outdoor fan B4. Electric heat begins.

18- Defrost continues 10 minutes or until defrost thermostat switch S6 opens. When defrost thermostat switch opens, defrost control CMC1 loses power and resets.

19- When CMC1 resets, reversing valve L1 is de-energized while outdoor fan B4 is energized.

E-ECH29-1-P (ECH29-20 Shown)



DESCRIPTION	
KEY	COMPONENT
CB1,2	CIRCUIT BREAKER
F5	FUSE-THERMAL
HE1,2,3,4	ELEMENT-ELECTRIC HEAT
K32,-1,2	RELAY-SEQUENCER,ELECTRIC HEAT
K33,-1,2	RELAY-SEQUENCER,ELECTRIC HEAT
K34,-1,2	RELAY-SEQUENCER,ELECTRIC HEAT
P2	PLUG-ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY ,AUTO RESET
TB2	TERMINAL BLOCK-UNIT

LENNOX® Industries Inc. WIRING DIAGRAM 9/96

HEATING UNITS-ELECTRIC

ECH29-20-1-P

Supersedes Form No.	New Form No.
531,740W	532,112W

Litho U.S.A.

First Stage Heat

1- When there is a call for heat, Y1 energizes electric heat relay K32 through P2-3.

2- When K32-1 closes, electric heat element HE2 is energized assuming the N.C. primary limit S15 is closed. K32-2 closes energizing blower B3 through P2-2, and heating element HE1.

Second Stage Heat

3- W2 energizes electric heat relay K33 through P2-6.

4- K33-1 closes energizing K34.

5- When K34-1 closes, heating element HE4 is energized assuming primary limit S15 is closed.

6- When K33-2 closes, the blower will energize through P2-2 (if it has not been energized before).

7- When K34-2 closes, heating element HE3 is energized assuming primary limit S15 is closed.