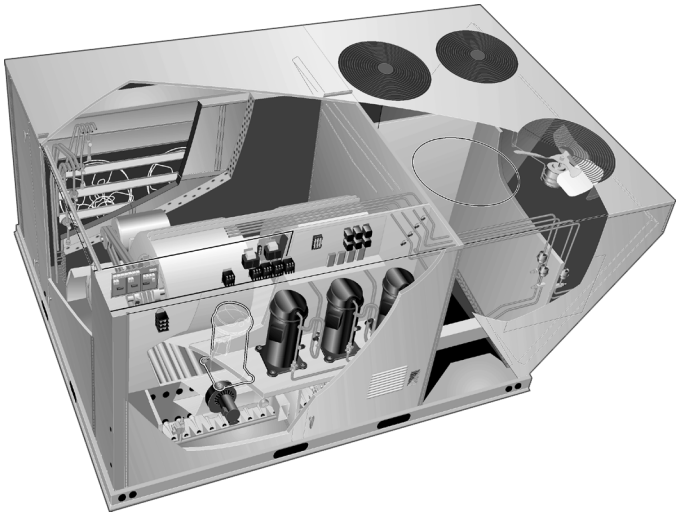
Service Literature

LGA/LCA/LHA

13, 15, 17.5, 20 & 25 Ton
(46, 53, 62, 70 & 88 kW)



The LGA/LCA 13, 15, 17.5, 20 and 25 ton (46, 53, 62, 70 and 88 kW) units are configured to order units (CTO) with a wide selection of factory installed options. The LGA180/210/2240/300S gas/electric rooftop units are available in 260,000 Btuh or 470,000 Btuh (76.2 kW or 137.7 kW) heating inputs. The LGA156H is available in 260,000 Btuh only. Gas heat sections are aluminized steel tube heat exchangers. The LCA156H/180/210/240/300S cooling packaged rooftop units are equipped with the same cooling sections as the LGA156H/180/210/240/300S units. Optional electric heat is factory-or field installed in LCA units. Electric heat operates in single of multiple stages depending on the kW input size. 15kW through 60kW heat sections are available for the LCA156H and LCA180 and 15kW through 90kW heat sections are available for LCA210/240/300S. LGA and LCA units have identical refrigerant circuits with 13, 15, 17.5, 20 or 25 ton (46, 53, 62, 70 or 88 kW) cooling capacities. LGA/LCA156H180 units utilize three compressors, while the LGA/LCA210,240 and 300S units utilize four compressors.

The LHA180 and 240 packaged heat pump units are available in 188,000 Btuh through 220,000 Btuh (55.1 kW through 64.5 kW) heating outputs and 15 or 20 ton (52.8 or 70.3 kW) cooling capacities. The LHA180/240 refrigerant systems utilize two compressors, two reversing valves, two accumulators and other parts common to a heat pump. Optional auxiliary electric heat is factory-or field-installed in LHA units. Electric heat operates in single or multiple stages depending on the kW input size. 15kW through 60kW hat sections are available for the LHA180 and 15kW through 90kW heat sections are available for the LHA240.

The LGA, LCA, and LHA units are designed to accept any of several different energy management thermostat control systems with minimum field wiring. Factory or field provided control options connect to the unit with jack plugs. When “plugged in” the controls become an integral part of the units wiring.

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

If the units must be lifted for service, rig unit by attaching four cables to the holes located in the unit base rail (two holes at each corner). Refer to the installation instructions for the proper rigging technique.

TABLE OF CONTENTS

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

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

SPECIFICATIONS - LCA/LGA 156/180

Model No.			LCA/LGA156H		LCA/LGA180S		LCA/LGA180H
Efficiency Type			High (H)		Standard (S)		High (H)
Cooling Ratings	Gross Cooling Capacity - Btuh (kW)		155,000 (45.4)		186,000 (54.5)		188,000 (55.1)
	★Net Cooling Capacity - Btuh (kW)		150,000 (44.0)		180,000 (52.7)		182,000 (53.3)
	Total Unit Power (kW)		13.0		19.6		15.8
	★EER (Btuh/Watt)		11.5		9.2		11.5
	★Integrated Part Load Value (Btuh/Watt)		12.6		10.5		13.3
Refrigerant Charge Furnished (HCFC-22)		Circuit 1	11 lbs. 0 oz. (4.99 kg)		9 lbs. 0 oz. (4.08 kg)		11 lbs. 0 oz. (4.99 kg)
		Circuit 2	11 lbs.. 0 oz. (4.99 kg)		9 lbs. 0 oz. (4.08 kg)		11 lbs. 0 oz. (4.99 kg)
		Circuit 3	11 lbs. 0 oz. (4.99 kg)		9 lbs. 0 oz. (4.08 kg)		11 lbs. 0 oz. (4.99 kg)
Two Stage Heating Capacity (Natural or LPG/Propane Gas (at Sea Level)	Model No.		LGA156		LGA180		
	Heat Input Type		Low (L)	Standard (S)	Low (L)	Standard (S)	High (H)
	Input (low) — Btuh (kW)		169,000 (49.5)	169,000 (49.5)	169,000 (49.5)	169,000 (49.5)	305,000 (89.4)
	Output (low) — Btuh (kW)		135,000 (39.6)	135,000 (39.6)	135,000 (39.6)	135,000 (39.6)	244,000 (71.5)
	Input (High) — Btuh (kW)		- - - -	260,000 (76.2)	- - - -	260,000 (76.2)	470,000 (137.7)
	Output (High) — Btuh (kW)		- - - -	208,000 (60.9)	- - - -	208,000 (60.9)	376,000 (110.2)
	A.G.A./C.G.A. Thermal Efficiency		80.0%				
Gas Supply Connections npt — in. -Natural l or LPG/Propane			1				
Recommended Gas Supply Pressure - wc. in. (kPa)		Natural	7 (1.7)				
		LPG/Propane	11 (2.7)				
Evaporator Blower and Drive Selection	Blower wheel nominal dia. x width — in. (mm)		(2) 15 x 15 (381 x 381)				
	2 hp (1.5 kW) [1]Motor & Drive	Nominal motor output - hp (kW)	2 (1.5)		- - - -		
		Max. usable motor output - hp (kW)	2.30 (1.7)		- - - -		
		Voltage & phase	208/230v, 460v 575v-3ph		- - - -		
		(Drive kit #) RPM range	(A) 535-725		- - - -		
	3 hp (2.2 kW) [1]Motor & Drives	Nominal motor output - hp (kW)	3 (2.2)				
		Max. usable motor output - hp (kW)	3.45 (2.6)				
		Voltage & phase	208/230v, 460v or 575v-3ph				
		(Drive kit #) RPM range	(A) 535-725 or (1 or 2) 685 — 865				
	5 hp (3.7 kW) [1]Motor & Drives	Nominal motor horsepower (kW)	5 (3.7)				
		Max. usable motor output - hp (kW)	5.75 (4.3)				
		Voltage & phase	208/230v, 460v or 575v-3ph				
		(Drive kit #) RPM range	(2) 685 - 865, (3) 850 - 1045 or (4) 945 - 1185				
	7.5 hp (5.6 kW) [1]Motor & Drive	Nominal motor output - hp (kW)	- - - -		7.5 (5.6)		
		Max. usable motor output - hp (kW)	- - - -		8.63 (6.4)		
		Voltage & phase	- - - -		208/230v, 460v or 575v-3ph		
		(Drive kit #) RPM range	- - - -		(5) 945 — 1185		
Evaporator Coil	Net face area — sq. ft. (m^2)		22.3 (2.07) total				
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 3				
	Fins per inch (m)		14 (551)				
	Drain connection no. & size — in. (mm) fpt		(1) 1 (25.4)				
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head				
Condenser Coil	Net face area — sq. ft. (m^2)		56.5 (5.25) total				
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 1 (standard efficiency) / 3/8 (9.5) — 2 (high efficiency)				
	Fins per inch (m)		20 (787) standard & 16 (630) high				
Condenser Fans	Diameter — in. (mm) & No. of blades		(4) 24 (610) — 3				
	Total Air volume — cfm (L/s)		15,850 (7480) standard efficiency — 15,700 (7410) high efficiency				
	Motor horsepower (W)		(4) 1/3 (249)				
	Motor rpm		1075				
	Total Motor watts		1370 standard efficiency — 1380 high efficiency				
Filters (furnished)	Type of filter		Disposable, commercial grade, pleated				
	No. and size — in. (mm)		(6) 24 x 24 x 2 (610 x 610 x 51)				
Electrical characteristics			208/230v, 460v or 575v — 60 hertz — 3 phase				

[1]Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished by Lennox are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

★Rated in accordance with ARI Standard 340/360 and certified to ARI; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator air; minimum external duct static pressure. Integrated Part Load Value tested at 80°F (27°C) outdoor air temperature.

NOTE — ARI capacity is net and includes evaporator blower motor heat deduction. Gross capacity does not include evaporator blower motor heat deduction.

SPECIFICATIONS - LCA/LGA-210

Model No.			LCA/LGA210S	LCA/LGA210H
Efficiency Type			Standard (S)	High (H)
Cooling Ratings	Gross Cooling Capacity - Btuh (kW)		212,000 (62.1)	218,000 (63.9)
	★Net Cooling Capacity - Btuh (kW)		204,000 (59.8)	210,000 (61.5)
	Total Unit Power (kW)		22.7	18.8
	★EER (Btuh/Watt)		9.0	11.2
	★Integrated Part Load Value (Btuh/Watt)		10.0	12.3
Refrigerant Charge Furnished (HCFC-22)		Circuit 1	7 lbs. 8 oz. (3.4 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 2	7 lbs. 8 oz. (3.4 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 3	7 lbs. 8 oz. (3.4 kg)	11 lbs. 0 oz. (4.99 kg)
		Circuit 4	7 lbs. 8 oz. (3.4 kg)	11 lbs. 0 oz. (4.99 kg)
Two Stage Heating Capacity (Natural or LPG/Propane Gas (at Sea Level)	Model No.		LGA210	
	Heat Input Type		Standard (S)	High (H)
	Input (low) — Btuh (kW)		169,000 (49.5)	305,000 (89.4)
	Output (low) — Btuh (kW)		135,000 (39.6)	244,000 (71.5)
	Input (High) — Btuh (kW)		260,000 (76.2)	470,000 (137.7)
	Output (High) — Btuh (kW)		208,000 (60.9)	376,000 (110.2)
	A.G.A./C.G.A. Thermal Efficiency		80.0%	
Gas Supply Connections npt — in. -Natural l or LPG/Propane			1	
Recommended Gas Supply Pressure - wc. in. (kPa)		Natural	7 (1.7)	
		LPG/Propane	11 (2.7)	
Evaporator Blower and Drive Selection	Blower wheel nominal dia. x width — in. (mm)		(2) 15 x 15 (381 x 381)	
	3 hp (2.2 kW) [1]Motor & Drives	Nominal motor output - hp (kW)	3 (2.2)	
		Max. usable motor output - hp (kW)	3.45 (2.6)	
		Voltage & phase	208/230v, 460v or 575v-3ph	
		(Drive kit #) RPM range	(A) 535-725 or (1 or 2) 685 — 865	
	5 hp (3.7 kW) [1]Motor & Drives	Nominal motor horsepower (kW)	5 (3.7)	
		Max. usable motor output - hp (kW)	5.75 (4.3)	
		Voltage & phase	208/230v, 460v or 575v-3ph	
		(Drive kit #) RPM range	(2) 685 - 865, (3) 850 - 1045 or (4) 945 - 1185	
	7.5 hp (5.6 kW) [1]Motor & Drive	Nominal motor output - hp (kW)	7.5 (5.6)	
		Max. usable motor output - hp (kW)	8.63 (6.4)	
		Voltage & phase	208/230v, 460v or 575v-3ph	
		(Drive kit #) RPM range	(5) 945 — 1185	
Evaporator Coil	Net face area — sq. ft. (m^2)		22.3 (2.07) total	
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 3 (standard efficiency) / 3/8 (9.5) — 4 (high efficiency)	
	Fins per inch (m)		14 (551)	
	Drain connection no. & size — in. (mm) fpt		(1) 1 (25.4)	
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head	
Condenser Coil	Net face area — sq. ft. (m^2)		56.5 (5.25) total	
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 1 (standard efficiency) / 3/8 (9.5) — 2 (high efficiency)	
	Fins per inch (m)		20 (787) standard & 16 (630) high	
Condenser Fans	Diameter — in. (mm) & No. of blades		(4) 24 (610) — 3	
	Total Air volume — cfm (L/s)		15,850 (7480) standard efficiency — 15,700 (7410) high efficiency	
	Motor horsepower (W)		(4) 1/3 (249)	
	Motor rpm		1075	
	Total Motor watts		1370 standard efficiency — 1380 high efficiency	
Filters (furnished)	Type of filter		Disposable, commercial grade, pleated	
	No. and size — in. (mm)		(6) 24 x 24 x 2 (610 x 610 x 51)	
Electrical characteristics			208/230v, 460v or 575v — 60 hertz — 3 phase	

[1]Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished by Lennox are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

★Rated in accordance with ARI Standard 340/360 and certified to ARI; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator air; minimum external duct static pressure. Integrated Part Load Value tested at 80°F (27°C) outdoor air temperature.

NOTE — ARI capacity is net and includes evaporator blower motor heat deduction. Gross capacity does not include evaporator blower motor heat deduction.

SPECIFICATIONS - LCA/LGA 240/300

Model No.			LCA/LGA240S	LCA/LGA240H	[1]LCA/LGA300S	
Cooling Ratings	Efficiency Type		Standard (S)	High (H)	Standard (S)	
	Gross Cooling Capacity — Btuh (kW)		248,000 (72.7)	252,000 (73.8)	301,600 (88.4)	
	★Net Cooling Capacity — Btuh (kW)		238,000 (69.7)	242,000 (70.9)	[1]284,000 (83.3)	
	Total Unit Power (kW)		26.4	22.0	31.5	
	★EER (Btuh/Watt)		9.0	11.0	[1]9.0	
	★Integrated Part Load Value (Btuh/Watt)		10.0	11.8	[1]9.5	
Refrigerant Charge Furnished (HCFC-22)		Circuit 1	10 lbs. 0 oz. (4.54 kg)	11 lbs. 4 oz. (5.10 kg)	11 lbs. 4 oz. (5.10 kg)	
		Circuit 2	10 lbs. 0 oz. (4.54 kg)	11 lbs. 4 oz. (5.10 kg)	11 lbs. 4 oz. (5.10 kg)	
		Circuit 3	10 lbs. 0 oz. (4.54 kg)	11 lbs. 4 oz. (5.10 kg)	11 lbs. 4 oz. (5.10 kg)	
		Circuit 4	10 lbs. 0 oz. (4.54 kg)	11 lbs. 4 oz. (5.10 kg)	11 lbs. 4 oz. (5.10 kg)	
Two Stage Heating Capacity (Natural or LPG/Propane Gas) (at sea level)	Model No.		LGA240		LGA300	
	Heat Input Type		Standard (S)	High (H)	Standard (S)	High (H)
	Input (low) — Btuh (kW)		169,000 (49.5)	305,000 (89.4)	169,000 (49.5)	305,000 (89.4)
	Output (low) — Btuh (kW)		135,000 (39.6)	244,000 (71.5)	135,000 (39.6)	244,000 (71.5)
	Input (High) — Btuh (kW)		260,000 (76.2)	470,000 (137.7)	260,000 (76.2)	470,000 (137.7)
	Output (High) — Btuh (kW)		208,000 (60.9)	376,000 (110.2)	208,000 (60.9)	376,000 (110.2)
	A.G.A./C.G.A. Thermal Efficiency		80.0%			
Gas Supply Connections npt — in.		Natural	1			
		LPG/Propane	1			
Recommended Gas Supply Pressure — wc. in. (kPa)		Natural	7 (1.7)			
		LPG/Propane	11 (2.7)			
Evaporator Blower and Drive Selection	Blower wheel nominal dia. x width — in. (mm)		(2) 15 x 15 (381 x 381)			
	3 hp (2.2 kW) [1]Motor & Drives	Nominal motor output — hp (kW)	3 (2.2)		- - - -	
		Max. usable motor output — hp (kW)	3.45 (2.6)		- - - -	
		Voltage & phase	208/230v, 460v or 575v-3ph		- - - -	
		(Drive kit #) RPM range	(1 or 2) 685 — 865		- - - -	
	5 hp (3.7 kW) [1]Motor & Drives	Nominal motor output — hp (kW)	5 (3.7)			
		Max. usable motor output — hp (kW)	5.75 (4.3)			
		Voltage & phase	208/230v, 460v or 575v-3ph			
		(Drive kit #) RPM range	(2) 685 - 865, (3) 850 - 1045 or (4) 945 - 1185			
	7.5 hp (5.6 kW) [1]Motor & Drive	Nominal motor horsepower (kW)	7.5 (5.6)			
		Max. usable motor output — hp (kW)	8.63 (6.4)			
		Voltage & phase	208/230v, 460v or 575v-3ph			
		(Drive kit #) RPM range	(5) 945 — 1185			
Evaporator Coil	Net face area — sq. ft. (m^2)		22.3 (2.07) total			
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 3 (Standard Efficiency) 3/8 (9.5) — 4 (High Efficiency)		3/8 (9.5) — 4	
	Fins per inch (m)		14 (551)			
	Drain connection no. & size — in. (mm) fpt		(1) 1 (25.4)			
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head			
Condenser Coil	Net face area — sq. ft. (m^2)		56.5 (5.25) total			
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 2			
	Fins per inch (m)		20 (787)			
Condenser Fans	Diameter — in. (mm) & No. of blades		(4) 24 (610) — 3			
	Total Air volume — cfm (L/s)		15,450 (7290)		16,000 (7550)	
	Motor horsepower (W)		(4) 1/3 (249)		(4) 1/2 (373)	
	Motor rpm		1075			
	Total Motor watts		1395		1800	
Filters (furnished)	Type of filter		Disposable, commercial grade, pleated			
	No. and size — in. (mm)		(6) 24 x 24 x 2 (610 x 610 x 51)			
Electrical characteristics			208/230v, 460v or 575v — 60 hertz — 3 phase			

[1]Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished by Lennox are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

★Rated in accordance with ARI Standard 340/360 and certified to ARI; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering evaporator air; minimum external duct static pressure. Integrated Part Load Value tested at 80°F (27°C) outdoor air temperature.

[1]Tested at conditions included in ARI Standard 340/360.

NOTE — ARI capacity is net and includes evaporator blower motor heat deduction. Gross capacity does not include evaporator blower motor heat deduction.

SPECIFICATIONS - LHA 180/240

Model No.			LHA180H	LHA240H
Cooling Ratings	Efficiency Type		High (H)	High (H)
	Gross Cooling Capacity — Btuh (kW)		185,000 (54.2)	233,000 (68.3)
	★Net Cooling Capacity — Btuh (kW)		180,000 (52.7)	226,000 (66.2)
	Total Unit Power (kW)		18.0	21.5
	★EER (Btuh/Watt)		10.0	10.5
	★Integrated Part Load Value (Btuh/Watt)		11.2	11.5
High Temperature Heating Ratings	*Total Heating Capacity — Btuh (kW)		188,000 (55.1)	220,000 (64.5)
	*Total Unit Power (kW)		16.7	20.2
	*C.O.P.		3.3	3.2
Low Temperature Heating Ratings	*Total Heating Capacity — Btuh (kW)		108,000 (31.6)	118,000 (34.6)
	*Total Unit Power (kW)		13.2	15.0
	*C.O.P.		2.4	2.3
Refrigerant Charge Furnished (HCFC-22)	Circuit 1		24 lbs. 8 oz. (11.11 kg)	26 lbs. 0 oz. (11.79 kg)
	Circuit 2		24 lbs. 8 oz. (11.11 kg)	26 lbs. 0 oz. (11.79 kg)
Indoor Coil Blower and Drive Selection	Blower wheel nominal dia. x width — in. (mm)		(2) 15 x 15 (381 x 381)	
	3 hp (2.2 kW) [1]Motor & Drives	Nominal motor output — hp (kW)	3 (2.2)	
		Max. usable motor output — hp (kW)	3.45 (2.6)	
		Voltage & phase	208/230v, 460v or 575v-3ph	
		(Drive kit #) RPM range	(1 or 2) 685 — 865	
	5 hp (3.7 kW) [1]Motor & Drives	Nominal motor horsepower (kW)	5 (3.7)	
		Max. usable motor output — hp (kW)	5.75 (4.3)	
		Voltage & phase	208/230v, 460v or 575v-3ph	
		(Drive kit #) RPM range	(2) 685 - 865, (3) 850 - 1045 or (4) 945 - 1185	
	7.5 hp (5.6 kW) [1]Motor & Drive	Nominal motor horsepower (kW)	7.5 (5.6)	
		Max. usable motor output — hp (kW)	8.63 (6.4)	
		Voltage & phase	208/230v, 460v or 575v-3ph	
		(Drive kit #) RPM range	(5) 945 — 1185	
Indoor Coil	Net face area — sq. ft. (m^2)		22.3 (2.07)	
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 3	3/8 (9.5) — 4
	Fins per inch (m)		14 (551)	
	Drain connection no. & size — in. (mm) fpt		(1) 1 (25.4)	
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head	
Outdoor Coil	Net face area — sq. ft. (m^2)		57.0 (5.30)	
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 2	
	Fins per inch (m)		20 (787)	
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head	
Outdoor Fans	Diameter — in. (mm) & No. of blades		(4) 24 (610) — 3	
	Total Air volume — cfm (L/s)		15,450 (7290)	
	Motor horsepower (W)		(4) 1/3 (249)	
	Motor rpm		1075	
	Total Motor watts		1395	
Filters (furnished)	Type of filter		Disposable, commercial grade, pleated	
	No. and size — in. (mm)		(6) 24 x 24 x 2 (610 x 610 x 51)	
Electrical characteristics			208/230v, 460v or 575v — 60 hertz — 3 phase	

★Rated in accordance with ARI Standard 340/360 and certified to ARI. Integrated Part Load Value tested at 80°F (27°C) outdoor air temperature.

Cooling Ratings— 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19°C) wb entering indoor coil air.

High Temperature Heating Ratings— 47°F (8°C) db/43°F (6°C) wb outdoor air temperature and 70°F (21°C) entering indoor coil air.

Low Temperature Heating Ratings— 17°F (-8°C) db/15°F (-9°C) wb outdoor air temperature and 70°F (21°C) entering indoor coil air.

NOTE — ARI capacity is net and includes indoor blower motor heat deduction. Gross capacity does not include indoor blower motor heat deduction.

[1]Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished by Lennox are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

OPTIONAL FIELD INSTALLED ACCESSORIES - ALL MODELS

Item		LCA/ LGA156	LCA/LGA/ LHA180	LCA/LGA210	LCA/LGA/ LHA240	LCA/LGA300S
Aspiration box — for duct mounting of Indoor Air Quality Sensor		**47N18**				
Coil Guards - Galvanized steel wire guards to protect outdoor coil. Not used with Hail Guards.		**88K52**				
Dehumidistat - Monitors humidity levels, reports to the IMC board which allows the heating and cooling to run simultaneously as needed.		**65F86**				
Diffusers - Aluminum grilles, large center grille, insulated diffuser box with flanges, hanging rings furnished, interior transition (even air flow), internally sealed (prevents recirculation), adapts to T-bar ceiling grids or plaster ceilings- Net Weight	**Step-Down -** double deflection louvers	RTD11-185 392 lbs. (178 kg)		RTD11-275 - 403 lbs. (183 kg)		
	Flush - fixed blade louvers	FD11-185 289 lbs. (135 kg)		FD11-275 - 363 lbs. (165 kg)		
Grille Guards — Protects the space between outdoor coils and main unit.		**72K78**				
Hail Guards — Constructed of heavy gauge steel, painted to match cabinet, helps protect outdoor coils from hail damage. Not used with Coil Guards.		**88K25 -** LCA/LGA Models **88K28 -** LHA Models				
Horizontal Gravity Exhaust Dampers — Aluminum blade dampers prevent blow back and outdoor air infiltration during off cycle, field installed in return air duct, bird screen furnished- Net Weight		LAGEDH18/24 - 20 lbs. (9 kg)				
Horizontal Return Air Panel Kit — Required for horizontal applications with horizontal roof mounting frame, contains panel with return air opening for field replacement of existing unit panel and panel to cover bottom return air opening in unit, see dimension drawings		**38K47**				
IMC Software and PC Interface Kit		**86K84**				
IMC Software and Manual Only		**32K22**				
Indoor Air Quality (CO_2) Sensor — Monitors CO_2 levels, reports to Integrated Modular Control (IMC) board which adjusts economizer dampers as needed		**93J69**				
Insulation Kit - helps prevent sweating on horizontal roof mounting frames	26 inch (660 mm) frames	**73K32**				
	30 inch (762 mm) frames	- - - -				**73K33**
	37 inch (940 mm) frames	**73K34**				
	41 inch (1041 mm) frames	- - - -				**73K35**
LPG/Propane Kits		**41L15** (2 kits required)				
PC Interface Kit Only		**28K56**				
Roof Mounting Frame — Nailer strip furnished, mates to unit, U.S. National Roofing Contractors Approved, shipped knocked down - Net Weight	14 inch (356 mm) height	LARMF18/36-14 - 160 lbs. (73 kg)				
	24 inch (610 mm) height	LARMF18/36-24 - 220 lbs. (100 kg)				
Roof Mounting Frame (Horizontal) — Nailer strip furnished, mates to unit, converts unit from downflow to horizontal (side) air flow, shipped knocked down, return air is on unit, supply air is on frame, see dimension drawings. Frames for rooftop applications meet National Roofing Code requirements. Requires Horizontal Return Air Panel, see above- Net Weight	26 in. (660 mm) height (for slab applications)	[1]LARMFH18/24-26 - 420 lbs. (191 kg)				
	30 in. (762 mm) height (for slab applications)	- - - -				[1]LARMFH 30/36-30 445 lbs. (202 kg)
	37 in. (940 mm) height (for rooftop applications)	[1]LARMFH18/24-37 - 580 lbs. (263 kg)				
	41 in. (1041 mm) height (for rooftop applications)	- - - -				[1]LARMFH 30/36-41 725 lbs. (329 kg)
Transitions (Supply and Return) — Used with diffusers, installs in roof mounting frame, galvanized steel construction, flanges furnished for duct connection, fully insulated		LASRT18 80 lbs. (36 kg)		LASRT21/24 - 75 lbs. (34 kg)		
Vertical Vent Extension Kit - to exhaust flue gases vertically above unit (LGA Models Only)		LB-94710A (**40L80**)				

[1]Either LARMFH30/36-30(-41) or LARMFH18/24-26(-37) roof mounting frames may be used for the 300S models, however, the smaller frames (LARMF18/24) will increase static pressure.

OPTIONAL ELECTRIC HEAT ACCESSORIES - LCA/LHA

ELECTRIC HEAT CONTROL MODULE AND UNIT FUSE BLOCKS

Unit Model No.			LCA156H	LCA180S	LCA180H	LCA210S	LCA210H	LCA240S	LCA240H	LCA300S	LHA180H	LHA240H
Electric Heat	Model No.		EHA (see Electric Heat Data tables for additional information)									
	kW Input Range	15	X	X	X	X	X	X	X	X	X	X
		30	X	X	X	X	X	X	X	X	X	X
		45	X	X	X	X	X	X	X	X	X	X
		60	X	X	X	X	X	X	X	X	X	X
		90	- - - -	- - - -	- - - -	X	X	X	X	X	- - - -	X
Electric Heat Control Module (45/60/90 kW)			**15K13** (208/230v), **15K92** (460v), **15K93** (575v)									
Unit Fuse Block (3 phase)	**With** Power Exhaust Fans	208/230v - 2 hp (1.5 kW)	**56K95**	- - - -								
		460v - 2 hp (1.5 kW)	**25K10**	- - - -								
		575v - 2 hp (1.5 kW)	**25K08**	- - - -								
		208/230v - 3 hp (2.2 kW)	**56K96**	**25K15**				**25K18**		- - - -	**25K17**	**25K18**
		460v - 3 hp (2.2 kW)	**25K10**	**25K11**	**25K13**					- - - -	**25K11**	**25K13**
		575v - 3 hp (2.2 kW)	**25K08**	**25K09**	**25K10**				**25K11**	- - - -	**25K09**	**25K10**
		208/230v - 5 hp (3.7 kW)	**56K96**	**25K17**		**25K18**	**25K17**	**25K18**		**25K19**	**25K17**	**25K18**
		460v - 5 hp (3.7 kW)	**25K11**	**25K13**			**25K14**		**25K13**	**25K14**	**25K11**	**25K13**
		575v - 5 hp (3.7 kW)	**25K09**	**25K10**					**25K11**	**25K13**	**25K10**	**25K11**
		208/230v - 7.5 hp (5.6 kW)	- - - -	**25K18**		**25K19**	**25K18**	**25K19**			**25K18**	**25K19**
		460v - 7.5 hp (5.6 kW)	- - - -	**25K13**		**25K14**					**25K13**	
		575v - 7.5 hp (5.6 kW)	- - - -	**25K10**	**25K11**	**25K13**	**25K12**	**25K11**	**25K13**		**25K10**	**25K11**
Unit Fuse Block (3 phase)	**Without** Power Exhaust Fans	208/230v - 2 hp (1.5 kW)	**56K95**	**- - - -**								
		460v - 2 hp (1.5 kW)	**25K10**	- - - -								
		575v - 2 hp (1.5 kW)	**25K08**	- - - -								
		208/230v - 3 hp (2.2 kW)	**56K95**	**25K15**				**25K17**	**25K18**	- - - -	**25K15**	**25K18**
		460v - 3 hp (2.2 kW)	**25K10**	**25K11**				**25K13**		- - - -	**25K10**	**25K11**
		575v - 3 hp (2.2 kW)	**25K08**	**25K08**	**25K09**				**25K11**	- - - -	**25K09**	**25K10**
		208/230v - 5 hp (3.7 kW)	**56K96**	**25K15**	**25K17**			**25K18**		**25K19**	**25K17**	**25K18**
		460v - 5 hp (3.7 kW)	**25K10**	**25K11**	**25K13**				**25K14**		**25K11**	**25K13**
		575v - 5 hp (3.7 kW)	**25K08**	**25K09**	**25K10**				**25K11**		**25K09**	**25K10**
		208/230v - 7.5 hp (5.6 kW)	- - - -	**25K18**				**25K19**			**25K18**	
		460v - 7.5 hp (5.6 kW)	- - - -	**25K13**		**25K14**					**25K13**	
		575v - 7.5 hp (5.6 kW)	- - - -	**25K10**	**25K11**		**25K13**				**25K10**	**25K11**

LTB2 ELECTRIC HEAT TERMINAL BLOCK
LTB2-175 (30K75) 175 amps, LTB2-335 (30K76) 335 amps
(Required For Units Without Disconnect/Circuit Breaker But With Single Point Power Source)

	Unit Model No.		LCA156H	LCA180S	LCA180H	LCA210S	LCA210H	LCA240S	LCA240H	LCA300S	LHA180H	LHA240H
LTB2 Terminal Block (3 phase)	15 kW *208/230v 3ph	2 hp (1.5 kW)	**30K75**	- - - -								
		3 hp (2.2 kW)		**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	- - - -	**30K75**	**30K75**
		5 hp (3.7 kW)								**30K75**		
		7.5 hp (5.6 kW)	- - - -									
	30 kW *208/230v 3ph	2 hp (1.5 kW)	**30K75**	- - - -								
		3 hp (2.2 kW)		**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	- - - -	**30K75**	**30K76**
		5 hp (3.7 kW)								**30K75**		
		7.5 hp (5.6 kW)	- - - -								**30K76**	
	45 kW *208/230v 3ph	2 hp (1.5 kW)	**30K75**	- - - -								
		3 hp (2.2 kW)		**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	- - - -	**30K76**	**30K76**
		5 hp (3.7 kW)								**30K75**		
		7.5 hp (5.6 kW)	- - - -							**30K76**		
	60 kW *208/230v 3ph	2 hp (1.5 kW)	**30K75**	- - - -								
		3 hp (2.2 kW)		**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	- - - -	**30K76**	**30K76**
		5 hp (3.7 kW)								**30K76**		
		7.5 hp (5.6 kW)	- - - -	**30K76**	**30K76**							
	90 kW *208/230v 3ph	3 hp (2.2 kW)	- - - -			**30K76**	**30K76**	**30K76**	**30K76**	- - - -	- - - -	**30K76**
		5 hp (3.7 kW)								**30K76**		
		7.5 hp (5.6 kW)										

NOTE — Terminal Block is factory installed in units with factory installed electric heat without disconnect/circuit breaker but with single point power source.

***NOTE — ALL 460V AND 575V UNIT VOLTAGES USE LTB2-175 (30K75) TERMINAL BLOCK.**

ELECTRICAL DATA

Model No.			LCA/LGA156H									LCA/LGA180								
Line voltage data — 60 Hz — 3 phase			208/230v			460v			575v			208/230v			460v			575v		
Condenser Fan Motors (4)	Full load amps - each (total)		2.4 (9.6)			1.3 (5.2)			1.0 (4.0)			2.4 (9.6)			1.3 (5.2)			1.0 (4.0)		
	Locked rotor amps - each (total)		4.7 (18.8)			2.3 (9.6)			1.9 (7.6)			4.7 (18.8)			2.3 (9.6)			1.9 (7.6)		
Evaporator Blower Motor	Motor Output	hp	2	3	5	2	3	5	2	3	5	3	5	7.5	3	5	7.5	3	5	7.5
		kW	1.5	2.2	3.7	1.5	2.2	3.7	1.5	2.2	3.7	2.2	3.7	5.6	2.2	3.7	5.6	2.2	3.7	5.6
	Full load amps		7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1	10.6	16.7	24.2	4.8	7.6	11.0	3.9	6.1	9.0
	Locked rotor amps		46.9	66	105	20.4	26.8	45.6	16.2	23.4	36.6	66	105	152	26.8	45.6	66	23.4	36.6	54
Optional Power Exhaust Fans	(No.) Horsepower (W)		(2) 1/3 (249)									(2) 1/3 (249)								
	Full load amps (total)		4.8			2.6			2.0			4.8			2.6			2.0		
	Locked rotor amps (total)		9.4			4.8			3.8			9.4			4.8			3.8		
Service Outlet (2) 115 volt GFCI (amp rating)			15			15			15			15			15			15		
LCA/LGA156H AND LCA/LGA180H MODELS																				
Compressors (3)	Rated load amps each (total)		13.5 (40.5)			7.4 (22.2)			5.8 (17.4)			17.3 (51.9)			9.0 (27.0)			7.1 (21.3)		
	Locked rotor amps each (total)		99 (297)			49.5 (148.5)			40 (120)			123.0 (369.0)			62.0 (186.0)			50.0 (150.00)		
Recommended maximum fuse size (amps)	With Exhaust Fans		70	80	80	40	40	45	30	30	35	90	100	110	50	50	50	40	40	45
	Less Exhaust Fans		70	70	80	40	40	40	30	30	30	90	100	110	45	50	50	35	40	45
†Minimum Circuit Ampacity	With Exhaust Fans		66	69	75	36	37	40	28	29	31	81	87	96	41	44	48	33	35	39
	Less Exhaust Fans		61	65	71	33	35	37	26	27	29	76	83	92	39	42	46	31	33	37
LCA/LGA180S MODEL																				
Compressors (3)	Rated load amps each (total)		----									16.7 (50.1)			8.6 (25.8)			6.0 (18.0)		
	Locked rotor amps each (total)											110.0 (330.0)			55.0 (165.0)			44.0 (132.0)		
Recommended maximum fuse size (amps)	With Exhaust Fans											90	100	110	45	50	50	35	35	40
	Less Exhaust Fans											90	90	110	45	45	50	30	35	40
†Minimum Circuit Ampacity	With Exhaust Fans											79	85	95	40	43	47	29	32	35
	Less Exhaust Fans											74	81	90	38	41	45	27	30	33

†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.
NOTE — Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only).

Model No.			LCA/LGA210								
Line voltage data — 60 Hz — 3 phase			208/230v			460v			575v		
Condenser Fan Motors (4)	Full load amps - each (total)		2.4 (9.6)			1.3 (5.2)			1.0 (4.0)		
	Locked rotor amps - each (total)		4.7 (18.8)			2.3 (9.6)			1.9 (7.6)		
Evaporator Blower Motor	Motor Output	hp	3	5	7.5	3	5	7.5	3	5	7.5
		kW	2.2	3.7	5.6	2.2	3.7	5.6	2.2	3.7	5.6
	Full load amps		10.6	16.7	24.2	4.8	7.6	11.0	3.9	6.1	9.0
	Locked rotor amps		66	105	152	26.8	45.6	66	23.4	36.6	54
Optional Power Exhaust Fans	(No.) Horsepower (W)		(2) 1/3 (249)								
	Full load amps (total)		4.8			2.6			2.0		
	Locked rotor amps (total)		9.4			4.8			3.8		
Service Outlet (2) 115 volt GFCI (amp rating)			15			15			15		
LCA/LGA210S MODELS											
Compressors (4)	Rated load amps each (total)		14.0 (56.0)			7.0 (28.0)			5.8 (23.2)		
	Locked rotor amps each (total)		92.0 (368.0)			46.0 (184.0)			44.0 (176.0)		
Recommended maximum fuse size (amps)	With Exhaust Fans		90	100	125	50	50	60	40	40	50
	Less Exhaust Fans		90	100	110	45	50	60	35	40	45
†Minimum Circuit Ampacity	With Exhaust Fans		85	91	101	45	48	52	35	38	41
	Less Exhaust Fans		80	87	96	43	46	50	33	35	39
LCA/LGA210H MODELS											
Compressors (4)	Rated load amps each (total)		13.5 (54.0)			7.4 (29.6)			5.8 (23.2)		
	Locked rotor amps each (total)		120.0 (480.0)			49.5 (198.0)			40.0 (160.0)		
Recommended maximum fuse size (amps)	With Exhaust Fans		90	100	110	50	50	60	40	40	45
	Less Exhaust Fans		90	100	110	45	50	60	35	40	45
†Minimum Circuit Ampacity	With Exhaust Fans		82	89	98	44	47	51	35	37	40
	Less Exhaust Fans		78	84	94	41	44	49	33	35	38

†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.
NOTE — Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only).

ELECTRICAL DATA - LCA/LGA210/300

Model No.			LCA/LGA240									LCA/LGA300S					
Line voltage data — 60 Hz — 3 phase			208/230v			460v			575v			208/230v		460v		575v	
Condenser Fan Motors (4)	Full load amps - each (total)		2.4 (9.6)			1.3 (5.2)			1.0 (4.0)			3 (12.0)		1.5 (6.0)		1.2 (4.8)	
	Locked rotor amps - each (total)		4.7 (18.8)			2.3 (9.6)			1.9 (7.6)			6 (24.0)		3 (12.0)		2.9 (11.6)	
Evaporator Blower Motor	Motor Output	hp	3	5	7.5	3	5	7.5	3	5	7.5	5	7.5	5	7.5	5	7.5
		kW	2.2	3.7	5.6	2.2	3.7	5.6	2.2	3.7	5.6	3.7	5.6	3.7	5.6	3.7	5.6
	Full load amps		10.6	16.7	24.2	4.8	7.6	11.0	3.9	6.1	9.0	16.7	24.2	7.6	11.0	6.1	9.0
	Locked rotor amps		66	105	152	26.8	45.6	66	23.4	36.6	54	105	152	45.6	66	36.6	54
Optional Power Exhaust Fans	(No.) Horsepower (W)		(2) 1/3 (249)									(2) 1/3 (249)					
	Full load amps (total)		4.8			2.6			2.0			4.8		2.6		2.0	
	Locked rotor amps (total)		9.4			4.8			3.8			9.4		4.8		3.8	
Service Outlet (2) 115 volt GFCI (amp rating)			15			15			15			15		15		15	
LCA/LGA240S AND LCA/LGA300S MODELS																	
Compressors (4)	Locked rotor amps each (total)		110.0 (440.0)			55.0 (220.0)			44.0 (176.0)			156 (624)		70 (280)		54 (216)	
	Rated load amps each (total)		16.7 (66.8)			8.6 (34.4)			6.0 (24.0)			18.6 (74.4)		9.0 (36.0)		7.4 (29.6)	
Recommended maximum fuse size (amps)	With Exhaust Fans		110	110	125	50	60	60	40	40	50	125	125	60	60	50	50
	Less Exhaust Fans		100	110	125	50	50	60	35	40	45	125	125	60	60	45	50
†Minimum Circuit Ampacity	With Exhaust Fans		96	102	111	49	52	56	35	38	41	113	122	55	59	45	48
	Less Exhaust Fans		91	97	107	47	49	53	33	36	39	108	117	52	56	43	46
LCA/LGA240H MODELS																	
Compressors (4)	Locked rotor amps each (total)		123.0 (492.0)			62.0 (248.0)			50.0 (200.0)			----					
	Rated load amps each (total)		17.3 (69.2)			9.0 (36.0)			7.1 (28.4)								
Recommended maximum fuse size (amps)	With Exhaust Fans		110	110	125	50	60	60	45	45	50						
	Less Exhaust Fans		110	110	125	50	60	60	45	45	50						
†Minimum Circuit Ampacity	With Exhaust Fans		98	104	114	50	53	57	40	42	46						
	Less Exhaust Fans		94	100	109	48	51	55	38	40	44						

†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.
NOTE — Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only).

ELECTRICAL DATA - LHA 180/240

Model No.			LHA180H									LHA240H								
Line voltage data — 60 Hz — 3 phase			208/230v			460v			575v			208/230v			460v			575v		
Unit Efficiency			High (H)									High (H)								
Compressors (2)	Rated load amps each (total)		23.9 (47.8)			10.6 (21.2)			8.7 (17.4)			27.6 (55.2)			11.6 (23.2)			10.4 (20.8)		
	Locked rotor amps each (total)		185.0 (370.0)			89.0 (178.0)			78.4 (156.8)			205.0 (410.0			104.0 (208.0)			78.4 (156.8)		
Outdoor Coil Fan Motors (4)	Full load amps - each (total)		2.4 (9.6)			1.3 (5.2)			1.0 (4.0)			2.4 (9.6)			1.3 (5.2)			1.0 (4.0)		
	Locked rotor amps (total)		4.7 (18.8)			2.3 (9.6)			1.9 (7.6)			4.7 (18.8)			2.3 (9.6)			1.9 (7.6)		
Indoor Coil Blower Motor	Motor Output	hp	3	5	7.5	3	5	7.5	3	5	7.5	3	5	7.5	3	5	7.5	3	5	7.5
		kW	2.2	3.7	5.6	2.2	3.7	5.6	2.2	3.7	5.6	2.2	3.7	5.6	2.2	3.7	5.6	2.2	3.7	5.6
	Full load amps		10.6	16.7	24.2	4.8	7.6	11.0	3.9	6.1	9.0	10.6	16.7	24.2	4.8	7.6	11.0	3.9	6.1	9.0
	Locked rotor amps		66	105	152	26.8	45.6	66	23.4	26.6	54	66	105	152	26.8	45.6	66	23.4	36.6	54
Rec. max. fuse size (amps)	With Exhaust Fans		100	100	110	45	45	50	35	40	40	110	110	125	50	50	50	40	45	45
	Less Exhaust Fans		90	100	110	40	45	50	35	35	40	110	110	110	45	50	50	40	40	45
†Minimum Circuit Ampacity	With Exhaust Fans		79	85	92	36	39	42	29	32	35	87	93	101	38	41	45	33	36	38
	Less Exhaust Fans		74	80	88	34	37	40	27	30	33	82	88	96	36	39	42	31	34	36
Optional Power Exhaust Fans	(No.) Horsepower (W)		(2) 1/3 (249)																	
	Full load amps (total)		4.8			2.6			2.0			4.8			2.6			2.0		
	Locked rotor amps (total)		9.4			4.8			3.8			9.4			4.8			3.8		
Service Outlet (2) 115 volt GFCI (amp rating)			15			15			15			15			15			15		

†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.
NOTE — Where current does not exceed 100 amps, HACR type circuit breaker may be used in place of fuse (U.S. only).

BLOWER DATA-BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR LCA156 BASE UNIT ONLY WITH DRY INDOOR COIL & AIR FILTERS IN PLACE.
FOR ALL UNITS ADD:

1 - Wet indoor coil air resistance of selected unit.
2 - Any factory installed options air resistance (heat section, economizer, etc.)
3 - Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output and drive required.
See Pages 30-31 for wet coil and option/accessory air resistance data.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

- -LCA156H units require 5200 cfm (2455 L/s) minimum air with electric heat.
- -All other LCA units require 6000 cfm (2830 L/s) minimum air with electric heat.
- -LHA units with 15, 30 or 45 kW electric heat require 6400 cfm (3020 L/s) minimum air.
- -LHA units with 60 or 90 kW electric heat require 7000 cfm (3305 L/s) minimum air.

BOLD ITALICS INDICATE FIELD FURNISHED DRIVE

Air Volume cfm (L/s)	TOTAL STATIC PRESSURE — Inches Water Gauge (Pa)																	
	.20 (50)		.40 (100)		.60 (150)		.80 (200)		1.00 (250)		1.20 (300)		1.40 (350)		1.60 (400)		1.80 (450)		2.00 (495)		2.20 (545)		2.40 (595)		2.60 (645)	
	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)	RPM	BHP (kW)
3500 (1650)	***395***	***0.35 (0.26)***	***495***	***0.55 (0.41)***	590	0.80 (0.60)	670	1.05 (0.78)	745	1.30 (0.97)	810	1.55 (1.16)	870	1.85 (1.38)	930	2.15 (1.60)	980	2.40 (1.79)	1030	2.70 (2.01)	1080	3.00 (2.24)	1125	3.30 (2.46)	1165	3.55 (2.65)
3750 (1770)	***395***	***0.40 (0.30)***	***495***	***0.60 (0.45)***	595	0.90 (0.67)	675	1.15 (0.86)	750	1.40 (1.04)	815	1.70 (1.27)	875	1.95 (1.45)	930	2.25 (1.68)	985	2.55 (1.90)	1035	2.85 (2.13)	1080	3.15 (2.35)	1130	3.50 (2.61)	1170	3.75 (2.80)
4000 (1890)	***400***	***0.45 (0.34)***	***500***	***0.65 (0.48)***	595	0.95 (0.71)	680	1.20 (0.90)	755	1.50 (1.12)	820	1.80 (1.34)	880	2.10 (1.57)	935	2.40 (1.79)	990	2.70 (2.01)	1040	3.00 (2.24)	1085	3.35 (2.50)	1130	3.65 (2.72)	1175	4.00 (2.98)
4250 (2005)	***405***	***0.50 (0.37)***	***505***	***0.75 (0.56)***	600	1.00 (0.75)	685	1.30 (0.97)	755	1.60 (1.19)	825	1.95 (1.45)	885	2.25 (1.68)	940	2.55 (1.90)	990	2.85 (2.13)	1040	3.15 (2.35)	1090	3.50 (2.61)	1135	3.85 (2.87)	1180	4.20 (3.13)
4500 (2125)	***405***	***0.55 (0.41)***	***510***	***0.80 (0.60)***	605	1.10 (0.82)	690	1.40 (1.04)	760	1.70 (1.27)	825	2.05 (1.53)	885	2.35 (1.75)	945	2.70 (2.01)	995	3.00 (2.24)	1045	3.35 (2.50)	1095	3.70 (2.76)	1140	4.05 (3.02)	1185	4.45 (3.32)
4750 (2240)	***410***	***0.60 (0.45)***	***515***	***0.85 (0.63)***	610	1.20 (0.90)	695	1.50 (1.12)	765	1.85 (1.38)	830	2.15 (1.60)	890	2.50 (1.87)	950	2.85 (2.13)	1000	3.20 (2.39)	1050	3.55 (2.65)	1100	3.90 (2.91)	1145	4.30 (3.21)	1185	4.60 (3.43)
5000 (2360)	***415***	***0.65 (0.48)***	***520***	***0.95 (0.71)***	615	1.25 (0.93)	695	1.60 (1.19)	770	1.95 (1.45)	835	2.30 (1.72)	895	2.65 (1.98)	950	3.00 (2.24)	1005	3.40 (2.54)	1055	3.75 (2.80)	1100	4.10 (3.06)	1145	4.45 (3.32)	***1190***	***4.85 (3.62)***
5250 (2475)	***420***	***0.70 (0.52)***	***525***	***1.00 (0.75)***	620	1.35 (1.01)	700	1.70 (1.27)	775	2.10 (1.57)	840	2.45 (1.83)	900	2.80 (2.09)	955	3.15 (2.35)	1010	3.55 (2.65)	1060	3.95 (2.95)	1105	4.30 (3.21)	1150	4.70 (3.51)	***1195***	***5.10 (3.80)***
5500 (2595)	***425***	***0.75 (0.56)***	***530***	***1.10 (0.82)***	625	1.45 (1.08)	705	1.85 (1.38)	775	2.20 (1.64)	845	2.60 (1.94)	905	2.95 (2.20)	960	3.35 (2.50)	1010	3.70 (2.76)	1065	4.15 (3.10)	1110	4.55 (3.39)	1155	4.95 (3.69)	***1200***	***5.35 (3.99)***
5750 (2715)	***430***	***0.80 (0.60)***	535	1.15 (0.86)	630	1.55 (1.16)	710	1.95 (1.45)	780	2.35 (1.75)	845	2.70 (2.01)	905	3.10 (2.31)	965	3.55 (2.65)	1015	3.90 (2.91)	1065	4.35 (3.25)	1115	4.75 (3.54)	1160	5.15 (3.84)	----	
6000 (2830)	***430***	***0.85 (0.63)***	540	1.25 (0.93)	635	1.65 (1.23)	715	2.05 (1.53)	785	2.45 (1.83)	850	2.85 (2.13)	910	3.30 (2.46)	965	3.70 (2.76)	1020	4.10 (3.06)	1070	4.55 (3.39)	1120	5.00 (3.73)	1165	5.40 (4.03)	----	
6250 (2950)	***435***	***0.95 (0.71)***	545	1.35 (1.01)	640	1.80 (1.34)	720	2.20 (1.64)	790	2.60 (1.94)	855	3.05 (2.28)	915	3.45 (2.57)	970	3.90 (2.91)	1025	4.35 (3.25)	1075	4.75 (3.54)	1120	5.20 (3.88)	1165	5.65 (4.21)	----	
6500 (3065)	***445***	***1.05 (0.78)***	550	1.45 (1.08)	640	1.85 (1.38)	725	2.35 (1.75)	795	2.75 (2.05)	860	3.20 (2.39)	920	3.65 (2.72)	975	4.10 (3.06)	1030	4.55 (3.39)	1080	5.00 (3.73)	1125	5.45 (4.07)	1170	5.90 (4.40)	----	
6750 (3185)	***450***	***1.10 (0.82)***	555	1.55 (1.16)	645	2.00 (1.49)	725	2.45 (1.83)	800	2.90 (2.16)	865	3.40 (2.54)	925	3.85 (2.87)	980	4.30 (3.21)	1035	4.75 (3.54)	1085	5.25 (3.92)	1130	5.70 (4.25)	1175	6.15 (4.59)	----	
7000 (3305)	***455***	***1.20 (0.90)***	560	1.65 (1.23)	650	2.10 (1.57)	730	2.60 (1.94)	805	3.10 (2.31)	870	3.55 (2.65)	930	4.05 (3.02)	985	4.50 (3.36)	1035	4.95 (3.69)	1085	5.45 (4.07)	1135	5.95 (4.44)	1180	6.45 (4.81)	----	
7250 (3420)	***460***	***1.25 (0.93)***	565	1.75 (1.31)	655	2.25 (1.68)	735	2.75 (2.05)	810	3.25 (2.42)	875	3.75 (2.80)	935	4.25 (3.17)	990	4.70 (3.51)	1040	5.20 (3.88)	1090	5.70 (4.25)	1140	6.20 (4.63)	1185	6.70 (5.00)	----	
7500 (3540)	***465***	***1.35 (1.01)***	570	1.85 (1.38)	660	2.35 (1.75)	740	2.90 (2.16)	815	3.40 (2.54)	880	3.95 (2.95)	935	4.40 (3.28)	995	4.95 (3.69)	1045	5.45 (4.07)	1095	5.95 (4.44)	1140	6.45 (4.81)	***1190***	***7.00 (5.22)***	----	
7750 (3655)	***470***	***1.45 (1.08)***	575	2.00 (1.49)	665	2.50 (1.87)	745	3.05 (2.28)	820	3.60 (2.69)	880	4.10 (3.06)	940	4.60 (3.43)	995	5.15 (3.84)	1050	5.70 (4.25)	1100	6.20 (4.63)	1145	6.70 (5.00)	***1190***	***7.25 (5.41)***	----	
8000 (3775)	***480***	***1.60 (1.19)***	585	2.15 (1.60)	675	2.70 (2.01)	750	3.20 (2.39)	820	3.75 (2.80)	885	4.30 (3.21)	945	4.85 (3.62)	1000	5.35 (3.99)	1055	5.95 (4.44)	1105	6.50 (4.85)	1150	7.00 (5.22)	***1195***	***7.55 (5.63)***	----	
8250 (3895)	***485***	***1.70 (1.27)***	590	2.25 (1.68)	680	2.85 (2.13)	755	3.35 (2.50)	825	3.95 (2.95)	890	4.50 (3.36)	950	5.05 (3.77)	1005	5.60 (4.18)	1060	6.20 (4.63)	1110	6.75 (5.04)	1155	7.30 (5.45)	***1200***	***7.85 (5.86)***	----	
8500 (4010)	***490***	***1.80 (1.34)***	595	2.40 (1.79)	685	3.00 (2.24)	760	3.55 (2.65)	830	4.10 (3.06)	895	4.70 (3.51)	955	5.30 (3.95)	1010	5.85 (4.36)	1065	6.45 (4.81)	1110	7.00 (5.22)	1160	7.60 (5.67)	----		----	
8750 (4130)	***500***	***1.90 (1.42)***	600	2.50 (1.87)	690	3.15 (2.35)	765	3.75 (2.80)	835	4.30 (3.21)	900	4.95 (3.69)	960	5.55 (4.14)	1015	6.10 (4.55)	1065	6.70 (5.00)	1115	7.30 (5.45)	1165	7.90 (5.89)	----		----	
9000 (4245)	***505***	***2.05 (1.53)***	610	2.70 (2.01)	695	3.30 (2.46)	770	3.90 (2.91)	840	4.55 (3.39)	905	5.15 (3.84)	965	5.75 (4.29)	1020	6.40 (4.77)	1070	6.95 (5.18)	1120	7.60 (5.67)	1170	8.25 (6.15)	----		----	
9250 (4365)	***515***	***2.20 (1.64)***	615	2.85 (2.13)	700	3.50 (2.61)	775	4.10 (3.06)	845	4.75 (3.54)	910	5.40 (4.03)	970	6.00 (4.48)	1025	6.65 (4.96)	1075	7.25 (5.41)	1125	7.90 (5.89)	1170	8.50 (6.34)	----		----	
9500 (4485)	***525***	***2.35 (1.75)***	620	3.00 (2.24)	705	3.65 (2.72)	785	4.35 (3.25)	850	4.95 (3.69)	915	5.60 (4.18)	975	6.30 (4.70)	1030	6.90 (5.15)	1080	7.55 (5.63)	1130	8.20 (6.12)	----		----		----	
9750 (4600)	***530***	***2.50 (1.87)***	630	3.20 (2.39)	715	3.85 (2.87)	790	4.55 (3.39)	855	5.20 (3.88)	920	5.85 (4.36)	980	6.55 (4.89)	1035	7.20 (5.37)	1085	7.85 (5.86)	1135	8.50 (6.34)	----		----		----	
10,000 (4720)	540	2.65 (1.98)	635	3.35 (2.50)	720	4.05 (3.02)	795	4.75 (3.54)	860	5.40 (4.03)	925	6.10 (4.55)	985	6.80 (5.07)	1035	7.45 (5.56)	1090	8.15 (6.08)	----		----		----		----	
10,250 (4835)	550	2.85 (2.13)	645	3.55 (2.65)	725	4.25 (3.17)	800	4.95 (3.69)	865	5.65 (4.21)	930	6.40 (4.77)	990	7.10 (5.30)	1040	7.75 (5.78)	1095	8.45 (6.30)	----		----		----		----	
10,500 (4955)	555	3.00 (2.24)	650	3.75 (2.80)	730	4.45 (3.32)	805	5.20 (3.88)	875	5.95 (4.44)	935	6.65 (4.96)	995	7.40 (5.52)	1045	8.05 (6.01)	----		----		----		----		----	
10,750 (5075)	565	3.15 (2.35)	655	3.90 (2.91)	740	4.70 (3.51)	810	5.40 (4.03)	880	6.20 (4.63)	940	6.90 (5.15)	1000	7.65 (5.71)	1050	8.35 (6.23)	----		----		----		----		----	
11,000 (5190)	575	3.35 (2.50)	665	4.15 (3.10)	745	4.90 (3.66)	820	5.70 (4.25)	885	6.45 (4.81)	945	7.20 (5.37)	1005	7.95 (5.93)	----		----		----		----		----		----	

BLOWER DATA ALL MODELS
FACTORY INSTALLED DRIVE KIT SPECIFICATIONS

Motor		RPM Range													
		Drive A		Drive1		Drive 2		Drive 3		Drive 4		Drive 5		Drive 6	
hp	kw	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz
2	1.5	535/725	- -	- -	- -	- -	--	--	--	--	--	--	--	--	--
3 Std Eff	2.2	535/725	--	685/865	--	--	570/755	--	710/ 870	--	790/990	--	--	--	--
3 Hi Eff	2.2	--	--	--	--	685/865	--	--	--	--	--	--	--	--	--
5	3.7	--	--	--	--	685/865	570/755	850 / 1045	710/ 870	945/ 1185	790/990	--	--	--	--
7.5	5.6	--	--	--	--	--	--	--	--	--	--	945/ 1185	790/990	--	870/ 1070

MANUFACTURER'S NUMBERS

DRIVE NO.	DRIVE COMPONENTS					
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS (2 REQUIRED)	
	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.
A	1VP40x7/8	79J0301	1BK95X1-7/16	80K1601	BX59	59A5001
1	1VP50x7/8	P-8-2187	BK100x1-7/16	39L1301	BX62	57A7701
2	1VP50x1-1/8	P-8-1977	BK100x1-7/16	39L1301	BX62	57A7701
3	2VP65x1-1/8	97J6001	2BK110x1-7/16	P-8-5123	BX66	97J5901
4	2VP60x1-1/8	P-8-9161	2BK90x1-7/16	14K9101	BX62	57A7701
5	2VP60x1-3/8	97J5701	2BK90x1-7/16	14K9101	BX63	97J5501

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

Air Volume		Total Resistance - inches water gauge (Pa)							
		Wet Indoor Coil		Gas Heat Exchanger (LGA Models)		Electric Heat (LCA/LHA Models)	Economizer	LARMFH18/24 Horizontal Roof Mounting Frame (156/180/210/ 240 models)	LARMFH30/36 Horizontal Roof Mounting Frame (for 300S Only)
cfm	L/s	156H 180S/180H 210S/240S	210H 240H 300S	Standard Heat	High Heat				
3500	1650	.03 (7)	- - - -	.03 (7)	- - - -	.01 (2)	.04 (10)	.05 (12)	- - - -
3750	1770	.03 (7)	- - - -	.04 (10)	- - - -	.01 (2)	.04 (10)	.06 (15)	- - - -
4000	1890	.04 (10)	- - - -	.04 (10)	- - - -	.01 (2)	.05 (12)	.06 (15)	- - - -
4250	2005	.04 (10)	- - - -	.04 (10)	- - - -	.01 (2)	.05 (12)	.07 (17)	- - - -
4500	2125	.04 (10)	.08 (20)	.05 (12)	.09 (22)	.01 (2)	.05 (12)	.07 (17)	.02 (5)
4750	2240	.05 (12)	.09 (22)	.05 (12)	.10 (25)	.01 (2)	.05 (12)	.08 (20)	.03 (7)
5000	2360	.05 (12)	.10 (25)	.05 (12)	.11 (27)	.01 (2)	.06 (15)	.08 (20)	.03 (7)
5250	2475	.06 (15)	.10 (25)	.06 (15)	.12 (30)	.02 (5)	.06 (15)	.09 (22)	.04 (10)
5500	2595	.06 (15)	.11 (27)	.06 (15)	.13 (32)	.02 (5)	.06 (15)	.10 (25)	.04 (10)
5750	2715	.06 (15)	.12 (30)	.06 (15)	.14 (35)	.02 (5)	.07 (17)	.11 (27)	.05 (12)
6000	2830	.07 (17)	.13 (32)	.07 (17)	.15 (37)	.02 (5)	.07 (17)	.11 (27)	.06 (15)
6250	2950	.07 (17)	.14 (35)	.07 (17)	.16 (40)	.02 (5)	.08 (20)	.12 (30)	.07 (17)
6500	3065	.08 (20)	.14 (35)	.08 (20)	.17 (42)	.03 (7)	.08 (20)	.13 (32)	.08 (20)
6750	3185	.08 (20)	.15 (37)	.08 (20)	.18 (45)	.03 (7)	.08 (20)	.14 (35)	.08 (20)
7000	3305	.09 (22)	.16 (40)	.09 (22)	.19 (47)	.03 (7)	.09 (22)	.15 (37)	.09 (22)
7250	3420	.09 (22)	.17 (42)	.09 (22)	.20 (50)	.03 (7)	.09 (22)	.16 (40)	.10 (25)
7500	3540	.10 (25)	.18 (45)	.10 (25)	.21 (52)	.03 (7)	.10 (25)	.17 (42)	.11 (27)
7750	3655	.10 (25)	.19 (47)	.10 (25)	.23 (57)	.04 (10)	.10 (25)	.18 (45)	.12 (30)
8000	3775	.11 (27)	.20 (50)	.11 (27)	.24 (60)	.04 (10)	.11 (27)	.19 (47)	.13 (32)
8250	3895	.11 (27)	.21 (52)	.11 (27)	.25 (62)	.04 (10)	.11 (27)	.20 (50)	.14 (35)
8500	4010	.12 (30)	.22 (55)	.12 (30)	.26 (65)	.04 (10)	.12 (30)	.21 (52)	.15 (37)
8750	4130	.12 (30)	.23 (57)	.12 (30)	.28 (70)	.05 (12)	.12 (30)	.22 (55)	.16 (40)
9000	4245	.13 (32)	.24 (60)	.13 (32)	.29 (72)	.05 (12)	.13 (32)	.24 (60)	.17 (42)
9250	4365	.14 (35)	.25 (62)	.14 (35)	.31 (77)	.05 (12)	.14 (35)	.25 (62)	.18 (45)
9500	4485	.14 (35)	.26 (65)	.14 (35)	.32 (80)	.05 (12)	.14 (35)	.26 (65)	.19 (47)
9750	4600	.15 (37)	.27 (67)	.15 (37)	.34 (85)	.06 (15)	.15 (37)	.27 (67)	.20 (50)
10,000	4720	.15 (37)	.28 (70)	.16 (40)	.35 (87)	.06 (15)	.16 (40)	.29 (72)	.21 (52)
10,250	4840	.15 (37)	.29 (72)	.16 (40)	.36 (90)	.06 (15)	.16 (40)	.30 (75)	.23 (57)
10,500	4955	.16 (40)	.30 (75)	.17 (42)	.38 (94)	.07 (17)	.17 (42)	.31 (77)	.24 (60)
10,750	5075	.16 (40)	.31 (77)	.18 (45)	.39 (97)	.07 (17)	.18 (45)	.33 (82)	.26 (65)
11,000	5190	.16 (40)	.32 (80)	.18 (45)	.40 (99)	.07 (17)	.18 (45)	.34 (85)	.27 (67)

BLOWER DATA ALL MODELS

CEILING DIFFUSER AIR RESISTANCE

Unit Size	Air Volume		Total Resistance - inches water gauge (Pa)			
			RTD11 Step-Down Diffuser			FD11 Flush Diffuser
	cfm	L/s	2 Ends Open	1 Side 2 Ends Open	All Ends & Sides Open	
156 & 180 Models	5000	2360	.51 (127)	.44 (109)	.39 (97)	.27 (67)
	5200	2455	.56 (139)	.48 (119)	.42 (1040)	.30 (75)
	5400	2550	.61 (152)	.52 (129)	.45 (112)	.33 (82)
	5600	2645	.66 (164)	.56 (139)	.48 (119)	.36 (90)
	5800	2735	.71 (177)	.59 (147)	.51 (127)	.39 (97)
	6000	2830	.76 (189)	.63 (157)	.55 (137)	.42 (104)
	6200	2925	.80 (199)	.68 (169)	.59 (147)	.46 (114)
	6400	3020	.86 (214)	.72 (179)	.63 (157)	.50 (124)
	6600	3115	.92 (229)	.77 (191)	.67 (167)	.54 (134)
	6800	3210	.99 (246)	.83 (206)	.72 (174)	.58 (144)
	7000	3305	1.03 (256)	.87 (216)	.76 (189)	.62 (154)
	7200	3400	1.09 (271)	.92 (229)	.80 (199)	.66 (164)
	7400	3490	1.15 (286)	.97 (241)	.84 (209)	.70 (174)
	7600	3585	1.20 (301)	1.02 (254)	.88 (219)	.74 (184)
210, 240 & 300S Models	6000	2830	.36 (90)	.31 (77)	.27 (67)	.29 (72)
	6500	3065	.42 (104)	.36 (90)	.31 (77)	.34 (85)
	7000	3305	.49 (122)	.41 (102)	.36 (90)	.40 (99)
	7500	3540	.51 (127)	.46 (114)	.41 (102)	.45 (112)
	8000	3775	.59 (147)	.49 (122)	.43 (107)	.50 (124)
	8500	4010	.69 (172)	.58 (144)	.50 (124)	.57 (142)
	9000	4245	.79 (196)	.67 (167)	.58 (144)	.66 (164)
	9500	4485	.89 (221)	.75 (186)	.65 (162)	.74 (184)
	10,000	4720	1.00 (249)	.84 (209)	.73 (182)	.81 (201)
	10,500	4955	1.10 (273)	.92 (229)	.80 (199)	.89 (221)
	11,000	5190	1.21 (301)	1.01 (251)	.88 (219)	.96 (239)

POWER EXHAUST FANS PERFORMANCE

Return Air System Static Pressure		Air Volume Exhausted	
in. w.g.	Pa	cfm	L/s
0	0	8630	4070
0.05	12	8210	3875
0.10	25	7725	3645
0.15	37	7110	3355
0.20	50	6470	3055
0.25	62	5790	2730
0.30	75	5060	2390
0.35	87	4300	2030
0.40	100	3510	1655
0.45	112	2690	1270
0.50	125	1840	870

CEILING DIFFUSER AIR THROW DATA

Model No.	Air Volume		*Effective Throw Range			
			RTD11 Step-Down		FD11 Flush	
	cfm	L/s	ft.	m	ft.	m
156 Models 180 Models	5250	2475	42-54	13-16	44-49	13-15
	6000	2830	45 - 55	14 - 17	48 - 55	15 - 17
	6750	3190	47 - 56	14 - 17	50 - 58	15 - 18
	7500	3540	49 - 58	15 - 18	55 - 66	17 - 20
210 Models 240 Models 300S Models	8000	3775	39 - 44	12 - 13	53 - 62	16 - 19
	9000	4245	47 - 56	14 - 17	55 - 64	17 - 20
	10,000	4720	49 - 58	15 - 18	57 - 67	17 - 20
	11,000	5190	54 - 65	17 - 21	59 - 70	18 - 22

*Throw is the horizontal or vertical distance an airstream travels on leaving the outlet or diffuser before the maximum velocity is reduced to 50 ft. (15 m) per minute. Four sides open.

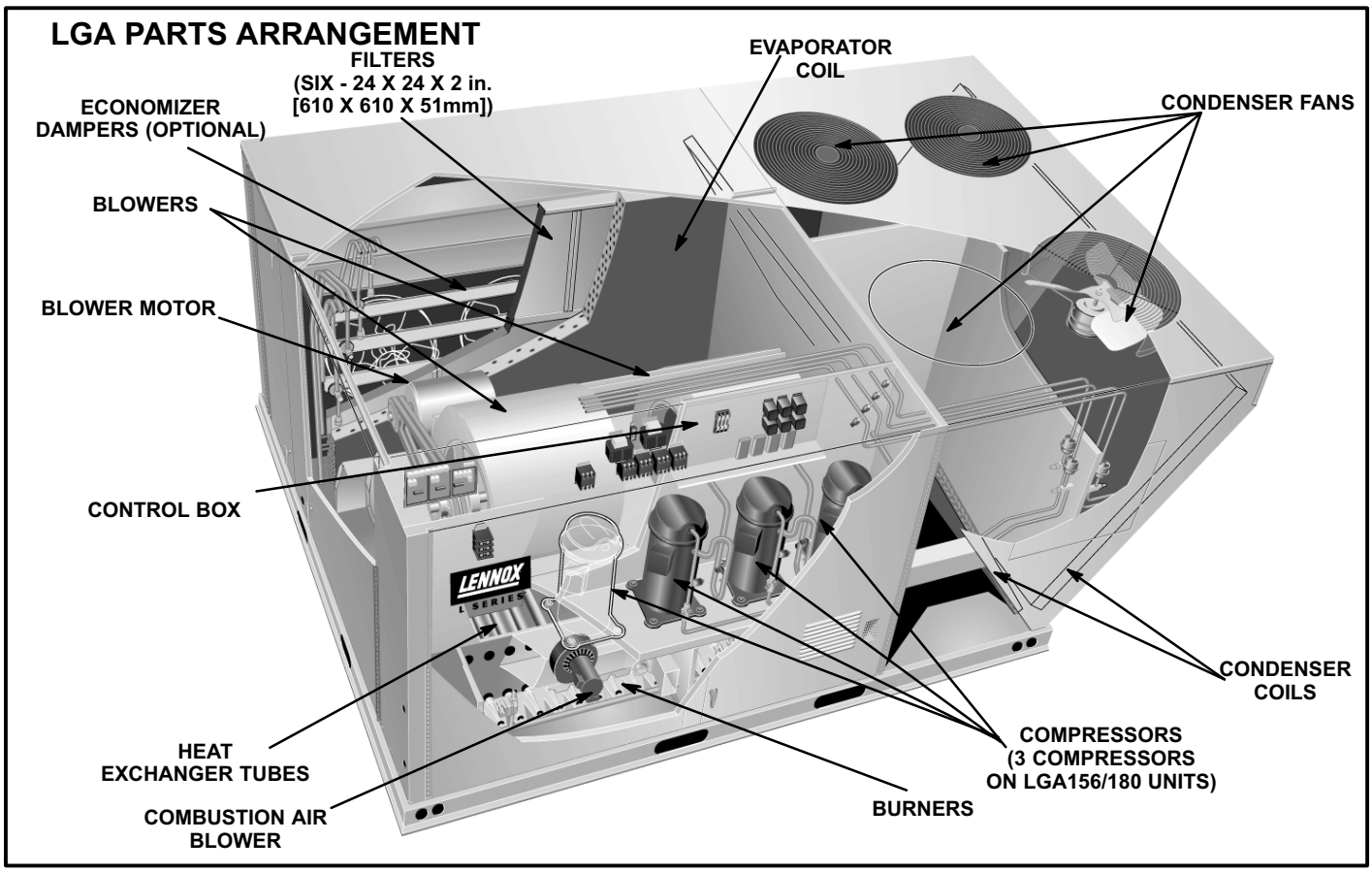


FIGURE 1

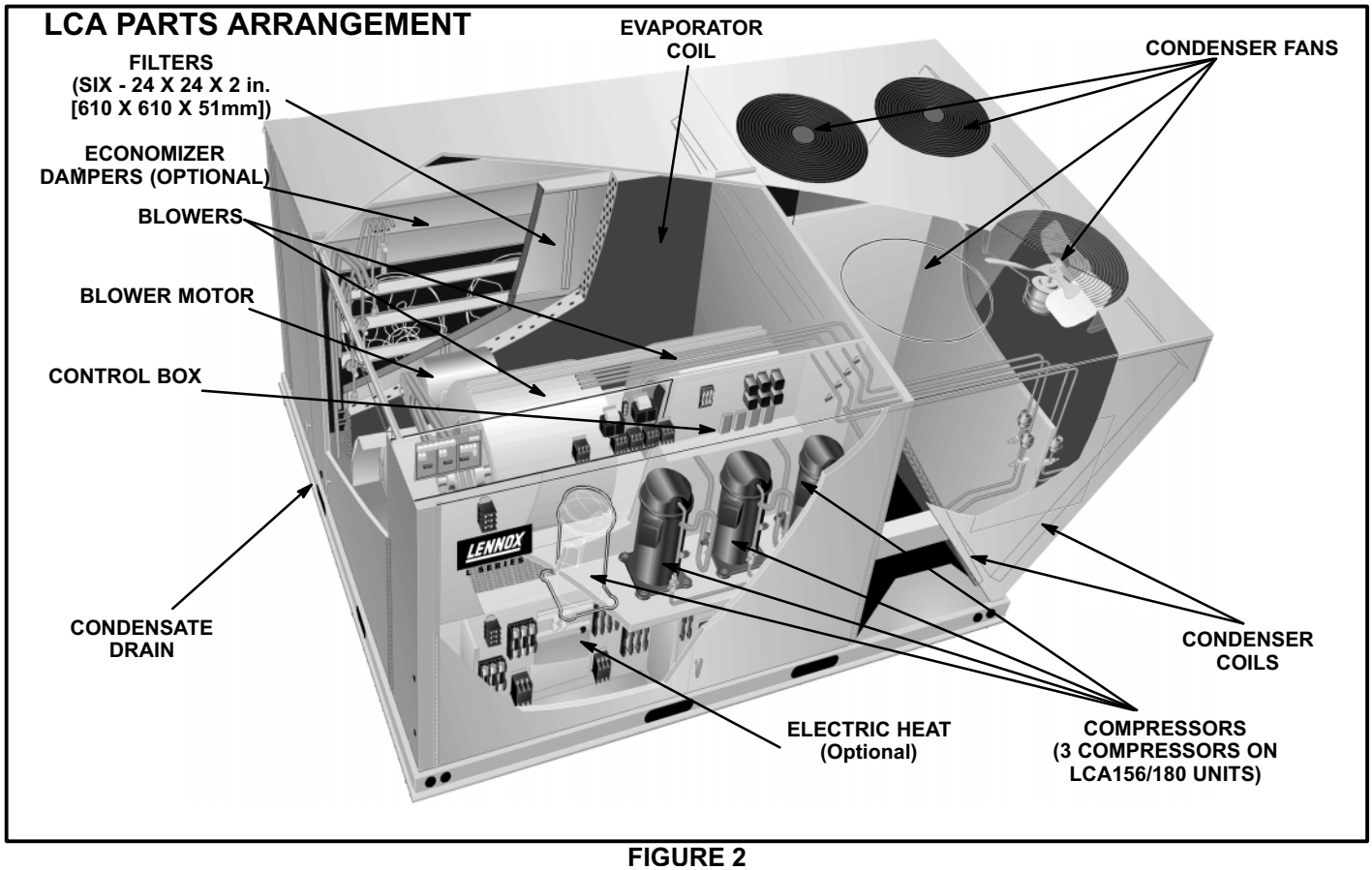


FIGURE 2

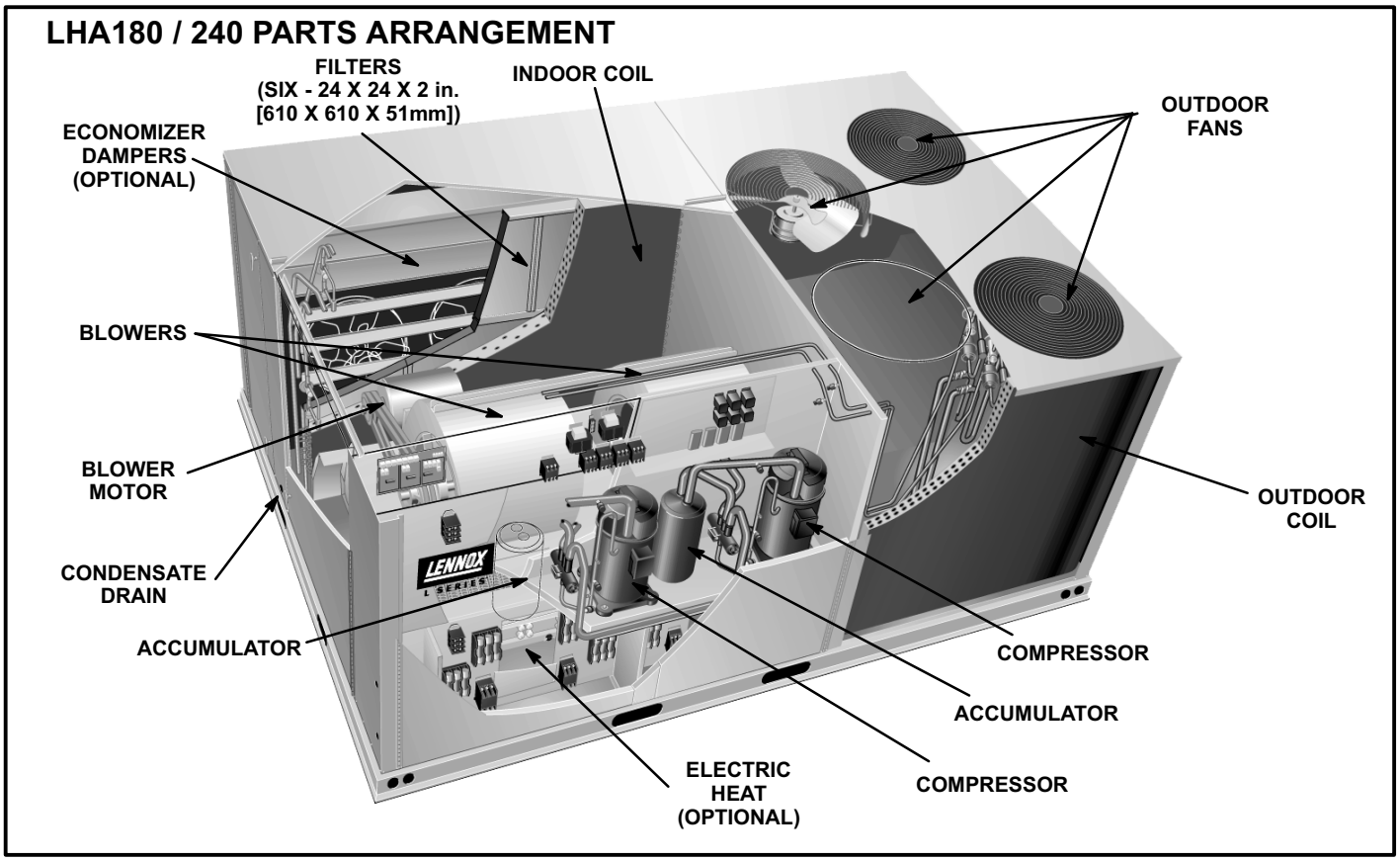

LHA180 / 240 PARTS ARRANGEMENT
FILTERS
(SIX - 24 X 24 X 2 in.
[610 X 610 X 51mm])
INDOOR COIL
OUTDOOR
FANS
ECONOMIZER
DAMPERS
(OPTIONAL)
BLOWERS
BLOWER
MOTOR
OUTDOOR
COIL
CONDENSATE
DRAIN
ACCUMULATOR
COMPRESSOR
ACCUMULATOR
ELECTRIC
HEAT
(OPTIONAL)
COMPRESSOR

FIGURE 3

LGA CONTROL BOX PARTS ARRANGEMENT

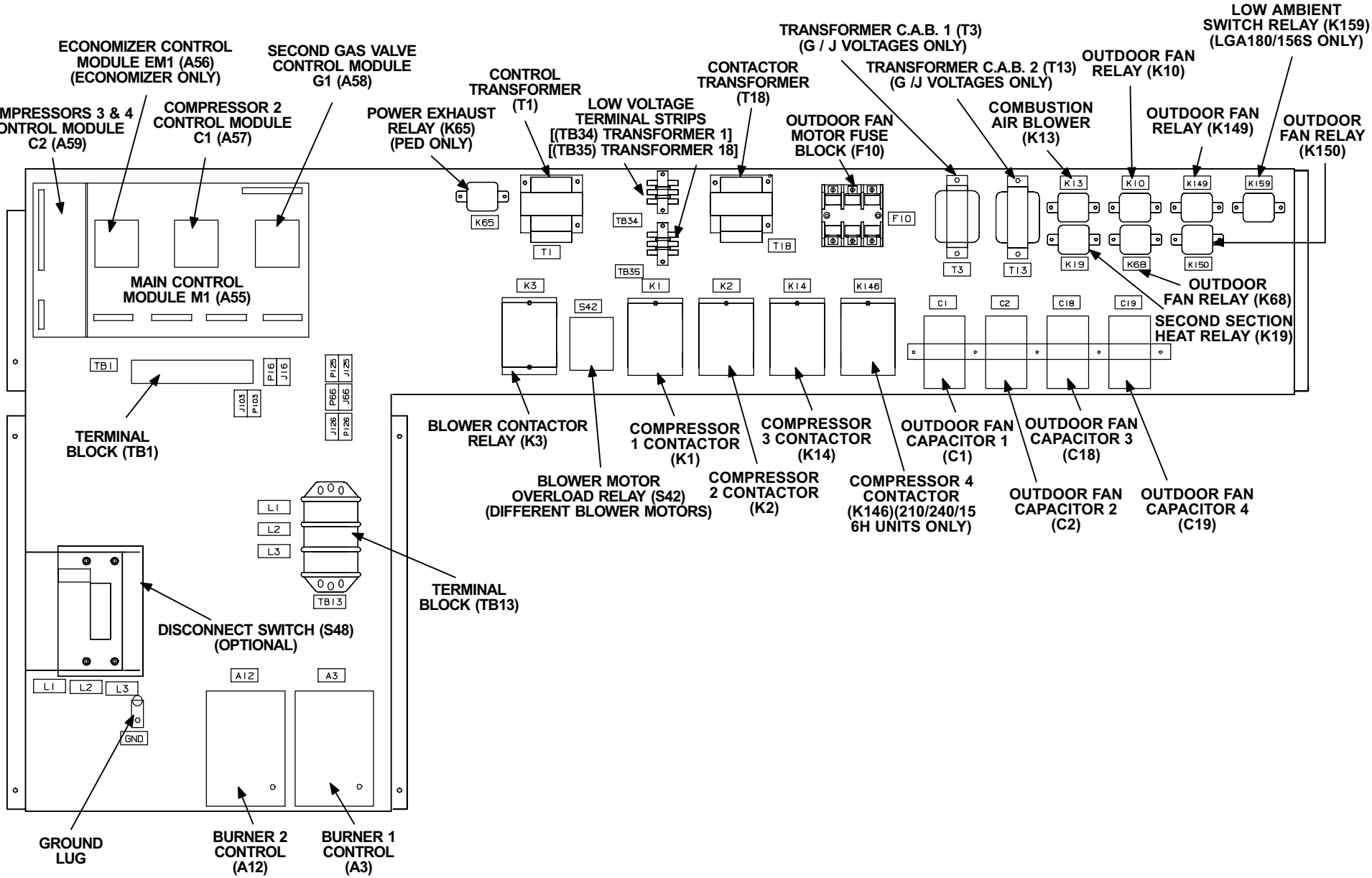


FIGURE 4

LCA CONTROL BOX PARTS ARRANGEMENT

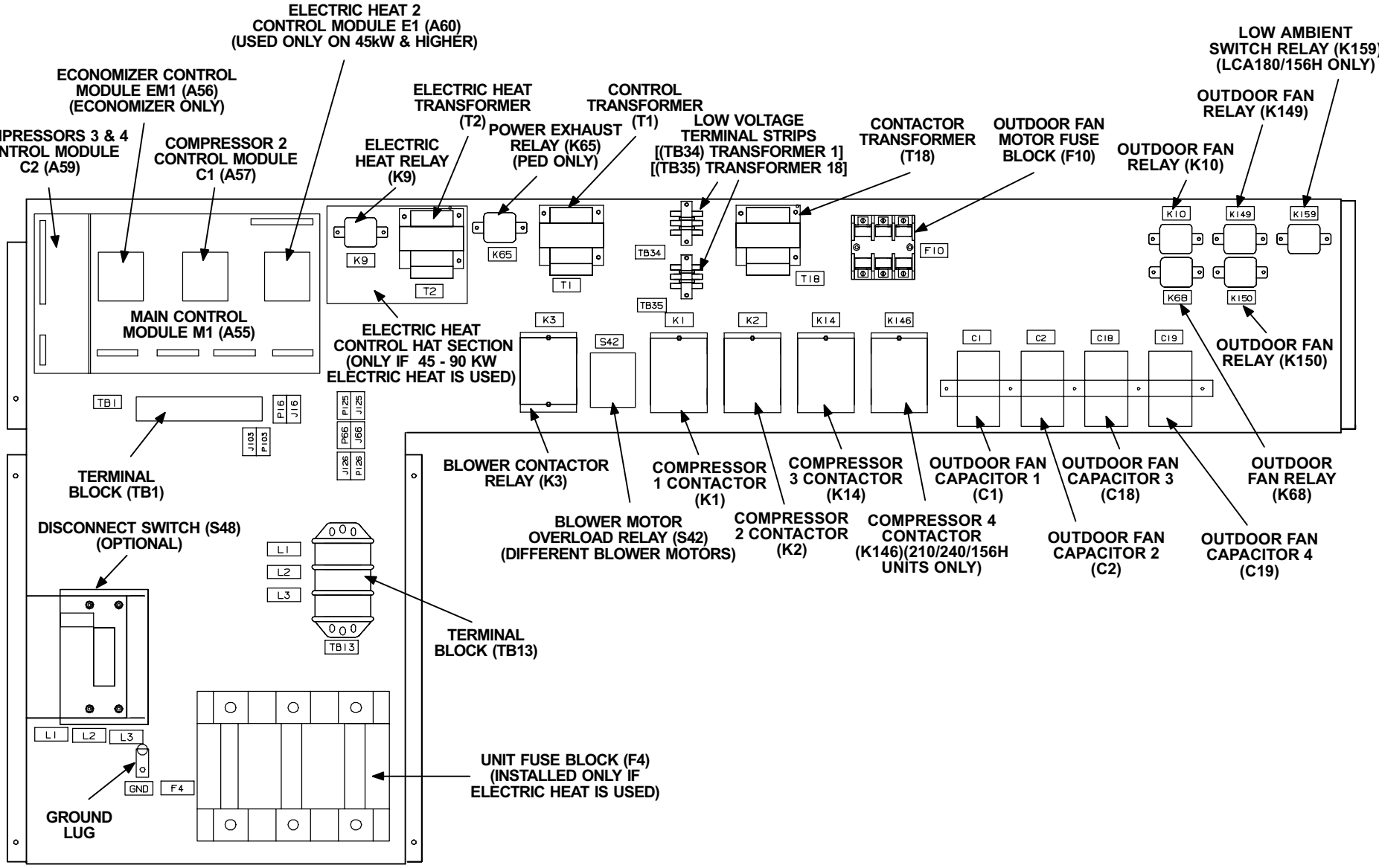


FIGURE 5

LHA 15 and 20 TON (53 and 70 KW) CONTROL BOX PARTS ARRANGEMENT

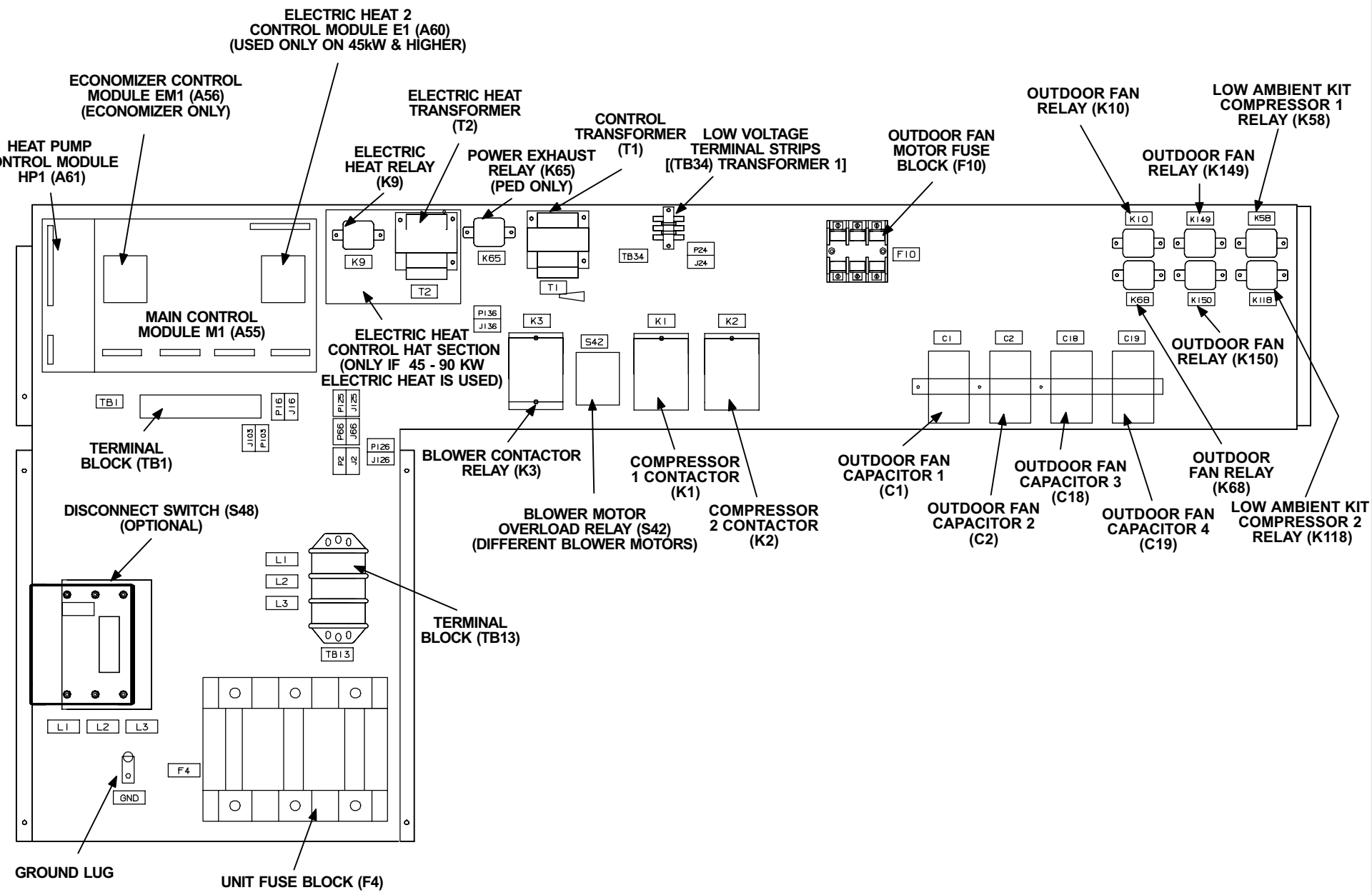


FIGURE 6

I-UNIT COMPONENTS

LGA / LCA / LHA13, 15, 17.5, 20 and 25 ton (46, 53, 62, 70, and 88 kW) units are configure to order units (CTO). The LGA and LCA unit components are shown in figures 1 and 2. For LHA 15 and 20 ton (52.8 and 70.3 kW) series unit components see figure 3. All units come standard with hinged unit panels. The unit panels may be held open with the door rod located inside the unit. All L1, L2, and L3 wiring is color coded; L1 is red, L2 is yellow, and L3 is blue.

A-Control Box Components

LGA control box components are shown in figure 4, while LCA control box components are shown in figure 5. LHA control box components are shown in figure 6. The control box is located in the upper left portion of the compressor compartment.

1-Disconnect Switch S48 (Optional all units)

All LGA/LCA/LHA units may be equipped with an optional disconnect switch S48. Other factory or field installed optional circuit breakers may be used, such as CB10. S48 and CB10 are toggle switches, which can be used by the service technician to disconnect power to the unit.

2-Control Transformer T1 (all units)

All LGA/LCA/LHA series units use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8). The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 7, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

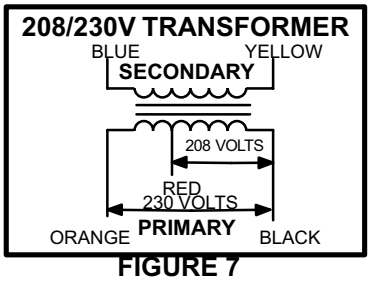


FIGURE 7

3-Contactor Transformer T18 (LGA / LCA units)

T18 is a single line voltage to 24VAC transformer used in all LGA/LCA series units. Transformer T18 is protected by a 3.5 amp circuit breaker (CB18). T18 is identical to transformer T1. The transformer supplies 24VAC power to the contactors.

4-C. A. B. Transformers T3 & T13 (LGA 460V & 575V units)

All LGA 460 (G) and 575 (J) voltage units use two auto voltage to 230VAC transformers mounted in the control box. The transformers have an output rating of 0.5A. T3 transformer supplies 230 VAC power to combustion air blower motor (B6), while T13 transformer supplies power to combustion air blower motor (B15).

5-Terminal Strips TB1, TB13, TB34 (all units), and TB35 (LGA / LCA units)

TB1 terminal strip distributes 24V power and common from the thermostat to the control box components. TB13 terminal strip distributes line voltage power to the line voltage items in the unit. TB34 terminal strip distributes 24V power from T1 to the control box components. TB35 terminal strip distributes 24V power from T18 to the contactors in the control box.

6-Outdoor Fan Motor Fuse Block & Fuses F10 (all units)

Three line voltage fuses F10 provide overcurrent protection to all condenser fans (and optional power exhaust fans) in all LGA / LCA and LHA units. The fuses are rated at 30A in 208/230V units and 15A in all others.

7-Unit Fuse Block & Fuses F4 (LHA & LCA units)

Three line voltage fuses F4 provide short circuit and ground fault protection to all cooling components in the LHA and LCA units. The fuses are rated in accordance with the amperage of the cooling components.

8-Outdoor Fan Capacitors C1, C2, C18, & C19 (all units)

Fan capacitors C1, C2, C18, C19 are 370V / 10 MFD capacitors used to assist in the start up of condenser fans B4, B5, B21, B22 respectively.

9-Compressor Contactor K1 & K2 (all units), K14 (LGA/LCA units), and K146 (LGA/LCA 210, 240 & 300S units)

All compressor contactors are three-pole-double-break contactors with a 24VAC coil. In all LHA units K1 (energized by A55) and K2 (energized by A61) energize compressors B1 and B2 respectively, in response to thermostat demand. In all LGA/LCA156H/180 units K1 (energized by A55), K2 (energized by A57), and K14 (energized by A59) energize compressors B1, B2, and B13 respectively in response to first or second stage cooling demands. In all LGA/LCA210/240/300S units K1 (energized by A55), K2 (energized by A57), K14 and K146 (energized by A59) energize compressors B1, B2, B13, and B20 respectively.

10-Blower Contactor K3 (all units)

Blower contactor K3, used in all units, is a three-pole-double-break contactor with a 24VAC coil used to energize the indoor blower motor B3 in response to blower demand. K3 is energized by main control panel (A55).

11-Outdoor Fan Relay K10, K68, K149, & K150 (all units)

Outdoor fan relays K10, K68, K149, and K150, used in all units, are DPDT relays with a 24VAC coil. In all LHA units K10 (energized by A55), K68, K149, and K150 (energized by A61) energize condenser fans B4 (fan 1), B5 (fan 2), B21 (fan 3), and B22 (fan 4) respectively, in response to thermostat demand. In the LGA/LCA units, the outdoor fan relays work the same; however, K10 is energized by A55, K68 is energized by A57, and K149 and K150 are energized by A59.

12-Combustion Air Blower Relay K13 (LGA units - first burner section)

Combustion air blower relay K13, used in all LGA units, is a DPDT relay with a 24VAC coil. K13 is energized by the main control module A55 after a first stage heating demand from the thermostat. K13 remains energized throughout the heating demand. When energized, K13 N.O. contacts close to energize combustion air blower and begin a heating sequence. Pressure switch S18, located in the compressor compartment, closes as combustion air static pressure falls to “prove” combustion air blower operation. When S18 closes, the ignition controls and gas valves are energized to begin a heating sequence.

13-Combustion Air Blower Relay K19 (LGA units - second burner section)

Combustion air blower relay K19, used in all LGA units, is a DPDT relay with a 24 VAC coil. K19 is energized by the gas valve control module A58 after a first stage heating demand from the thermostat. K19 remains energized throughout the first stage heating demand. When energized, K19 N.O. contacts close to energize the second heat section combustion air blower and begin second section heating sequence. Pressure switch S45, located in the compressor compartment, closes as combustion air static pressure falls to “prove” combustion air blower operation. When S45 closes, the second section of the ignition control and gas valve are energized to begin the second section heating sequence.

14-Low Ambient Switch Relay K159 (LGA/LCA180 units)

Low ambient switch relay K159, used in all LGA/LCA156H/180 units, is a DPDT relay with a 24VAC coil. When one of the N.O. low pressure low ambient switches S11, S84, or S85 close (due to a pressure rise), K159 is energized. When K159-1 closes, A55 energizes K10 which in turn energizes outdoor fan motor B4. When K159-2 closes, A59 energizes K149 which in turn energizes outdoor fan motor B21. When the pressure lowers due to the outdoor fan motors cycling on, the pressure switch(es) will open and K159 will be de-energized.

15-Low Ambient Bypass Fan (Kit) Relays K58 & K118 (LHA units)

Low ambient bypass relays K58 and K118, used in all LHA units, are N.C. DPDT relays with a 24VAC coil. K58 is wired in parallel with the first compressor reversing valve (L1) and is energized by A55. K118 is wired in parallel with the second compressor reversing valve (L2) and is energized by A61. When L1 is energized in the cooling cycle, K58 is also energized, opening K58-1. When L2 is energized in the cooling cycle, K118 is also energized, opening K118-1. Therefore, K58-1 and K118-1 are always closed during heating demand bypassing S11 and S84. This allows all fans to operate during heating demand and to cycle during cooling demand.

16-Burner Controls A3 & A12 (LGA units)

All LGA units have two burner controls. A3 controls gas heat section one, while A12 controls gas heat section two. The first gas heat section and the second gas heat section burner controls are identical. Both burner controls are factory set and are not adjustable. The control makes three attempts at ignition and then locks out the system if ignition is not obtained after the third trial. Reset after lockout requires only breaking and remaking thermostat demand. The control shuts off gas flow immediately in the event of a gas or power failure. Upon restoration of gas and power, the control will restart the ignition sequence and continue until flame is established or system locks out. For a more detailed description see the Gas Heat Components section.

17-Power Exhaust Relay K65 (PED units)

Power exhaust relay K65 is a N.O. DPDT relay with a 24VAC coil. K65 is used in all LGA/LCA/LHA units equipped with the optional power exhaust dampers. K65 is energized by the economizer control panel (A56), after the economizer dampers reach 50% open (adjustable in ECTO). When K65 closes, the exhaust fans B10 and B11 are energized.

18-Blower Motor Overload Relay S42 (units with high efficiency motors & standard efficiency motors of 7.5 HP and above)

The blower motor overload relay is used in all L series units equipped with high efficiency motors, as well as units with standard efficiency motors 7.5 HP and higher. The relay (S42) is connected in line with the blower motor to monitor the current flow to the motor. When the relay senses an overload condition, a set of normally closed contacts open to de-energize pin #9 in plug 110 of the A55 main control module. A55 de-energizes all outputs. Early model units have been equipped with a control manufactured by Telemecanique which is detailed in figure 8. Units built after November 21, 1997, are equipped with a relay manufactured by Siemens which is detailed in figure 9. 7.5 HP motors used in units built in late 1998, will have an internal overload relay.

ELECTRIC HEAT CONTROL HAT SECTION (45 - 90 kW electric heat only)

19-Electric Heat Relay K9

All LCA/LHA series units with 45 - 90 kW electric heat use an electric heat relay K9. K9 is a N.O. SPST pilot relay intended to electrically isolate the unit's 24V circuit from the electric heat 24V circuit. K9 is energized by the main control board A55. K9-1 closes, enabling T2 to energize the electric heat control panel A60 and contactors K17 and K18.

20-Electric Heat Transformer T2

All LCA/LHA series units with 45 - 90 kW electric heat use a single line voltage to 24VAC transformer mounted in the electric heat control hat section in the control box. The transformer supplies power to all electric heat controls (contactors and coils). The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker CB13. The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 7. Transformer T2 is identical to T1.

INTEGRATED MODULAR CONTROL BOARDS

The Integrated Modular Control (IMC) is a series of control boards which integrates most control functions required for the LGA/LCA/LHA units. The control boards are located in the upper left hand corner of the control box. The control includes complete unit diagnostics with permanent code storage, field programmable control parameters and control options, on-site testing, and serial communications. Seven different printed circuit boards (see figure 10) make-up the modular configurations for the LGA/LCA/LHA units. See table 1 for a list of control panels used for each unit. For further information refer to Integrated Modular Control Guide sent with each unit.

TABLE 1

UNIT	CONTROL PANELS						
	A55	A57	A59	A58	A60	A61	A56
LGA	X	X	X	X			OPT
LCA	X	X	X		X		OPT
LHA	X				X	X	OPT

21-Main Control Module A55 (all units)

The main control module A55 is the heart of the system. It controls one compressor, one two-stage gas valve, one bank of electric heat, one outdoor fan, and one blower. A55 includes the thermostat inputs, serial communications ports, diagnostic code display, control pushbutton, system configuration dip switches, and four expansion ports. A diagnostic code list is located on the back side of the left access panel.

22-Compressor 2 Control Module A57 (LGA & LCA units)

The compressor 2 control module A57 controls one additional compressor stage for the LGA/LCA units. A57 includes all inputs and outputs required for compressor and fan control, compressor stages diagnostics, and low ambient control.

23-Compressor 3 & 4 Control Module A59 (LGA & LCA units)

The compressor 3 & 4 control module A59 controls two additional compressor stage for the LGA/LCA units. A59 includes all inputs and outputs required for compressor and fan control, compressor stage diagnostics, and low ambient control.

24-Gas Valve Control Module A58 (LGA units)

The gas valve control module A58 controls an additional burner with a two-stage gas valve. A58 includes all inputs and outputs required for control and diagnostics of one two-stage gas valve burner.

25-Electric Heat Control Module A60 (LCA & LHA units if 45 - 90 kW electric heat is used)

The electric heat control module A60 is used to control a second electric heat bank. A60 is used on the LHA and LCA units.

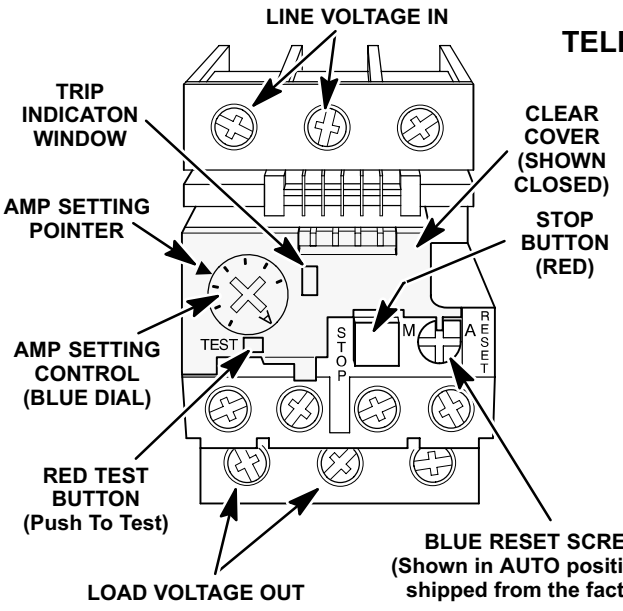
26-Heat Pump Control Module A61 (LHA units)

The heat pump control module A61 is used to control the second compressor stage on the LHA units. Like the A57 and A59 boards, the A61 board includes all inputs and outputs required for the compressor and fan control, compressor stage diagnostics and low ambient control.

27-Economizer Control Module A56 (Economizer only)

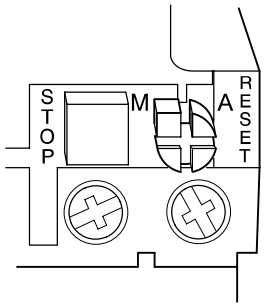
The economizer control module A56 controls the economizer. A56 has four different cooling modes, sensible temperature, outdoor enthalpy, differential enthalpy, and global control.

TELEMECANIQUE OVERLOAD RELAY



DETAIL SHOWING RESET BUTTON ADJUSTED TO MANUAL POSITION

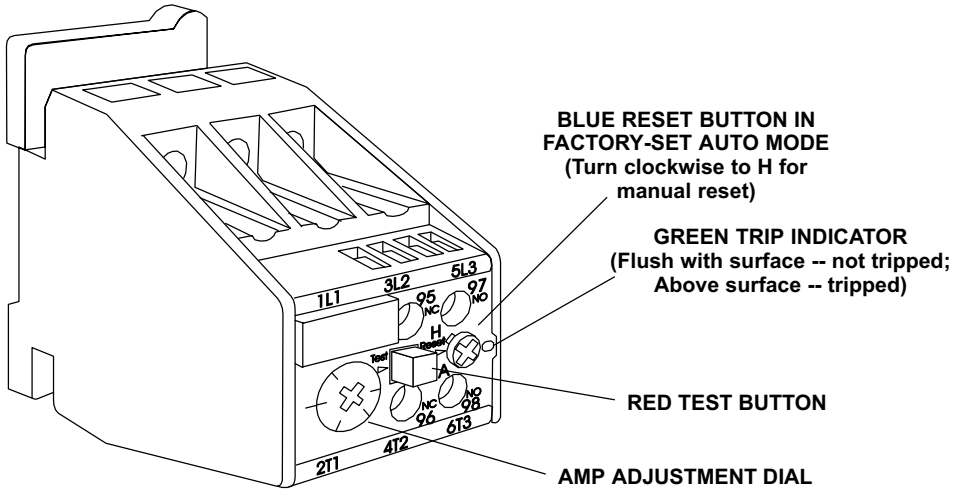
Lift clear cover and turn adjustment screw counterclockwise. Reset screw will pop out when pointer is in M (manual position). Close cover to lock reset screw into position.



Lift clear cover to adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.
Cover must also be lifted to adjust control mode from automatic reset to manual reset (see detail above) and to test the control.
Control must be in the manual reset mode to perform a test. Use a pointed object to press the small red test button. A yellow marker should appear in the trip indication window to the right of the amp setting control. Press the blue reset screw to reset the relay.
The red STOP button opens the normally closed contacts which power the blower motor. This button stops blower motor operation as long as it is pressed in.

FIGURE 8

SIEMENS OVERLOAD RELAY



Adjust relay amp setting according to value given on the blower motor nameplate. Proper relay amp setting equals motor nameplate FLA X service factor of 1.15 X .95.
Use small slotted screwdriver to adjust control mode from automatic reset (A) to manual reset (H).
Control must be in the manual reset mode (H) to perform a test. Press the red test button. Green trip indicator should pop out. Press the blue reset screw to reset the relay.

FIGURE 9

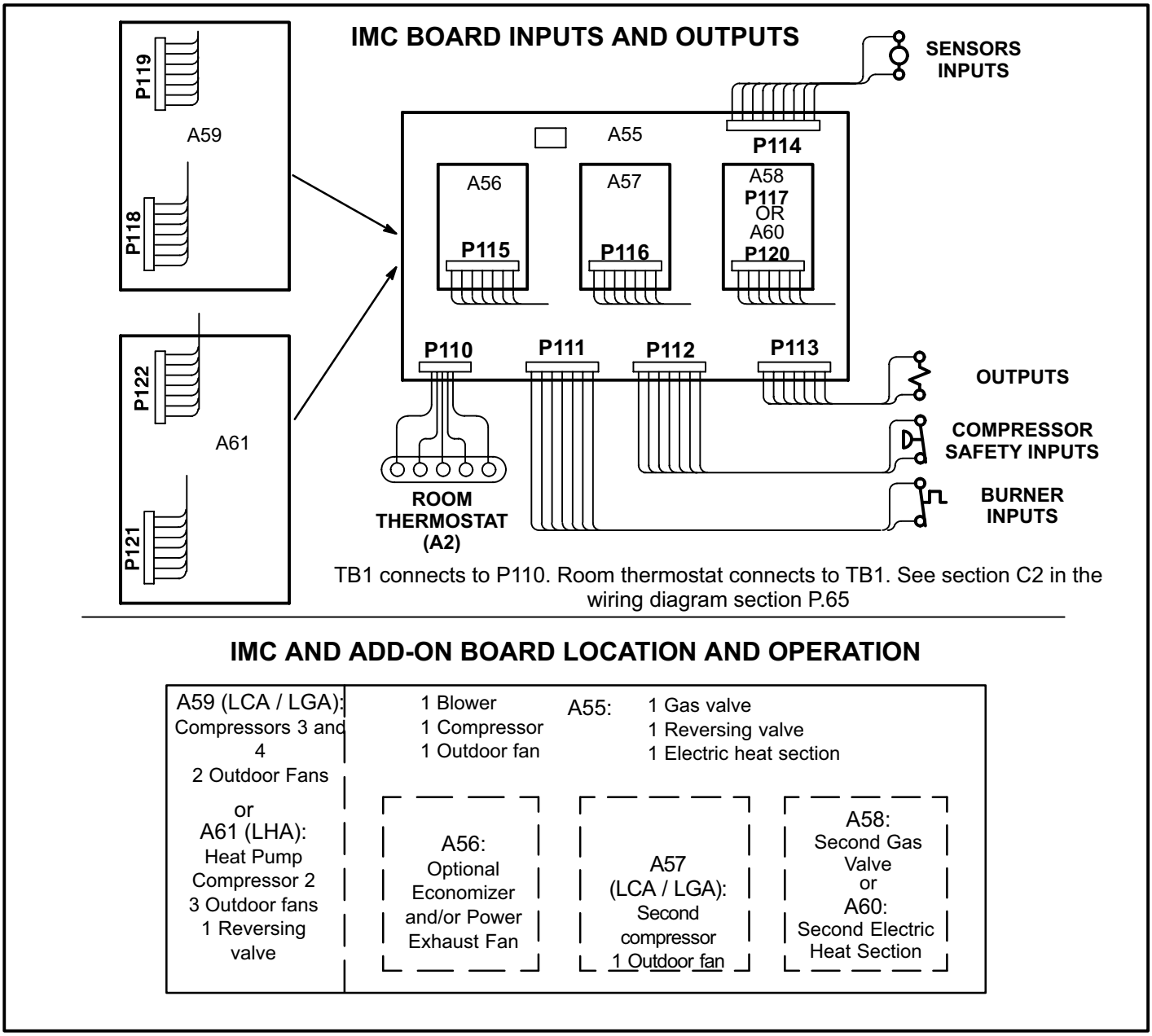

IMC BOARD INPUTS AND OUTPUTS
SENSORS INPUTS
P119
A59
P118
A55
P114
A56
P115
A57
P116
A58
P117
OR
A60
P120
P122
A61
P121
P110
P111
P112
P113
OUTPUTS
COMPRESSOR SAFETY INPUTS
BURNER INPUTS
ROOM THERMOSTAT (A2)
TB1 connects to P110. Room thermostat connects to TB1. See section C2 in the wiring diagram section P.65
IMC AND ADD-ON BOARD LOCATION AND OPERATION
A59 (LCA / LGA):
Compressors 3 and 4
2 Outdoor Fans
or
A61 (LHA):
Heat Pump
Compressor 2
3 Outdoor fans
1 Reversing valve
1 Blower
1 Compressor
1 Outdoor fan
A55:
1 Gas valve
1 Reversing valve
1 Electric heat section
A56:
Optional Economizer and/or Power Exhaust Fan
A57
(LCA / LGA):
Second compressor
1 Outdoor fan
A58:
Second Gas Valve
or
A60:
Second Electric Heat Section

FIGURE 10

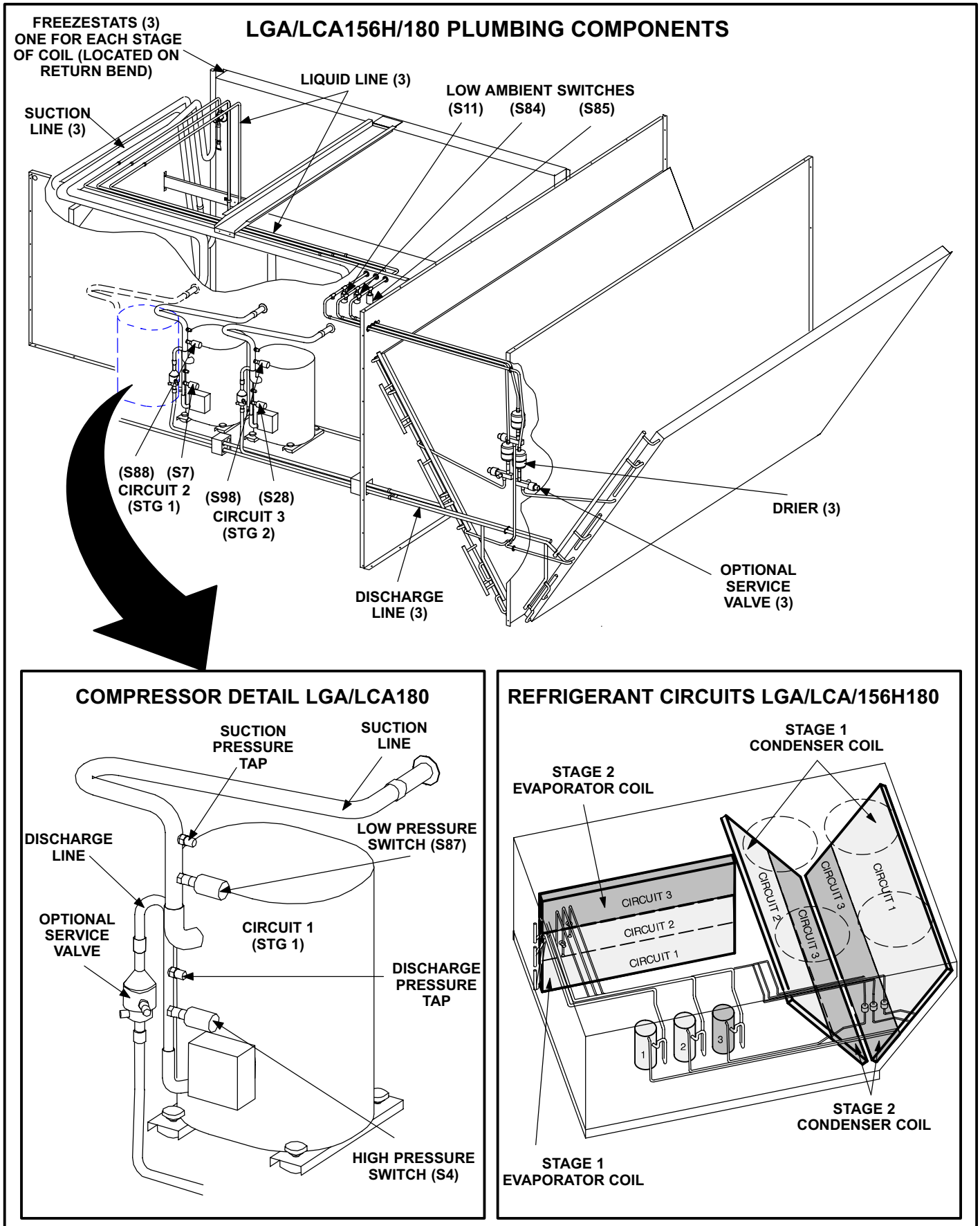

LGA/LCA156H/180 PLUMBING COMPONENTS
FREEZESTATS (3) ONE FOR EACH STAGE OF COIL (LOCATED ON RETURN BEND)
LIQUID LINE (3)
LOW AMBIENT SWITCHES (S11) (S84) (S85)
SUCTION LINE (3)
(S88) (S7) CIRCUIT 2 (STG 1)
(S98) (S28) CIRCUIT 3 (STG 2)
DRIER (3)
OPTIONAL SERVICE VALVE (3)
DISCHARGE LINE (3)
COMPRESSOR DETAIL LGA/LCA180
SUCTION PRESSURE TAP
SUCTION LINE
LOW PRESSURE SWITCH (S87)
DISCHARGE LINE
OPTIONAL SERVICE VALVE
CIRCUIT 1 (STG 1)
DISCHARGE PRESSURE TAP
HIGH PRESSURE SWITCH (S4)
REFRIGERANT CIRCUITS LGA/LCA/156H180
STAGE 1 CONDENSER COIL
STAGE 2 EVAPORATOR COIL
CIRCUIT 3
CIRCUIT 2
CIRCUIT 1
CIRCUIT 2
CIRCUIT 3
CIRCUIT 3
CIRCUIT 1
1
2
3
STAGE 2 CONDENSER COIL
STAGE 1 EVAPORATOR COIL

FIGURE 11

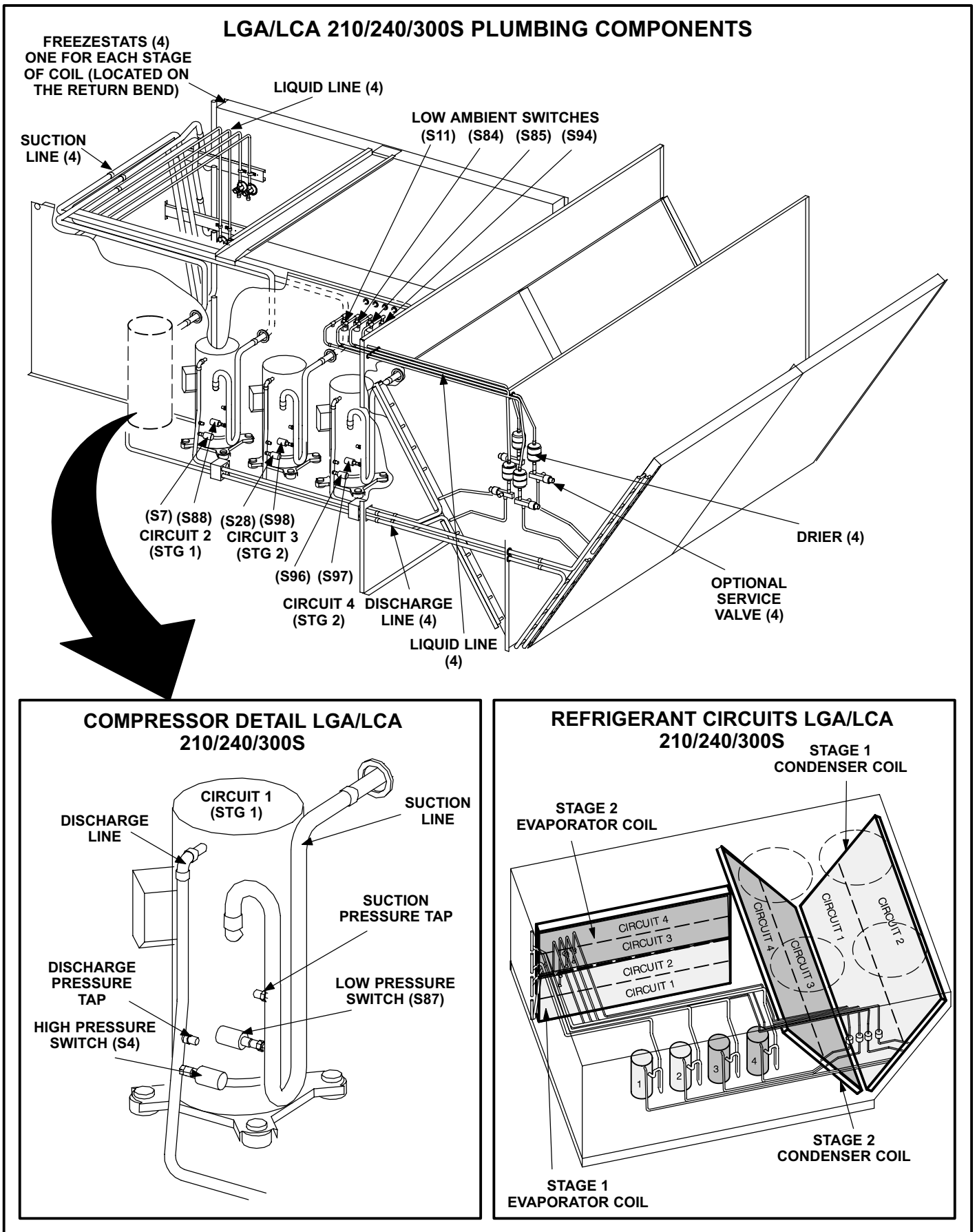

LGA/LCA 210/240/300S PLUMBING COMPONENTS
FREEZESTATS (4) ONE FOR EACH STAGE OF COIL (LOCATED ON THE RETURN BEND)
LIQUID LINE (4)
LOW AMBIENT SWITCHES (S11) (S84) (S85) (S94)
SUCTION LINE (4)
(S7) (S88) CIRCUIT 2 (STG 1)
(S28) (S98) CIRCUIT 3 (STG 2)
(S96) (S97) CIRCUIT 4 (STG 2)
DISCHARGE LINE (4)
LIQUID LINE (4)
DRIER (4)
OPTIONAL SERVICE VALVE (4)
COMPRESSOR DETAIL LGA/LCA 210/240/300S
CIRCUIT 1 (STG 1)
SUCTION LINE
DISCHARGE LINE
SUCTION PRESSURE TAP
DISCHARGE PRESSURE TAP
LOW PRESSURE SWITCH (S87)
HIGH PRESSURE SWITCH (S4)
REFRIGERANT CIRCUITS LGA/LCA 210/240/300S
STAGE 1 CONDENSER COIL
STAGE 2 EVAPORATOR COIL
CIRCUIT 4
CIRCUIT 3
CIRCUIT 2
CIRCUIT 1
STAGE 2 CONDENSER COIL
STAGE 1 EVAPORATOR COIL

FIGURE 12

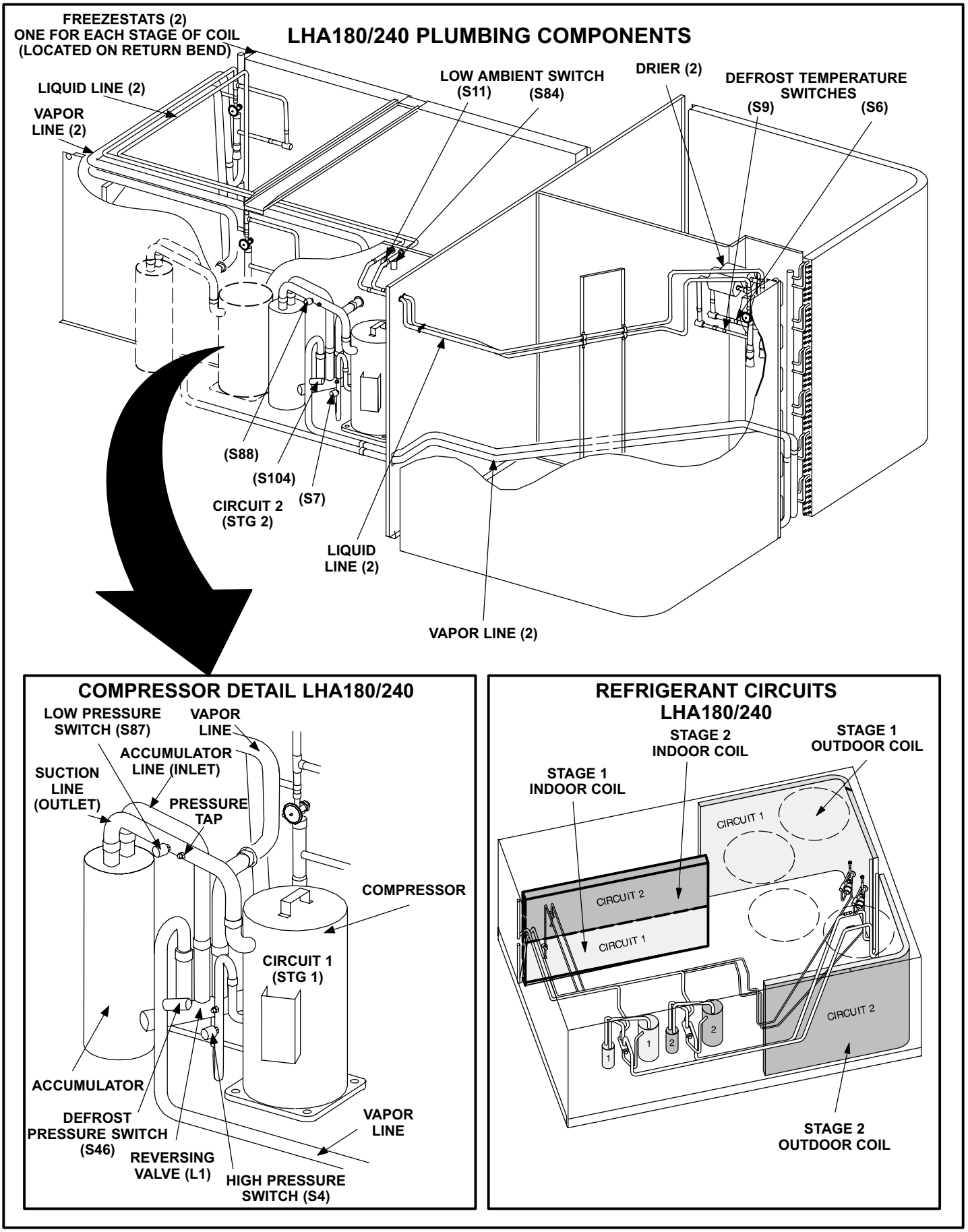

LHA180/240 PLUMBING COMPONENTS
FREEZESTATS (2)
ONE FOR EACH STAGE OF COIL
(LOCATED ON RETURN BEND)
LIQUID LINE (2)
VAPOR
LINE (2)
LOW AMBIENT SWITCH
(S11)
(S84)
DRIER (2)
DEFROST TEMPERATURE
SWITCHES
(S9)
(S6)
(S88)
(S104)
(S7)
CIRCUIT 2
(STG 2)
LIQUID
LINE (2)
VAPOR LINE (2)
COMPRESSOR DETAIL LHA180/240
LOW PRESSURE
SWITCH (S87)
VAPOR
LINE
ACCUMULATOR
LINE (INLET)
SUCTION
LINE
(OUTLET)
PRESSURE
TAP
COMPRESSOR
CIRCUIT 1
(STG 1)
ACCUMULATOR
DEFROST
PRESSURE SWITCH
(S46)
REVERSING
VALVE (L1)
HIGH PRESSURE
SWITCH (S4)
VAPOR
LINE
REFRIGERANT CIRCUITS
LHA180/240
STAGE 2
INDOOR COIL
STAGE 1
OUTDOOR COIL
STAGE 1
INDOOR COIL
CIRCUIT 1
CIRCUIT 2
CIRCUIT 1
CIRCUIT 2
1
2
1
2
STAGE 2
OUTDOOR COIL

FIGURE 13

B-Cooling Components

LGA/LCA/LHA units use independent cooling circuits consisting of separate compressors, condenser coils and evaporator coils. See figures 11, 12, and 13. Four draw-through type condenser fans are used in all units. All units are equipped with belt-drive blowers which draw air across the evaporator during unit operation.

Cooling may be supplemented by a factory- or field-installed economizer. The evaporators are slab type and are stacked. Each evaporator uses a thermostatic expansion valve as the primary expansion device. Each evaporator is also equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a crankcase heater, high pressure switch and low pressure switch. Additional protection is provided by low ambient switches and freezestats (on each evaporator).

1-Compressors B1 and B2 (all units) B13 (all LGA/LCA/156H 180/210/240 units) B20 (all LGA/LCA 210/240/300S units)

All LGA/LCA standard efficiency and LHA high efficiency units use reciprocating type compressors, while all LGA and LCA high efficiency units use scroll compressors. All LGA/LCA 13 ton (46 kW) units use three four ton (14.1 kW) compressors;15 ton (52.8 kW) units use three five-ton (10.6 kW) compressors; 17.5 ton (61.5 kW) units use four four-ton (14.1 kW) compressors; 20 ton (70.3 kW) units use four five-ton (17.6 kW) compressors and 25 ton (88 kW) units use four six ton (21 kW) compressors. All LHA 15 ton (52.8 kW) units use two 7.5-ton (26.4 kW) compressors and 20-ton (70.3 kW) units use two 10-ton (35.2 kW) compressors. Compressors are supplied by various manufacturers. All units are equipped with independent cooling circuits. Compressor electrical specifications vary by manufacturer. Likewise, compressor capacity may vary from stage to stage. In all cases, the capacity of each compressor is added to reach the total capacity of the unit.

⚠ 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.

Each compressor is energized by a corresponding compressor contactor.

NOTE-Refer to the wiring diagram section for specific unit operation.

2-Crankcase Heaters HR1 and HR2 (all units) HR5 (LGA/LCA 156H/180/210/240/300S) HR11 (LGA/LCA 210/240/300S)

All LGA/LCA high efficiency units and all LHA units use belly-band type crankcase heaters, while all LGA/LCA standard efficiency units use insertion type heaters. Heater HR1 is installed around compressor B1, heater HR2 compressor B2, HR5 compressor B13, and HR11 compressor B20. Crankcase heater wattage varies by compressor manufacturer.

3-High Pressure Switches S4 and S7 (all units) S28 (LGA/LCA 156H/180/210/240/300S) S96 (LGA/LCA 210/240/300S)

The high pressure switches is an auto-reset SPST N.C. switch which opens on a pressure rise. All LGA/LCA/LHA units are equipped with this switch. The switch is located in the compressor discharge line and is wired in series with the compressor contactor coil.

S4 (first circuit), S7 (second circuit), S28 (third circuit), and S96 (fourth circuit) are wired in series with the respective compressor contactor coils.

When discharge pressure rises to 410 ± 10 psig (2827 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate). When discharge pressure drops to 310 ± 20 psig (2137 ± 138 kPa) the pressure switch will close. Main control A55 has a three-strike counter before lockouting out. This means the control allows three high pressure trips per one thermostat demand. The control can be reset by breaking and remaking the thermostat demand or manually resetting the control.

4-Low Ambient Switches S11 & S84(all units) S85 (LGA/LCA 156H/180/210/240/300S) S94 (LGA/LCA 210/240/300S)

The low ambient switch is an auto-reset SPST N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. All LGA/LCA/LHA units are equipped with this switch. In all models a switch is located in each liquid line prior to the indoor coil section.

In the LGA/LCA156H/180 units S11 (compressor one), S84 (compressor two), and S85 (compressor three) are wired in parallel, wired to the low ambient switch relay K159. In the LGA/LCA 210/240/300S units S11 and S84 are in parallel, wired to outdoor fan relay K10, while S85 and S94 (compressor four) are in parallel, wired to third outdoor fan relay K149. In the LHA180/240 units S11 is wired in series with the first outdoor fan relay K10, while S84 is wired in series with the third outdoor fan relay K149.

When liquid pressure rises to 275 ± 10 psig (1896 ± 69 kPa), the switch closes and the condenser fan is energized. When discharge pressure in one refrigerant circuit drops to 150 ± 10 psig (1034 ± 69 kPa), the switch opens and the condenser fan in that refrigerant circuit is de-energized. This intermittent fan operation results in higher evaporating temperature allowing the system to operate without icing the evaporator coil and losing capacity.

5-Low Pressure Switches S87 & S88(all units) S98 (all LGA/LCA 156H/180/210/240/300S) S97 (LGA/LCA 210/240/300S)

The low pressure switch is an auto-reset SPST N.O. switch (held N.C. by refrigerant pressure) which opens on a pressure drop. All LGA/LCA/LHA units are equipped with this switch. The switch is located in the compressor suction line.

S87 (compressor one), S88 (compressor two), S98 (compressor three), and S97 (compressor four) are wired in series with the main control module A55.

The main control module A55 governs the low pressure switches by shunting the switches during start up until pressure is stabilized. After the shunt period, the control has a three-strike counter, during first thermostat demand, before the compressor is locked out. The control is reset by breaking and remaking the thermostat demand or manually resetting the control.

When suction pressure drops to 25 $\pm$ 5 psig (172 ± 34 kPa) (indicating low pressure), the switch opens and the compressor is de-energized. The switch automatically resets when pressure in the suction line rises to 55 $\pm$ 5 psig (379 ± 34 kPa), due to many causes such as refrigerant being added.

6-Service Valve (optional on LGA/LCA units)

LGA/LCA units may be equipped with service valves located in the discharge and liquid lines. The service valves are manually operated valves used for service operation.

7-Reversing Valves L1 and L2 (all LHA180/240 units)

Two refrigerant reversing valves, each with 24 volt solenoid coils, are used to reverse refrigerant flow during unit operation in all LHA units. The reversing valves are connected in the vapor lines of each refrigerant circuit. Reversing valve L1 is connected in the first refrigerant cycle and L2 is connected in the second refrigerant cycle. The reversing valve coils are energized during cooling demand and during defrost.

The reversing valves in all LHA units are wired independently. Reversing valve L1 is controlled by the main control module A55 in response to first stage cooling demand or by first stage defrost. Reversing valve L2 is controlled by the heat pump control module A61 in response to second stage cooling demand or by second stage defrost.

8-Defrost Components and Operation (all LHA180/240 units)

a-Defrost Pressure Switch S46 and S104

The defrost pressure switches (S46 and S104) are auto-reset SPST N.C. pressure switches which open on a pressure rise. All LHA units are equipped with these switches. The switches are located on the suction line during heating cycle (discharge line during cooling and defrost cycle).

S46 (refrigeration circuit one) is wired to the main control board. S104 (refrigeration circuit two) is wired to the heat pump control board.

When discharge pressure reaches 275 $\pm$ 10 psig (1096 ± 69 kPa) (indicating defrost is completed) the switch opens. The switch automatically resets when pressure in the suction line drops to 80 $\pm$ 10 psig (552 ± 69 kPa).

b-Defrost Thermostat Switches S6 and S9 (all LHA180/240 units)

Defrost thermostat switches S6 (refrigeration circuit one) and S9 (refrigeration circuit two) are S.P.S.T. N.O. contacts which close on a temperature fall (initiating defrost). The switches are located on each of the expansion valve distributor assemblies at the inlet to the outdoor coil. The switches monitor the outdoor coil suction temperature to determine when defrost is needed. When the outdoor coil suction temperature falls to 35°F $\pm$ 4°F (1.7°C $\pm$ 2.2°C) the switch closes (initiating defrost after minimum run time of 30, 60, or 90 minutes). When the temperature rises to 60°F $\pm$ 5°F (15.6°C $\pm$ 2.8°C) the switch opens.

DEFROST OPERATION

Defrost operation of each of the two refrigeration circuits are controlled independently with separete timers, thermostats (S6 and S9) and pressure switches (S46 and S104).

During heating operation when outdoor coil temperature drops to 35 ± 4 °, the defrost thermostat S6 or S9 closes initiating defrost.

When defrost begins, the reversing valve (L1 or L2) for the circuit in defrost mode is energized. Supplemental electric heat is then energized.

When L1 energizes, N.C. K58-1 contacts open de-energizing outdoor fan relay K10, followed by outdoor fan B4. When L2 energizes, N.C. K118-1 contacts open de-energizing outdoor fan relay K68, followed by outdoor fan B5.

Defrost of a circuit terminates when the pressure switch for the circuit (S46 or S104) opens or when 15 minutes elapse. Defrost does **not** terminate when thermosts demand ends.

9-Accumulator (all LHA180/240 units)

All LHA units are equipped with an accumulator. The purpose of the accumulator is to trap and evaporate all liquid refrigerant and prevent liquid refrigerant from entering the compressor.

10-Filter Drier (all units)

LGA/LCA/LHA units have a filter drier located in the liquid line of each refrigerant circuit at the exit of each condenser coil (outdoor coil in LHA units). The drier removes contaminants and moisture from the system.

11-Freezestats S49 and S50 (all units) S53(LGA/LCA 156H/180/210/240/300S) S95(LGA/LCA 210/240/300S)

Each unit is equipped with a low temperature switch (freezestat) located on the return bend of each evaporator coil. S49 (first circuit), S50 (second circuit), S53 (third circuit), and S95 (fourth circuit) are located on the corresponding evaporator coils.

Each freezestat is wired to the main control module A55. Each freezestat is a SPST N.C. auto-reset switch which opens at 29°F ± 3°F (-1.7°C ± 1.7°C) on a temperature drop and closes at 58°F ± 4°F (14.4°C ± 2.2°C) on a temperature rise. To prevent coil icing, freezestats open during compressor operation to temporarily disable the respective compressor until the coil warms sufficiently to melt any accumulated frost.

If the freezestats are tripping frequently due to coil icing, check the unit charge, airflow and filters before allowing unit back in operation. Make sure to eliminate conditions which might promote evaporator ice buildup.

12-Condenser Fans B4, B5, B21, and B22 (all units)

The tables on pages 3, 5, and 6 in this manual show the specifications of condenser fans used in LGA/LCA/LHA units. All condenser fans used have single-phase motors. All units are equipped with four condenser fans. The complete fan assembly may be removed for servicing and cleaning by removing the fan grill and turning the complete assembly until the motor brackets line up with the notches in the top panel. Lift the fan assembly out of the unit and disconnect the jack plug located on the motor.

C-Blower Compartment

The blower compartment in all LGA/LCA/LHA units is located between the evaporator coil and the compressor / control section on the opposite side of the condenser coil. The blower assembly is accessed by disconnecting the blower motor jack plug J98/P98 (and all other plugs) and removing the screws on either side of the sliding base. The base pulls out as shown in figure 14.

1-Blower Wheels (all units)

All 13 through 25 ton (46 through 88 kW) LGA/LCA/LHA units have two 15 in. x 15 in. (381 mm x 381 mm) blower wheels. Both wheels are driven by one motor.

2-Indoor Blower Motor B3 (all units)

All LGA/LCA/LHA units use three-phase single-speed blower motors. CFM adjustments are made by adjusting the motor pulley (sheave). Motors are equipped with sealed ball bearings. All motor specifications are listed in the tables on pages 3, 5, and 6. Units may be equipped with motors manufactured by various manufacturers, therefore electrical FLA and LRA specifications will vary. See unit rating plate for information specific to your unit.

OPERATION / ADJUSTMENT

Blower Operation

NOTE-The following is a generalized procedure and does not apply to all thermostat control systems.

1- Blower operation is dependent on the thermostat control system option that has been installed in the LGA/LCA/LHA units. Refer to operation sequence of the control system installed for detailed descriptions of blower operation.

2- Generally, blower operation is set at the thermostat fan switch. With the fan switch in “ON” position and the **OCP** input is **“ON”**, the blower operates continuously. With the fan switch in “AUTO” position, the blower cycles with demand.

3- In most cases, the blower and entire unit will be off when the system switch is in the “OFF” position. The only exception is immediately after a heating demand when the blower control keeps the blower on until all heat is extracted from the heat exchanger.

Determining Unit Air Volume

1- The following measurements must be made with a dry indoor coil. Run blower without cooling demand. Air filters must be in place when measurements are taken.

2- With all access panels in place, measure static pressure external to unit (from supply to return).

3- Measure the indoor blower wheel RPM.

4- Refer to blower table on page 10, use static pressure and RPM readings to determine unit air volume. Use blower tables on pages 11 and 12 when installing units with the optional accessories listed.

5- The RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase RPM. Turn counterclockwise to decrease RPM. See figure 14.

Blower Belt Adjustment

Proper pulley alignment and belt tension must be maintained for maximum belt life.

NOTE-Tension new belt after 24-48 hours of operation. This will allow belts to stretch and seat in grooves.

1- Loosen four screws securing blower motor to sliding base. See figure 14.

2- *To increase belt tension -*

Turn belt tension adjusting screw to the left, or counterclockwise, to tighten the belt. This increases the distance between the blower motor and the blower housing.

To loosen belt tension -

Turn the adjusting screw to the right, or clockwise to loosen belt tension.

3- Tighten four screws securing blower motor to sliding base once adjustments have been made.

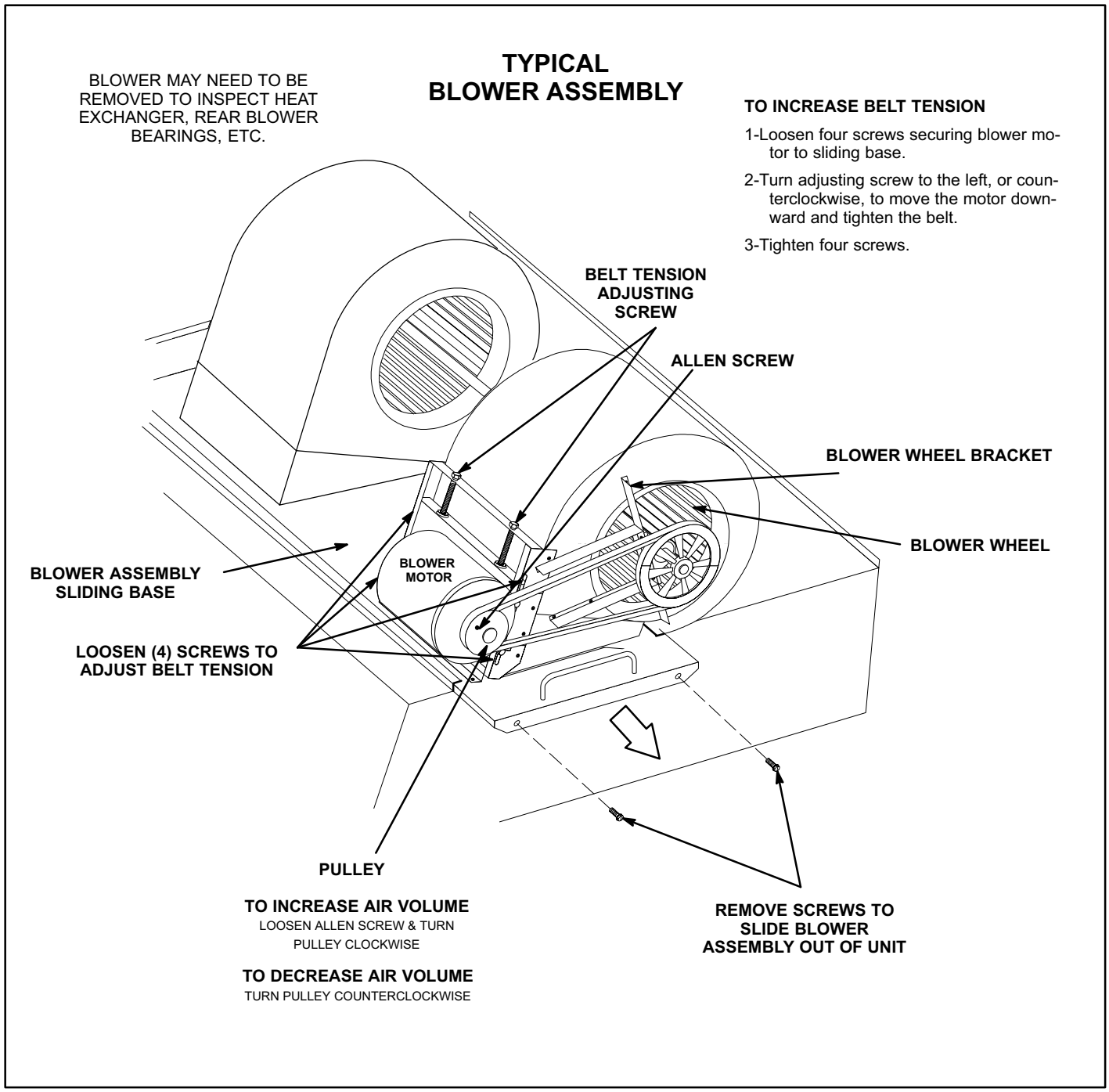


FIGURE 14

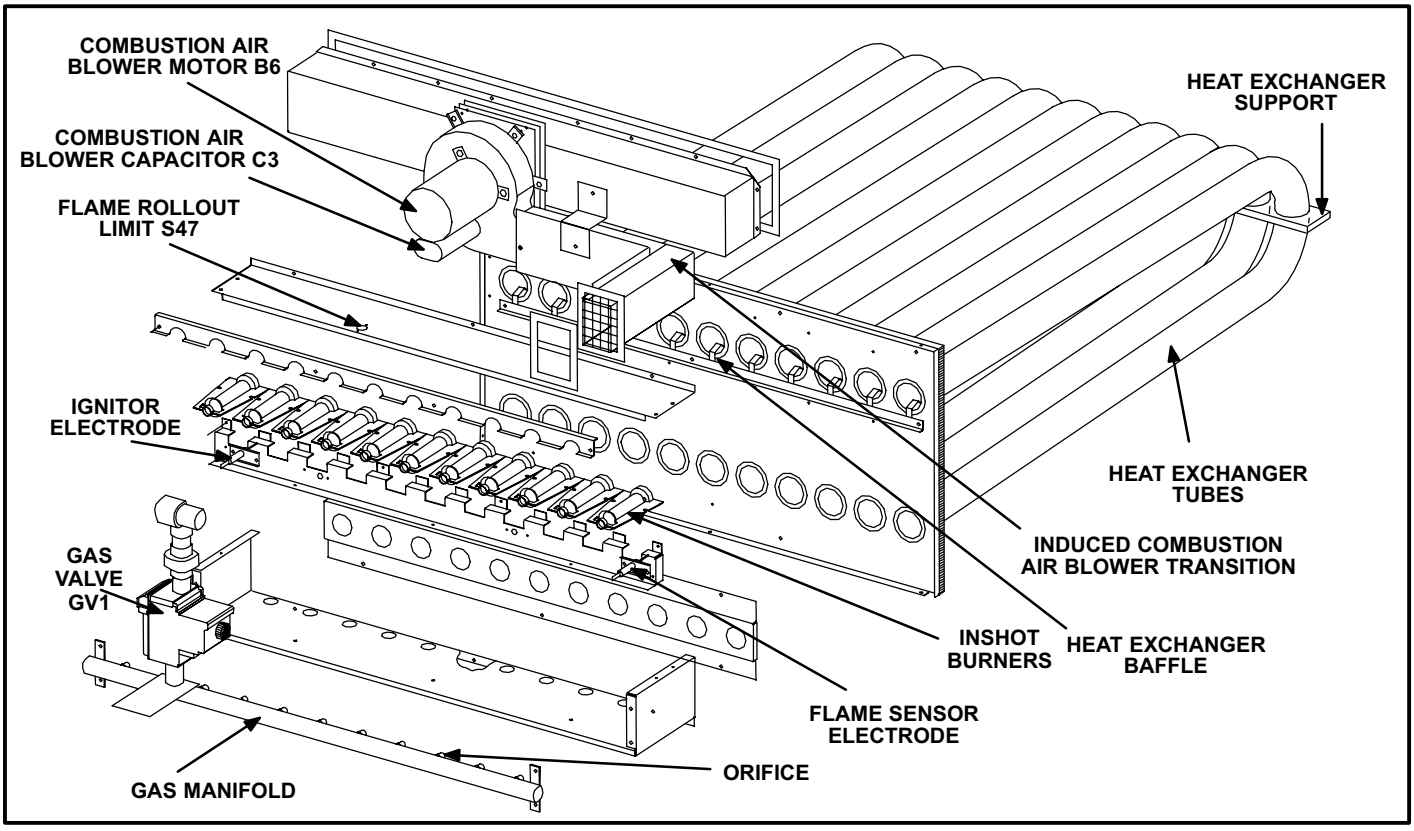


FIGURE 15

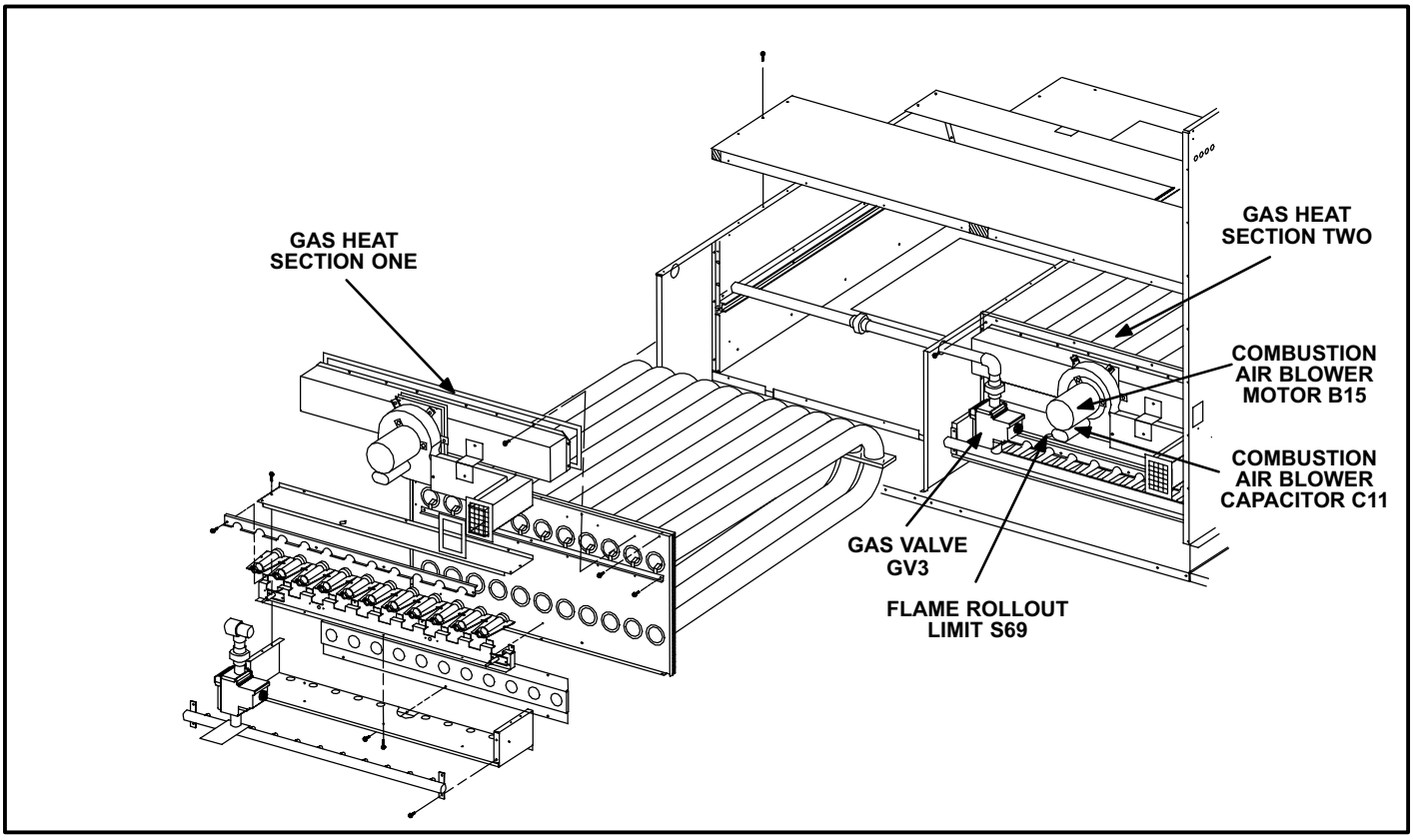


FIGURE 16

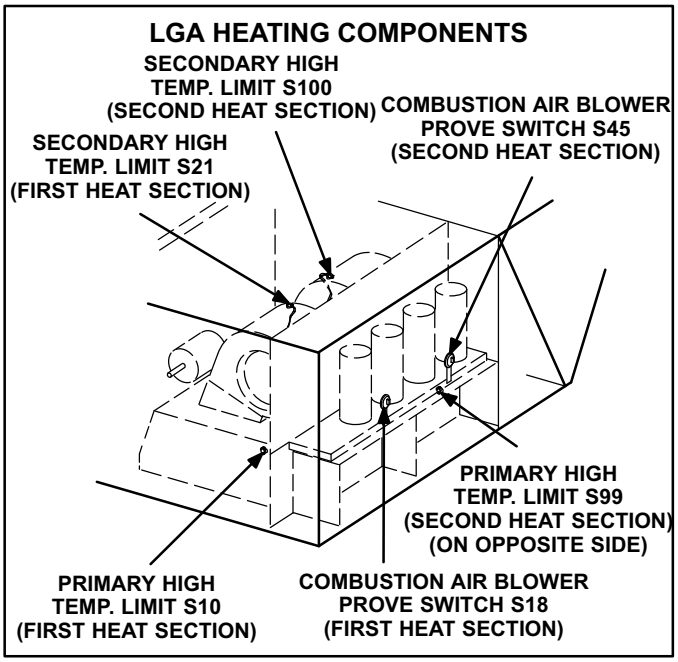


FIGURE 17

D-GAS HEAT COMPONENTS (all LGA units)

LGA180/210/240/300S units are available in 260,000 BTUH (76.2 kW) (standard gas heat) or 470,000 BTUH (137.7 kW) (high gas heat) sizes. LGA156H is available only in 260,000 BTUH. All units are equipped with two identical gas heat sections (gas heat section one and gas heat section two).

1-Control Box Components A3, A12, A55, A58, T3, T13, K13 and K19

The main control box (see figure 4) houses the burner controls A3 and A12, main control module A55, gas valve (burner) control module A58, combustion air blower transformers T3 and T13, combustion air blower relay K13, and second heat section relay K19. For a description of the components see section I-A. A more detailed description of burner controls A3 and A12 is given below.

Burner Ignition Control A3 and A12

The ignition controls are located in the control box. Three different manufacturers' (Fenwal, Johnson Controls, and RAM) controls are used in the LGA units. All three ignition controls operate the same.

The ignition control provides three main functions: gas valve control, ignition, and flame sensing. The unit will usually ignite on the first attempt; however, the ignition attempt sequence provides three trials for ignition before locking out. The lockout time for the Johnson control is 5 minutes. The lockout time for the Fenwal control and RAM control is 1 hour. After lockout, the ignition control automatically resets and provides three more attempts at ignition. Manual reset after lockout requires breaking and remaking power to the ignition control. See figure 19 for a normal ignition sequence and figure 20 for the ignition attempt sequence with retrials (nominal timings given for simplicity). Specific timings for the ignition controls are shown in figure 21.

Flame rectification sensing is used on all LGA units. Loss of flame during a heating cycle is indicated by an absence of flame signal (0 microamps). If this happens, the control will immediately restart the ignition sequence and then lock out if ignition is not gained after the third trial. See Sytems Service Checks section for flame current measurement.

The control shuts off gas flow immediately in the event of a power failure. Upon restoration of gas and power, the control will restart the ignition sequence and continue until flame is established or system locks out.

On a heating demand, the ignition control is energized by the main control module A55. The ignition control then allows 30 to 40 seconds for the combustion air blower to vent exhaust gases from the burners. When the combustion air blower is purging the exhaust gases, the combustion air prove switch is closing proving that the combustion air blower is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates gas valve, the spark electrode and the flame sensing electrode. Sparking stops immediately after flame is sensed. The combustion air blower continues to operate throughout the heating demand. If the flame fails or if the burners do not ignite, the ignition control will attempt to ignite the burners up to two more times. If ignition cannot be obtained after the third attempt, the control will lock out. The ignition control is not adjustable.

The RAM control is illustrated in figure 18. The four spade connections are used to connect the control to unit. Each of the four spade terminals are identified by function. The spark electrode wire connects to the spark-plug-type connector on top of the control.

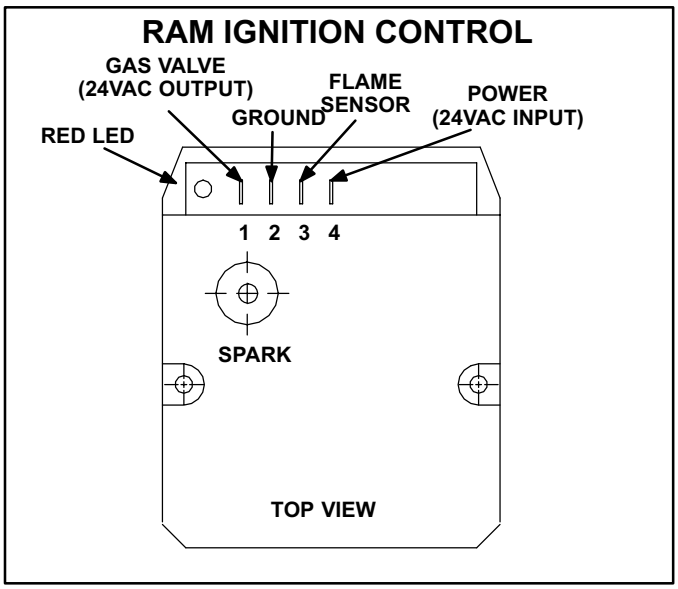


FIGURE 18

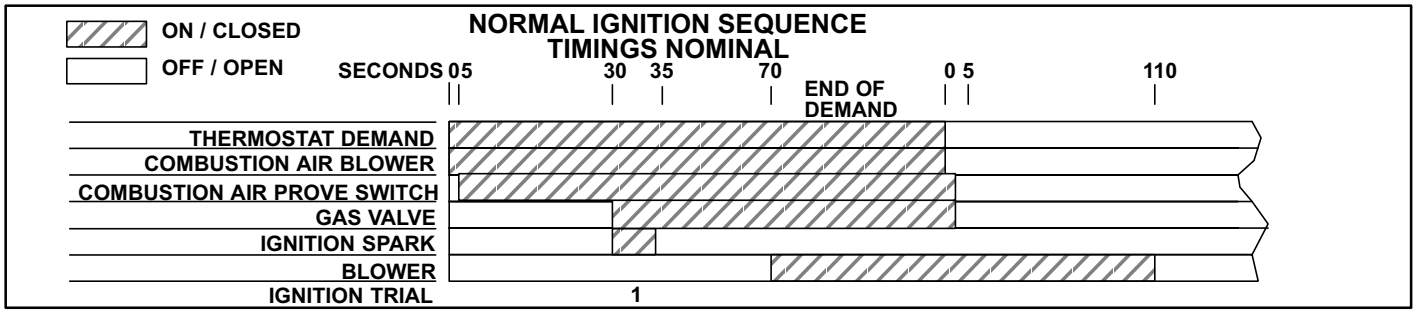


FIGURE 19

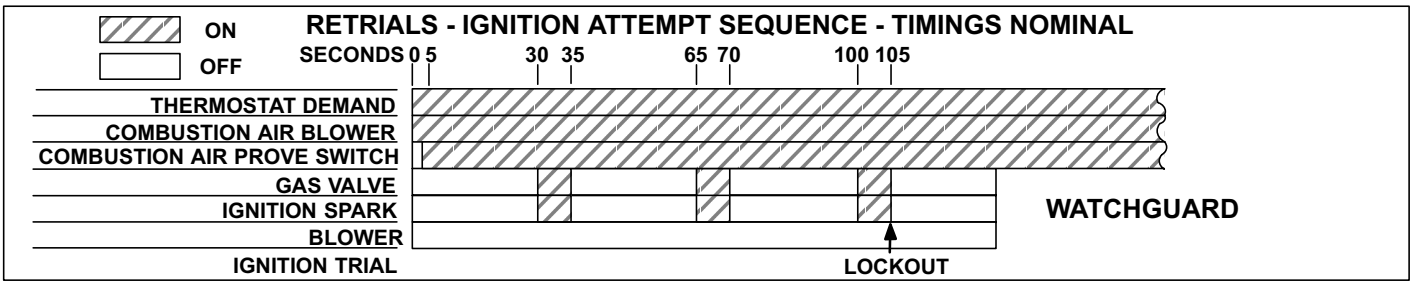


FIGURE 20

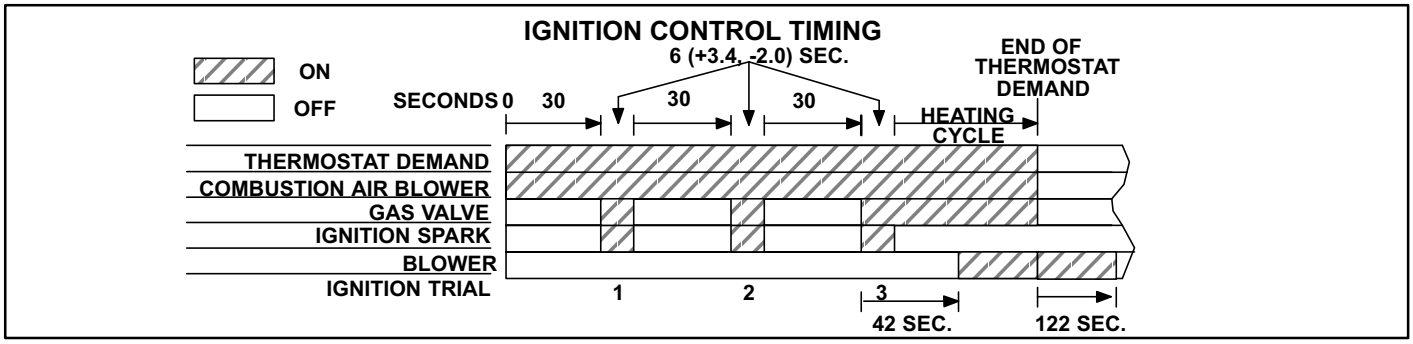


FIGURE 21

⚠ WARNING

SHOCK HAZARD. SPARK RELATED COMPONENTS CONTAIN HIGH VOLTAGE WHICH CAN CAUSE PERSONAL INJURY OR DEATH. DISCONNECT POWER BEFORE SERVICING. CONTROL IS NOT FIELD REPAIRABLE. UNSAFE OPERATION WILL RESULT. IF THE CONTROL IS INOPERABLE, SIMPLY REPLACE THE ENTIRE CONTROL.

2-Heat Exchanger (Figure 15)

The LGA units use aluminized steel inshot burners with matching tubular aluminized (stainless steel is an option) steel heat exchangers and two-stage redundant gas valves. LGA uses two eleven tube/burners for high heat and two six tube/burners for low heat. Each burner uses a burner venturi to mix gas and air for proper combustion. Combustion takes place at each tube entrance. As hot combustion gases are drawn upward through each tube by the combustion air blower, exhaust gases are drawn out the top and fresh air/gas mixture is drawn in at the bottom. Heat is transferred to the air stream from all surfaces of the heat exchanger tubes. The supply air blowers, controlled by the main control panel A55, force air across all surfaces of the tubes to extract the heat of combustion. The shape of the tubes ensures maximum heat exchange.

The gas valves accomplish staging by allowing more or less gas to the burners as called for by heating demand.

3-Burner Assembly (Figure 22)

The burners are controlled by the spark electrode, flame sensing electrode, gas valve and combustion air blower. The spark electrode, flame sensing electrode and gas valve are directly controlled by ignition control. Ignition control and combustion air blower is controlled by main control panel A55.

Burners

All units use inshot burners (see figures 22 and 23). Burners are factory set and do not require adjustment. A peep hole with cover is furnished in the heating access panel for flame viewing. Always operate the unit with the access panel in place.

Burners can be removed individually for service.

Burner maintenance and service is detailed in the SERVICE CHECKS sections of this manual.

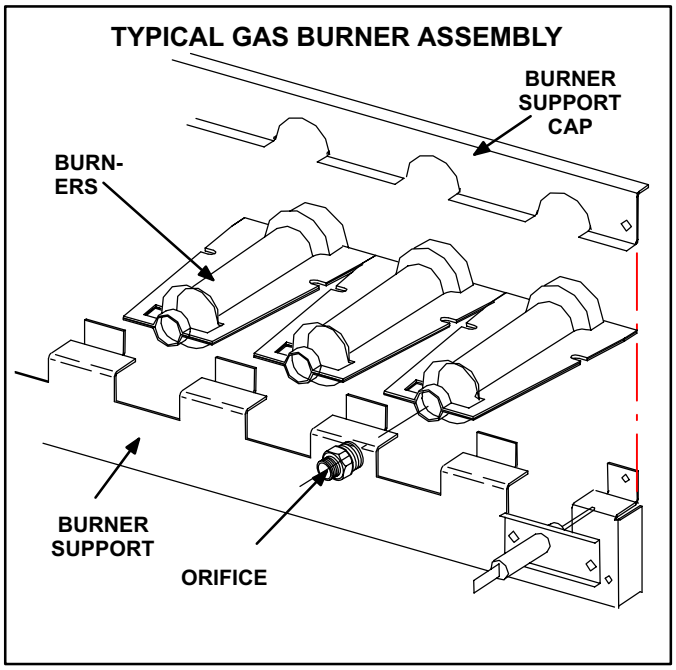


FIGURE 22

Orifice

Each burner uses an orifice which is precisely matched to the burner input. The orifice is threaded into the burner manifold. The burner is supported by the orifice and will easily slide off for service.

NOTE-Do not use thread sealing compound on the orifices. Using thread sealing compound may plug the orifices.

Each orifice and burner are sized specifically to the unit. Refer to Lennox Repair Parts Listing for correct sizing information.

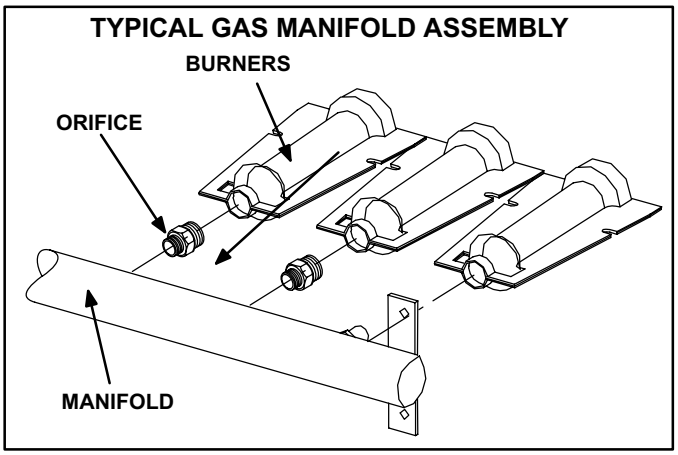


FIGURE 23

NOTE-In primary and secondary high temperature limits S10, S99, S21, and S100 the ignition circuits in both gas heat sections one and two are immediately de-energized when terminals 1-3 open and the indoor blower motor is immediately energized when terminals 1-2 close. This is the primary and secondary safety shutdown function of the unit.

4-Primary High Temperature Limits S10 & S99

S10 is the primary high temperature limit for gas heat section one, while S99 is the primary high temperature limit for gas heat section two. S10 is located in the blower compartment and is mounted on the end of the blower support panel which divides the blower compartment from the heating compartment (see figure 17). S99 is located on the blower support panel which separates the second gas heat section from the outdoor condenser section (see figure 17).

Primary limit S10 is wired to the main control panel A55 which energizes burner 1 control (A3), while primary limit S99 is wired to the gas 2 panel A58 which energizes burner 2 control (A12). Its N.C. contacts open to de-energize the ignition control when excessive temperature is reached in the blower compartment. At the same time, the N.O. contacts of S10 and S99 close energizing the blower relay coil K3 through control A55. If either limit trips the blower will be energized. Three limits with different actuating temperatures are used for limits S10 and S99 (standard and high first heat section use two different limits, while yet another limit is used for the second heat section). All three limits are SPDT N.C. auto-reset limits.

Limit S10 in standard heat units is factory preset to open at 180°F ± 6°F (82.2°C ± 3.3°C) on a temperature rise and automatically reset at 150°F ± 7°F (65.6°C ± 3.9°C) on a temperature fall. Limit S10 in high heat units opens at 150°F ± 5°F (65.6°C ± 2.8°C) on a temperature rise and automatically resets at 120°F ± 6°F (48.9°C ± 3.3°C) on a temperature fall. Limit S99 in both standard and high heat units opens at 140°F ± 5°F (60°C ± 2.8°C) on a temperature rise and automatically resets at 110°F ± 6°F (43.3°C ± 3.3°C) on a temperature fall.

5-Secondary High Temperature Limits S21 & S100

S21 is the secondary high temperature limit for heat section one, while S100 is the secondary high temperature limit for heat section two. Like the primary limits, the secondary limits are located in the blower compartment. S21 and S100 are mounted on top of the blowers (see figure 17).

Secondary limit S21 is also wired to the main control panel A55, while secondary limit S100 is wired to the gas 2 panel A58. The secondary limits function in the same manner as the primary limits, but are factory set to actuate at different temperatures. The N.O. contacts of both S21 and S100 are connected to the blower relay coil K3 through control A55. If either limit trips the blower will be energized. All limits used are SPDT N.C. auto-reset limits.

Limit S21 and S100 in standard heat units are factory preset to open at 140°F ± 6°F (60°C ± 3.3°C) on a temperature rise and automatically reset at 100°F ±7°F (37.8°C ± 3.9°C) on a temperature fall. On high heat units, limits S10 and S100 open at 160°F ± 6°F (71.1°C ± 3.3°C) on a temperature rise and automatically reset (close) at 120°F ± 7°F (48.9°C ± 3.9°C) on a temperature fall. This is a secondary safety shut-down function of the unit.

6-Flame Rollout Limits S47 and S69

Flame rollout limits S47 (first heat section) and S69 (second heat section) are SPST N.C. high temperature limits located just above the burner air intake opening in the burner enclosures (see figure 15). S47 is wired to the main control panel A55, while S69 is wired to the gas 2 panel A58. When S47 or S69 senses flame rollout (indicating a blockage in the combustion air passages), the corresponding flame rollout limit trips, and the ignition control immediately closes the gas valve.

Limit S47 and S69 in standard heat units are factory preset to open at 250°F ± 12°F (121.1°C ± 6.7°C) on a temperature rise, while on high heat units both limits open at 270°F ± 12°F (132.2°C ± 6.7°C) on a temperature rise. All flame rollout limits are manual reset.

7-Combustion Air Prove Switches S18 & S45

The combustion air prove switch S18 (first heat section) and S45 (second heat section) are SPST N.O. pressure switches located in the compressor compartment (see figure 17). Both switches are identical and are used to monitor combustion air blower operation. Switch S18 is wired to the main control panel A55, while S45 is wired to the gas 2 panel A58. The switch actuates at 0.80"W.C. ± 0.05" (198.9 Pa ± 12.4 Pa) for standard heat units and 1.0" W.C. ± 0.05" (248.6Pa ± 12.4 Pa) for high heat units on pressure fall.This pressure fall and switch actuation allows power to the ignition control (proves, by closing, that the combustion air blower is operating before allowing the ignition control to energize.) The combustion air prove switch is factory set and not adjustable. The switch will automatically open on a pressure rise at 0.65" W.C. ± 0.05" W.C. (161.6 Pa ± 12.4 Pa) for standard heat units and .85" W.C. ± 0.05" W.C. (211.3 Pa ± 12.4 Pa) negative pressure for high heat units.

8-Combustion Air Blowers B6 and B15

Combustion air blowers B6 (first heat section) and B15 (second heat section) are identical blowers which provide fresh air to the corresponding burners while clearing the combustion chamber of exhaust gases. The blowers begin operating immediately upon receiving a thermostat demand and are de-energized immediately when thermostat demand is satisfied.

Both combustion air blowers use a 208/230V single-phase PSC motor and a 4.81in. x 1.25in. (122mm x 32mm) blower wheel. All motors operate at 3200RPM and are equipped with auto-reset overload protection. Blowers are supplied by various manufacturers. Ratings may vary by manufacturer. Specific blower electrical ratings can be found on the unit rating plate.

All combustion air blower motors are sealed and cannot be oiled. The blower cannot be adjusted but can be disassembled for cleaning.

9-Combustion Air Motor Capacitors C3 & C11

The combustion air blower motors in all LGA units require run capacitors. Capacitor C3 is connected to combustion air blower B6 and C11 is connected to combustion air blower B15. Both capacitors are rated at 3 MFD and 370VAC.

10-Gas Valves GV1 and GV3

Gas valves GV1 and GV3 are identical. The gas valves are two-stage redundant valves. Units are equipped with valves manufactured by White-Rodgers. First stage (low fire) is quick opening (on and off in less than 3 seconds). Second stage is slow opening (on to high fire pressure in 40 seconds and off to low fire pressure in 30 seconds). On a call for first stage heat (low fire), the valve is energized by the ignition control simultaneously with the spark electrode. On a call for second stage heat (high fire), the second stage operator is energized directly from A55 (GV1) and A58 (GV3). When demand is satisfied, second stage must be closed (30 seconds to close completely) before first stage can close. Low fire outlet pressure is non-adjustable, while high fire outlet pressure is adjustable from 2.5" W.C. to 5.0" W.C. (621.6 Pa to 1243.2 Pa). A manual shut-off knob is provided on the valve for shut-off. Manual shut-off knob immediately closes both stages without delay. Figure 24 shows White-Rodgers gas valve components. Table 2 shows factory gas valve regulation

for LGA series units. Optional factory installed gas valves for single stage heat only, are available for the LGA156H, LGA180S and LGA180H. Gas valves are wired without W2 eliminating two stage heat.

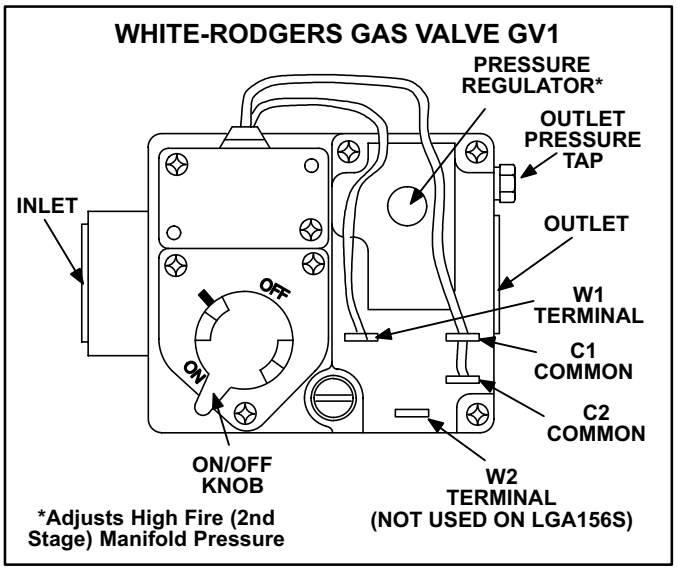


FIGURE 24

TABLE 2

GAS VALVE REGULATION FOR LGA UNITS				
Maximum Inlet Pressure	Operating Pressure (outlet) Factory Setting			
	Natural		L.P	
	Low	High	Low	High
13.0"W.C. 3232Pa	1.6±0.2"W.C. 398±50Pa	3.7±0.3"W.C. 920±75Pa	5.5±0.3"W.C. 1368±75Pa	10.5±0.5"W.C. 2611±7124Pa

11-Spark Electrodes

An electrode assembly is used for ignition spark. Two identical electrodes are used (one for each gas heat section). The electrode is mounted through holes on the left-most end of the burner support. The electrode tip protrudes into the flame envelope of the adjacent burner. The electrode assembly is fastened to burner supports and can be removed for service without removing any part of the burners.

During ignition, spark travels through the spark electrode (figure 25) and ignites the left burner. Flame travels from burner to burner until all are lit.

The spark electrode is connected to the ignition control by a 8 mm silicone-insulated stranded high voltage wire. The wire uses 1/4" (6.35 mm)female quick connect on the electrode end and female spark plug-type terminal on the ignition control end.

NOTE-IN ORDER TO MAXIMIZE SPARK ENERGY TO ELECTRODE, HIGH VOLTAGE WIRE SHOULD TOUCH UNIT CABINET AS LITTLE AS POSSIBLE.

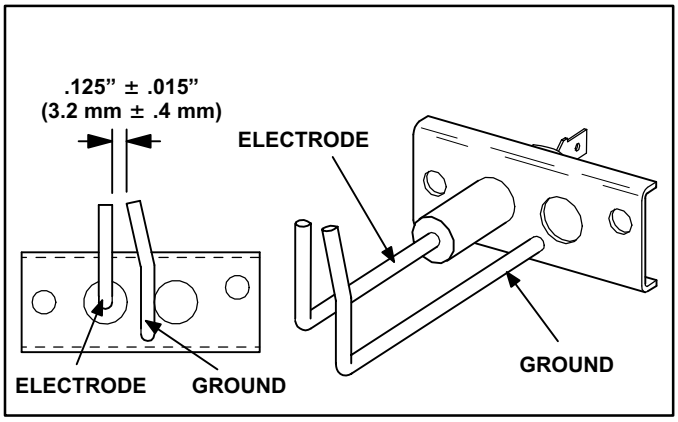


FIGURE 25

12-Flame Sensors

A flame sensor is located on the right side of each burner support. The sensor is mounted through a hole in the burner support and the tip protrudes into the flame envelope of the right most burner. The sensor assembly is fastened to burner supports and can be removed for service without removing any part of the burners.

When flame is sensed by the flame sensor (indicated by microamp signal through the flame) sparking stops immediately. During operation, flame is sensed by current passed along the ground electrode (located on the spark electrode), through the flame and into the sensing electrode. The ignition control allows the gas valve to stay open as long as a flame signal (current passed through the flame) is sensed.

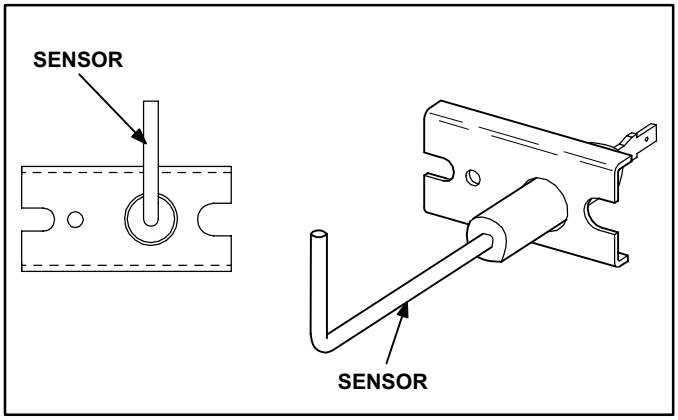


FIGURE 26

Electric Heat Data

TABLE 3 - OPTIONAL ELECTRIC HEAT DATA - LCA156H/180

156 SIZE

kW Size	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	†Total Unit, Power Exhaust Fans and Electric Heat Minimum Circuit Ampacity		
						2 hp (1.5kW)	3 hp (2.2kW)	5 hp (3.7kW)
15 kW	†(1) EHA240-7.5 208/230v **(99J16)** 460v **(99J18)** 575v **(99J20)** and †(1) EHA240S-7.5 208/230v **(99J17)** 460v **(99J19)** 575v **(99J21)** 59 lbs. (27 kg) (total weight)	1	208	11.3	38,600	66	69	75
			220	12.6	43,000			
			230	13.8	47,100			
			240	15.0	51,200			
			440	12.6	43,000	36	37	40
			460	13.8	47,100			
			480	15.0	51,200			
			550	12.6	43,000	28	29	31
			575	13.8	47,100			
			600	15.0	51,200			
30 kW	†(1) EHA156-15 208/230v **(86K55)** 460v **(86K56)** 575v **(86K57)** and †(1) EHA156S-15 208/230v **(86K58)** 460v **(86K59)** 575v **(86K60)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	94	98	106
			220	25.2	86,000	106	110	118
			230	27.5	93,900			
			240	30.0	102,400			
			440	25.2	86,000	53	55	58
			460	27.5	93,900			
			480	30.0	102,400			
			550	25.2	86,000	42	44	47
			575	27.5	93,900			
			600	30.0	102,400			
45 kW	¥(2) EHA156-22.5 208/230v **(86K10)** 460v **(86K11)** 575v **(86K12)** 76 lbs. (35 kg) (total weight)	[1]2	208	33.8	115,300	133	137	145
			220	37.8	129,000	151	155	163
			230	41.3	141,000			
			240	45.0	153,600			
			440	37.8	129,000	76	77	81
			460	41.3	141,000			
			480	45.0	153,600			
			550	37.8	129,000	61	62	65
			575	41.3	141,000			
			600	45.0	153,600			
60 kW	¥(2) EHA156-30 208/230v **(86K13)** 460v **(86K14)** 575v **(86K15)** 76 lbs. (35 kg) (total weight)	[1]2	208	45.0	153,600	141	145	153
			220	50.4	172,000	160	164	172
			230	55.1	188,000			
			240	60.0	204,800			
			440	50.4	172,000	80	82	85
			460	55.1	188,000			
			480	60.0	204,800			
			550	50.4	172,000	64	66	68
			575	55.1	188,000			
			600	60.0	204,800			

180 SIZE

kW Size	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	†Total Unit, Power Exhaust Fans and Electric Heat Minimum Circuit Ampacity		
						3 hp (2.2kW)	5 hp (3.7kW)	7.5 hp (5.6kW)
15 kW	†(1) EHA240-7.5 208/230v **(99J16)** 460v **(99J18)** 575v **(99J20)** and †(1) EHA240S-7.5 208/230v **(99J17)** 460v **(99J19)** 575v **(99J21)** 59 lbs. (27 kg) (total weight)	1	208	11.3	38,600	81	87	97
			220	12.6	43,000			
			230	13.8	47,100	81	87	96
			240	15.0	51,200			
			440	12.6	43,000			
			460	13.8	47,100	41	44	48
			480	15.0	51,200			
			550	12.6	43,000			
			575	13.8	47,100	33	35	39
			600	15.0	51,200			
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	96	104	113
			220	25.2	86,000			
			230	27.5	93,900	108	116	125
			240	30.0	102,400			
			440	25.2	86,000			
			460	27.5	93,900	53	57	61
			480	30.0	102,400			
			550	25.2	86,000			
			575	27.5	93,900	43	46	49
			600	30.0	102,400			
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	[1]2	208	33.8	115,300	135	143	152
			220	37.8	129,000			
			230	41.3	141,000	153	161	170
			240	45.0	153,600			
			440	37.8	129,000			
			460	41.3	141,000	76	79	84
			480	45.0	153,600			
			550	37.8	129,000			
			575	41.3	141,000	61	64	68
			600	45.0	153,600			
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	[1]2	208	45.0	153,600	143	151	160
			220	50.4	172,000			
			230	55.1	188,000	162	170	179
			240	60.0	204,800			
			440	50.4	172,000			
			460	55.1	188,000	80	84	88
			480	60.0	204,800			
			550	50.4	172,000			
			575	55.1	188,000	65	67	71
			600	60.0	204,800			

†NOTE - For field installed electric heat, order (1) of each heater shown to make up heater size required.

¥NOTE - For field installed electric heat, order (2) of same heater shown to make up heater size required.

†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).

[1]May be used with two stage control.

NOTE — Fuse block must be ordered extra. Factory installed heaters will have the fuse block factory installed. Fuse block must be installed in field installed heaters. Also requires LTB2 Terminal Block. See Optional Electric Heat Accessories tables.

[2]Electric Heat Control Module required on 45, 60 & 90 kW sizes only (module furnished with factory installed electric heaters). See Optional Electric Heat Accessories tables.

TABLE 4 - OPTIONAL ELECTRIC HEAT DATA - LCA210/240

210 SIZE

kW Size	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	†Total Unit, Power Exhaust Fans and Electric Heat Minimum Circuit Ampacity		
						3 hp (2.2kW)	5 hp (3.7kW)	7.5 hp (5.6kW)
15 kW	†(1) EHA240-7.5 208/230v **(99J16)** 460v **(99J18)** 575v **(99J20)** and †(1) EHA240S-7.5 208/230v **(99J17)** 460v **(99J19)** 575v **(99J21)** 59 lbs. (27 kg) (total weight)	1	208	11.3	38,600	87	94	103
			220	12.6	43,000	85	91	101
			230	13.8	47,100			
			240	15.0	51,200			
			440	12.6	43,000	45	48	52
			460	13.8	47,100			
			480	15.0	51,200			
			550	12.6	43,000	35	38	41
			575	13.8	47,100			
			600	15.0	51,200			
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	96	104	113
			220	25.2	86,000	108	116	125
			230	27.5	93,900			
			240	30.0	102,400			
			440	25.2	86,000	53	57	61
			460	27.5	93,900			
			480	30.0	102,400			
			550	25.2	86,000	43	46	49
			575	27.5	93,900			
			600	30.0	102,400			
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	[1]2	208	33.8	115,300	135	143	152
			220	37.8	129,000	153	161	170
			230	41.3	141,000			
			240	45.0	153,600			
			440	37.8	129,000	76	79	84
			460	41.3	141,000			
			480	45.0	153,600			
			550	37.8	129,000	61	64	68
			575	41.3	141,000			
			600	45.0	153,600			
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	[1]2	208	45.0	153,600	143	151	160
			220	50.4	172,000	162	170	179
			230	55.1	188,000			
			240	60.0	204,800			
			440	50.4	172,000	80	84	88
			460	55.1	188,000			
			480	60.0	204,800			
			550	50.4	172,000	65	67	71
			575	55.1	188,000			
			600	60.0	204,800			
90 kW	¥(2) EHA360-45 208/230v **(99J31)** 460v **(99J32)** 575v **(99J33)** 84 lbs. (38 kg) (total weight)	[1]2	208	67.6	230,700	206	213	223
			220	75.6	258,000	234	242	251
			230	82.7	282,200			
			240	90.0	307,100			
			440	75.6	258,000	116	120	124
			460	82.7	282,200			
			480	90.0	307,100			
			550	75.6	258,000	93	96	100
			575	82.7	282,200			
			600	90.0	307,100			

240 SIZE

kW Size	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	†Total Unit, Power Exhaust Fans and Electric Heat Minimum Circuit Ampacity		
						3 hp (2.2kW)	5 hp (3.7kW)	7.5 hp (5.6kW)
15 kW	†(1) EHA240-7.5 208/230v **(99J16)** 460v **(99J18)** 575v **(99J20)** and †(1) EHA240S-7.5 208/230v **(99J17)** 460v **(99J19)** 575v **(99J21)** 59 lbs. (27 kg) (total weight)	1	208	11.3	38,600	99	105	114
			220	12.6	43,000	98	104	114
			230	13.8	47,100	98	104	114
			240	15.0	51,200			
			440	12.6	43,000	50	53	57
			460	13.8	47,100	50	53	57
			480	15.0	51,200			
			550	12.6	43,000	40	42	46
			575	13.8	47,100	40	42	46
			600	15.0	51,200			
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	99	105	114
			220	25.2	86,000	108	116	125
			230	27.5	93,900	108	116	125
			240	30.0	102,400			
			440	25.2	86,000	53	57	61
			460	27.5	93,900	53	57	61
			480	30.0	102,400			
			550	25.2	86,000	43	46	49
			575	27.5	93,900	43	46	49
			600	30.0	102,400			
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	[1]2	208	33.8	115,300	135	143	152
			220	37.8	129,000	153	161	170
			230	41.3	141,000	153	161	170
			240	45.0	153,600			
			440	37.8	129,000	76	79	84
			460	41.3	141,000	76	79	84
			480	45.0	153,600			
			550	37.8	129,000	61	64	68
			575	41.3	141,000	61	64	68
			600	45.0	153,600			
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	[1]2	208	45.0	153,600	143	151	160
			220	50.4	172,000	162	170	179
			230	55.1	188,000	162	170	179
			240	60.0	204,800			
			440	50.4	172,000	80	84	88
			460	55.1	188,000	80	84	88
			480	60.0	204,800			
			550	50.4	172,000	65	67	71
			575	55.1	188,000	65	67	71
			600	60.0	204,800			
90 kW	¥(2) EHA360-45 208/230v **(99J31)** 460v **(99J32)** 575v **(99J33)** 84 lbs. (38 kg) (total weight)	[1]2	208	67.6	230,700	206	213	223
			220	75.6	258,000	234	242	251
			230	82.7	282,200	234	242	251
			240	90.0	307,100			
			440	75.6	258,000	116	120	124
			460	82.7	282,200	116	120	124
			480	90.0	307,100			
			550	75.6	258,000	93	96	100
			575	82.7	282,200	93	96	100
			600	90.0	307,100			

†NOTE - For field installed electric heat, order (1) of each heater shown to make up heater size required.
¥NOTE - For field installed electric heat, order (2) of same heater shown to make up heater size required.

†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).

[1]May be used with two stage control.

NOTE — Fuse block must be ordered extra. Factory installed heaters will have the fuse block factory installed. Fuse block must be installed in field installed heaters. Also requires LTB2 Terminal Block. See Optional Electric Heat Accessories tables.

[2]Electric Heat Control Module required on 45, 60 & 90 kW sizes only (module furnished with factory installed electric heaters). See Optional Electric Heat Accessories tables.

TABLE 5 - OPTIONAL ELECTRIC HEAT DATA - LCA300S

300S SIZE							
kW Size	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	†Total Unit, Power Exhaust Fans and Electric Heat Minimum Circuit Ampacity	
						5 hp (3.7kW)	7.5 hp (5.6kW)
15 kW	†(1) EHA240-7.5 208/230v **(99J16)** 460v **(99J18)** 575v **(99J20)** and †(1) EHA240S-7.5 208/230v **(99J17)** 460v **(99J19)** 575v **(99J21)** 59 lbs. (27 kg) (total weight)	1	208	11.3	38,600	115	124
			220	12.6	43,000	113	122
			230	13.8	47,100		
			240	15.0	51,200		
			440	12.6	43,000	55	59
			460	13.8	47,100		
			480	15.0	51,200		
			550	12.6	43,000	45	48
			575	13.8	47,100		
			600	15.0	51,200		
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	120	130
			220	25.2	86,000	118	127
			230	27.5	93,900		
			240	30.0	102,400		
			440	25.2	86,000	58	63
			460	27.5	93,900		
			480	30.0	102,400		
			550	25.2	86,000	47	50
			575	27.5	93,900		
			600	30.0	102,400		
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	[1]2	208	33.8	115,300	165	175
			220	37.8	129,000	163	172
			230	41.3	141,000		
			240	45.0	153,600		
			440	37.8	129,000	81	85
			460	41.3	141,000		
			480	45.0	153,600		
			550	37.8	129,000	65	68
			575	41.3	141,000		
			600	45.0	153,600		
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	[1]2	208	45.0	153,600	174	184
			220	50.4	172,000	172	181
			230	55.1	188,000		
			240	60.0	204,800		
			440	50.4	172,000	85	90
			460	55.1	188,000		
			480	60.0	204,800		
			550	50.4	172,000	68	72
			575	55.1	188,000		
			600	60.0	204,800		
90 kW	¥(2) EHA360-45 208/230v **(99J31)** 460v **(99J32)** 575v **(99J33)** 84 lbs. (38 kg) (total weight)	[1]2	208	67.6	230,700	246	256
			220	75.6	258,000	244	253
			230	82.7	282,200		
			240	90.0	307,100		
			440	75.6	258,000	122	126
			460	82.7	282,200		
			480	90.0	307,100		
			550	75.6	258,000	97	101
			575	82.7	282,200		
			600	90.0	307,100		

†**NOTE - For field installed electric heat, order (1) of each heater shown to make up heater size required.**
¥**NOTE - For field installed electric heat, order (2) of same heater shown to make up heater size required.**
†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).
[1]May be used with two stage control.
NOTE — Fuse block must be ordered extra. Factory installed heaters will have the fuse block factory installed. Fuse block must be installed in field installed heaters. Also requires LTB2 Terminal Block. See Optional Electric Heat Accessories tables.
[2]Electric Heat Control Module required on 45, 60 & 90 kW sizes only (module furnished with factory installed electric heaters). See Optional Electric Heat Accessories tables.

TABLE 6 - OPTIONAL ELECTRIC HEAT DATA - LHA180/240

180 SIZE

kW Size	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	†Total Unit Power Exhaust Fans and Electric Heat Minimum Circuit Ampacity		
						3 hp (2.2kW)	5 hp (3.7kW)	7.5 hp (5.6kW)
15 kW	†(1) EHA240-7.5 208/230v **(99J16)** 460v **(99J18)** 575v **(99J20)** and †(1) EHA240S-7.5 208/230v **(99J17)** 460v **(99J19)** 575v **(99J21)** 59 lbs. (27 kg) (total weight)	1	208	11.3	38,600	118	124	131
			220	12.6	43,000	124	130	137
			230	13.8	47,100			
			240	15.0	51,200			
			440	12.6	43,000	59	61	65
			460	13.8	47,100			
			480	15.0	51,200			
			550	12.6	43,000	47	50	53
			575	13.8	47,100			
			600	15.0	51,200			
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	157	163	171
			220	25.2	86,000	169	175	183
			230	27.5	93,900			
			240	30.0	102,400			
			440	25.2	86,000	81	84	87
			460	27.5	93,900			
			480	30.0	102,400			
			550	25.2	86,000	65	68	71
			575	27.5	93,900			
			600	30.0	102,400			
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	[1]2	208	33.8	115,300	196	202	210
			220	37.8	129,000	214	220	228
			230	41.3	141,000			
			240	45.0	153,600			
			440	37.8	129,000	104	107	110
			460	41.3	141,000			
			480	45.0	153,600			
			550	37.8	129,000	84	86	89
			575	41.3	141,000			
			600	45.0	153,600			
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	[1]2	208	45.0	153,600	204	210	218
			220	50.4	172,000	223	229	237
			230	55.1	188,000			
			240	60.0	204,800			
			440	50.4	172,000	108	111	115
			460	55.1	188,000			
			480	60.0	204,800			
			550	50.4	172,000	87	89	92
			575	55.1	188,000			
			600	60.0	204,800			

240 SIZE

kW Size	Electric Heat Model No. (see footnote) & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	†Total Unit Power Exhaust Fans and Electric Heat Minimum Circuit Ampacity		
						3 hp (2.2kW)	5 hp (3.7kW)	7.5 hp (5.6kW)
15 kW	†(1) EHA240-7.5 208/230v **(99J16)** 460v **(99J18)** 575v **(99J20)** and †(1) EHA240S-7.5 208/230v **(99J17)** 460v **(99J19)** 575v **(99J21)** 59 lbs. (27 kg) (total weight)	1	208	11.3	38,600	128	134	141
			220	12.6	43,000	132	138	146
			230	13.8	47,100			
			240	15.0	51,200			
			440	12.6	43,000	61	64	67
			460	13.8	47,100			
			480	15.0	51,200			
			550	12.6	43,000	51	54	56
			575	13.8	47,100			
			600	15.0	51,200			
30 kW	†(1) EHA360-15 208/230v **(99J22)** 460v **(99J24)** 575v **(99J26)** and †(1) EHA360S-15 208/230v **(99J23)** 460v **(99J25)** 575v **(99J27)** 59 lbs. (27 kg) (total weight)	1	208	22.5	76,800	167	173	180
			220	25.2	86,000	177	183	191
			230	27.5	93,900			
			240	30.0	102,400			
			440	25.2	86,000	83	86	90
			460	27.5	93,900			
			480	30.0	102,400			
			550	25.2	86,000	69	72	74
			575	27.5	93,900			
			600	30.0	102,400			
45 kW	¥(2) EHA360-22.5 208/230v **(99J28)** 460v **(99J29)** 575v **(99J30)** 76 lbs. (35 kg) (total weight)	[1]2	208	33.8	115,300	206	212	219
			220	37.8	129,000	222	228	236
			230	41.3	141,000			
			240	45.0	153,600			
			440	37.8	129,000	106	109	112
			460	41.3	141,000			
			480	45.0	153,600			
			550	37.8	129,000	88	90	93
			575	41.3	141,000			
			600	45.0	153,600			
60 kW	¥(2) EHA150-30 208/230v **(99J07)** 460v **(99J08)** 575v **(99J09)** 76 lbs. (35 kg) (total weight)	[1]2	208	45.0	153,600	214	220	227
			220	50.4	172,000	231	237 113	245
			230	55.1	188,000			
			240	60.0	204,800			
			440	50.4	172,000	111	113	117
			460	55.1	188,000			
			480	60.0	204,800			
			550	50.4	172,000	91	93	96
			575	55.1	188,000			
			600	60.0	204,800			
90 kW	¥(2) EHA360-45 208/230v **(99J31)** 460v **(99J32)** 575v **(99J33)** 84 lbs. (38 kg) (total weight)	[1]2	208	67.6	230,700	276	283	290
			220	75.6	258,000	304	310	317
			230	82.7	282,200			
			240	90.0	307,100			
			440	75.6	258,000	147	149	153
			460	82.7	282,200			
			480	90.0	307,100			
			550	75.6	258,000	120	122	125
			575	82.7	282,200			
			600	90.0	307,100			

†NOTE - For field installed electric heat, order (1) of each heater shown to make up heater size required.

¥NOTE - For field installed electric heat, order (2) of same heater shown to make up heater size required.

†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).

[1]May be used with two stage control.

NOTE — Fuse block must be ordered extra. Factory installed heaters will have the fuse block factory installed. Fuse block must be installed in field installed heaters. Also requires LTB2 Terminal Block. See Optional Electric Heat Accessories tables.

[2]Electric Heat Control Module required on 45, 60 & 90 kW sizes only (module furnished with factory installed electric heaters). See Optional Electric Heat Accessories tables.

E-Optional Electric Heat Components

Tables 3 through 6 show all possible LCA/LHA to EHA matchups and electrical ratings.

EHA parts arrangement is shown in figures 28 and 29. All electric heat sections consist of electric heating elements exposed directly to the airstream. Two electric heat sections (first section and second section) are used in all 15kW through 90kW heaters. See figure 27. Multiple-stage elements are sequenced on and off in response to thermostat demand.

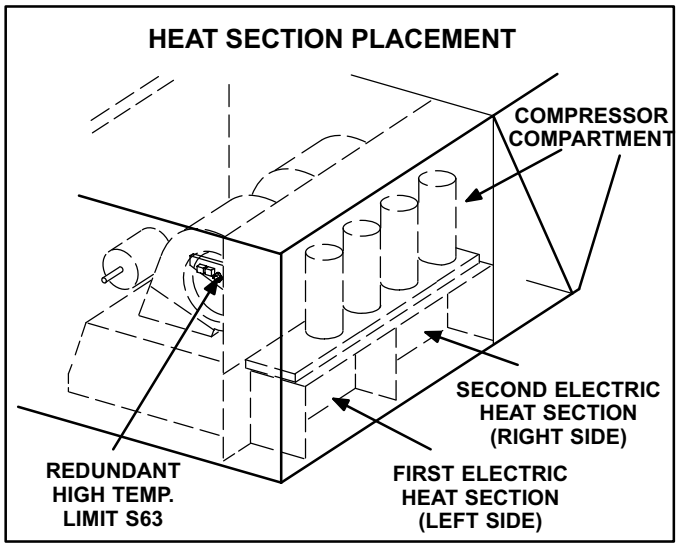


FIGURE 27

1-Main Control Box Components
A55, A60, K9, T2, and F4

The main control box (see figure 4) houses a few of the electric heat controls, such as: the main control module A55, second electric heat section control panel A60, electric heat control hat section for 45 - 90 kW (electric heat relay K9 and transformer T2), and unit fuse block F4. For a description of the components see section I-A.

2-Contactors K15, K16, K17 and K18

Contactors K15, K16, K17 and K18 are all three-pole double-break contactors located on the electric heat vestibule. K15 and K16 are located on the first electric heat section, while K17 and K18 are located on the second electric heat section. However, in the 15 and 30kW heaters, the first section houses all contactors and fuses. All contactors are equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by the main panel A55, while the coil in the K17 and K18 contactors are energized by the electric heat 2 control panel A60. Contactors K15 and K17 energize the first stage heating elements, while K16 and K18 energize the second stage heating elements.

3-High Temperature Limits S15 and S107 (Primary)

S15 and S107 are SPST N.C. auto-reset thermostats located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the first electric heat section, while S107 is the high temperature limit for the second electric heat section. Both thermostats are identical and are wired in series with the first stage contactor coil. When either S15 or S107 opens, indicating a problem in the system, contactor K15 is de-energized. When K15 is de-energized, first stage and all subsequent stages of heat are de-energized. The thermostats used on EHA360-45-1 Y/G/J are factory set to open at 200°F ± 5°F (93.3°C ± 2.8°C) on a temperature rise and automatically reset at 160°F ± 6°F (71.1°C ± 3.3°C) on a temperature fall. All other electric heat section thermostats are factory set to open at 170°F ± 5°F (76.7°C ± 2.8°C) on a temperature rise and automatically reset at 130°F ± 6°F (54.4°C ± 3.3°C) on a temperature fall. The thermostats are not adjustable.

4-High Temperature Limit S63 (Redundant)

S63 is a SPST N.C. manual-reset thermostat located on the suction line bracket inside the blower compartment (see figure 27). S63 is a redundant temperature limit factory installed in all LCA / LHA units. Like the primary temperature limits, S63 is wired in series with the first stage contactor coil (K15). When S63 opens, all contactors (K15, K16, K17, K18) are de-energized. When the contactors are de-energized, first stage and all subsequent stages of heat are de-energized. The thermostat is factory set to open at 170°F ± 8°F (76.7°C ± 4.4°C) on a temperature rise and can be manually reset when the temperature falls below 160°F ± 6°F (71.1°C ± 3.3°C).

5-Terminal Strip TB3

Electric heat line voltage connections are made to terminal strip TB3 (or a fuse block on some models) located in the upper left corner of the electric heat vestibule.

6-Heating Elements HE1 through HE14

Heating elements are composed of helix wound bare nichrome wire exposed directly to the airstream. Three elements are connected in a three-phase arrangement. The elements in 208/230V units are connected in a “Delta” arrangement. Elements in 460 and 575V units are connected in “Wye” arrangement. Each stage is energized independently by the corresponding contactors located on the electric heat vestibule panel. Once energized, heat transfer is instantaneous. High temperature protection is provided by primary and redundant high temperature limits and overcurrent protection is provided by fuses.

7-Fuse F3

Fuse F3 are housed in a fuse block which holds three fuses. Each F3 fuse is connected in series with each leg of electric heat. Figure 29 and table 7 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1 through F3 - 8.

TABLE 7

LCA / LHA ELECTRIC HEAT SECTION FUSE RATING									
EHA QUANTITY & SIZE	**VOLTAGES**	**FUSE (3 each)**							
		F3 - 1	**F3 - 2**	**F3 - 3**	**F3 - 4**	**F3 - 5**	**F3 - 6**	**F3 - 7**	**F3 - 8**
(1) EHA240-7.5 & (1) EHA240S-7.5 (15 kW Total)	208/230V	50 Amp 250V	—	—	—	—	—	—	—
	460V	25 Amp 600V	—	—	—	—	—	—	—
	575V	20 Amp 600V	—	—	—	—	—	—	—
(1) EHA360-15 & (1) EHA360S-15 (30 kW Total) or (1) EHA156-15 & (1) EHA156S-15	208/230V	60 Amp 250V	60 Amp 250V	—	—	—	—	—	—
	460V	50 Amp 600V	—	—	—	—	—	—	—
	575V	40 Amp 600V	—	—	—	—	—	—	—
(2) EHA360-22.5 (45 kW Total) or (2) EHA156-22.5	208/230V	50 Amp 250V	—	—	25 Amp 250V	50 Amp 250V	—	—	25 Amp 250V
	460V	25 Amp 600V	—	—	15 Amp 600V	25 Amp 600V	—	—	15 Amp 600V
	575V	20 Amp 600V	—	—	10 Amp 600V	20 Amp 600V	—	—	10 Amp 600V
(2) EHA150-30 (60 kW Total) or (2) EHA156-30	208/230V	50 Amp 250V	—	—	50 Amp 250V	50 Amp 250V	—	—	50 Amp 250V
	460V	25 Amp 600V	—	—	25 Amp 600V	25 Amp 600V	—	—	25 Amp 600V
	575V	20 Amp 600V	—	—	20 Amp 600V	20 Amp 600V	—	—	20 Amp 600V
(2) EHA360-45 (90 kW Total)	208/230V	50 Amp 250V	—	60 Amp 250V	60 Amp 250V	50 Amp 250V	—	60 Amp 250V	60 Amp 250V
	460V	25 Amp 600V	—	—	50 Amp 600V	25 Amp 600V	—	—	50 Amp 600V
	575V	20 Amp 600V	—	—	40 Amp 600V	20 Amp 600V	—	—	40 Amp 600V

EHA 15, 30, 45, 60, and 90 KW ELECTRIC HEAT SECTION PARTS ARRANGEMENT

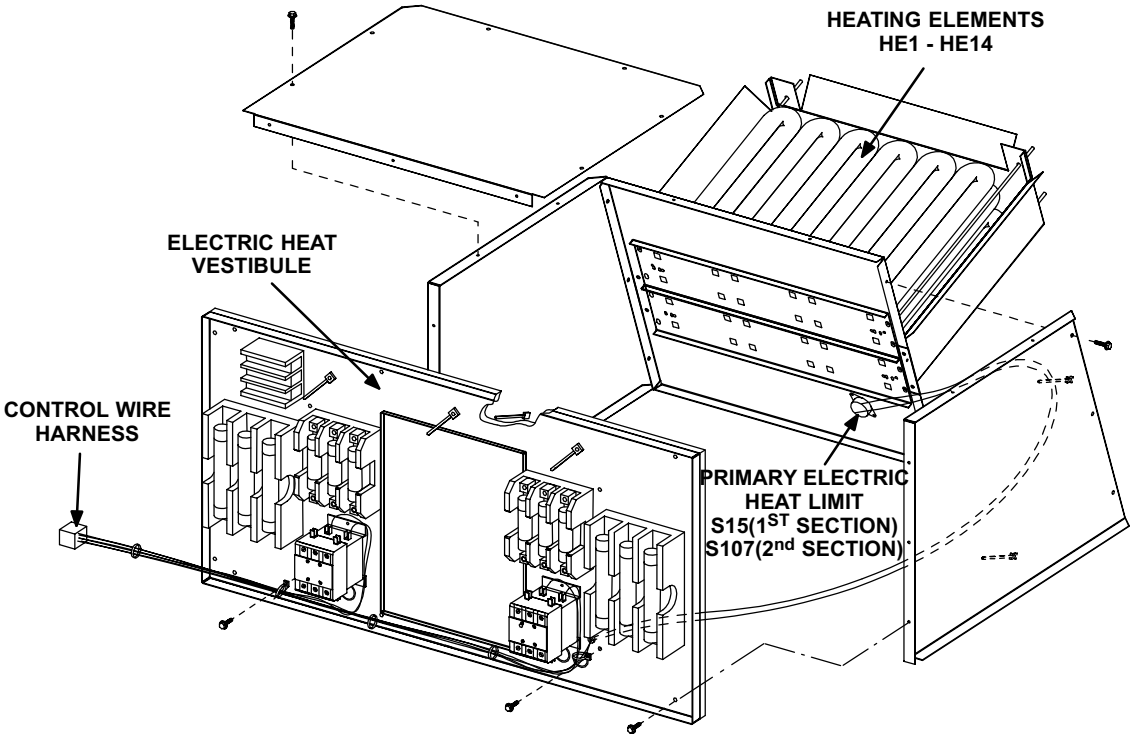
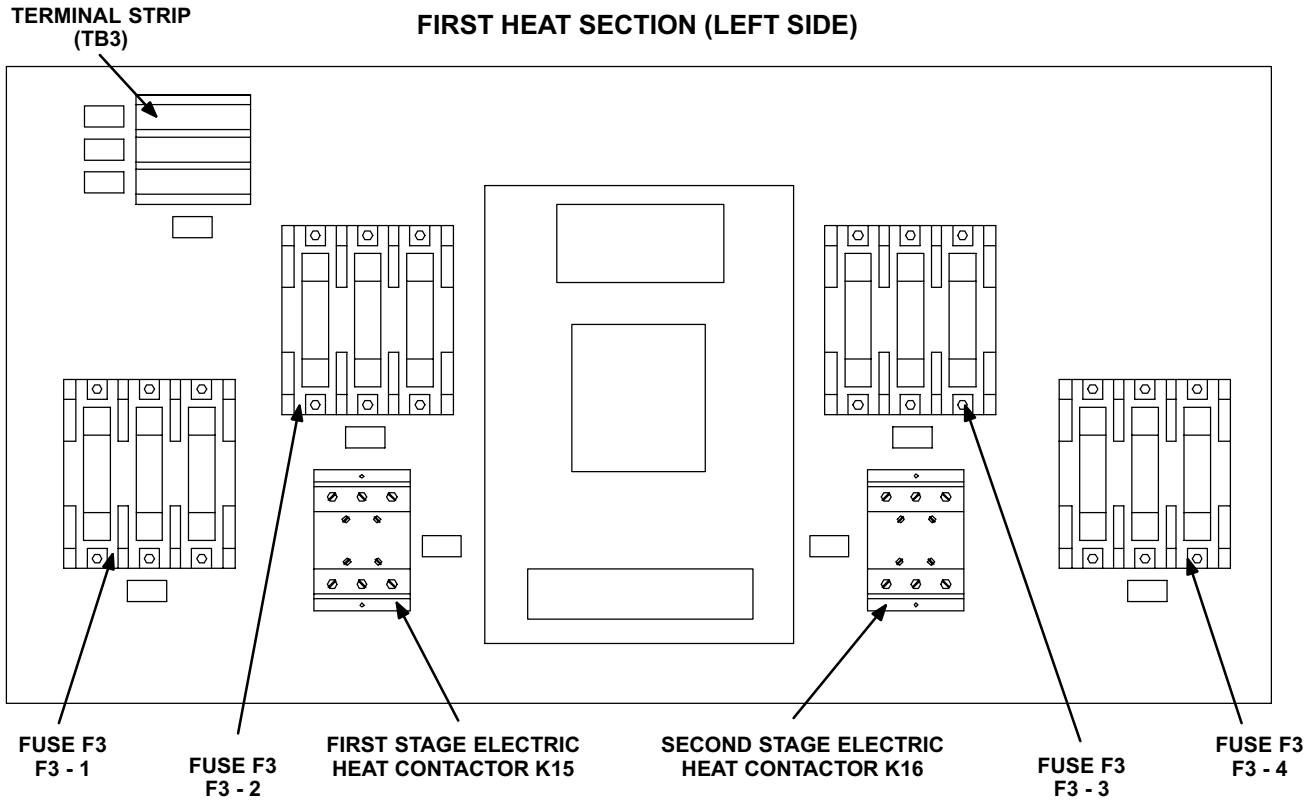


FIGURE 28

ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT



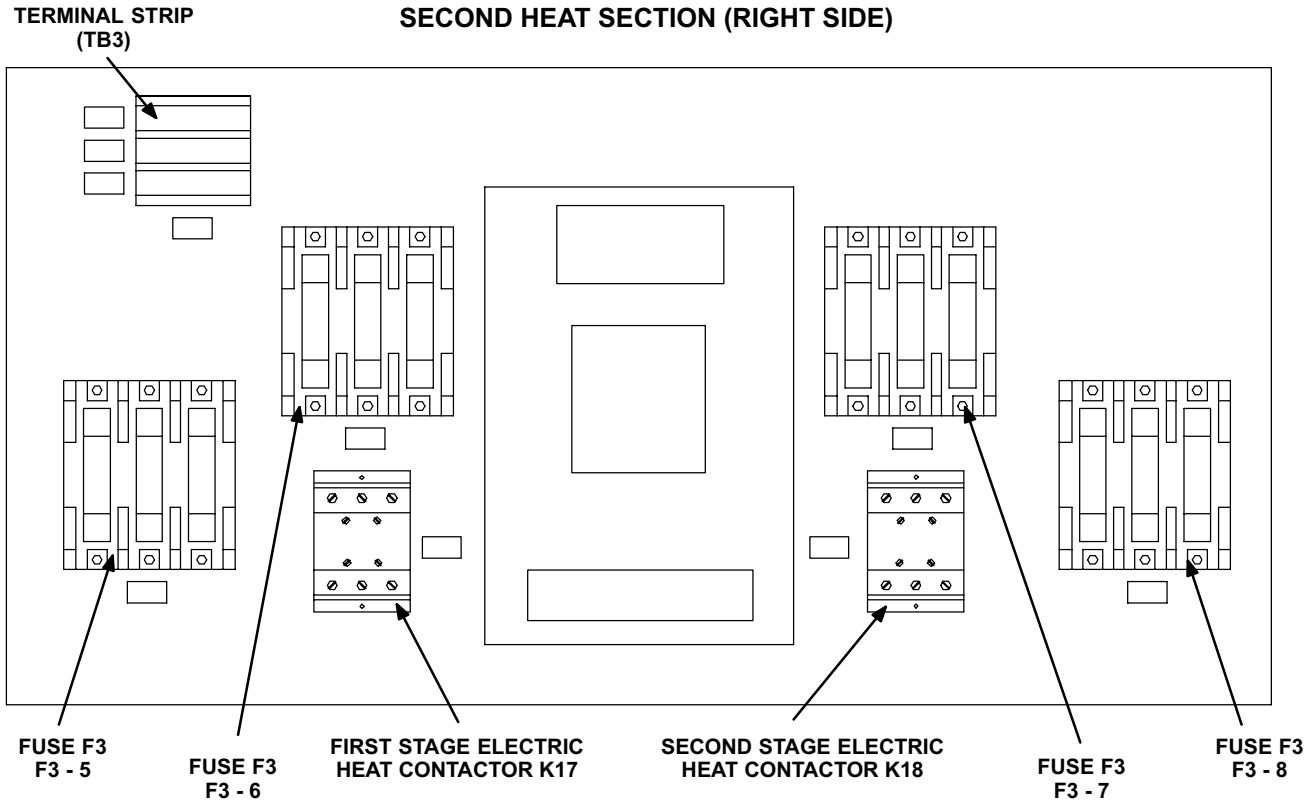


FIGURE 29

II-PLACEMENT AND INSTALLATION

Make sure the unit is installed in accordance with the installation instructions and all applicable codes. See accessories section for conditions requiring use of the optional roof mounting frame (LARMF18/36 or LARMFH18/24).

III-CHARGING

D-Refrigerant Charge and Check

WARNING-Do not exceed nameplate charge under any condition.

This unit is factory charged and should require no further adjustment. If the system requires charge, *reclaim the charge, evacuate the system,* and *add required nameplate charge.*

NOTE - System charging is not recommended below 60° F (15° C). In temperatures below 60° F (15° C) , the charge ***must*** *be weighed into the system.*

If weighing facilities are not available, or to check the charge, use the following procedure:

1- Attach gauge manifolds and operate unit in cooling mode until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.

2- Check each system separately with all stages operating.

3- Use a thermometer to accurately measure the outdoor ambient temperature.

4- Apply the outdoor temperature to tables 8 through 15 to determine normal operating pressures.

5- Compare the normal operating pressures to the pressures obtained from the gauges. 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. **Correct any system problems before proceeding.**

6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.

- Add or remove charge in increments.
- Allow the system to stabilize each time refrigerant is added or removed.

7- Use the following approach method along with the normal operating pressures to confirm readings.

TABLE 8
LGA/LCA156H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis.± 10 psig	Suct. ± 5 psig	Dis.± 10 psig	Suct. ± 5 psig	Dis.± 10 psig	Suct. ± 5 psig
65°F	OUTDOOR FAN CYCLES					
75°F	171	77	168	81	180	82
85°F	196	78	194	82	206	83
95°F	228	79	227	84	237	84
105°F	262	80	260	85	272	85
115°F	301	82	299	86	309	86

TABLE 9
LGA/LCA180S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis.± 10 psig	Suct. ± 5 psig	Dis.± 10 psig	Suct. ± 5 psig	Dis.± 10 psig	Suct. ± 5 psig
65°F	191	74	193	76	200	75
75°F	217	76	222	77	225	76
85°F	245	78	252	79	250	78
95°F	279	80	288	81	290	79
105°F	312	82	324	83	332	81
115°F	354	85	368	85	372	83

TABLE 10
LCA/LGA180H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ± 10 psig	Suct. ± 5 psig	Dis.± 10 psig	Suct. ± 5 psig	Dis. ± 10 psig	Suct. ± 5 psig
65°F	163	75	161	77	165	73
75°F	186	77	187	79	190	74
85°F	213	78	215	80	218	76
95°F	244	80	246	81	247	78
105°F	280	82	282	83	285	80
115°F	318	85	323	85	325	82

TABLE 11
LCA/LGA210S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis.± 10 psig	Suct .± 5 psig
65°F	198	77	192	78	199	77	195	69
75°F	226	78	218	79	227	78	225	71
85°F	257	80	248	81	260	80	258	74
95°F	290	82	280	83	294	82	295	76
105°F	328	84	318	85	335	83	335	79
115°F	367	86	357	86	380	85	380	82

TABLE 12
LCA/LGA210H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis.± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis.± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig
65°F	170	80	175	82	168	82	165	80
75°F	195	82	200	83	192	83	190	81
85°F	223	83	228	85	222	84	220	83
95°F	255	85	260	86	257	85	254	85
105°F	292	86	297	88	290	87	290	86
115°F	324	88	334	89	334	88	330	88

TABLE 13
LGA/LCA240S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis.± 10 psig	Suct .± 5 psig
65°F	180	69	175	72	186	75	178	72
75°F	205	71	200	73	213	76	204	73
85°F	232	73	230	75	242	78	236	74
95°F	265	75	260	77	276	80	267	76
105°F	300	77	300	79	316	82	305	78
115°F	343	79	340	81	360	84	346	80

TABLE 14
GA/LCA240H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis.± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig
65°F	177	75	170	76	180	78	178	77
75°F	202	76	195	77	208	79	202	78
85°F	232	77	225	78	240	80	232	80
95°F	265	78	258	79	274	81	265	81
105°F	300	80	295	81	314	82	303	83
115°F	340	82	332	82	353	83	340	84

TABLE 15
LGA/LCA300S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp.	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis.± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig	Dis. ± 10 psig	Suct .± 5 psig
65°F	184	74	183	76	191	77	188	76
75°F	213	76	210	77	220	77	216	77
85°F	244	78	242	79	252	79	247	79
95°F	282	79	285	80	295	80	278	80
105°F	313	80	317	82	324	81	325	82
115°F	357	82	361	83	368	83	372	84

E-Charge Verification - Approach Method

8- Using the same thermometer, compare liquid temperature to outdoor ambient temperature.

Approach Temperature = Liquid temperature minus ambient temperature.

9- Approach temperature should match values in tables 16 and 17. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

10-Do not use the approach method if system pressures do not match pressures in tables 8 through 15. The approach method is not valid for grossly over or undercharged systems.

TABLE 16

LGA/ LCA UNIT	APPROACH TEMPERATURE LIQUID TEMP. MINUS AMBIENT TEMP.			
	1ST STAGE	2ND STAGE	3RD STAGE	4TH STAGE
156H	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	NA
180S	9°F ± 1 (5°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	NA
180H	10°F ± 1 (5.6°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	NA
210S	9°F ± 1 (5°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	6°F ± 1 (3.3°C ± 0.5)
210H	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	6°F ± 1 (3.3°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
240S	12°F ± 1 (6.7°C ± 0.5)	11°F ± 1 (6.1 °C ± 0.5)	13°F ± 1 (7.2°C ± 0.5)	14°F ± 1 (7.8°C ± 0.5)
240H	10°F ± 1 (5.6°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)	11°F ± 1 (6.1 °C ± 0.5)
300S	11°F ± 1 (6.1 °C ± 0.5)	11°F ± 1 (6.1 °C ± 0.5)	11°F ± 1 (6.1 °C ± 0.5)	11°F ± 1 (6.1 °C ± 0.5)

TABLE 17

UNIT	APPROACH TEMPERATURE LIQUID TEMP. MINUS AMBIENT TEMP.	
	1ST STAGE	2ND STAGE
LHA180	10°F ± 1 (5.6°C ± 0.5)	11°F ± 1 (6.1 °C ± 0.5)
LHA240	11°F ± 1 (6.1 °C ± 0.5)	11°F ± 1 (6.1 °C ± 0.5)

IV-STARTUP - OPERATION

Refer to startup directions and refer closely to the unit wiring diagram when servicing. See unit nameplate for minimum circuit ampacity and maximum fuse size.

A-Preliminary and Seasonal Checks

1- Make sure the unit is installed in accordance with the installation instructions and applicable codes.

2- Inspect all electrical wiring, both field and factory installed for loose connections. Tighten as required. Refer to unit diagram located on inside of unit control box cover.

3- Check to ensure that refrigerant lines are in good condition and do not rub against the cabinet or other refrigerant lines.

4- Check voltage at the disconnect switch. Voltage must be within the range listed on the nameplate. If not, consult the power company and have the voltage corrected before starting the unit.

5- Recheck voltage and amp draw with unit running. If voltage is not within range listed on unit nameplate, stop unit and consult power company. Refer to unit nameplate for maximum rated load amps.

6- Inspect and adjust blower belt (see section on Blower Compartment - Blower Belt Adjustment).

B-Cooling Startup

NOTE-The following is a generalized procedure and does not apply to all thermostat control systems. Electronic and ramping thermostat control systems may operate differently. Refer to the operation sequence section of this manual for more information.

⚠ WARNING

Crankcase heaters must be energized for 24 hours before attempting to start compressors. Set thermostat so there is no compressor demand before closing disconnect switch. Attempting to start compressors during the 24-hour warm-up period could result in damaged or failed compres-

1- Set fan switch to AUTO or ON and move the system selection switch to COOL. Adjust the thermostat to a setting far enough below room temperature to bring on all compressors. Compressors will start and cycle on demand from the thermostat (allowing for unit and thermostat time delays).

2- Each circuit is charged with R-22 refrigerant. See unit rating plate for correct charge amount.

3- Refer to Cooling System Service Checks and Charging sections for proper method of checking and charging the system.

C-Heating Startup

1 Set the fan switch to AUTO or ON and move the system selection switch to HEAT. Adjust thermostat setting above room temperature.

2 The indoor blower, first stage gas (LGA only), all compressors (LHA only), and first stage electric heat (LCA only) immediately start.

3 Additional stages are controlled by the indoor thermostat. An increased heating demand (W2) in the LHA units will bring on the electric heat if so equipped.

D-Safety or Emergency Shutdown

Turn off power to the unit.

V- SYSTEMS SERVICE CHECKS

A-LGA Heating System Service Checks

All LGA units are A.G.A and C.G.A. design certified without modification.

Before checking piping, check with gas company or authorities having jurisdiction for local code requirements. Refer to the LGA Installation, Operation and Maintenance instruction for more information.

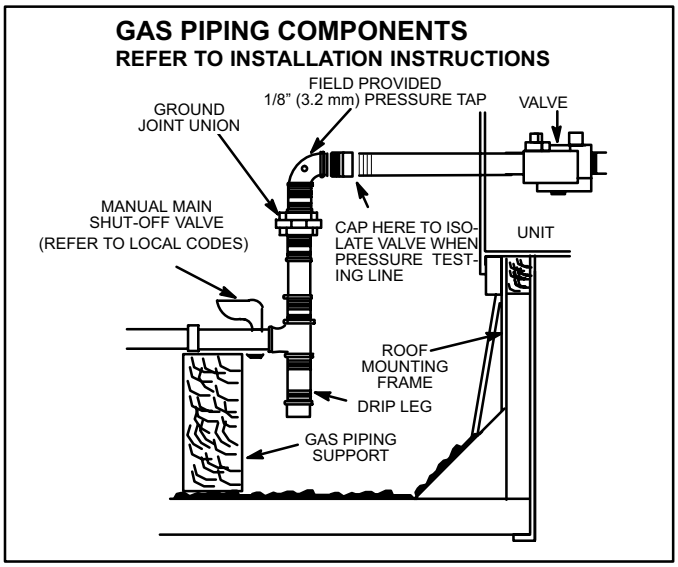


FIGURE 30

1-Gas Piping

Gas supply piping must not allow more than 0.5"W.C. (124.3 Pa) drop in pressure between the gas meter and the unit. Supply gas pipe must not be smaller than the unit gas connection. Refer to installation instructions for details.

2-Testing Gas Piping

NOTE-In case emergency shutdown is required, turn off the main manual shut-off valve and disconnect the main power to the unit. These controls should be properly labeled by the installer.

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig [14"W.C. (3481 Pa)]. See figure 30.

When checking piping connection for gas leaks, use the preferred means. Common kitchen detergents can cause harmful corrosion on various metals used in gas piping. The use of specialty Gas Leak Detector is strongly recommended. It is available through Lennox under part number 31B2001. See CORP 8411-L10, for further details.

Do not use matches, candles, flame or any other source of ignition to check for gas leaks.

3-Testing Gas Supply Pressure

When testing gas supply pressure, connect test gauge to the inlet pressure tap (field provided - figure 30). Test supply gas pressure with unit firing at maximum rate (both stages energized). Make sure the reading falls within the range of the following values. Low pressure may result in erratic operation or "underfire." High pressure can result in permanent damage to the gas valve or "overfire." For natural

gas units, operating pressure at the unit gas connection must be between 4.7"W.C. and 10.5"W.C. (1168 Pa and 2610 Pa). For L.P. gas units, operating pressure at the unit gas connection must be between 10.8"W.C. and 13.5"W.C. (2685.3 Pa and 3356.7 Pa).

On multiple unit installations, each unit should be checked separately while operating at maximum rate, beginning with the one closest to the supply gas main and progressing to the one furthest from the main. Multiple units should also be tested with and without the other units operating. Supply pressure must fall within the range listed in the previous paragraph.

4-Check and Adjust Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move test gauge to the outlet pressure tap located on unit gas valve GV1. See figure 24 for location of pressure tap on the gas valve.

The manifold pressure is factory set and should not require adjustment. If manifold pressure is incorrect and no other source of improper manifold pressure can be found, the valve must be replaced. White-Rodgers gas valve can be adjusted from 2.5" W.C. to 5.0" W.C. (621.6 Pa and 1243.2 Pa). Refer to figure 24 for location of gas valve (manifold pressure) adjustment screw.

All gas valves are factory regulated. The gas valve should completely and immediately cycle off in the event of gas or power failure. The manual shut-off knob can be used to immediately shut off gas supply.

⚠ CAUTION

For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.

Manifold Adjustment Procedure

1- Connect test gauge to the outlet pressure tap on the gas valve. Start the unit (call for second stage heat) and allow five minutes for the unit to reach steady state.

2- While waiting for the unit to stabilize, notice the flame. The flame should be stable without flashback and should not lift from the burner heads. Natural gas should burn basically blue with some clear streaks. L.P. gas should burn mostly blue with some clear yellow streaks.

3- After allowing the unit to stabilize for five minutes, record the manifold pressure and compare to the values given for gas supply pressure (above).

⚠ CAUTION

Disconnect heating demand as soon as an accurate reading has been obtained.

5-Proper Gas Flow

To check for proper gas flow to burners, determine Btuh input from unit rating plate or the gas heating capacity tables on page 4. Divide this input rating by the Btuh per cubic foot of available gas. Result is the number of cubic feet per hour required. Determine the flow of gas through gas meter for two minutes and multiply by 30 to get hourly flow of gas to the burners.

NOTE - To obtain accurate reading, shut off all other gas appliances connected to meter.

6-High Altitude Derate

Natural gas units may be installed at altitudes up to 2000 feet (610m) above sea level without any modification. At altitudes above 2000 feet (610 m), units must be derated to match gas manifold pressures shown in the following table. *NOTE-This is the only permissible derate for these units.*

TABLE 18

Altitude - ft. (m)	Gas Manifold Pressure - in. w.g. (kPa)
2001 - 3000 (610 - 915)	3.6 (0.90)
3001 - 4000 (915 - 1220)	3.5 (0.87)
4001 - 5000 (1220 - 1525)	3.4 (0.85)
5001 - 6000 (1525 - 1830)	3.3 (0.82)
6001 - 7000 (1830 - 2135)	3.2 (0.80)
7001 - 8000 (2135 - 2440)	3.1 (0.77)

Derate Procedure:

1- Check manifold pressure at the gas valve pressure tap with unit operating at high fire (second stage).

2- To reduce maximum input, turn regulator adjusting screw (figure 24) counterclockwise.

3- Re-check manifold pressure.

7-Inshot Burner

Burners are factory set for maximum air and cannot be adjusted. Always operate unit with access panel in place. A peep hole is furnished in the heating access panel for flame viewing. Natural gas should burn basically blue with some clear streaks. L.P. gas should burn mostly blue with some clear yellow streaks.

Figure 31 shows how to remove burner assembly.

1- Turn off power to unit and shut off gas supply.

2- Remove screws holding the burner support cap.

3- Slide each burner off its orifice.

4- Clean and reassemble (reverse steps 1-3).

5- Be sure to secure all wires and check plumbing.

6- Turn on power to unit. Follow lighting instructions attached to unit and operate unit in heating mode. Check burner flames. They should be blue with yellow streaks.

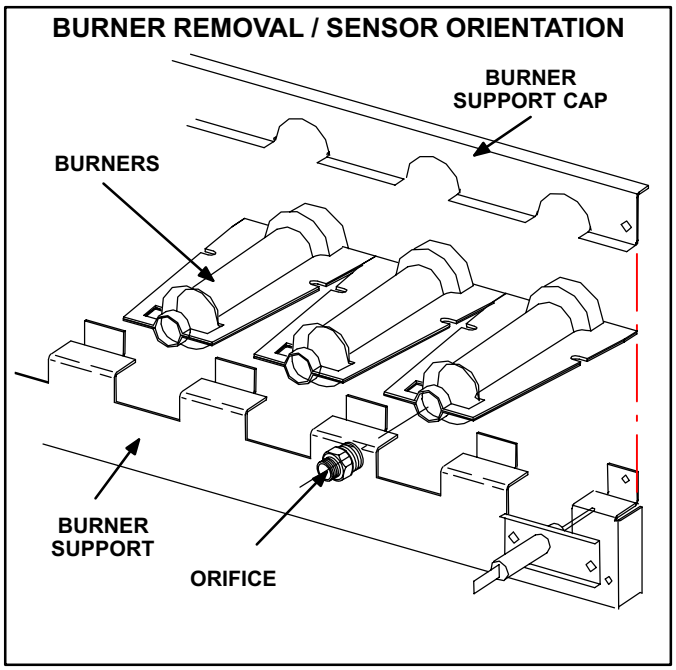


FIGURE 31

8-Heat Exchanger

To Access or Remove Heat Exchanger From Unit:

1- Turn off gas and electric power.
2- Remove access panel(s) and unit center mullion.
3- Remove gas valve, manifold assembly and burners.
4- Remove combustion air blower and flue box. Pay careful attention to the order in which gaskets and orifice are removed.
5- Support heat exchanger (to prevent it from falling when final screws are removed.)
6- Remove screws supporting heat exchanger.
7- To install heat exchanger, reverse procedure. Be sure to secure all wires and check plumbing and burner plate for airtight seal. Screws must be torqued to 35 in.-lbs. (155.7 N) to ensure proper operation.

9-Spark Electrode Gap

The spark electrode assembly can be removed for inspection by removing two screws securing the electrode assembly and sliding it out of unit.

For proper unit operation, electrodes must be positioned and gapped correctly.

Spark gap may be checked with appropriately sized twist drills or feeler gauges. Disconnect power to the unit and remove electrode assembly. The gap should be between 0.125" ± 0.015" (3.2 mm ± .4 mm). See figure 25.

10-Flame Sensing

Flame current is an electrical current which passes from the ignition control through the sensor electrode during unit operation. The current passes from the sensor through the flame to the ground electrode (located on the flame electrode) to complete a safety circuit. The electrodes should be located so the tips are at least 1/2" (12.7 mm) inside the flame envelope. Do not bend electrodes. To measure flame current, follow the procedure below:

TABLE 19

Manufacturer	Nominal Signal Microamps	Drop Out
RAM	1.7-3.6	0.5
JOHNSON	0.5-1.0	.09
FENWALL	1.7-3.6	0.7

NOTE-Electrodes are not field adjustable. Any alterations to the electrode may create a hazardous condition that can cause property or personal injury.

1- Disconnect power to unit.
2- Remove lead from sensing electrode and install a 0-50DC microamp meter in series between the sensing electrode and the sensing lead.
3- Reconnect power and adjust thermostat for heating demand.
4- When flame is established, compare reading to table 19. Do not bend electrodes.
5- Disconnect power to unit before disconnecting meter. Make sure sensor wire is securely reconnected before reconnecting power to unit.

NOTE-If the meter scale reads 0, the leads are reversed. Disconnect power and reconnect leads for proper polarity.

11-Combustion Air Blower

The combustion air blower is factory set and is not field adjustable. However, operation should be monitored to ensure proper operation. The combustion air blower is used to draw fresh air into the combustion chamber while simultaneously expelling exhaust gases. The blower operates throughout the heating cycle.

On a heating demand, the ignition control is energized by the main control module A55. The ignition control then allows 30 to 40 seconds for the combustion air blower to vent exhaust gases from the burners. When the combustion air blower is purging the exhaust gases, the combustion air prove switch is closing proving that the combustion air blower is operating before allowing the ignition control to energize. When the combustion air prove switch is closed and the delay is over, the ignition control activates the first stage operator of the gas valve (low fire), the spark and the flame sensing electrode. Sparking stops immediately after flame is sensed.

B-Cooling System Service Checks

LGA / LCA/ LHA units are factory charged and require no further adjustment; however, charge should be checked periodically using the approach method. The approach method compares actual liquid temperature with the outdoor ambient temperature.

1-Gauge Manifold Attachment

Service gauge ports are identified in figures 11, 12 and 13 on pages 23, 24, and 25 respectively. Attach high pressure line to discharge line schrader port and the low pressure line to the suction line schrader port.

NOTE-When unit is properly charged discharge line pressures should approximate those in tables 8 through 15.

VI-MAINTENANCE

NOTE-TURN OFF POWER TO UNIT BEFORE CLEANING OR PERFORMING ANY SERVICE OPERATION TO THIS UNIT.

A-Filters

LGA / LCA / LHA units are equipped with six 24" x 24" x 2" (610mm x 610mm x 51mm) pleated throw-away type filters. Filters may be accessed through the economizer / filter access door (left of the blower door). All filters are removed by pulling on the pull tab, located on the bottom of each row of filters. Filters should be checked monthly (or more frequently in severe use) and cleaned or replaced regularly. Take note of the "AIR FLOW DIRECTION" marking on the filter frame when re-installing.

NOTE-Filters must be U.L.C. certified or equivalent for use in Canada.

B-Lubrication

All motors and blower wheels used in LGA / LCA / LHA units are prelubricated; no further lubrication is required.

C-Supply Air Blower Wheel

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove access panel or to clean blower wheel.

D-Evaporator Coil

Inspect and clean coil at beginning of each season. Clean using mild detergent or commercial coil cleanser. Check condensate drain pan and line, if necessary. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet. Check connecting lines and coil for evidence of oil and refrigerant leaks.

E-Condenser Coil

Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season. Check connecting lines and coil for evidence of oil and refrigerant leaks.

NOTE-If owner complains of insufficient cooling, the unit should be gauged and refrigerant charge checked. Refer to Gauge Manifold Attachment and Charging sections in this manual.

F-Electrical

1- Check all wiring for loose connections.

2- Check for correct voltage at unit (unit operating).

3- Check amp-draw on both condenser fan motor and blower motor.
Fan Motor Rating Plate ____ Actual _____
Indoor Blower Motor Rating Plate____ Actual____

VII-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory or field installed to either the LGA / LCA / LHA units.

A-LARMF18/36-14, 24 or LARMFH18/24-26, 37 Mounting Frames

When installing either the LGA / LCA / LHA units on a combustible surface for downflow discharge applications, the Lennox LARMF18/36 14-inch or 24-inch (356 mm or 610mm) height roof mounting frame is used. For horizontal discharge applications, use LARMFH18/24 26-inch or 37-inch (660mm or 940mm) height roof mounting frame. This frame converts unit from down-flow to horizontal air flow. The 37 inch (940mm) horizontal frame meets National Roofing Code requirements. The roof mounting frames are recommended in all other applications but not required. If the LGA / LCA / LHA units are not mounted on a flat (roof) surface, they MUST be supported under all edges and under the middle of the unit to prevent sagging. The units MUST be mounted level within 1/16" per linear foot or 5mm per meter in any direction.

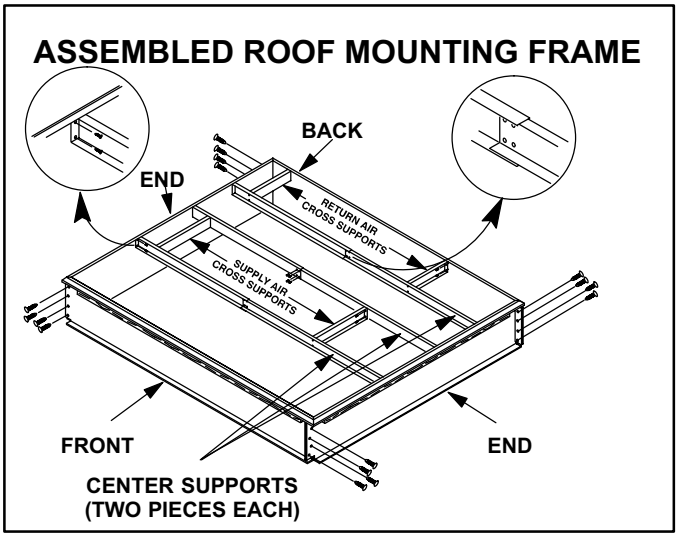


FIGURE 32

The assembled LARMF18/36 mounting frame is shown in figure 32. Refer to the roof mounting frame installation instructions for details of proper assembly and mounting. The roof mounting frame MUST be squared to the roof and level before mounting. Plenum system MUST be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in figure 33. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

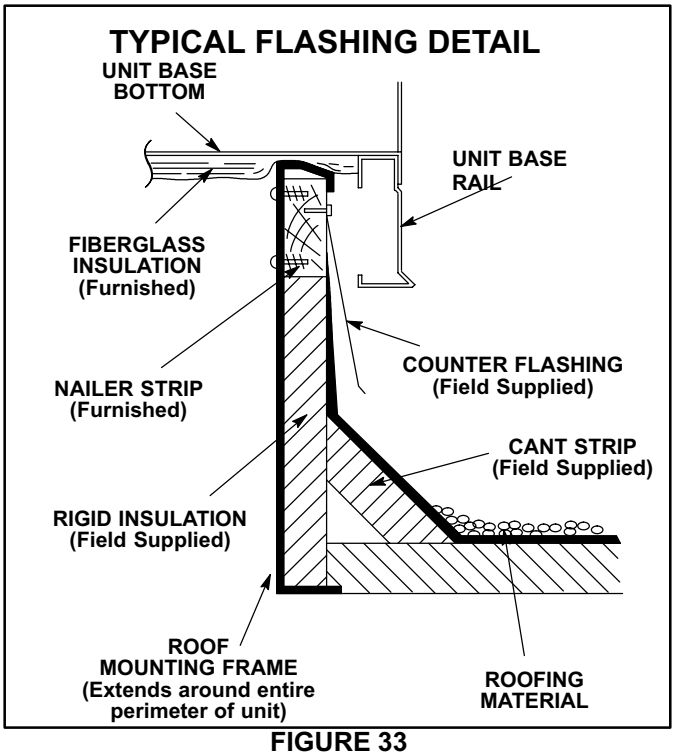


FIGURE 33

B-Transitions

Optional supply/return transitions LASRT18/21/24 are available for use with LGA / LCA / LHA series units utilizing optional LARMF18/36 roof mounting frame. Transition must be installed in the LARMF18/36 mounting frame before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

C-Supply and Return Diffusers

Optional flush mount diffuser/return FD11 and extended mount diffuser/return RTD11 are available for use with the LGA / LCA / LHA units. Refer to manufacturer's instructions included with transition for detailed installation procedures.

D-LAOAD(M)18/24 Outdoor Air Dampers

LAOAD(M)18/24 consists of a set of dampers which may be manually or motor (M) operated to allow up to 25 percent outside air into the system at all times (see figure 34). Both air dampers can be installed in LGA / LHA / LCA units. R for specific installation procedure. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild detergent.It should be sprayed with Filter Handicoater when dry prior to reinstallation.Filter Handicoater is R.P. Products coating no. 418 and is available as Lennox Part No. P-8-5069.

E-LAREMD18/24 Economizer

(Field or Factory Installed)

The optional LAREMD18/24 economizer can be used with LGA / LCA / LHA units in downflow and horizontal air discharge applications. The LAREMD18 / 24 economizer uses outdoor air for free cooling when temperature and/or humidity is suitable. An economizer hood is required and must be ordered separately.

NOTE - Gravity exhaust dampers are required with power exhaust.

The economizer is controlled by the economizer control module A56 which connects to the main control module A55. Both boards are part of the Integrated Modular Control (IMC) which controls "L" series unit operation.

The economizer will operate in one of four modes. Each mode requires a different EM1 economizer DIP switch setting. Each mode also requires different sensors.

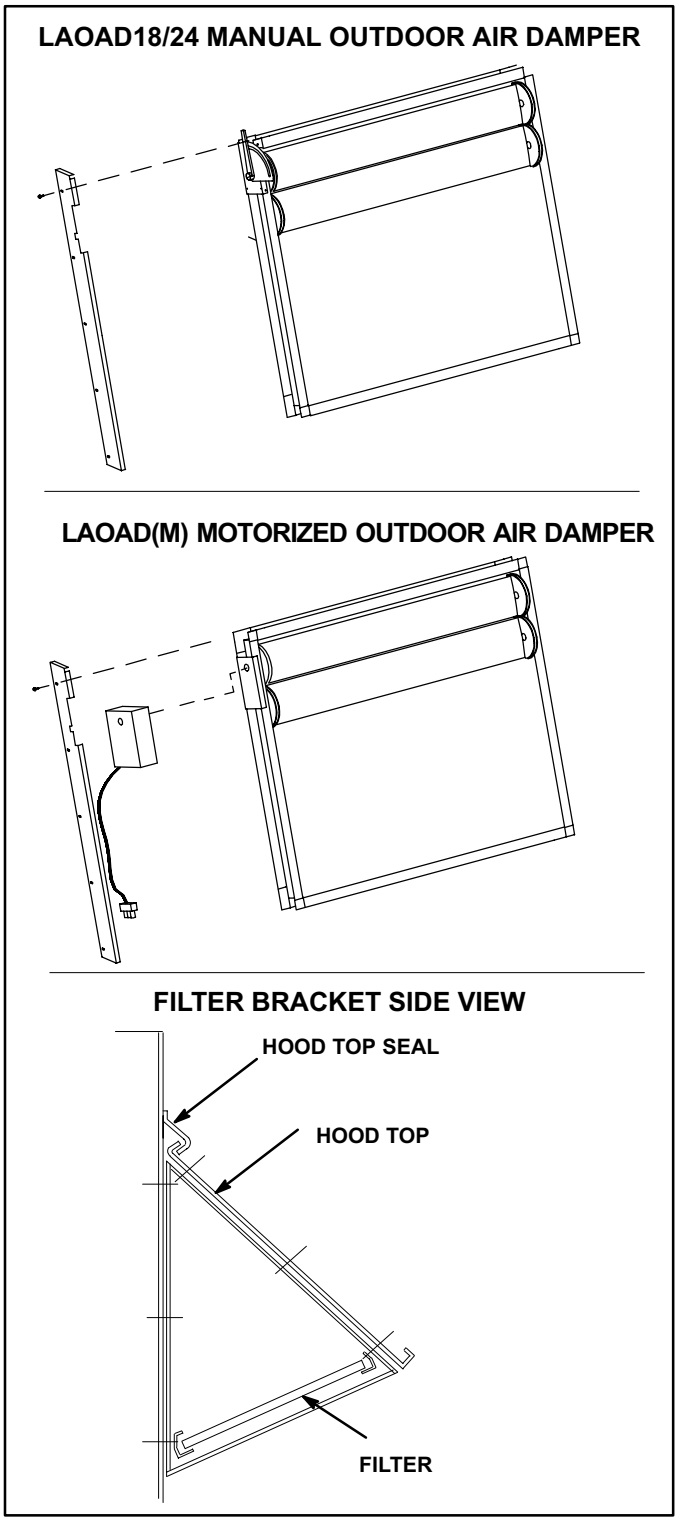


FIGURE 34

1-"TMP" MODE (SENSIBLE TEMPERATURE)

In the "TMP" mode, the IMC uses input from the factory installed RT6 Supply Air Sensor, RT16 Return Air Sensor, and RT17 Outdoor Air Sensor to determine suitability of outside air and economizer damper operation. When outdoor sensible temperature is less than return air sensible temperature, outdoor air is used for cooling. This may be supplemented by mechanical cooling to meet comfort demands. This application does not require additional optional sensors.

2-"ODE" MODE (OUTDOOR ENTHALPY)

The "ODE" or outdoor enthalpy mode requires a field-provided and -installed Honeywell C7400 enthalpy sensor (16K96). The sensor monitors outdoor air temperature and humidity (enthalpy). When outdoor air enthalpy is below the enthalpy control setpoint, the economizer modulates to allow outdoor air for free cooling.

3-"DIF" MODE (DIFFERENTIAL ENTHALPY)

The "DIF" or differential enthalpy mode requires two field-provided and -installed Honeywell C7400 enthalpy sensors (16K97). One sensor is installed in the outside air opening and the other sensor is installed in the return air opening. When the outdoor air enthalpy is below the return air enthalpy, the economizer opens to bring in outdoor air for free cooling.

4-"GLO" MODE (GLOBAL)

Global Mode - The "GLO" or global mode is used with an energy management system which includes a global control feature. Global control is used when multiple units (in one location) respond to a single outdoor air sensor. Each energy management system uses a specific type of outdoor sensor which is installed and wired by the controls contractor.

Motorized Outdoor Air Damper - The "GLO" mode is also used when a motorized outdoor air damper is installed in the system.

NOTE - All economizer modes of operation will modulate dampers to 55° F (13° C) supply air.

F-LAGED(H)18/24 Gravity Exhaust Dampers

LAGED(H)18/24 dampers are used with LGA / LCA / LHA series units. LAGED dampers are used in downflow and LAGEDH are used in horizontal air discharge applications. LAGED(H) gravity exhaust dampers are installed in the return air plenum (see figure 35). The dampers must be used any time an economizer or power exhaust fans are applied to LGA / LCA / LHA series units.

Gravity exhaust dampers allow exhaust air to be discharged from the system when an economizer and/or power exhaust is operating. Gravity exhaust dampers also prevent outdoor air infiltration during unit off cycle. See installation instructions for more detail.

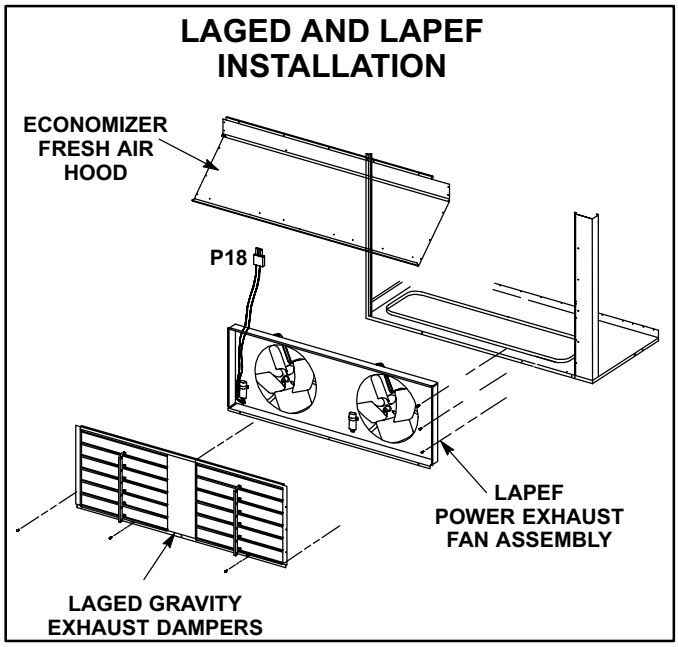


FIGURE 35

G-LAPEF18/24 Power Exhaust Fans

LAPEF18/24 power exhaust fans are used with LGA / LCA / LHA series units. LAPEF (requires optional down-flow gravity exhaust dampers and LAREMD economizers) are used in downflow applications only. Power exhaust fans provide exhaust air pressure relief and also run when return air dampers are closed and supply air blowers are operating. Figure 35 shows location of the LAPEF. See installation instructions for more detail.

H-Optional Cold Weather Kit (Canada only)

Electric heater is available to automatically control the minimum temperature in the gas burner compartment. Heater is C.G.A. certified to allow cold weather operation of unit down to -60°F (-50°C).

The kit includes the following parts:

1- Transformer (T20) is a 600V to 120/240V stepdown transformer mounted in the blower compartment.

2- T20 has two in line fuses (F20), one on each leg of the transformer. Both are rated at 15 amps.

3- The strip heater (HR6) is located as close as possible to the gas valve. It is wired in series with T20. The strip heater is rated at 500 Watts

4- A thermostat mounting box is installed on the vestibule of the heating compartment. Included in the box are the following thermostat switches:

a - Thermostat switch (S59) is an auto-reset SPST N.C. switch which opens on a temperature drop. The switch is wired in series with 24v power and the combustion air blower switch. When the temperature drops below -20°F (28.9°C) the switch opens and the gas heat section is de-energized. The switch automatically resets when the heating compartment temperature reaches 10°F (-12.2°C).

b - Thermostat switch (S60) is an auto-reset SPST N.C. switch which opens on a temperature rise. The switch is wired in series with HR6 and T20. When the temperature rises above 20°F (-6.7°C) the switch opens and the electric heater is de-energized. The switch automatically resets when the heating compartment temperature reaches -10°F (23.3°C).

c -Thermostat switch (S61) is an auto-reset SPST N.O. switch which closes on a temperature drop. The switch is wired in series with HR6 and T20. When temperature drops below 20°F (-6.7°C) the switch closes and electric heater is energized. The switch automatically opens when heating compartment temperature reaches 50°F (10°C).

I-Control Systems

Three different types of control systems may be used with the LGA / LCA / LHA series units. All thermostat wiring is connected to terminal block TB1 located in the control box of the unit. Each thermostat has additional control options available. See thermostat installation instructions for more detail.

1- Electro-mechanical thermostat (13F06)

The electro-mechanical thermostat is a two stage heat / two stage cool thermostat with dual temperature levers. A non-switching or manual system switch subbase may be used.

2- Electronic thermostat (see price book)

Any two stage heat / two stage cool electronic thermostat may be used.

3- Honeywell T7300 thermostat (81G59)

The Honeywell T7300 thermostat is a programmable, internal or optional remote temperature sensing thermostat. The T7300 provides occupied and unoccupied changeover control.

J-Smoke Detectors A17 and A64

Photoelectric smoke detectors are a factory installed option. The smoke detectors can be installed in the supply air section (A64), return air section (A17), or in both the supply and return air section. Wiring for the smoke detectors are shown on the temperature control section (C2) wiring diagram in back of this manual.

K-Blower Proving Switch S52

The blower proving switch monitors blower operation and locks out the unit in case of blower failure. The switch is N.O. and closes at .14" W.C. (34.9 Pa) The switch is mounted on the upper left hand corner of the blower deck. Wiring for the blower proving switch is shown on the temperature control section (C2) wiring diagram in back of this manual.

L-Dirty Filter Switch S27

The dirty filter switch senses static pressure increase indicating a dirty filter condition. The switch is N.O. and closes at 1" W.C. (248.6 Pa) The switch is mounted on the top filter channel corner. Wiring for the dirty filter switch is shown on the temperature control section (C2) wiring diagram in back of this manual.

M-Indoor Air Quality (CO_2) Sensor A63

The indoor air quality sensor monitors CO_2 levels and reports the levels to the main control module A55. The board adjusts the economizer dampers according to the CO_2 levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment. Wiring for the indoor air quality switch is shown on the temperature control section (C2) wiring diagram in back of this manual.

N-LP / Propane Kit

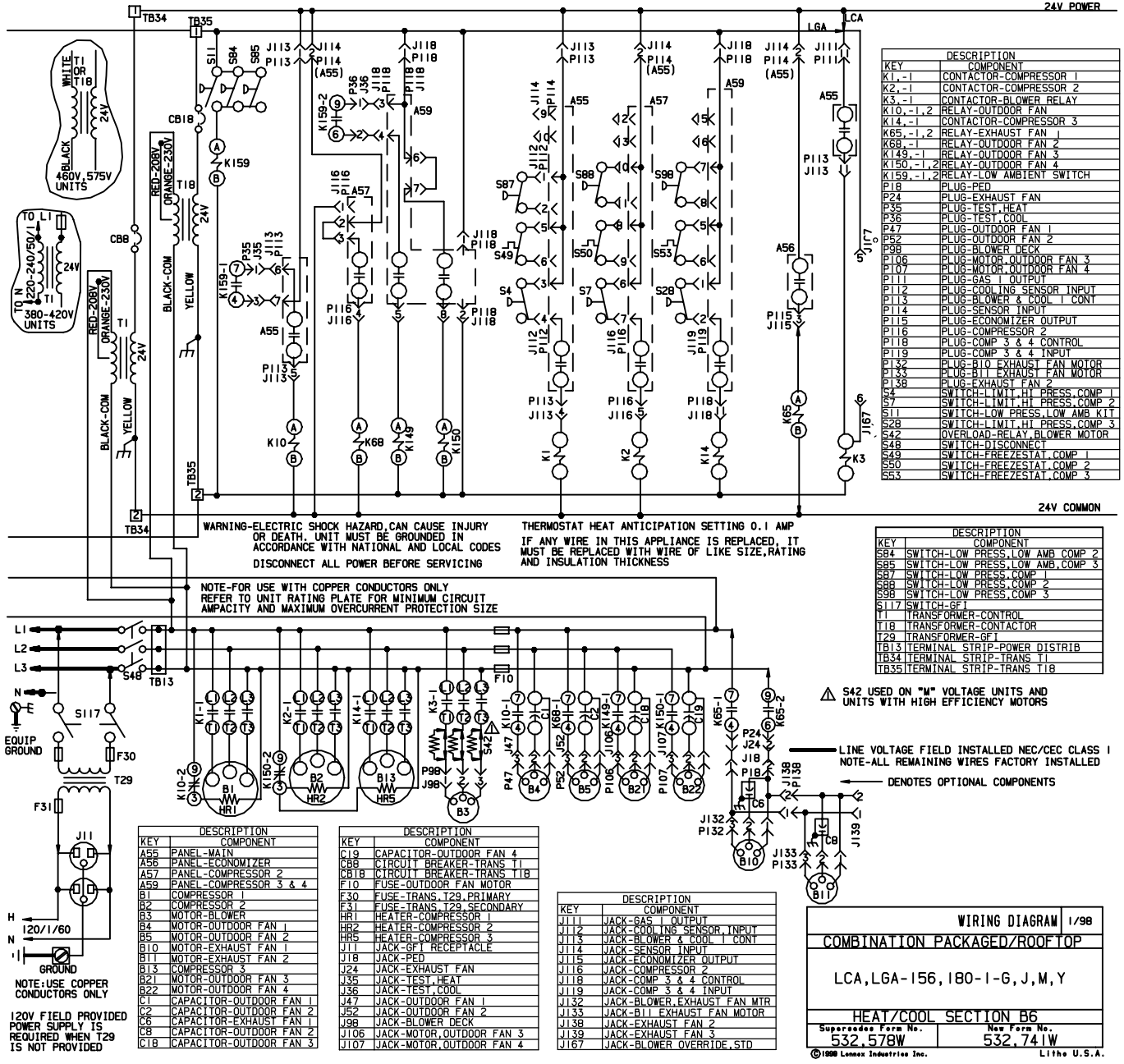
Two natural to LP / propane gas changeover kits are required for gas conversion on LGA180/210/240 series units (one for each gas heat section). The kit includes one gas valve, eleven burner orifices, and three stickers. For more detail refer to the natural to LP gas changover kit installation instructions.

VIII-WIRING DIAGRAMS AND OPERATION SEQUENCE

The following pages contain the wiring diagrams for LGA, LCA, LHA156H/180/210/240/300S series units. An economizer and thermostat are also shown. Each wiring diagram is followed by a sequence of operation. The sequence is outlined by numbered steps which correspond to circled numbers on the wiring diagrams.

Each wiring diagram is identified with a letter A, B, C, or D followed by a number. Each LGA / LCA / LHA unit wiring diagram is assigned a "B" number (likewise, each control system is assigned a "C" number, each heating section an "A" number and each economizer diagram a "D" number). Use the numbers when joining the schematics to help you identify how the unit is set up.

B6 diagram *LGA, LCA156H/180 Y, G, J*



DESCRIPTION	
KEY	COMPONENT
K1,-1	CONTACTOR-COMPRESSOR 1
K2,-1	CONTACTOR-COMPRESSOR 2
K3,-1	CONTACTOR-BLOWER RELAY
K10,-1,2	RELAY-OUTDOOR FAN
K14,-1	CONTACTOR-COMPRESSOR 3
K65,-1,2	RELAY-EXHAUST FAN 1
K68,-1	RELAY-OUTDOOR FAN 2
K149,-1	RELAY-OUTDOOR FAN 3
K150,-1,2	RELAY-OUTDOOR FAN 4
K159,-1,2	RELAY-LOW AMBIENT SWITCH
P18	PLUG-PED
P24	PLUG-EXHAUST FAN
P35	PLUG-TEST,HEAT
P36	PLUG-TEST,COOL
P47	PLUG-OUTDOOR FAN 1
P52	PLUG-OUTDOOR FAN 2
P98	PLUG-BLOWER DECK
P106	PLUG-MOTOR,OUTDOOR FAN 3
P107	PLUG-MOTOR,OUTDOOR FAN 4
P111	PLUG-GAS 1 OUTPUT
P112	PLUG-COOLING SENSOR INPUT
P113	PLUG-BLOWER & COOL 1 CONT
P114	PLUG-SENSOR INPUT
P115	PLUG-ECONOMIZER OUTPUT
P116	PLUG-COMPRESSOR 2
P118	PLUG-COMP 3 & 4 CONTROL
P119	PLUG-COMP 3 & 4 INPUT
P132	PLUG-B10 EXHAUST FAN MOTOR
P133	PLUG-B11 EXHAUST FAN MOTOR
P138	PLUG-EXHAUST FAN 2
S4	SWITCH-LIMIT,HI PRESS,COMP 1
S7	SWITCH-LIMIT,HI PRESS,COMP 2
S11	SWITCH-LOW PRESS,LOW AMB KIT
S28	SWITCH-LIMIT,HI PRESS,COMP 3
S42	OVERLOAD-RELAY,BLOWER MOTOR
S48	SWITCH-DISCONNECT
S49	SWITCH-FREEZESTAT,COMP 1
S50	SWITCH-FREEZESTAT,COMP 2
S53	SWITCH-FREEZESTAT,COMP 3

DESCRIPTION	
KEY	COMPONENT
S84	SWITCH-LOW PRESS,LOW AMB COMP 2
S85	SWITCH-LOW PRESS,LOW AMB,COMP 3
S87	SWITCH-LOW PRESS,COMP 1
S88	SWITCH-LOW PRESS,COMP 2
S98	SWITCH-LOW PRESS,COMP 3
S117	SWITCH-GFI
T1	TRANSFORMER-CONTROL
T18	TRANSFORMER-CONTACTOR
T29	TRANSFORMER-GFI
TB13	TERMINAL STRIP-POWER DISTRIB
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18

DESCRIPTION	
KEY	COMPONENT
A55	PANEL-MAIN
A56	PANEL-ECONOMIZER
A57	PANEL-COMPRESSOR 2
A59	PANEL-COMPRESSOR 3 & 4
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
B11	MOTOR-EXHAUST FAN 2
B13	COMPRESSOR 3
B21	MOTOR-OUTDOOR FAN 3
B22	MOTOR-OUTDOOR FAN 4
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN 1
C8	CAPACITOR-OUTDOOR FAN 2
C18	CAPACITOR-OUTDOOR FAN 3

DESCRIPTION	
KEY	COMPONENT
C19	CAPACITOR-OUTDOOR FAN 4
CB8	CIRCUIT BREAKER-TRANS T1
CB18	CIRCUIT BREAKER-TRANS T18
F10	FUSE-OUTDOOR FAN MOTOR
F30	FUSE-TRANS,T29,PRIMARY
F31	FUSE-TRANS,T29,SECONDARY
HR1	HEATER-COMPRESSOR 1
HR2	HEATER-COMPRESSOR 2
HR5	HEATER-COMPRESSOR 3
J11	JACK-GFI RECEPTACLE
J18	JACK-PED
J24	JACK-EXHAUST FAN
J35	JACK-TEST,HEAT
J36	JACK-TEST,COOL
J47	JACK-OUTDOOR FAN 1
J52	JACK-OUTDOOR FAN 2
J98	JACK-BLOWER DECK
J106	JACK-MOTOR,OUTDOOR FAN 3
J107	JACK-MOTOR,OUTDOOR FAN 4

DESCRIPTION	
KEY	COMPONENT
J111	JACK-GAS 1 OUTPUT
J112	JACK-COOLING SENSOR,INPUT
J113	JACK-BLOWER & COOL 1 CONT
J114	JACK-SENSOR INPUT
J115	JACK-ECONOMIZER OUTPUT
J116	JACK-COMPRESSOR 2
J118	JACK-COMP 3 & 4 CONTROL
J119	JACK-COMP 3 & 4 INPUT
J132	JACK-BLOWER,EXHAUST FAN MTR
J133	JACK-B11 EXHAUST FAN MOTOR
J138	JACK-EXHAUST FAN 2
J139	JACK-EXHAUST FAN 3
J167	JACK-BLOWER OVERRIDE,STD

WIRING DIAGRAM	1/98
COMBINATION PACKAGED/ROOFTOP	
LCA,LGA-156,180-1-G,J,M,Y	
HEAT/COOL SECTION B6	
Supersedes Form No. 532,578W	New Form No. 532,741W

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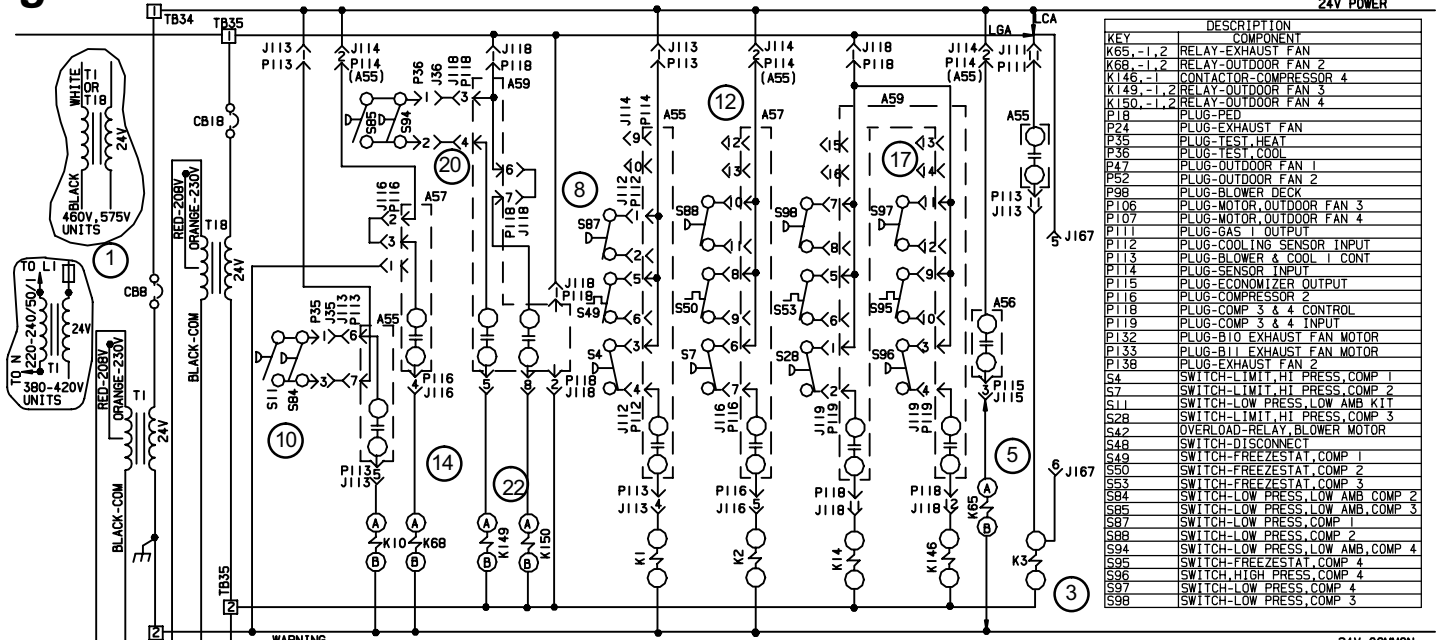
B7 diagram LGA, LCA210/240/300S Y, G, J



KEY	DESCRIPTION COMPONENT
K65,-1,2	RELAY-EXHAUST FAN
K68,-1,2	RELAY-OUTDOOR FAN 2
K146,-1	CONTACTOR-COMPRESSOR 4
K149,-1,2	RELAY-OUTDOOR FAN 3
K150,-1,2	RELAY-OUTDOOR FAN 4
P18	PLUG-PED
P24	PLUG-EXHAUST FAN
P35	PLUG-TEST,HEAT
P36	PLUG-TEST,COOL
P47	PLUG-OUTDOOR FAN 1
P52	PLUG-OUTDOOR FAN 2
P98	PLUG-BLOWER DECK
P106	PLUG-MOTOR,OUTDOOR FAN 3
P107	PLUG-MOTOR,OUTDOOR FAN 4
P111	PLUG-GAS 1 OUTPUT
P112	PLUG-COOLING SENSOR INPUT
P113	PLUG-BLOWER & COOL 1 CONT
P114	PLUG-SENSOR INPUT
P115	PLUG-ECONOMIZER OUTPUT
P116	PLUG-COMPRESSOR 2
P118	PLUG-COMP 3 & 4 CONTROL
P119	PLUG-COMP 3 & 4 INPUT
P132	PLUG-B10 EXHAUST FAN MOTOR
P133	PLUG-B11 EXHAUST FAN MOTOR
P138	PLUG-EXHAUST FAN 2
S4	SWITCH-LIMIT,HI PRESS,COMP 1
S7	SWITCH-LIMIT,HI PRESS,COMP 2
S11	SWITCH-LOW PRESS,LOW AMB KIT
S28	SWITCH-LIMIT,HI PRESS,COMP 3
S42	OVERLOAD-RELAY,BLOWER MOTOR
S48	SWITCH-DISCONNECT
S49	SWITCH-FREEZESTAT,COMP 1
S50	SWITCH-FREEZESTAT,COMP 2
S53	SWITCH-FREEZESTAT,COMP 3
S84	SWITCH-LOW PRESS,LOW AMB COMP 2
S85	SWITCH-LOW PRESS,LOW AMB,COMP 3
S87	SWITCH-LOW PRESS,COMP 1
S88	SWITCH-LOW PRESS,COMP 2
S94	SWITCH-LOW PRESS,LOW AMB,COMP 4
S95	SWITCH-FREEZESTAT,COMP 4
S96	SWITCH,HIGH PRESS,COMP 4
S97	SWITCH-LOW PRESS,COMP 4
S98	SWITCH-LOW PRESS,COMP 3

24V COMMON

WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES

DISCONNECT ALL POWER BEFORE SERVICING

IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE,RATING AND INSULATION THICKNESS

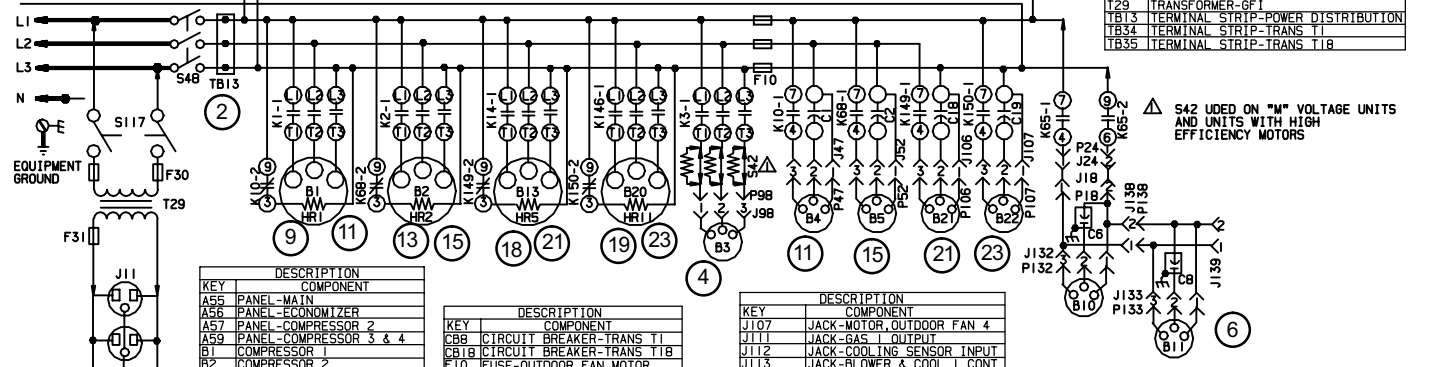
THERMOSTAT HEAT ANTICIPATION SETTING 0.1 AMP

NOTE-FOR USE WITH COPPER CONDUCTORS ONLY
REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE

DENOTES OPTIONAL COMPONENTS

LINE VOLTAGE FIELD INSTALLED NEC/CEC CLASS 1
NOTE-ALL REMAINING WIRES FACTORY INSTALLED

KEY	DESCRIPTION COMPONENT
S117	SWITCH-GFI
T1	TRANSFORMER-CONTROL
T18	TRANSFORMER-CONTACTOR
T29	TRANSFORMER-GFI
TB13	TERMINAL STRIP-POWER DISTRIBUTION
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18



S42 UDED ON "M" VOLTAGE UNITS AND UNITS WITH HIGH EFFICIENCY MOTORS

KEY	DESCRIPTION COMPONENT
A55	PANEL-MAIN
A56	PANEL-ECONOMIZER
A57	PANEL-COMPRESSOR 2
A59	PANEL-COMPRESSOR 3 & 4
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
B11	MOTOR-EXHAUST FAN 2
B13	COMPRESSOR 3
B20	COMPRESSOR 4
B21	MOTOR-OUTDOOR FAN 3
B22	MOTOR-OUTDOOR FAN 4
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN 1
C8	CAPACITOR-EXHAUST FAN 2
C18	CAPACITOR-OUTDOOR FAN 3
C19	CAPACITOR-OUTDOOR FAN 4

KEY	DESCRIPTION COMPONENT
CB8	CIRCUIT BREAKER-TRANS T1
CB18	CIRCUIT BREAKER-TRANS T18
F10	FUSE-OUTDOOR FAN MOTOR
F30	FUSE-TRANS.T29.PRIMARY
F31	FUSE-TRANS.T29.SECONDARY
HR1	HEATER-COMPRESSOR 1
HR2	HEATER-COMPRESSOR 2
HR5	HEATER-COMPRESSOR 3
HR11	HEATER-COMPRESSOR 4
J11	JACK-GFI RECEPTACLE
J18	JACK-PED
J24	JACK-EXHAUST FAN
J35	JACK-TEST,HEAT
J36	JACK-TEST,COOL
J47	JACK-OUTDOOR FAN 1
J52	JACK-OUTDOOR FAN 2
J98	JACK-BLOWER DECK
J106	JACK-MOTOR,OUTDOOR FAN 3

KEY	DESCRIPTION COMPONENT
J107	JACK-MOTOR,OUTDOOR FAN 4
J111	JACK-GAS 1 OUTPUT
J112	JACK-COOLING SENSOR INPUT
J113	JACK-BLOWER & COOL 1 CONT
J114	JACK-SENSOR INPUT
J115	JACK-ECONOMIZER OUTPUT
J116	JACK-COMPRESSOR 2
J118	JACK-COMP 3 & 4 CONTROL
J119	JACK-COMP 3 & 4 INPUT
J132	JACK-BLWR EXHAUST FAN MTR
J133	JACK-B11 EXHAUST FAN MOTOR
J138	JACK-EXHAUST FAN 2
J139	JACK-EXHAUST FAN 3
J167	JACK-BLOWER OVERRIDE,STD
K1,-1	CONTACTOR-COMPRESSOR 1
K2,-1	CONTACTOR-COMPRESSOR 2
K3,-1	CONTACTOR-BLOWER
K10,-1,2	RELAY-OUTDOOR FAN
K14,-1	CONTACTOR-COMPRESSOR 3

NOTE:USE COPPER CONDUCTORS ONLY

120V FIELD PROVIDED POWER SUPPLY IS REQUIRED WHEN T29 IS NOT PROVIDED

WIRING DIAGRAM 1/98

COMBINATION PACKAGED/ROOFTOP

LCA,LGA-210,240,300S-1-G,J,M,Y

HEAT/COOL SECTION B7

Supersedes Form No. 532,577W

New Form No. 532,740W

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SEQUENCE OF OPERATION
B7 DIAGRAM - LGA, LCA210/240/300S Y, G, J
(B6 DIAGRAM - LGA, LCA156H/180 Y, G, J SIMILAR)

Power:

1- Line voltage from TB2, unit disconnect S48, or other factory or field installed optional power disconnects, such as CB10, energizes transformer T1 and T18. Transformer T1 provides 24VAC power to terminal strip TB34 and T18 provides 24VAC power to terminal strip TB35. The two terminal strips provide 24VAC power to the unit cooling, heating and blower controls and thermostat.

2- Terminal strip TB13 is also energized when the unit disconnect closes. TB13 supplies line voltage to compressor crankcase heaters, compressors, blower motors, and fan motors.

Blower Operation (OCP input must be on):

3- The main control module A55 receives a demand from thermostat terminal G. A55 energizes blower contactor K3 with 24VAC.

4- N.O. K3-1 closes, energizing blower B3.

Economizer Operation:

5- The economizer control module A56 receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% (travel) outside air damper open (adjustable).

6- N.O. K65-1 and K65-2 both close, energizing exhaust fan motors B10 and B11.

1st Stage Cooling (both compressors B1 and B2 are energized):

7- First stage cooling demand energizes Y1 and G in the thermostat. G energizes blower, if blower is not already running (see step 3).

8- 24VAC is routed through TB34 to the main control module A55. After A55 proves N.C. low pressure switch S87, N.C. freezestat S49, and N.C. high pressure switch S4, compressor contactor K1 is energized.

9- N.O. contacts K1-1 close energizing compressor B1.

10-N.O. low ambient switch S11 and S84 close to energize condenser fan contactor K10.

NOTE: In 15 ton (52.8 kW) units, K10 is energized after K159-1 closes. K159 is energized by TB35 after one of the N.O. low ambient pressure switches S11, S84, and S85 closes.

11- N.O. contacts K10-1 close energizing condenser fan B4 and N.C. contacts K10-2 open de-energizing compressor 1 crankcase heater HR1.

12- Simultaneous with step 8, 24VAC is routed through the compressor 2 control module A57. After A57 proves N.C. low pressure switch S88, N.C. freezestat S50, and N.C. high pressure switch S7, compressor contactor K2 is energized.

13- N.O. contacts K2-1 close energizing compressor B2.

14- Compressor 2 control module A57 energizes condenser fan 2 relay K68.

15- N.O. contacts K68-1 close energizing condenser fan B5 and N.C. contacts K68-2 open de-energizing compressor 2 crankcase heater HR2.

2nd Stage Cooling (B13 in 15 ton (52.8 kW)and both B13 and B20 in 17.5 and 20 ton [61.5 and 70.3 kW] are energized):

16- Second stage cooling demand energizes Y2.

17-24VAC is routed through TB35 to compressor 3 and 4 module A59. After A59 proves N.C. low pressure switches S98 and S97, N.C. freezestats S53 and S95, and N.C. high pressure switches S28 and S96, compressor contactors K14 and K146 are energized.

18- N.O. contacts K14-1 close energizing compressor B13.

19- N.O. contacts K146-1 close energizing compressor B20.

20-N.O. low ambient pressure switches S85 and S94 close to energize condenser fan relay K149.

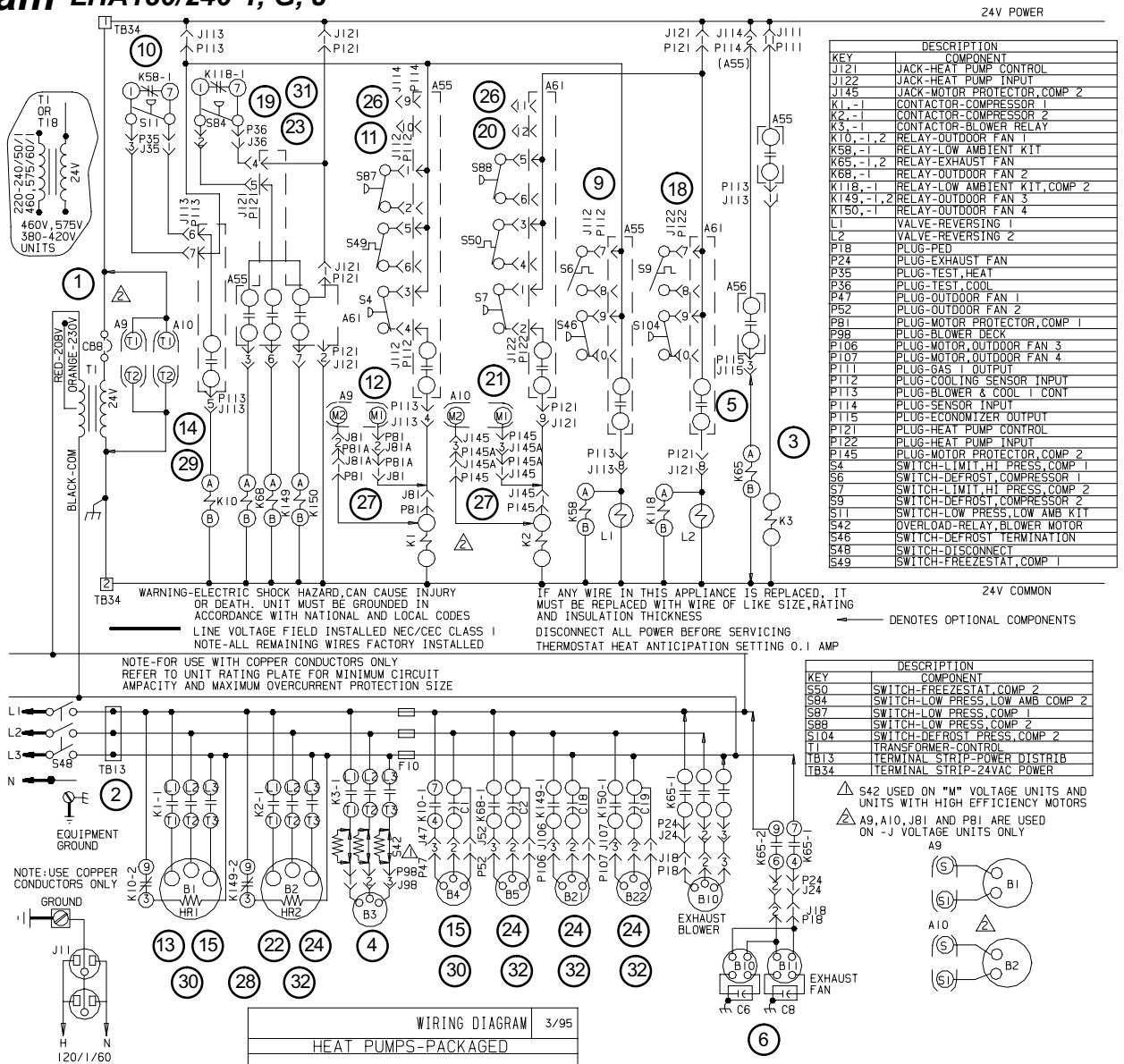
NOTE: In 15 ton (52.8 kW) units, K149 is energized after K159-2 closes. K159 is energized by TB35 after one of the N.O. low ambient pressure switches S11, S84, and S85 closes.

21-N.O. contacts K149-1 close energizing condenser fan B21 and N.C. contacts K149-2 open de-energizing compressor 3 crankcase heater HR5.

22- Compressor 3 and 4 module A59 energizes condenser fan relay K150.

23-N.O. contacts K150-1 close energizing condenser fan B22 and N.C. contacts K150-2 open de-energizing compressor 4 crankcase heater HR11.

B15 diagram *LHA180/240 Y, G, J*



DESCRIPTION	
KEY	COMPONENT
A9	PROTECTOR-COMPRESSOR 1
A10	PROTECTOR-COMPRESSOR 2
A55	PANEL-MAIN
A56	PANEL-ECONOMIZER
A61	PANEL-HEAT PUMP
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
B11	MOTOR-EXHAUST FAN 2
B21	MOTOR-OUTDOOR FAN 3
B22	MOTOR-OUTDOOR FAN 4
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN
C8	CAPACITOR-OUTDOOR FAN 2
C18	CAPACITOR-OUTDOOR FAN 4

DESCRIPTION	
KEY	COMPONENT
C19	CAPACITOR-OUTDOOR FAN 5
CB8	CIRCUIT BREAKER-TRANS TI
F10	FUSE-OUTDOOR FAN MOTOR
HR1	HEATER-COMPRESSOR 1
HR2	HEATER-COMPRESSOR 2
J11	JACK-GFI RECEPTACLE
J18	JACK-PED
J24	JACK-EXHAUST FAN
J35	JACK-TEST,HEAT
J36	JACK-TEST,COOL
J47	JACK-OUTDOOR FAN 1
J52	JACK-OUTDOOR FAN 2
J81	JACK-MOTOR PROTECTOR,COMP 1
J98	JACK-BLOWER DECK
J106	JACK-MOTOR,OUTDOOR FAN 3
J107	JACK-MOTOR,OUTDOOR FAN 4
J111	JACK-GAS 1 OUTPUT
J112	JACK-COOLING SENSOR INPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J114	JACK-SENSOR INPUT
J115	JACK-ECONOMIZER OUTPUT

DESCRIPTION	
KEY	COMPONENT
J121	JACK-HEAT PUMP CONTROL
J122	JACK-HEAT PUMP INPUT
J145	JACK-MOTOR PROTECTOR,COMP 2
K1,-1	CONTACTOR-COMPRESSOR 1
K2,-1	CONTACTOR-COMPRESSOR 2
K3,-1	CONTACTOR-BLOWER RELAY
K10,-1,2	RELAY-OUTDOOR FAN 1
K58,-1	RELAY-LOW AMBIENT KIT
K65,-1,2	RELAY-EXHAUST FAN
K68,-1	RELAY-OUTDOOR FAN 2
K118,-1	RELAY-LOW AMBIENT KIT,COMP 2
K149,-1,2	RELAY-OUTDOOR FAN 3
K150,-1	RELAY-OUTDOOR FAN 4
L1	VALVE-REVERSING 1
L2	VALVE-REVERSING 2
P18	PLUG-PED
P24	PLUG-EXHAUST FAN
P35	PLUG-TEST,HEAT
P36	PLUG-TEST,COOL
P47	PLUG-OUTDOOR FAN 1
P52	PLUG-OUTDOOR FAN 2
P81	PLUG-MOTOR PROTECTOR,COMP 1
P98	PLUG-BLOWER DECK
P106	PLUG-MOTOR,OUTDOOR FAN 3
P107	PLUG-MOTOR,OUTDOOR FAN 4
P111	PLUG-GAS 1 OUTPUT
P112	PLUG-COOLING SENSOR INPUT
P113	PLUG-BLOWER & COOL 1 CONT
P114	PLUG-SENSOR INPUT
P115	PLUG-ECONOMIZER OUTPUT
P121	PLUG-HEAT PUMP CONTROL
P122	PLUG-HEAT PUMP INPUT
P145	PLUG-MOTOR PROTECTOR,COMP 2
S4	SWITCH-LIMIT,HI PRESS,COMP 1
S6	SWITCH-DEFROST,COMPRESSOR 1
S7	SWITCH-LIMIT,HI PRESS,COMP 2
S9	SWITCH-DEFROST,COMPRESSOR 2
S11	SWITCH-LOW PRESS,LOW AMB KIT
S42	OVERLOAD-RELAY,BLOWER MOTOR
S46	SWITCH-DEFROST TERMINATION
S48	SWITCH-DISCONNECT
S49	SWITCH-FREEZESTAT,COMP 1

DESCRIPTION	
KEY	COMPONENT
S50	SWITCH-FREEZESTAT,COMP 2
S84	SWITCH-LOW PRESS,LOW AMB COMP 2
S87	SWITCH-LOW PRESS,COMP 1
S88	SWITCH-LOW PRESS,COMP 2
S104	SWITCH-DEFROST PRESS,COMP 2
T1	TRANSFORMER-CONTROL
TB13	TERMINAL STRIP-POWER DISTRIB
TB34	TERMINAL STRIP-24VAC POWER

⚠1 S42 USED ON "M" VOLTAGE UNITS AND UNITS WITH HIGH EFFICIENCY MOTORS

⚠2 A9,A10,J81 AND P81 ARE USED ON -J VOLTAGE UNITS ONLY

WIRING DIAGRAM	3/95
HEAT PUMPS-PACKAGED	
LHA-180,240-1-G,J,M,Y	
HEAT PUMP SECTION B15	
Supersedes Form No.	New Form No. 531,072W

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SEQUENCE OF OPERATION
B15 DIAGRAM - LHA180/240 Y, G, J

Power:

1- Line voltage from TB2, unit disconnect S48, or other factory or field installed optional power disconnects, such as CB10, energizes transformer T1. Transformer T1 provides 24VAC power to terminal strip TB34, which provides 24VAC power to the unit cooling, heating, and blower controls and thermostat.

2- Terminal strip TB13 is also energized when the unit disconnect closes. TB13 supplies line voltage to compressor crankcase heaters, compressors, blower motors, and fan motors.

Blower Operation (OCP input must be on):

3- The main control module A55 receives a demand from thermostat terminal G. A55 energizes blower contactor K3 with 24VAC.

4- N.O. K3-1 closes, energizing blower B3.

Economizer Operation:

5- The economizer control module A56 receives a demand and energizes exhaust fan relay K65 with 24VAC at 50% (travel) outside air damper open (adjustable).

6- N.O. K65-1 and K65-2 both close, energizing exhaust fan motors B10 and B11.

First Stage Cooling Demand (compressors B1 is energized):

7- Cooling demand energizes G and Y1 in the thermostat. G energizes blower (see step 3).

8- 24VAC is routed through TB34 to the main control module A55.

9- A55 proves N.O. defrost switch S6 and N.C. defrost termination switch S46 to energize reversing valve L1 and low ambient relay K58.

10- N.C. contacts K58-1 open, giving control of K10 fan relay to low ambient pressure switch S11.

11- A55 proves N.C. low pressure switch S87, N.C. freezestat S49, and N.C. high pressure switch S4 to energize compressor contactor K1.

12- Compressor protector A9 may be installed on J voltage units only.

13- N.O. contacts K1-1 close energizing compressor B1.

14-24VAC is routed through N.O. low ambient pressure switch S11 (now closed) and N.C. low ambient contact K58-1 (now open) to energize outdoor fan contactor K10.

15- N.O. contacts K10-1 close energizing outdoor fan B4 and N.C. contacts K10-2 open de-energizing compressor crankcase heater HR1.

Second Stage Cooling Demand (compressors B2 is energized):

16- Second stage cooling demand energizes Y2.

17- 24VAC is routed through TB34 to the heat pump control module A61.

18-A61 proves N.O. defrost switch S9 and N.C. defrost switch S104 to energize reversing valve L2 and low ambient relay K118.

19- N.C. contacts K118-1 open giving control of the K149 fan relay to the low ambient pressure switch S84.

20- A61 proves N.C. low pressure switch S88, N.C. freezestat S50, and N.C. high pressure switch S7 to energize compressor contactor K2.

21- Compressor protector A10 may be installed on J voltage units only.

22- N.O. contacts K2-1 close energizing compressor B2.

23-24VAC is routed through N.O. low ambient pressure switch S84 (now closed) and N.C. low ambient contact K118-1 (now open) to energize outdoor fan relay K149.

NOTE: If the outdoor temperature is above the A55 and A61 TP2 setpoint, fan relays K68 and K150 are also energized.

24- N.O. contacts K68-1 close energizing outdoor fan B5. N.O. contacts K149-1 close energizing outdoor fan B21. N.C. contacts K149-2 open de-energizing compressor crankcase heater HR2, and N.O. contacts K150-1 close energizing outdoor fan B22.

First Stage Heating Demand (compressors B1 and B2 are energized):

25- Heating demand energizes W1 in the thermostat.

26-24VAC is routed through TB34 to the main control module A55 and heat pump control module A61. After A55 and A61 proves N.C. low pressure switches S87 and S88, N.C. freezestat S49 and S50, and N.C. high pressure switch S4 and S7, compressor contactor K1 and K2 are energized.

NOTE: On first heating demand after unit has been in cooling mode, modules A55 and A61 will de-energize reversing valves L1 and L2, and low ambient relays K58 and K118. K58-1 and K118-1 N.C. contacts will take control away from low ambient pressure switches S11 and S84.

27-Compressor protector A9 and A10 are installed on J voltage units only.

28- N.O. contacts K1-1 and K2-1 close energizing compressors B1 and B2.

29-24VAC from the main control module A55 is routed through the N.C. low ambient contact K58-1 to energize outdoor fan contactor K10.

30- N.O. contacts K10-1 close energizing outdoor fan B4 and N.C. contacts K10-2 open de-energizing compressor crankcase heater HR1.

31-24VAC heat pump control module A61 is routed through N.C. low ambient contact K118-1 to energize outdoor fan contactor K149.

Second Stage Heating Demand (electric heat):

32- Second stage heating demand energizes W2 in the thermostat.

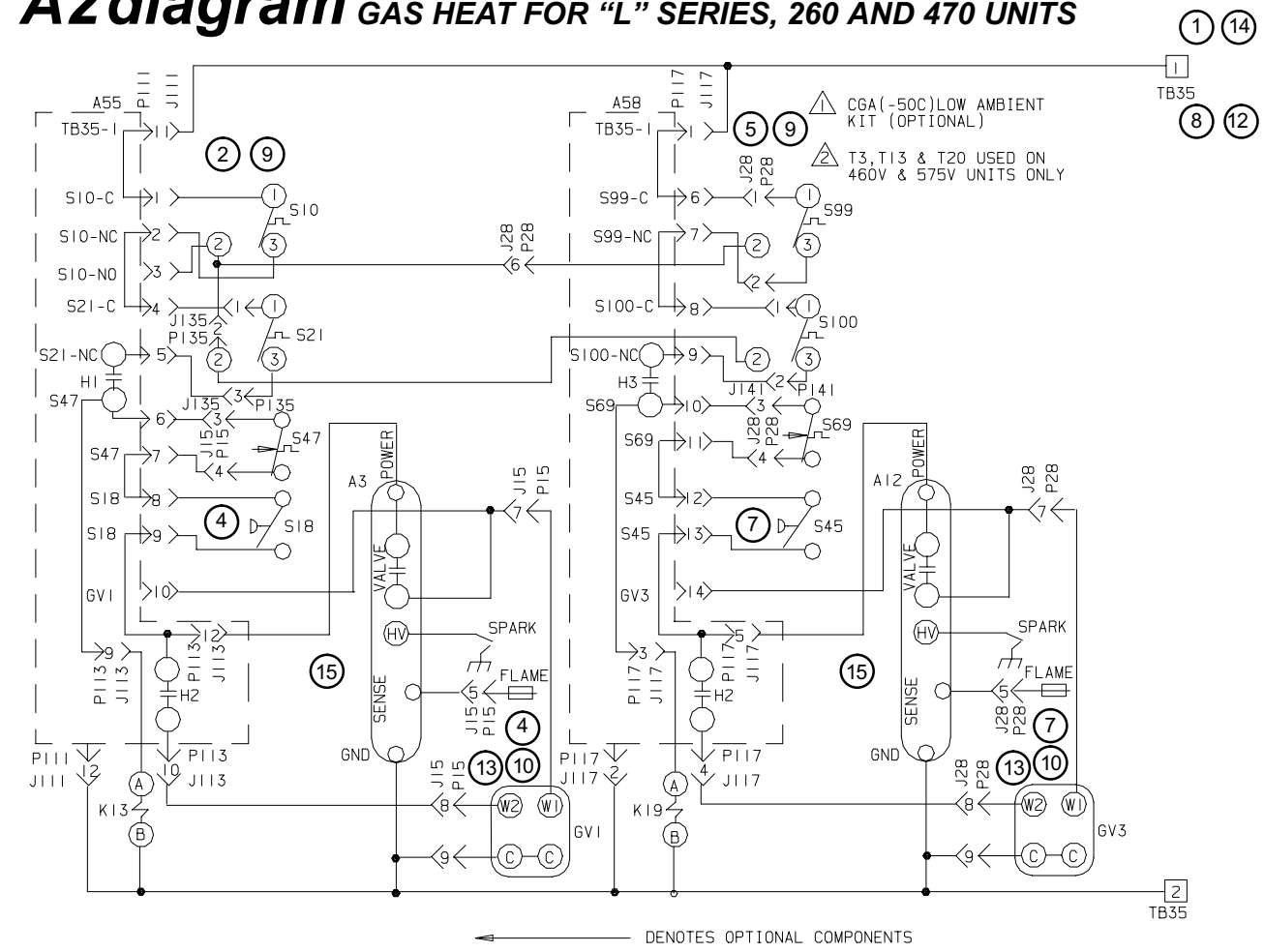
33- See sequence of operation for electric heat (diagrams A7 and A6).

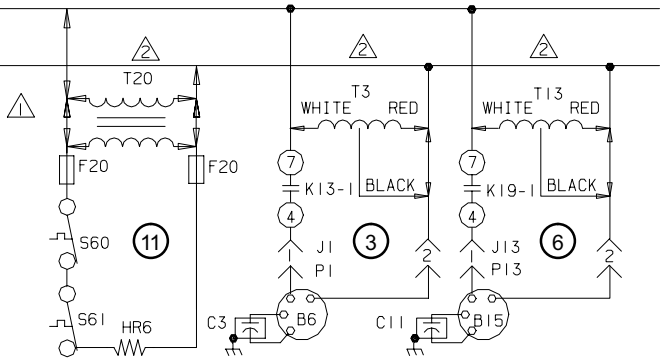
NOTE: Outdoor fan contacts K68 and K150 are also energized through the A61 module. A55 and A61 TP2 setpoint is only in effect during cooling mode.

34- N.O. contacts K68-1 close energizing outdoor fan B5. N.O. contacts K149-1 close energizing outdoor fan B21. N.C. contacts K149-2 open de-energizing compressor crankcase heater HR2, and N.O. contacts K150-1 close energizing outdoor fan B22.

Defrost Mode: See Defrost Operation in Section I Unit Components-B Cooling Components.

A2 diagram GAS HEAT FOR "L" SERIES, 260 AND 470 UNITS





DESCRIPTION	
KEY	COMPONENT
A3	CONTROL-BURNER 1
A12	CONTROL-BURNER 2
A55	PANEL-MAIN
A58	PANEL-GAS 2
B6	MOTOR-COMBUSTION AIR BLOWER 1
B15	MOTOR-COMBUSTION AIR BLOWER 2
C3	CAPACITOR-COMB AIR BLOWER,MOTOR 1
C11	CAPACITOR-COMB AIR BLOWER,MOTOR 2
F20	FUSE,-50C LOW AMBIENT KIT
GV1	VALVE-GAS 1
GV3	VALVE-GAS 2
HR6	HEATER,-50C LOW AMBIENT KIT
J1	JACK-GAS LIMIT
J13	JACK-GAS
J15	JACK-GAS
J28	JACK-ECONOMIZER PROGRAM
J111	JACK-GAS 1,OUTPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J117	JACK-GAS 2 CONTROL
J135	JACK-SECONDARY LIMIT
J141	JACK-SEC LIMIT,BURNER 2
K13,-1	RELAY-COMBUSTION AIR BLOWER
K19,-1	RELAY-STAGE 2, HEAT
P1	PLUG-GAS LIMIT
P13	PLUG-GAS
P15	PLUG-GAS
P28	PLUG-ECONOMIZER PROGRAM
P111	PLUG-GAS 1,OUTPUT
P113	PLUG-BLOWER & COOL 1 CONTROL
P117	PLUG-GAS 2 CONTROL
P135	PLUG-SECONDARY LIMIT
P141	PLUG-SEC LIMIT,BURNER 2
S10	SWITCH-LIMIT, PRIMARY GAS
S18	SWITCH-COMB AIR BLOWER, PROVE
S21	SWITCH-LIMIT, SEC GAS HEAT
S45	SWITCH-LIMIT,COMB AIR BWR,PROVE 2
S47	SWITCH-FLAME ROLLOUT, BURNER 1

DESCRIPTION	
KEY	COMPONENT
S60	THERMOSTAT,-23C CL,-7C OP,-50C LOW AMB KIT
S61	THERMOSTAT,+24C OPEN,-50C LOW AMB KIT
S69	SWITCH-FLAME ROLLOUT 2
S99	SWITCH-LIMIT,PRIMARY BURNER 2
S100	SWITCH-LIMIT,SECOND. BURNER 2
T3	TRANSFORMER-COMB AIR BLOWER 1
T13	TRANSFORMER-COMB AIR BLOWER 2
T20	TRANSFORMER,-50C LOW AMBIENT KIT
TB35	TERMINAL STRIP-TRANS T1

WIRING DIAGRAM	3/95
COMBINATION UNIT-ROOFTOP	
GAS HEAT FOR "L" SERIES,260 AND 470 UNITS	
HEATING SECTION-A2	
Supersedes Form No.	New Form No. 531,060W

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SEQUENCE OF OPERATION
A2 DIAGRAM - GAS HEAT FOR "L" SERIES, 260 AND 470 UNITS

FIRST STAGE HEAT:

1 - Heating demand initiates at W1 in thermostat.

2 - 24VAC is routed through TB35 to the main control module A55. After A55 proves N.C. primary limit S10 and N.C. secondary limit S21 the combustion air blower relay K13 is energized.

3 - N.O. K13-1 contacts close allowing line voltage (or transformer T3 in 460V and 575V only) to energize combustion air blower B6.

4 - After the combustion air blower B6 has reached full speed, the combustion air proving switch (S18) contacts close. The A55 routes 24VAC through N.C. burner 1 flame rollout switch S47 and the closed contacts of the combustion air proving switch (S18) to energize the ignition module A3. After a 30 second delay A3 energizes the W1 terminal (low fire) of gas valve GV1.

5 - As steps 2, 3 and 4 occur, 24VAC is also routed to the gas valve control module A58. After A58 proves N.C. primary gas heat limit S99 and N.C. secondary limit S100 the combustion air blower relay K19 is energized.

6 - N.O. K19-1 contacts close allowing line voltage (or transformer T13 in 460V and 575V only) to energize combustion air blower B15.

7 - After the combustion air blower B15 has reached full speed, the combustion air proving switch (S45) contacts close. The A58 routes 24VAC through N.C. burner 2 flame rollout switch S69 and the closed contacts of the combustion air proving switch (S45) to energize the ignition module A12. After a 30 second delay A12 energizes the W1 terminal (low fire) of gas valve GV3.

SECOND STAGE HEAT:

8 - With first stage heat operating, an additional heating demand initiates W2 in the thermostat.

9 - A second stage heating demand is received by both A55 and A58 modules.

10 - Each module will energize the corresponding W2 terminal (high fire) of gas valves GV1 and GV3 respectively.

OPTIONAL LOW AMBIENT KIT (C.G.A. -50°C LOW AMBIENT KIT):

11 - Line voltage (or transformer T20 in 460V and 575V only) is routed through the low ambient kit fuses F20 and N.C. low ambient kit thermostats S60 and S61 to energize low ambient kit heater HR6.

END OF SECOND STAGE HEAT:

12 - Heating demand is satisfied. Terminal W2 is de-energized.

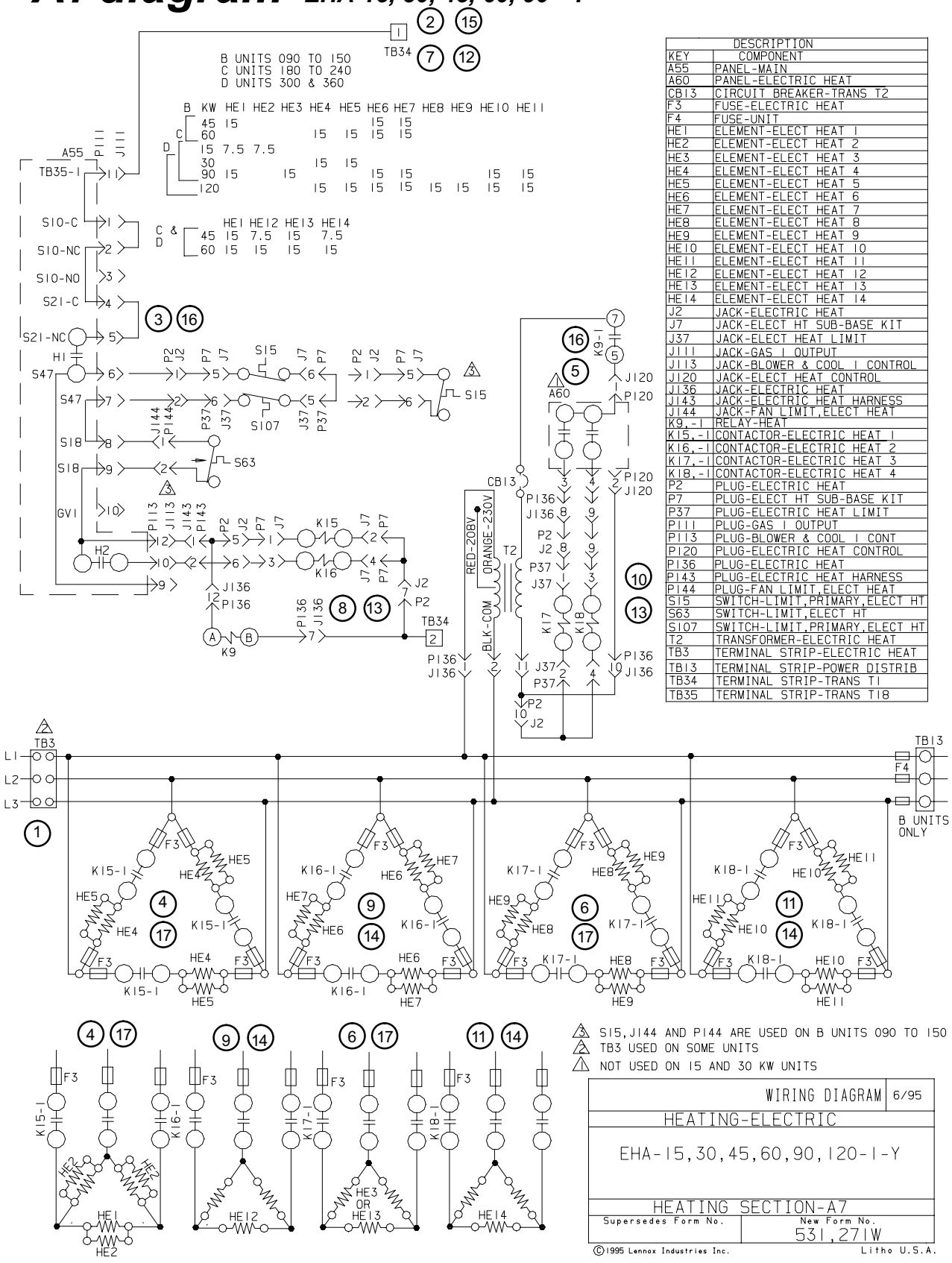
13 - Terminals W2 (high fire) of GV1 and GV3 are de-energized by the A55 and A58 Module.

END OF FIRST STAGE HEAT:

14 - Heating demand is satisfied. Terminal W1 is de-energized.

15 - Ignition module A3 is de-energized by A55 in turn de-energizing terminal W1 of GV1. Combustion blower relay K13 is also de-energized. At the same instant, ignition module A12 is de-energized by A58 module in turn de-energizing the W1 terminal of GV3. K19 combustion air blower relay is also de-energized.

A7 diagram *EHA-15, 30, 45, 60, 90 - Y*



DESCRIPTION	
KEY	COMPONENT
A55	PANEL-MAIN
A60	PANEL-ELECTRIC HEAT
CB13	CIRCUIT BREAKER-TRANS T2
F3	FUSE-ELECTRIC HEAT
F4	FUSE-UNIT
HE1	ELEMENT-ELECT HEAT 1
HE2	ELEMENT-ELECT HEAT 2
HE3	ELEMENT-ELECT HEAT 3
HE4	ELEMENT-ELECT HEAT 4
HE5	ELEMENT-ELECT HEAT 5
HE6	ELEMENT-ELECT HEAT 6
HE7	ELEMENT-ELECT HEAT 7
HE8	ELEMENT-ELECT HEAT 8
HE9	ELEMENT-ELECT HEAT 9
HE10	ELEMENT-ELECT HEAT 10
HE11	ELEMENT-ELECT HEAT 11
HE12	ELEMENT-ELECT HEAT 12
HE13	ELEMENT-ELECT HEAT 13
HE14	ELEMENT-ELECT HEAT 14
J2	JACK-ELECTRIC HEAT
J7	JACK-ELECT HT SUB-BASE KIT
J37	JACK-ELECT HEAT LIMIT
J111	JACK-GAS 1 OUTPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J120	JACK-ELECT HEAT CONTROL
J136	JACK-ELECTRIC HEAT
J143	JACK-ELECTRIC HEAT HARNESS
J144	JACK-FAN LIMIT,ELECT HEAT
K9,-1	RELAY-HEAT
K15,-1	CONTACTOR-ELECTRIC HEAT 1
K16,-1	CONTACTOR-ELECTRIC HEAT 2
K17,-1	CONTACTOR-ELECTRIC HEAT 3
K18,-1	CONTACTOR-ELECTRIC HEAT 4
P2	PLUG-ELECTRIC HEAT
P7	PLUG-ELECT HT SUB-BASE KIT
P37	PLUG-ELECTRIC HEAT LIMIT
P111	PLUG-GAS 1 OUTPUT
P113	PLUG-BLOWER & COOL 1 CONT
P120	PLUG-ELECTRIC HEAT CONTROL
P136	PLUG-ELECTRIC HEAT
P143	PLUG-ELECTRIC HEAT HARNESS
P144	PLUG-FAN LIMIT,ELECT HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HT
S63	SWITCH-LIMIT,ELECT HT
S107	SWITCH-LIMIT,PRIMARY,ELECT HT
T2	TRANSFORMER-ELECTRIC HEAT
TB3	TERMINAL STRIP-ELECTRIC HEAT
TB13	TERMINAL STRIP-POWER DISTRIB
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18

3 S15, J144 AND P144 ARE USED ON B UNITS 090 TO 150
2 TB3 USED ON SOME UNITS
1 NOT USED ON 15 AND 30 KW UNITS

WIRING DIAGRAM	6/95
HEATING-ELECTRIC	
EHA-15,30,45,60,90,120-1-Y	
HEATING SECTION-A7	
Supersedes Form No.	New Form No. 531,271W

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SEQUENCE OF OPERATION
A7 DIAGRAM - EHA-15, 30, 45, 60, 90 - Y
A6 DIAGRAM - EHA-15, 30, 45, 60, 90 - G, J

Diagrams A7 and A6 are the EHA electric heat sections used in the LHA and LCA units. The Y voltage diagram (A7) use elements configured in a Wye. The G and J voltage diagram (A6) use elements configured in a Delta. Both diagrams A7 and A6 follow the following sequence of operation:

NOTE:Two electric heat sections are used in all 15kW through 90kW heaters. The heat sections are labelled first electric heat section (left side) and second electric heat section (right side). See figure 27.

NOTE: In the case of EHA 15 and 30kW, the second heat section (right side) is a slave (only has electric heat elements and a limit). In this case the A60 module, T2 transformer, and K9 heat relay are not used. Line voltage is supplied to elements in both heat section one (left side) and two (right side) by the contactors in heat section one (left side) and all control is through the A55 module.

HEATING ELEMENTS:

1 - Terminal strip TB3 is energized when the unit disconnect closes. TB3 supplies line voltage to electric heat elements HE1 through HE14. Each heating element is protected by fuse F3.

FIRST STAGE HEAT:

2 - Heating demand initiates at W1 in thermostat.

3 - 24VAC is routed through TB34 to the main control module A55. After A55 proves N.C. primary limits S15 (heat section one, left side), S107 (heat section two, right side), and redundant electric heat limit S63, the electric heat contactor K15 and heat relay K9 are energized.

4 - N.O. contact K15-1 closes allowing the first bank of elements in heat section one (left side) to be energized.

5 - At the same time, line voltage is routed through transformer T2, which provides 24VAC to the electric heat control module A60. A60 is energized when N.O. contacts K9-1 close. A N.O. contact in A60 closes,
energizing electric heat relay K17.

6 - N.O. contacts K17-1 close allowing the first set of elements in heat section two (right side) to be energized.

SECOND STAGE HEAT:

7 - With the first stage heat operating, an additional heating demand initiates at W2 in thethermostat.

8 - 24VAC is routed through the main control module A55, which in turn energizes the
electric heat contactor K16.

9 - N.O. contacts K16-1 close allowing the second set of elements in heat section one (left side) to be energized.

10 - Simultaneous with step eight, a N.O. contact in the electric heat control module A60 closes,
allowing 24VAC to energize electric heat contactor K18.

11 - N.O. contacts K18-1 close allowing the second set of elements in heat section two (right side) to be energized.

END OF SECOND STAGE HEAT:

12 - Heating demand is satisfied. Terminal W2 in the thermostat is de-energized.

13 - Electric heat contactors K16 and K18 are de-energized.

14 - The second set of electric heat elements in heat sections one (left side) and two (right side) are de-energized.

END OF FIRST STAGE HEAT:

15 - Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.

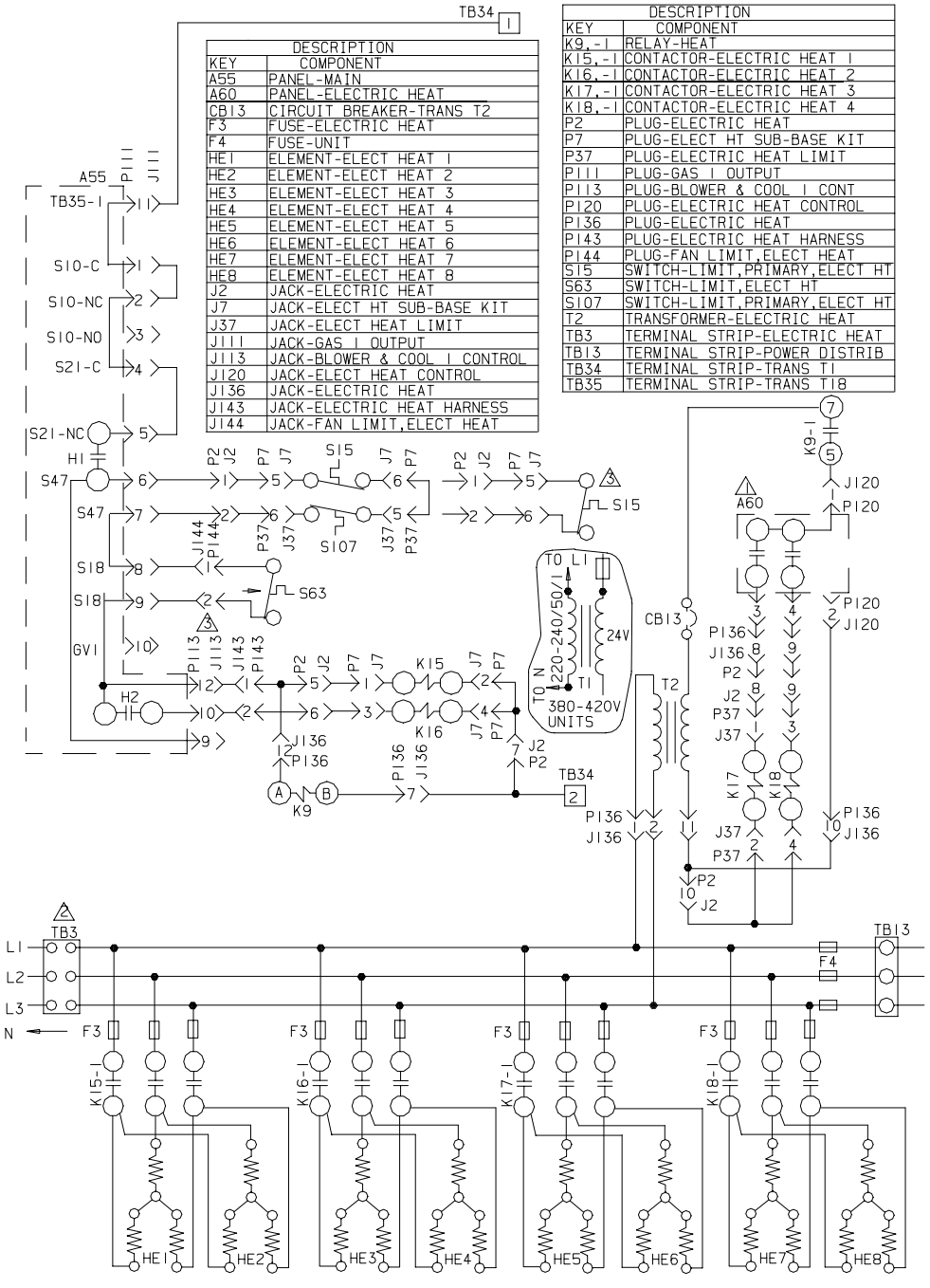
16 - Electric heat contactors K15 and K17 are de-energized.

17 - The first set of electric heat elements in heat sections one (left side) and two (right side) are de-energized.

A6 diagram *EHA-15, 30, 45, 60, 90 - G, J*

DESCRIPTION	
KEY	COMPONENT
A55	PANEL-MAIN
A60	PANEL-ELECTRIC HEAT
CB13	CIRCUIT BREAKER-TRANS T2
F3	FUSE-ELECTRIC HEAT
F4	FUSE-UNIT
HE1	ELEMENT-ELECT HEAT 1
HE2	ELEMENT-ELECT HEAT 2
HE3	ELEMENT-ELECT HEAT 3
HE4	ELEMENT-ELECT HEAT 4
HE5	ELEMENT-ELECT HEAT 5
HE6	ELEMENT-ELECT HEAT 6
HE7	ELEMENT-ELECT HEAT 7
HE8	ELEMENT-ELECT HEAT 8
J2	JACK-ELECTRIC HEAT
J7	JACK-ELECT HT SUB-BASE KIT
J37	JACK-ELECT HEAT LIMIT
J111	JACK-GAS 1 OUTPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J120	JACK-ELECT HEAT CONTROL
J136	JACK-ELECTRIC HEAT
J143	JACK-ELECTRIC HEAT HARNESS
J144	JACK-FAN LIMIT,ELECT HEAT

DESCRIPTION	
KEY	COMPONENT
K9,-1	RELAY-HEAT
K15,-1	CONTACTOR-ELECTRIC HEAT 1
K16,-1	CONTACTOR-ELECTRIC HEAT 2
K17,-1	CONTACTOR-ELECTRIC HEAT 3
K18,-1	CONTACTOR-ELECTRIC HEAT 4
P2	PLUG-ELECTRIC HEAT
P7	PLUG-ELECT HT SUB-BASE KIT
P37	PLUG-ELECTRIC HEAT LIMIT
P111	PLUG-GAS 1 OUTPUT
P113	PLUG-BLOWER & COOL 1 CONT
P120	PLUG-ELECTRIC HEAT CONTROL
P136	PLUG-ELECTRIC HEAT
P143	PLUG-ELECTRIC HEAT HARNESS
P144	PLUG-FAN LIMIT,ELECT HEAT
S15	SWITCH-LIMIT,PRIMARY,ELECT HT
S63	SWITCH-LIMIT,ELECT HT
S107	SWITCH-LIMIT,PRIMARY,ELECT HT
T2	TRANSFORMER-ELECTRIC HEAT
TB3	TERMINAL STRIP-ELECTRIC HEAT
TB13	TERMINAL STRIP-POWER DISTRIB
TB34	TERMINAL STRIP-TRANS T1
TB35	TERMINAL STRIP-TRANS T18



3 S15, J144 AND P144 ARE USED ON B UNITS 090 TO 150
2 TB3 IS USED ON SOME UNITS
1 NOT USED ON 15 AND 30KW UNITS

B UNITS 090 TO 150
C UNITS 180 TO 240
D UNITS 300 & 360

	B KW	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8
	45	15		15	15				
C	60	15	15	15	15				
D	15	7.5	7.5						
	30	15	15						
	45	15		7.5		15		7.5	
	60	15		15		15		15	
	90	15		15	15	15		15	15
	120	15	15	15	15	15	15	15	15

WIRING DIAGRAM	6/95
HEATING-ELECTRIC	
EHA-15,30,45,60,90,120-1-G,J,M	
HEATING SECTION-A6	
Supersedes Form No.	New Form No. 531,270W

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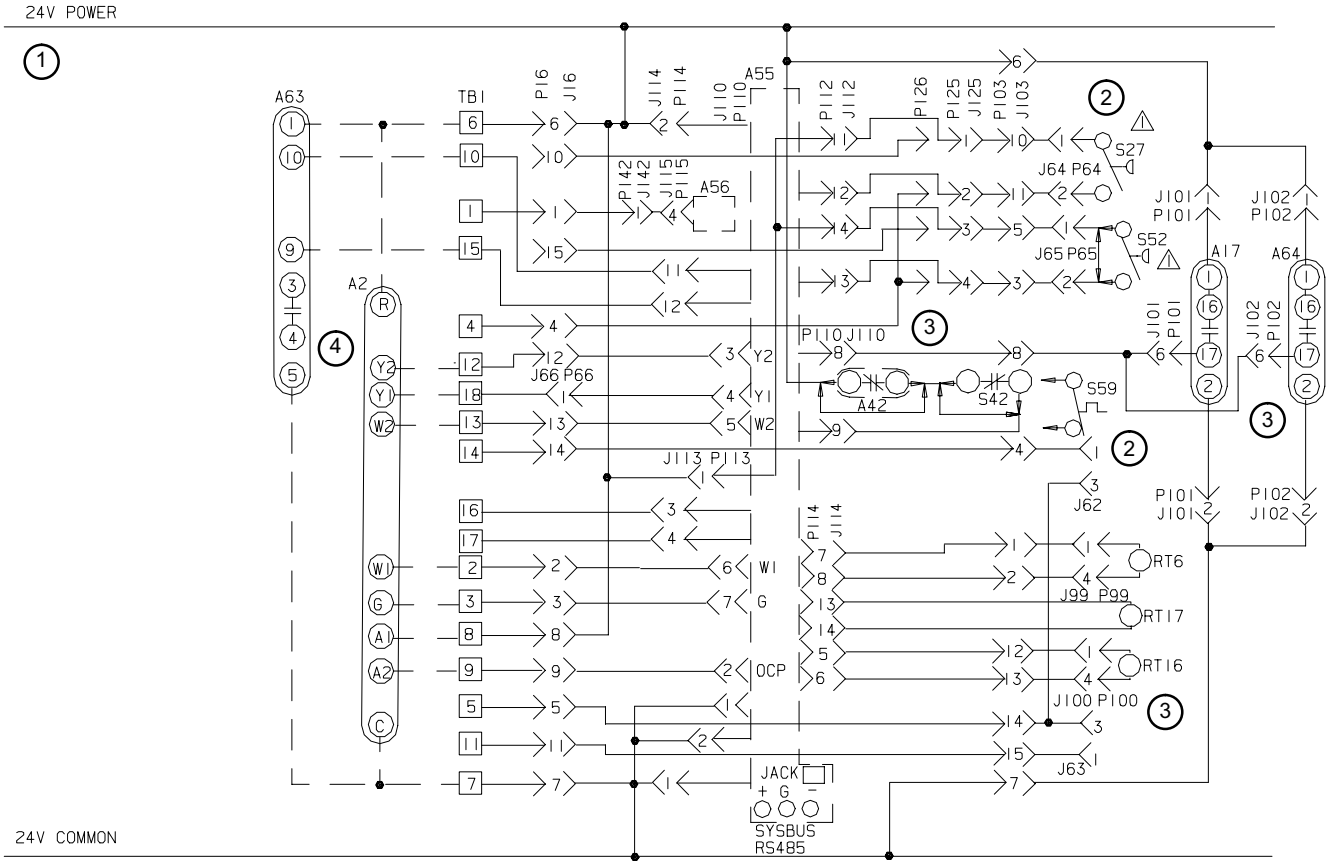
C2 diagram *ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT*



DESCRIPTION	
KEY	COMPONENT
A2	SENSOR-ELECTRONIC
A17	DETECTOR-SMOKE
A42	MONITOR-PHASE PROTECTION
A55	PANEL-MAIN
A56	PANEL-ECONOMIZER
A63	SENSOR-CO2(IAQ)
A64	DETECTOR-SMOKE,SUPPLY AIR
J16	JACK-UNIT
J62	JACK-A2 RETURN AIR SENSOR
J63	JACK-RTI DISCH. AIR SENSOR
J64	JACK-S27 FILTER SWITCH
J65	JACK-S52 FAN SWITCH
J66	JACK-COOL 1 INTERFACE
J99	JACK-DISCHARGE TEMP SENSOR
J100	JACK-OUTDOOR TEMP SENSOR
J101	JACK-SMOKE DETECTOR,RETURN AIR
J102	JACK-SMOKE DETECTOR,SUPPLY AIR
J103	JACK-SENSORS,CONTROL
J110	JACK-THERMOSTAT INPUT
J112	JACK-COOLING SENSOR INPUT
J113	JACK-BLOWER & COOL 1 CONTROL
J114	JACK-SENSOR INPUT
J115	JACK-ECONOMIZER OUTPUT
J125	JACK-BLOWER PROVING
J126	JACK-JUMPER,BLOWER PROVING
J142	JACK-ECONOMIZER HARNESS

DESCRIPTION	
KEY	COMPONENT
P16	PLUG-UNIT
P64	PLUG-S27 FILTER SWITCH
P65	PLUG-S50 FAN SWITCH
P66	PLUG-COOL ONE
P99	PLUG-DISCHARGE TEMP SENSOR
P100	PLUG-OUTDOOR TEMP SENSOR
P101	PLUG-SMOKE DETECTOR,RETURN AIR
P102	PLUG-SMOKE DETECTOR,SUPPLY AIR
P103	PLUG-SENSORS,CONTROL
P110	PLUG-THERMOSTAT INPUT
P112	PLUG-COOLING SENSOR INPUT
P113	PLUG-BLOWER & COOL 1 CONTROL
P114	PLUG-SENSOR INPUT
P115	PLUG-ECONOMIZER OUTPUT
P125	PLUG-BLOWER PROVING
P126	PLUG-JUMPER,BLOWER PROVING
P142	PLUG-ECONOMIZER HARNESS
RT6	SENSOR-ADDER DISCHARGE CONTROL
RT16	SENSOR-RETURN AIR TEMP
RT17	SENSOR-OUTSIDE AIR TEMP
S27	SWITCH-FILTER
S42	OVERLOAD-RELAY,BLOWER MOTOR
S52	SWITCH-AIR FLOW
S59	THERMOSTAT,-35 C OPEN,-50 C
TB1	TERMINAL STRIP-24V CLASS II

⚠ S27 AND S52 ARE OPTIONAL

CLASS II FIELD WIRING

WIRING DIAGRAM	3/95
ACCESSORIES	
ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT FOR "L" SERIES UNITS	
TEMPERATURE CONTROL SECTION C2	
Supersedes Form No.	New Form No. 531,279W

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SEQUENCE OF OPERATION

C2 DIAGRAM - ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT

POWER:

1 - Terminal strip TB34 energizes the thermostat components with 24VAC via TB1.

OPERATION:

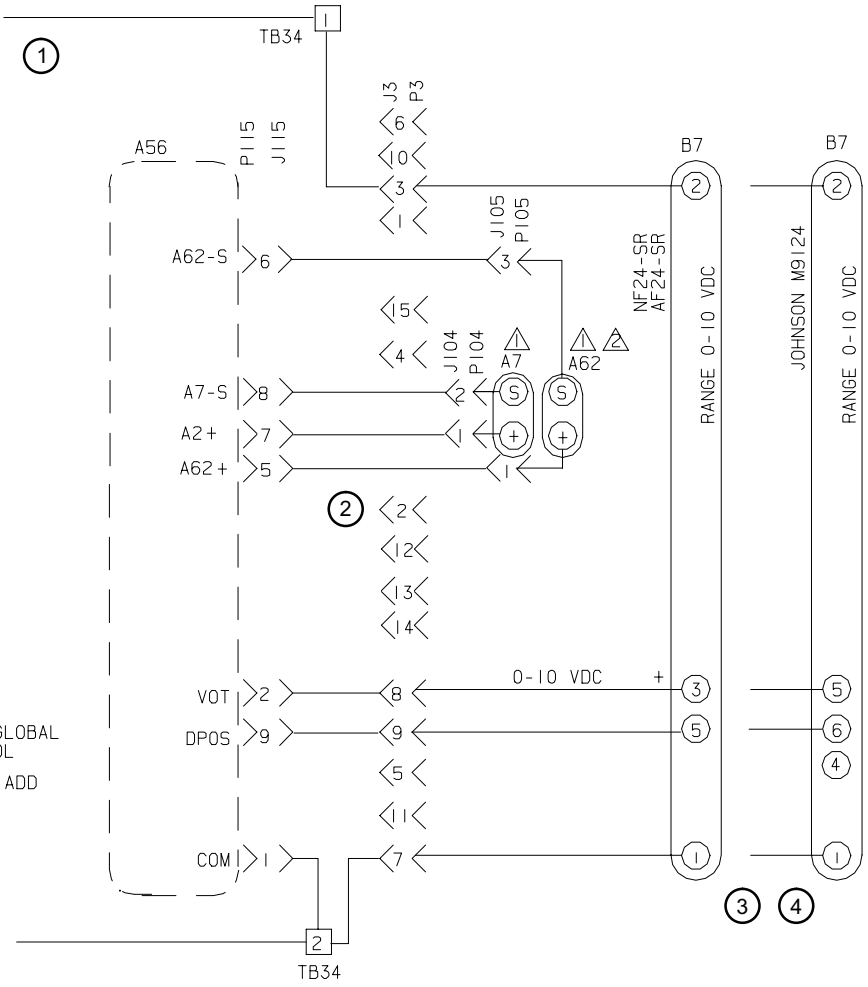
2 - The main control module A55 proves the optional N.O. filter switch S27(indicates dirty filter when closed), optional N.O. air flow switch S52(indicates no air [i.e. broken belt] system shuts down), and optional C.G.A. -50°C low ambient kit thermostat S59 (used in C.G.A. units only).

3 - The main control module A55 receives data from the supply and return smoke detectors A17 and A64, optional phase protection monitor A42, blower motor overload relay S42, discharge sensor RT6, return air sensor RT16, and the outdoor air sensor RT17.

4 - The main control module A55 receives data from the electronic thermostat A2 (Y1, Y2, W1, W2, G, OCP) and the CO_2 sensor (if economizer is used) via terminal strip TB1. A55 energizes the appropriate components.

D1 diagram "L" SERIES ECONOMIZER

DESCRIPTION	
KEY	COMPONENT
A7	SENSOR-SOLID STATE ENTHALPY
A56	PANEL-ECONOMIZER
A62	SENSOR-ENTHALPY, INDOOR
B7	MOTOR-DAMPER
J3	JACK-UNIT ECONOMIZER
J104	JACK-SENSOR, OUTDOOR ENTHALPY
J105	JACK-SENSOR, RETURN AIR ENTHALPY
J115	JACK-ECONOMIZER, OUTPUT
P3	PLUG-UNIT ECONOMIZER
P104	PLUG-SENSOR, OUTDOOR ENTHALPY
P105	PLUG-SENSOR, RETURN AIR ENTHALPY
P115	PLUG-ECONOMIZER, OUTPUT
TB34	TERMINAL STRIP-TRANSFORMER TI



⚠1 DELETE A7 AND A62 (IF USED) FOR EITHER GLOBAL ENTHALPY OR SENSIBLE TEMPERATURE CONTROL

⚠2 FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR

NOTE: THIS DIAGRAM USED ONLY WHEN ECONOMIZER OR MOTORIZED OUTDOOR AIR DAMPERS ARE INSTALLED

WIRING DIAGRAM	5/95
ACCESSORIES	
"L" SERIES ECONOMIZER AND MOTORIZED OUTSIDE AIR DAMPER	
ECONOMIZER-SECTION D1	
Supersedes Form No.	New Form No. 531,285W

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SEQUENCE OF OPERATION
D1 DIAGRAM - "L" SERIES ECONOMIZER

POWER:

1 - Terminal strip TB34 energizes the economizer components with 24VAC.

OPERATION:

2 - The main control module A55 along with outdoor enthalpy sensor A7 and indoor enthalpy sensor A62 (if differential enthalpy is used) communicates to the economizer control module A56 when to power the damper motor B7.

3 - The economizer control module A56 supplies B7 with 0 - 10 VDC to control the positioning of economizer.

4 - The damper actuator provides 2 to 10 VDC position feedback.