LENNOX®
Service Literature

UNIT INFORMATION
Corp. 0414-L4
Revised 07-2018

THA
7.5 / 8.5 / 10 / 12.5 TON
26.3 / 29.8 / 35.2 / 44 kW

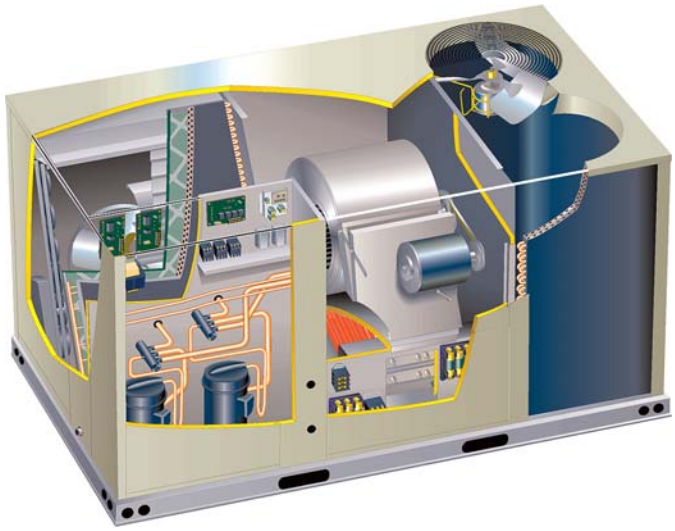
THA SERIES

The THA commercial heat pump is available in 7.5, 8.5, 10 and 12.5 ton capacities. The THA090/150 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 THA units. Electric heat operates in single or multiple stages depending on the kW input size. 7.5kW through 60kW heat sections are available for the THA heat pump.

THA 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 unit wiring.

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

If the unit 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.



⚠ WARNING

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

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

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

⚠ WARNING

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

Table of Contents

Optional Accessories . . . . . Page 2
Optional Electric Heat Accessories Page 3
Specifications . . . . . Page 4
Blower Data . . . . . Page 6
Electrical Data . . . . . Page 8
I Unit Components . . . . . Page 11
II Placement and Installation . . . . . Page 30
III Start Up . . . . . Page 30
IV System Service Checks . . . . . Page 31
V Maintenance . . . . . Page 32
VI Accessories . . . . . Page 33
VII Wiring Diagrams . . . . . Page 40

OPTIONAL ACCESSORIES

Item		7.5 ton 090	8.5 ton 102	10 ton 120	12.5 ton 150
Cabinet Accessories	Coil Guards	TACGKGC10/15			
	Hail Guards	TAHGKGC10/15			
	Horizontal Discharge Conversion Kit	LTHSDKGC10/15			
Ceiling Diffusers	Step-Down - Net Weight	RTD11-95 88 lbs. (40 kg)	RTD11-135 205 lbs. (93 kg)		RTD11-185 392 lbs. (178 kg)
	Flush - Net Weight	FD11-95 75 lbs. (34 kg)	FD11-135 174 lbs. (79 kg)		FD11-185 289 lbs. (131 kg)
	Transitions (Supply and Return) - Net Weight	LASRT08/10 30 lbs (14 kg)	LASRT10/12 32 lbs (15 kg)		LASRT15 36 lbs. (16 kg)
Controls	Blower Proving Switch	LTABPSK			
	Dirty Filter Switch	LTADFSK			
	L Connection® Network	See Engineering Handbook			
	Smoke Detector - Supply	LTASASDK10/36			
	Smoke Detector - Return	LTRASDK-10/30			
Cooling Accessories	PVC Condensate Drain Trap	LTACDKP03/36			
	Compressor Crankcase Heater	TACCHK10/15			
	Copper Condensate Drain Trap	LTACDKC03/36			
Economizer	Economizer - Net Weight	TAREMD10/15 - 47 lbs. (21 kg)			
	Economizer Outdoor Air Hood - Net Weight Number and Size of Filters	LAOAH10/15 - 11 lbs. (5 kg) (2) 16 x 25 x 1 in. (406 x 635 x 25 mm)			
	Economizer Enthalpy Control - Differential	LTADEK03/36			
	Economizer Enthalpy Control - Outdoor	LTASEK03/36			
	Economizer Modulating Sensor Kit	TAMEK03/36			
Barometric Relief	Down-Flow Barometric Relief Dampers - Net Weight	LAGED10/15 - 8 lbs. (4 kg)			
	Hood for Down-Flow LAGED	LAGEH09/15			
	Horizontal Barometric Relief Dampers - Net Weight	LAGEDH03/15 - 8 lbs. (4 kg)			
Outdoor Air Dampers	Damper Section (down-flow) - Automatic - Net Weight	TAOADM10/15 - 31 lbs. (14 kg)			
	Damper Section (down-flow) - Manual - Net Weight	LAOAD10/15 - 26 lbs. (12 kg)			
	Outdoor Air Hood (down-flow) Net Weight Number and Size of Filters	LAOAH10/15 - 11 lbs. (5 kg) (2) 16 x 25 x 1 in. (406 x 635 x 25 mm)			
Power Exhaust	Power Exhaust Fan - Net Weight	LAPEF10/15 - 28 lbs. (13 kg)			
Electrical Accessories	HACR Circuit Breaker	TAHBK10/15-* (indicate size)			
	Disconnect Switch	TADK10/15-80 (80A) TADK10/15-150 (150A)			
	GFI Service Outlets	LTAGFIK10/15			
Electric Heat	Electric Heat	See Electric Heat Data Tables			
	Electric Heat Control Kit	TAEHK10/15			
	Electric Heat LTB2 Terminal Block	See Optional Electric Heat Accessories			
	Unit/Electric Heat Fuse Block	See Optional Electric Heat Accessories Page			
Filters	MERV 11 High Efficiency	AFK-11 (18 x 24 x 2 specify four per unit)			
Indoor Air Quality (CO_2) Sensors	CO_2 Sensor Duct Mounting Kit	LTIAQSDMK03/36			
	Sensor - white case CO_2 display	LTAIAQSWDK03/36			
	Sensor - white case no display	LTAIAQSWN03/36			
	Sensor - black case CO_2 display	LTAIAQSND03/36			
	Sensor - duct mount, black, no display	LTAIAQSDMBN03/36			
	Aspiration Box for duct mounting	LTIAQABD03/36			
	Handheld CO_2 Monitor	LTAIAQSHM03/36			
Standard Roof Curbs	14 in. (356 mm) height - Net Weight	LARMF10/15-14 - 126 lbs. (57 kg)			
	24 in. (610 mm) height - Net Weight	LARMF10/15-24 - 174 lbs. (79 kg)			
Cliplock 1000 Roof Curbs	14 in. (356 mm) height - Net Weight	LARMF10/15S-14 - 126 lbs. (57 kg)			
	18 in. (457 mm) height - Net Weight	LARMF10/15S-18 - 156 lbs. (71 kg)			
	24 in. (610 mm) height - Net Weight	LARMF10/15S-24 - 174 lbs. (79 kg)			

OPTIONAL ELECTRIC HEAT ACCESSORIES

UNIT FUSE BLOCKS WITH ELECTRIC HEAT							
Unit Model No.				**THA090S**	**THA102S**	**THA120S**	**THA150S**
Electric Heat			Model No.	EHA (see Electric Heat Data tables for additional information)			
			kW Input Range	7.5-15-22.5-30-45		15-22.5-30-45-60	
Electric Heat Control Module				**TAEHK10/15**	**TAEHK10/15**	**TAEHK10/15**	**TAEHK10/15**
Unit Fuse Block (3 phase)	**With** Power Exhaust Fans	2 hp (1.5 kW)	208/230V	**56K93**	**56K94**	**56K94**	**56K95**
			460V	**56K52**	**25K08**	**25K08**	**25K09**
			575V	**56K51**	**56K51**	**56K51**	**25K08**
		3 hp (2.2 kW)	208/230V	**56K93**	**56K94**	**56K94**	**56K95** **150-3 units 56K96**
			460V	**56K52**	**25K08**	**25K08**	**25K09**
			575V	**56K51**	**56K52**	**56K52**	**25K08**
		5 hp (3.7 kW)	208/230V	**56K95**	**56K95**	**56K95**	**56K96**
			460V	**25K08**	**25K09**	**25K09**	**25K10**
			575V	**56K52**	**56K52**	**56K52**	**25K08**
	Without Power Exhaust Fans	2 hp (1.5 kW)	208/230V	**56K93**	**56K94**	**56K94**	**56K95**
			460V	**56K52**	**56K52**	**25K08**	**25K09**
			575V	**56K51**	**56K51**	**56K51**	**56K52** **150-3 units**
		3 hp (2.2 kW)	208/230V	**56K93**	**56K94**	**56K94**	**56K95** **150-3 units**
			460V	**56K52**	**25K08**	**25K08**	**25K09**
			575V	**56K51**	**56K51**	**56K52**	**25K08**
		5 hp (3.7 kW)	208/230V	**56K94**	**56K95**	**56K95**	**56K96**
			460V	**25K08**	**25K08**	**25K08**	**25K09** **150-3 units**
			575V	**56K52**	**56K52**	**56K52**	**25K08**

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)**											
LTB2 Terminal Block	**7.5 kW**	All hp	208/230V	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
	15 kW	All hp	208/230V	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
	22.5 kW	All hp	208/230V	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
	30 kW	All hp	208/230V	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
	45 kW	All hp	208/230V	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75** **150-3** **30K76**	**30K75** **150-3** **30K76**
	60 kW	All hp	208/230V	- - -	- - -	- - -	- - -	**30K76**	**30K76**	**30K76**	**30K76**

NOTE - All 460v and 575v models use 30K75 terminal block.
NOTE - Terminal Block is factory installed in units with factory installed electric heat without disconnect/circuit breaker but with single point power source.

SPECIFICATIONS

General Data		Nominal Tonnage	7.5 Ton	8.5 Ton	10 Ton
		Model No.	THA090S2B	THA102S2B	THA120S2B
		Efficiency Type	Standard	Standard	Standard
Cooling Performance		Gross Cooling Capacity - Btuh (kW)	93,000 (27.2)	104,000 (30.5)	126,000 (36.6)
		[1]Net Cooling Capacity - Btuh (kW)	89,000 (26.1)	100,000 (29.3)	118,000 (34.6)
		ARI Rated Airflow - cfm (L/s)	3000 (1415)	3500 (1650)	4200 (1980)
		Total Unit Power (kW)	8.8	9.9	11.8
		[1] EER (Btuh/Watt)	10.1	10.1	10.1
		[2] Integrated Part Load Value (Btuh/Watt)	10.5	10.5	10.5
	Refrigerant Charge Furnished (HCFC-22)	Circuit 1	12 lbs. 0 oz. (5.44 kg)	11 lbs. 0 oz. (4.99 kg)	12 lbs. 8 oz. (5.67 kg)
		Circuit 2	10 lbs. 10 oz. (4.82 kg)	11 lbs. 0 oz. (4.99 kg)	12 lbs. 8 oz. (5.67 kg)
[3] Sound Rating Number (dB)			88	88	88
Heating Performance		[1] Total High Heating Capacity - Btuh (kW)	90,000 (26.4)	102,000 (29.9)	120,000 (35.2)
		Total Unit Power (kW)	8.3	9.3	11.0
		[1] C.O.P.	3.2	3.2	3.2
		[1] Total Low Heating Capacity - Btuh (kW)	52,000 (15.2)	56,000 (16.4)	72,000 (21.1)
		Total Unit Power (kW)	7.1	7.5	9.5
		[1] C.O.P.	2.2	2.2	2.2
Compressor - Number & Type			(2) Scroll	(2) Scroll	(2) Scroll
Outdoor Coil		Net face area - sq. ft. (m^2)	29.3 (2.72) total	29.3 (2.72) total	29.3 (2.72) total
		Tube diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
		Number of rows	2	2	2
		Fins per inch (m)	20 (787)	20 (787)	20 (787)
Outdoor Coil Fans		Motor horsepower (W)	(2) 1/3 (249)	(2) 1/3 (249)	(2) 1/3 (249)
		Motor rpm	1075	1075	1075
		Total Motor watts	700	700	700
		Diameter - in. (mm) - no. of blades	(2) 24 (610) - 3	(2) 24 (610) - 3	(2) 24 (610) - 3
		Total air volume - cfm (L/s)	8,000 (3775)	8,000 (3775)	8,000 (3775)
Indoor Coil		Net face area - sq. ft. (m^2)	10.5 (0.98) total	10.5 (0.98) total	10.5 (0.98) total
		Tube diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
		Number of rows	3	3	4
		Fins per inch (m)	14 (551)	14 (551)	14 (551)
		Drain Connection - no. & size	(1) 1 in. NPT coupling	(1) 1 in. NPT coupling	(1) 1 in. NPT coupling
		Expansion device type	Balanced Port Thermostatic Expansion Valve, removeable power head		
Standard Indoor Blower and Drive		[4] Belt Drive - Nominal motor output	2 hp (1.5 kW)	2 hp (1.5 kW)	3 hp (2.2 kW)
		Maximum usable output (US Only)	2.3 hp (1.7 kW)	2.3 hp (1.7 kW)	3.45 hp (2.6 kW)
		Drive kit	kit #1 680 - 925 rpm	kit #1 680 - 925 rpm	kit #3 895 - 1120 rpm
		Wheel nominal diameter x width - in. (mm)	(1) 15 x 15 (381 x 381)	(1) 15 x 15 (381 x 381)	(1) 15 x 15 (381 x 381)
Filters		Type of filter	Disposable, pleated MERV 7 (standard) or MERV 11 (optional)		
		Number and size - in. (mm)	(4) 18 x 24 x 2 (457 x 610 x 51)	(4) 18 x 24 x 2 (457 x 610 x 51)	(4) 18 x 24 x 2 (457 x 610 x 51)
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase		

NOTE - Net capacity includes evaporator blower motor heat deduction. Gross capacity does not include evaporator blower motor heat deduction.

[1] Certified in accordance with the ULE certification program, which is based on ARI Standard 340/360.
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.

[2] Integrated Part Load Value rated at 80°F (27°C) outdoor air temperature, 80°F (27°C) db/67°F (19°C) wb indoor air temperature.

[3] Sound Rating Number rated in accordance with test conditions included in ARI Standard 270.

[4] 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.

SPECIFICATIONS

General Data		Nominal Tonnage	**12.5 Ton**	**12.5 Ton**
		Model No.	**THA150S2B**	**THA150S2B-3**
		Efficiency Type	**Standard**	**Standard**
Cooling Performance		Gross Cooling Capacity - Btuh (kW)	144,000 (42.2)	145,000 (42.6)
		[1]Net Cooling Capacity - Btuh (kW)	138,000 (40.4)	138,000 (40.4)
		ARI Rated Airflow - cfm (L/s)	4400 (2075)	4400 (2075)
		Total Unit Power (kW)	14.8	14.8
		[1] EER (Btuh/Watt)	9.3	9.3
		[2] Integrated Part Load Value (Btuh/Watt)	9.7	10.5
	Refrigerant Charge Furnished (HCFC-22)	Circuit 1	12 lbs. 0 oz. (5.44 kg)	11 lbs. 8 oz. (5.2 kg)
		Circuit 2	12 lbs. 0 oz. (5.44 kg)	11 lbs. 8 oz. (5.2 kg)
[3] Sound Rating Number (dB)			88	88
Heating Performance		[1] Total High Heating Capacity - Btuh (kW)	140,000 (41.0)	136,000 (39.9)
		Total Unit Power (kW)	13.2	12.9
		[1] C.O.P.	3.1	3.1
		[1] Total Low Heating Capacity - Btuh (kW)	80,000 (23.4)	80,000 (23.4)
		Total Unit Power (kW)	11.7	11.7
		[1] C.O.P.	2.0	2.0
Compressor - Number & Type			(2) Scroll	(2) Scroll
Outdoor Coil		Net face area - sq. ft. (m^2)	29.3 (2.72) total	29.3 (2.72) total
		Tube diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)
		Number of rows	2	2
		Fins per inch (m)	20 (787)	20 (787)
Outdoor Coil Fans		Motor horsepower (W)	(2) 1/3 (249)	(2) 1/2 (373)
		Motor rpm	1075	1075
		Total Motor watts	700	700
		Diameter - in. (mm) - no. of blades	(2) 24 (610) - 3	(2) 24 (610) - 3
		Total air volume - cfm (L/s)	8,000 (3775)	10,000 (4719)
Indoor Coil		Net face area - sq. ft. (m^2)	10.5 (0.98) total	10.5 (0.98) total
		Tube diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)
		Number of rows	4	4
		Fins per inch (m)	14 (551)	14 (551)
		Drain Connection - no. & size	(1) 1 in. NPT coupling	(1) 1 in. NPT coupling
		Expansion device type	Balanced Port Thermostatic Expansion Valve, removeable power head	Balanced Port Thermostatic Expansion Valve, removeable power head
Standard Indoor Blower and Drive		[4] Belt Drive - Nominal motor output	5 hp (3.7 kW)	5 hp (3.7 kW)
		Maximum usable output (US Only)	5.75 hp (4.3 kW)	5.75 hp (4.3 kW)
		Drive kit	kit #6 1100 - 1395 rpm	kit #6 1100 - 1395 rpm
		Wheel nominal diameter x width - in. (mm)	(1) 15 x 15 (381 x 381)	(1) 15 x 15 (381 x 381)
Filters		Type of filter	Disposable, pleated MERV 7 (standard) or MERV 11 (optional)	Disposable, pleated MERV 7 (standard) or MERV 11 (optional)
		Number and size - in. (mm)	(4) 18 x 24 x 2 (457 x 610 x 51)	(4) 18 x 24 x 2 (457 x 610 x 51)
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase	208/230V, 460V or 575V - 60 hertz - 3 phase

NOTE - Net capacity includes evaporator blower motor heat deduction. Gross capacity does not include evaporator blower motor heat deduction.

[1] Certified in accordance with the ULE certification program, which is based on ARI Standard 340/360.
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.

[2] Integrated Part Load Value rated at 80°F (27°C) outdoor air temperature, 80°F (27°C) db/67°F (19°C) wb indoor air temperature.

[3] Sound Rating Number rated in accordance with test conditions included in ARI Standard 270.

[4] 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.

BELT DRIVE BLOWER - BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND 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 below for blower motors and drives.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

3000 cfm (1415 L/s) minimum air with electric heat for THA090/102 models.
4000 cfm (1890 L/s) minimum air with electric heat for THA120/150 models.

BOLD INDICATES FIELD FURNISHED DRIVE.

Air Volume cfm (L/s)	Total Static Pressure - in. w.g. (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)
2250 (1060)	**455**	**0.30 (0.22)**	**555**	**0.45 (0.34)**	**640**	**0.60 (0.45)**	720	0.80 (0.60)	790	1.00 (0.75)	855	1.20 (0.90)	915	1.40 (1.04)	975	1.60 (1.19)	1030	1.85 (1.38)	1080	2.05 (1.53)	1130	2.30 (1.72)	1175	2.55 (1.90)	1220	2.80 (2.09)
2500 (1180)	**475**	**0.40 (0.30)**	**575**	**0.55 (0.41)**	**660**	**0.70 (0.52)**	735	0.90 (0.67)	805	1.10 (0.82)	870	1.30 (0.97)	930	1.55 (1.16)	985	1.75 (1.31)	1040	2.00 (1.49)	1090	2.25 (1.68)	1140	2.50 (1.87)	1185	2.75 (2.05)	1230	3.00 (2.24)
2750 (1300)	**495**	**0.45 (0.34)**	**595**	**0.65 (0.48)**	**675**	**0.85 (0.63)**	750	1.05 (0.78)	820	1.25 (0.93)	885	1.45 (1.08)	940	1.70 (1.27)	995	1.90 (1.42)	1050	2.20 (1.64)	1100	2.45 (1.83)	1145	2.65 (1.98)	1195	2.95 (2.20)	1240	3.25 (2.42)
3000 (1415)	**525**	**0.55 (0.41)**	**615**	**0.75 (0.56)**	695	0.95 (0.71)	770	1.20 (0.90)	835	1.40 (1.04)	895	1.60 (1.19)	955	1.85 (1.38)	1010	2.10 (1.57)	1060	2.35 (1.75)	1110	2.65 (1.98)	1160	2.90 (2.16)	1205	3.20 (2.39)	1250	3.45 (2.57)
3250 (1535)	**550**	**0.65 (0.48)**	**640**	**0.90 (0.67)**	715	1.10 (0.82)	790	1.35 (1.01)	855	1.60 (1.19)	915	1.80 (1.34)	970	2.05 (1.53)	1025	2.35 (1.75)	1075	2.60 (1.94)	1125	2.85 (2.13)	1170	3.15 (2.35)	1215	3.40 (2.54)	1260	3.70 (2.76)
3500 (1650)	**580**	**0.80 (0.60)**	**665**	**1.05 (0.78)**	740	1.25 (0.93)	810	1.50 (1.12)	870	1.75 (1.31)	930	2.00 (1.49)	985	2.25 (1.68)	1040	2.55 (1.90)	1090	2.85 (2.13)	1135	3.10 (2.31)	1185	3.40 (2.54)	1230	3.70 (2.76)	1270	4.00 (2.98)
3750 (1770)	**605**	**0.95 (0.71)**	690	1.20 (0.90)	760	1.45 (1.08)	830	1.70 (1.27)	890	1.95 (1.45)	950	2.25 (1.68)	1005	2.50 (1.87)	1055	2.80 (2.09)	1105	3.10 (2.31)	1150	3.35 (2.50)	1195	3.65 (2.72)	1240	3.95 (2.95)	1285	4.30 (3.21)
4000 (1890)	**635**	**1.10 (0.82)**	715	1.40 (1.04)	785	1.65 (1.23)	850	1.90 (1.42)	910	2.20 (1.64)	965	2.45 (1.83)	1020	2.75 (2.05)	1070	3.05 (2.28)	1120	3.35 (2.50)	1165	3.65 (2.72)	1210	3.95 (2.95)	1255	4.30 (3.21)	1295	4.60 (3.43)
4250 (2005)	**665**	**1.30 (0.97)**	740	1.60 (1.19)	810	1.85 (1.38)	870	2.15 (1.60)	930	2.45 (1.83)	985	2.75 (2.05)	1040	3.05 (2.28)	1090	3.35 (2.50)	1135	3.65 (2.72)	1185	4.00 (2.98)	1225	4.30 (3.21)	1270	4.65 (3.47)	1310	4.95 (3.69)
4500 (2125)	695	1.50 (1.12)	770	1.80 (1.34)	835	2.10 (1.57)	895	2.40 (1.79)	955	2.70 (2.01)	1005	3.00 (2.24)	1060	3.35 (2.50)	1105	3.65 (2.72)	1155	4.00 (2.98)	1200	4.30 (3.21)	1245	4.65 (3.47)	1285	5.00 (3.73)	1325	5.30 (3.95)
4750 (2240)	725	1.75 (1.31)	795	2.05 (1.53)	860	2.40 (1.79)	920	2.70 (2.01)	975	3.00 (2.24)	1030	3.35 (2.50)	1080	3.65 (2.72)	1125	3.95 (2.95)	1175	4.35 (3.25)	1215	4.65 (3.47)	1260	5.00 (3.73)	1300	5.35 (3.99)	1340	5.70 (4.25)
5000 (2360)	760	2.05 (1.53)	825	2.35 (1.75)	885	2.65 (1.98)	945	3.00 (2.24)	1000	3.35 (2.50)	1050	3.65 (2.72)	1100	4.00 (2.98)	1145	4.35 (3.25)	1190	4.70 (3.51)	1235	5.05 (3.77)	1280	5.45 (4.07)	- - -		- - -	
5250 (2475)	790	2.30 (1.72)	855	2.65 (1.98)	910	2.95 (2.20)	970	3.35 (2.50)	1020	3.65 (2.72)	1070	4.00 (2.98)	1120	4.35 (3.25)	1165	4.70 (3.51)	1210	5.10 (3.80)	1255	5.45 (4.07)	- - -		- - -		- - -	
5500 (2595)	820	2.60 (1.94)	880	2.95 (2.20)	940	3.30 (2.46)	995	3.70 (2.76)	1045	4.05 (3.02)	1095	4.40 (3.28)	1145	4.80 (3.58)	1190	5.15 (3.84)	1230	5.50 (4.10)	- - -		- - -		- - -		- - -	
5750 (2715)	850	2.95 (2.20)	910	3.30 (2.46)	965	3.70 (2.76)	1020	4.05 (3.02)	1070	4.45 (3.32)	1120	4.80 (3.58)	1165	5.20 (3.88)	1210	5.60 (4.18)	- - -		- - -		- - -		- - -		- - -	
6000 (2830)	885	3.35 (2.50)	940	3.70 (2.76)	995	4.10 (3.06)	1045	4.45 (3.32)	1095	4.85 (3.62)	1145	5.25 (3.92)	1190	5.65 (4.21)	- - -		- - -		- - -		- - -		- - -		- - -	

FACTORY INSTALLED DRIVE KIT SPECIFICATIONS

Motor Outputs				RPM Range				
Nominal hp	Maximum hp	Nominal kW	Maximum kW	Drive 1	Drive 3	Drive 4	Drive 5	Drive 6
2	2.3	1.5	1.7	680 - 925	895 - 1120	- - -	- - -	- - -
3	3.45	2.2	2.6	680 - 925	895 - 1120	- - -	1110 - 1395	- - -
5	5.75	3.7	4.3	- - -	- - -	895 - 1120	- - -	1110 - 1395

NOTE - 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.

BLOWER DATA

ACCESSORY AIR RESISTANCE

Air Volume		Wet Indoor Coil 090/102		Wet Indoor Coil 120/150		Electric Heat		Economizer		MERV 11 Filter	
cfm	L/s	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa
2250	1060	.06	15	.10	25	.01	2	.035	9	.01	2
2500	1180	.08	20	.12	30	.01	2	.04	10	.01	2
2750	1325	.09	22	.14	35	.01	2	.045	11	.02	5
3000	1420	.10	25	.16	40	.02	5	.05	12	.02	5
3250	1535	.11	27	.19	47	.02	5	.06	15	.02	5
3500	1650	.13	32	.21	52	.03	7	.07	17	.03	7
3750	1770	.14	35	.23	57	.03	7	.075	19	.03	7
4000	1890	.16	40	.26	65	.04	10	.08	20	.04	10
4250	2005	.17	42	.28	70	.04	10	.09	22	.04	10
4500	2125	.18	45	.31	77	.05	12	.10	25	.04	10
4750	2240	.20	50	.33	82	.05	12	.11	27	.05	12
5000	2360	.22	55	.36	90	.06	15	.12	30	.06	15
5250	2475	.24	60	.39	97	.06	15	.13	32	.06	15
5500	2595	.26	65	.42	104	.07	17	.14	35	.07	17
5750	2715	.28	70	.45	112	.07	17	.15	37	.07	17
6000	2830	.30	75	.48	119	.08	20	.16	40	.08	20

AIR RESISTANCE - CEILING DIFFUSERS

Unit Size	Air Volume		RTD11 Step-Down Diffuser 2 Ends Open		RTD11 Step-Down Diffuser 1 Side, 2 Ends Open		RTD11 Step-Down Diffuser All Ends & Sides Open		FD11 Flush Diffuser	
	cfm	L/s	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa	in. w.g.	Pa
090 Models	2400	1135	0.21	52	0.18	45	0.15	37	0.14	35
	2600	1225	0.24	60	0.21	52	0.18	45	0.17	42
	2800	1320	0.27	67	0.24	60	0.21	52	0.20	50
	3000	1415	0.32	80	0.29	72	0.25	62	0.25	62
	3200	1510	0.41	102	0.37	92	0.32	80	0.31	77
	3400	1605	0.50	124	0.45	112	0.39	97	0.37	92
	3600	1700	0.61	152	0.54	134	0.48	119	0.44	109
	3800	1795	0.73	182	0.63	157	0.57	142	0.51	127
102 & 120 Models	3600	1700	0.36	90	0.28	70	0.23	57	0.15	37
	3800	1795	0.40	99	0.32	80	0.26	65	0.18	45
	4000	1890	0.44	109	0.36	90	0.29	72	0.21	52
	4200	1980	0.49	122	0.40	99	0.33	82	0.24	60
	4400	2075	0.54	134	0.44	109	0.37	92	0.27	67
	4600	2170	0.60	149	0.49	122	0.42	104	0.31	77
	4800	2265	0.65	162	0.53	132	0.46	114	0.35	87
	5000	2360	0.69	172	0.58	144	0.50	124	0.39	97
	5200	2455	0.75	186	0.62	154	0.54	134	0.43	107
150 Models	4200	1980	0.22	55	0.19	47	0.16	40	0.10	25
	4400	2075	0.28	70	0.24	60	0.20	50	0.12	30
	4600	2170	0.34	85	0.29	72	0.24	60	0.15	37
	4800	2265	0.40	99	0.34	85	0.29	72	0.19	47
	5000	2360	0.46	114	0.39	97	0.34	85	0.23	57
	5200	2455	0.52	129	0.44	109	0.39	97	0.27	67
	5400	2550	0.58	144	0.49	122	0.43	107	0.31	77
	5600	2645	0.64	159	0.54	134	0.47	117	0.35	87
	5800	2735	0.70	174	0.59	147	0.51	127	0.39	97

BLOWER DATA

CEILING DIFFUSER AIR THROW DATA

Model No.	Air Volume		[1]Effective Throw Range			
			RTD11 Step-Down		FD11 Flush	
	cfm	L/s	ft.	m	ft.	m
090	2600	1225	24 - 29	7 - 9	19 - 24	6 - 7
	2800	1320	25 - 30	8 - 9	20 - 28	6 - 9
	3000	1415	27 - 33	8 - 10	21 - 29	6 - 9
	3200	1510	28 - 35	9 - 11	22 - 29	7 - 9
	3400	1605	30 - 37	9 - 11	22 - 30	7 - 9
102 120	3600	1700	25 - 33	8 - 10	22 - 29	7 - 9
	3800	1795	27 - 35	8 - 11	22 - 30	7 - 9
	4000	1885	29- 37	9 - 11	24 - 33	7 - 10
	4200	1980	32 - 40	10 - 12	26 - 35	8 - 11
	4400	2075	34 - 42	10 - 13	28 - 37	9 - 11
150	5600	2645	39 - 49	12 - 15	28 - 37	9 - 11
	5800	2740	42 - 51	13 - 16	29 - 38	9 - 12
	6000	2830	44 - 54	13 - 17	40 - 50	12 - 15
	6200	2925	45 - 55	14 - 17	42 - 51	13 - 16
	6400	3020	46 - 55	14 - 17	43 - 52	13 - 16
	6600	3115	47 - 56	14 - 17	45 - 56	14 - 17

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

POWER EXHAUST FANS PERFORMANCE

Return Air System Static Pressure		Air Volume Exhausted	
in. w.g.	Pa	cfm	L/s
0	0	4200	1980
0.05	12	3970	1875
0.10	25	3750	1770
0.15	37	3520	1660
0.20	50	3300	1560
0.25	62	3080	1455
0.30	75	2860	1350
0.35	87	2640	1245

ELECTRICAL DATA

7.5 AND 8.5 TON STANDARD EFFICIENCY

Model No.		THA090S						THA102S					
Line voltage data - 60 Hz - 3 phase		208/230V		460V		575V		208/230V		460V		575V	
Compressors (2)	Rated load amps - each (total)	12.4 (24.8)		6.4 (12.8)		4.8 (9.6)		14.7 (29.4)		7.1 (14.2)		5.1 (10.2)	
	Locked rotor amps - each (total)	88 (176)		44 (88)		34 (68)		91 (182)		50 (100)		37 (74)	
Condenser Fan MotorS (2)	Full load amps - each (total)	2.4 (4.8)		1.3 (2.6)		1.0 (2.0)		2.4 (4.8)		1.3 (2.6)		1.0 (2.0)	
	Locked rotor amps - each (total)	4.7 (9.4)		2.4 (4.8)		1.9 (3.8)		4.7 (9.4)		2.4 (4.8)		1.9 (3.8)	
Evaporator Blower Motor	Motor Output - hp	2	3	2	3	2	3	2	3	2	3	2	3
	kW	1.5	2.2	1.5	2.2	1.5	2.2	1.5	2.2	1.5	2.2	1.5	2.2
	Full load amps	7.5	10.6	3.4	4.8	2.7	3.9	7.5	10.6	3.4	4.8	2.7	3.9
	Locked rotor amps	46.9	66	20.4	26.8	16.2	23.4	46.9	66	20.4	26.8	16.2	23.4
[1] Maximum Overcurrent Protection (amps)	With Exhaust Fan	50	50	25	25	20	20	60	60	30	30	20	20
	Less Exhaust Fan	50	50	25	25	20	20	60	60	25	30	20	20
[2] Minimum Circuit Ampacity	With Exhaust Fan	43	46	22	24	17	18	48	51	24	25	18	19
	Less Exhaust Fan	41	44	21	22	16	17	46	49	22	24	17	18
Optional Power Exhaust Fan	(Number) Horsepower (W)	(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)	
	Full load amps	2.4		1.3		1.0		2.4		1.3		1.0	
	Locked rotor amps	4.7		2.4		1.9		4.7		2.4		1.9	

10 TON STANDARD EFFICIENCY

Model No.		THA120S								
Line voltage data - 60 Hz - 3 phase		208/230V			460V			575V		
Compressors (2)	Rated load amps - each (total)	17.3 (34.6)			9.0 (18.0)			7.1 (14.2)		
	Locked rotor amps - each (total)	123 (246)			62 (124)			50 (100)		
Condenser Fan Motors (2)	Full load amps - each (total)	2.4 (4.8)			1.3 (2.6)			1.0 (2.0)		
	Locked rotor amps - each (total)	4.7 (9.4)			2.4 (4.8)			1.9 (3.8)		
Evaporator Blower Motor	Motor Output - hp	2	3	5	2	3	5	2	3	5
	kW	1.5	2.2	3.7	1.5	2.2	3.7	1.5	2.2	3.7
	Full load amps	7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
	Locked rotor amps	46.9	66	105	20.4	26.8	45.6	16.2	23.4	36.6
[1] Maximum Overcurrent Protection (amps)	With Exhaust Fan	70	70	80	35	35	40	25	25	30
	Less Exhaust Fan	60	70	70	35	35	35	25	25	30
[2] Minimum Circuit Ampacity	With Exhaust Fan	54	57	63	28	29	32	22	23	26
	Less Exhaust Fan	52	55	61	27	28	31	21	22	25
Optional Power Exhaust Fan	(Number) Horsepower (W)	(1) 1/3 (249)			(1) 1/3 (249)			(1) 1/3 (249)		
	Full load amps	2.4			1.3			1.0		
	Locked rotor amps	4.7			2.4			1.9		

NOTE - Extremes of operating range are plus and minus 10 % of line voltage.
1 HACR type breaker or fuse.
2 Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

12.5 TON STANDARD EFFICIENCY

Model No.		THA150S						THA150S–3					
Line voltage data - 60 Hz - 3 phase		208/230V		460V		575V		208/230V		460V		575V	
Compressors (2)	Rated load amps - each (total)	19.3 (38.6)		9.0 (18.0)		7.4 (14.8)		19.6 (39.2)		9.5 (19.0)		7.8 (15.6)	
	Locked rotor amps - each (total)	156 (312)		75 (150)		54 (108)		156 (312)		75 (150)		54 (108)	
Condenser Fan Motors (2)	Full load amps - each (total)	2.4 (4.8)		1.3 (2.6)		1.0 (2.0)		3.0 (6.0)		1.5 (3.0)		1.2 (2.4)	
	Locked rotor amps - each (total)	4.7 (9.4)		2.4 (4.8)		1.9 (3.8)		6.0 (12.0)		3.0 (6.0)		2.9 (5.8)	
Evaporator Blower Motor	Motor Output - hp	3	5	3	5	3	5	3	5	3	5	3	5
	kW	2.2	3.7	2.2	3.7	2.2	3.7	2.2	3.7	2.2	3.7	2.2	3.7
	Full load amps	10.6	16.7	4.8	7.6	3.9	6.1	10.6	16.7	4.8	7.6	3.9	6.1
	Locked rotor amps	66	105	26.8	45.6	23.4	36.6	66	105	26.8	45.6	23.4	36.6
[1] Maximum Overcurrent Protection (amps)	With Exhaust Fan	80	80	35	40	30	30	80	80	35	40	30	30
	Less Exhaust Fan	70	80	35	35	25	30	80	80	35	40	30	30
[2] Minimum Circuit Ampacity	With Exhaust Fan	62	68	29	32	24	26	64	70	31	34	25	28
	Less Exhaust Fan	59	65	28	31	23	25	61	67	30	32	24	27
Optional Power Exhaust Fan	(Number) Horsepower (W)	(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)		(1) 1/3 (249)	
	Full load amps	2.4		1.3		1.0		2.4		1.3		1.0	
	Locked rotor amps	4.7		2.4		1.9		4.7		2.4		1.9	

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

1 HACR type breaker or fuse.

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

THA PARTS ARRANGEMENT

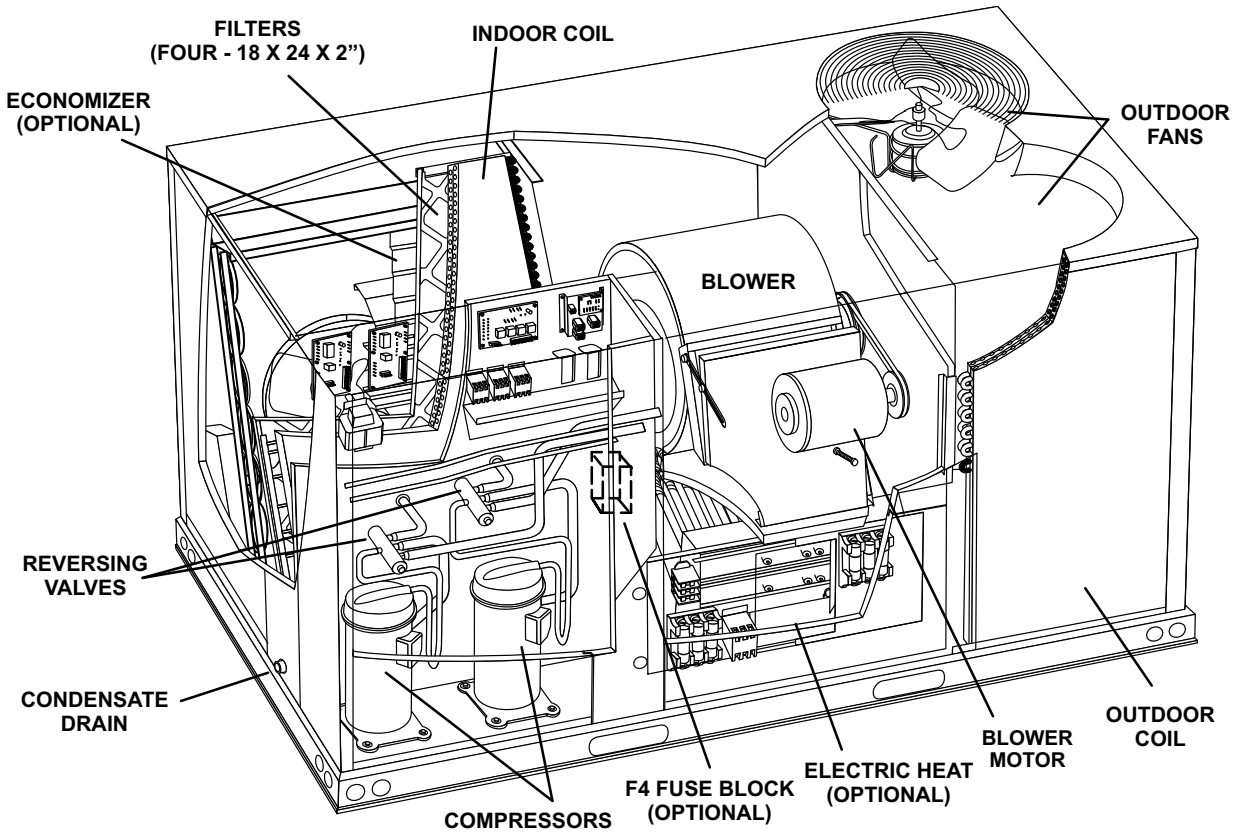


FIGURE 1

THA090/102/120/150 CONTROL BOX

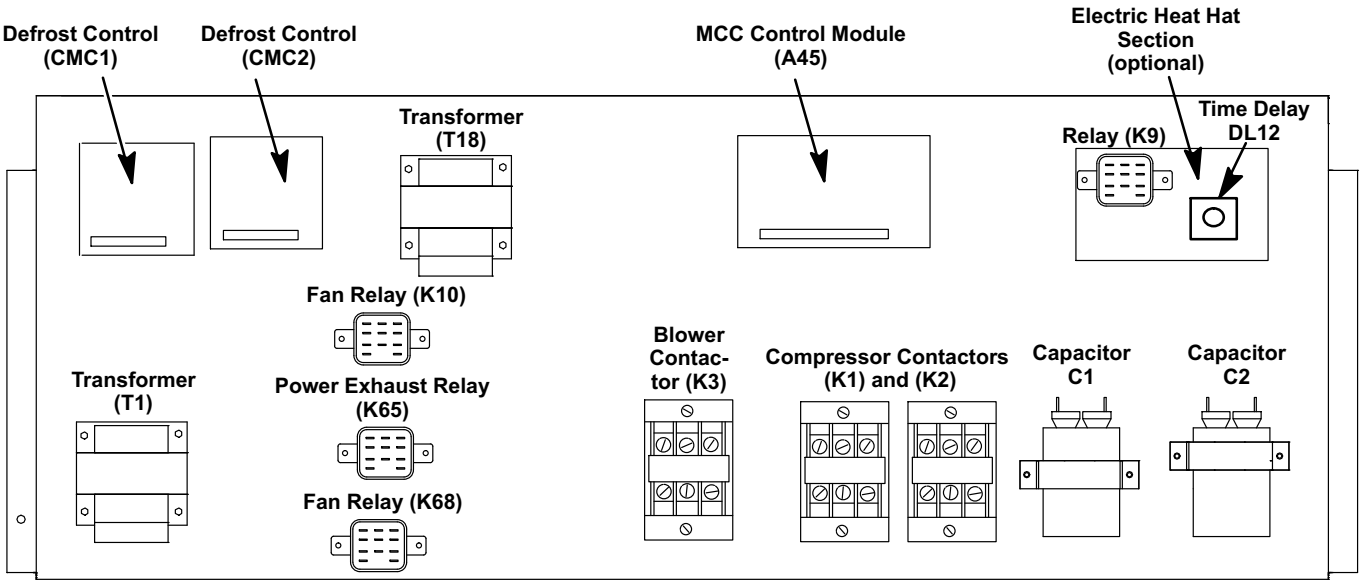


FIGURE 2

I-UNIT COMPONENTS

The THA unit parts arrangement are shown in figure 1. All L1, L2, and L3 wiring is color coded; L1 is red, L2 is yellow, and L3 is blue. See wiring diagrams in the back of this manual for complete call out of components per THA unit.

A-Control Box Components

THA control box components are shown in figure 2. The control box is located in the upper p$\sqrt{a^2}$ortion of the compressor compartment.

1-Disconnect Switch S48 (field installed)

THA units may be equipped with an optional disconnect switch S48. S48 is a toggle switch, which can be used by the service technician to disconnect power to the unit.

2-Transformer T1

All THA 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 3, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

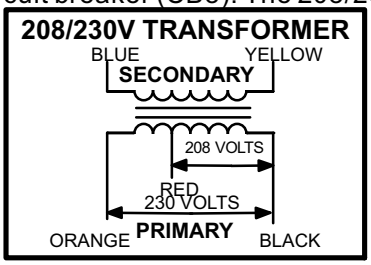


FIGURE 3

3-Transformer T18

T18 is a single line voltage to 24VAC transformer used in all THA units. T18 is identical to T1 and is protected by a 3.5 amp circuit breaker (CB18). T18 provides 24VAC to CMC1, CMC2 and reversing valves L1 and L2.

4-Terminal Strip TB14

Terminal strip TB14 is located on MCC A45. TB14 distributes 24 volts from the thermostat to the control box components. Units not equipped with smoke detectors A17 or A64 will have a factory installed jumper across terminals 24VAC and R.

5-Outdoor Fan Capacitor C1 and C2

Fan capacitors C1 and C2 are 370V/10MF capacitors used to assist in the start up of condenser fan motors B4 and B5. Capacitor ratings will be on outdoor fan motor nameplate.

6-Compressor Contactor K1 & K2

All compressor contactors are three-pole-double-break contactors with a 24VAC coil. In all THA units, K1and K2 energize compressors B1 and B2 respectively in response to first or second stage cooling demands.

7-Blower Contactor K3

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 MCC A45.

8-Outdoor Fan Relay K10 and K68

Outdoor fan relay K10 and K68 are DPDT relays with a 24VAC coil. K10 and K68 (energized by A45), energizes condenser fan motors B4 and B5 in response to a heating or cooling demand. In all THA units, K10 energizes condenser fan B4 in response to Y1 demand and K68 energizes B5 in response to Y2 demand.

9-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 THA units equipped with the optional power exhaust dampers. K65 is energized by the economizer control panel (A6), after the economizer dampers reach 50% open (adjustable on control A6). When K65 closes, the exhaust fan B10 is energized.

10-MCC Control A45

The main control module A45 (figure 5) is the heart of the system. It controls all cooling and heating operation and serves as a staging point for all internal inputs to the appropriate components of the THA unit. The MCC control receives and sends out 24 volts to the components located in the THA control box, economizer and supply/return compartments. Relays KA and KB located on the board, correspond to compressors contactors K1 and K2. Relay KC corresponds to reversing valve solenoids L1 and L2 and relay KD corresponds to indoor blower contactor K3. Thermostat connections (TB1) and accessory low voltage connections (TB14) are located on the board. See tables 2 and 3 for terminal designations. Table s 4 through 7 show pin terminal designations.

Features

The MCC is equipped with a green LED for board status. See table 1 for LED flash codes. While in the cooling mode the board will incorporate AUTO-STAGING. If the board receives a Y3 demand (if applicable) the board will energize Y1, Y2 and Y3 in successive order. In the same manner a Y2, will be interpreted as a Y1/Y2. The MCC control also incorporates a minimum run time of 4 minutes for up to 3 independent cooling stages. This 4 minute run time can be interrupted by pushing SW1 located on the board. If pressed for 3 seconds or more, the control goes into TEST mode disabling AUTO-STAGING. The MCC control board is used for all T series units so a dip switch is provided for factory setting unit type (TGA, TCA, THA) See figure 4.

TABLE 1

LED Status	Indicates	Action
Off	No power to board.	Check field wiring.
On	Processor error.	Press MCC pushbutton and hold for three seconds to reset processor.*
Flashing Slowly	Normal.	None.
Flashing Rapidly	Invalid unit DIP switch selected.	Make sure switches are set correctly. Refer to figure 4.
Flashing Rapidly	Simultaneous heat and cool demands.	Check thermostat and wiring.

*Press pushbutton and immediately release to override the 4-minute compressor-minimum run time.

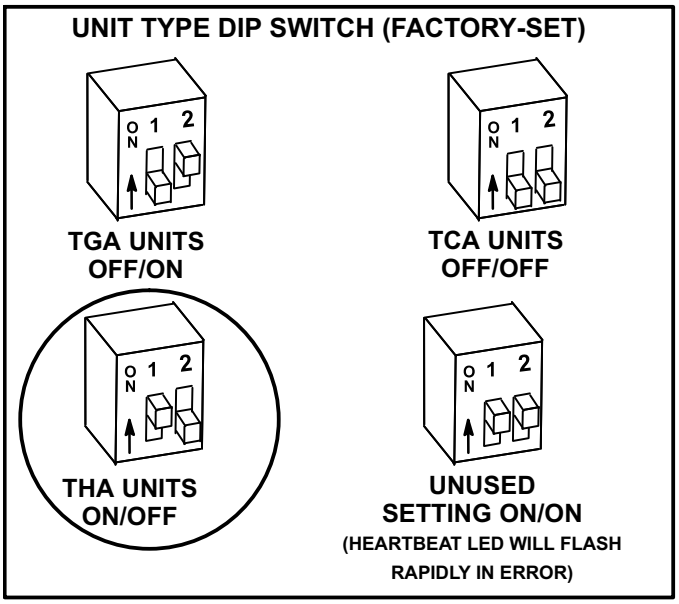


FIGURE 4

TABLE 2

TB1 TERMINAL DESIGNATIONS	
Y1	Cool Stage 1
Y2	Cool Stage 2
Y3	Cool Stage 3
Y4	Cool Stage 4
W1	Heat Stage 1
W2	Heat Stage 2 (Electric Heat)
A1	Occupied Loop
A2	Occupied Loop
G	Indoor Blower
R	24V To Thermostat
C	Ground
TEST	Test Terminal

TABLE 3

TB14 24VAC TERMINAL DESIGNATIONS	
24VAC	Uninterrupted 24 Volt Power
R	24 Volt Accessories (from T1 transformer)
T18	24 Volts Accessories (from T18 transformer)
C	Ground

TABLE 4

P142 TERMINAL DESIGNATIONS	
Terminal	Function
Y2	To Economizer
Y2E	To Processor (micro chip)
Y1	To Economizer
Y1E	To Processor (micro chip)
24V	To Smoke Detector
24V	From T1 Transformer
A1	Occupied Loop from Thermostat
24V	To Economizer
GND	Ground to Economizer
24V	From Transformer T1
GND	Ground
24V	From Transformer T2
Y3	To Processor (micro chip)

TABLE 5

P113 TERMINAL DESIGNATIONS	
Terminal	Function
S49	Relay KC To Freeze Stat
S49	From Freeze Stat
K10	Relay KA To Outdoor Fan Contactor
K1	Freeze Stat to Compressor Contactor
S50	Relay KB To Freeze Stat
S50	From Freeze Stat
K2	Freeze Stat To Compressor Contactor
K3	KD To Blower Contactor
C	Ground To Cooling Components

TABLE 6

P118 TERMINAL DESIGNATIONS	
Terminal	Function
O - CMC1	Reversing Valve - Defrost Board
S53	N/A
O - CMC2	Reversing Valve - CMC2
K14	N/A
S95	N/A
S95	N/A
K146	N/A
T18	N/A
C	Common
C	Common
T18	24V from T18
C	Common

TABLE 7

P88 TERMINAL DESIGNATIONS	
Terminal	Function
R	24V
W1	Heat Stage
Y1	N/A
C	Ground
G	N/A
G	N/A
W2	Heat Stage

11-Electric Heat Relay K9

All THA series units with electric heat use an electric heat relay K9. K9 is a N.O. SPDT 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 A45. K9-1 closes, energizing timer DL2.

12-Time Delay DL2

DL2 is a factory installed solid state timer used in 22.5 to 60 kW electric heat units. DL2 allows staging by providing a timed-interval between the first and second heating elements. When the timer is energized, the contacts are delayed for 30 seconds before closing. When the timer is de-energized, the contacts are delayed 1 second before opening.

13-Defrost Control Boards CMC1 & CMC2

The defrost thermostat, defrost pressure switch and the defrost control work together to ensure that the heat pump outdoor coil does not ice excessively during the heating mode.

Compressor Accumulated Run-Time Interval

The defrost control will not energize a defrost cycle unless the unit has been operating in heating mode for an accumulated 60 minutes (default). The run time interval can be changed by moving the jumper on the CMC board timing pins. See figure 6.

The defrost interval can be adjusted to 30, 60, or 90 minutes. The defrost timing jumper is factory-installed to provide a 60-minute defrost interval. If the timing selector jumper is not in place, the control defaults to a 90-minute defrost interval.

Note - When adjusting timing pins, set both CMC1 and CMC2 defrost controls to the same defrost interval.

Defrost Test Option

A TEST option is provided for troubleshooting. The TEST mode may be started any time the unit is in the heating mode and the defrost thermostat is closed or jumpered**.** If the timing jumper is in the TEST position at power-up, the defrost control will ignore the test pins. When the jumper is placed across the TEST pins for two seconds, the control will enter the defrost mode. If the jumper is removed before an additional 5-second period has elapsed (7 seconds total), the unit will remain in defrost mode until the defrost pressure switch opens or 14 minutes have passed. If the jumper is not removed until after the additional 5-second period has elapsed, the defrost will terminate and the test option will not function again until the jumper is removed and re-applied.

Diagnostic LEDs

The defrost board uses two LEDs for diagnostics. The LEDs flash a sequence according to the condition.

TABLE 8

Defrost Control Board Diagnostic LED		
Indicates	**LED 1**	**LED 2**
Normal operation / power to board	Synchronized Flash with LED 2	Synchronized Flash with LED 1
Board failure / no power	Off	Off
Board failure	On	On
Pressure switch open	Flash	On

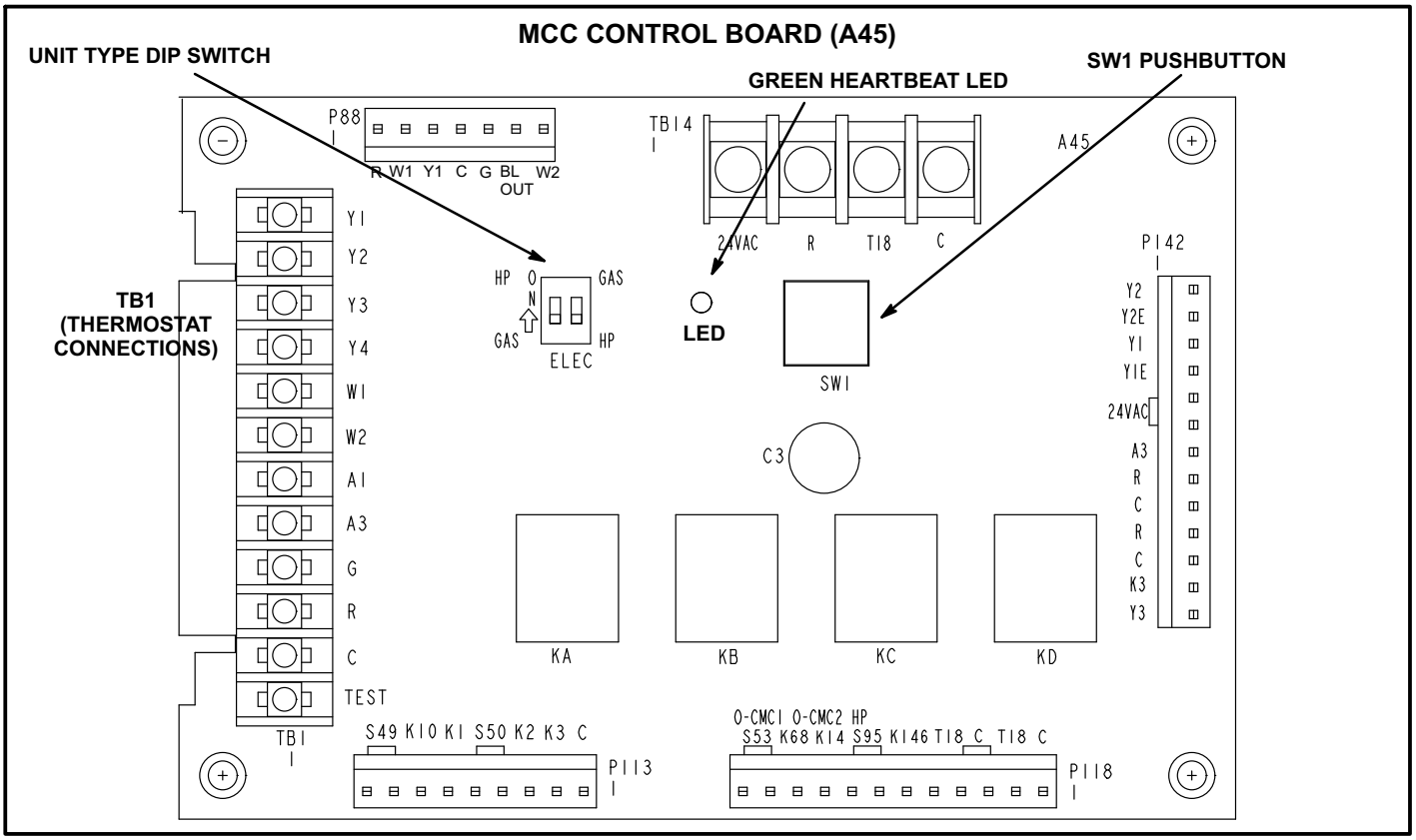


FIGURE 5

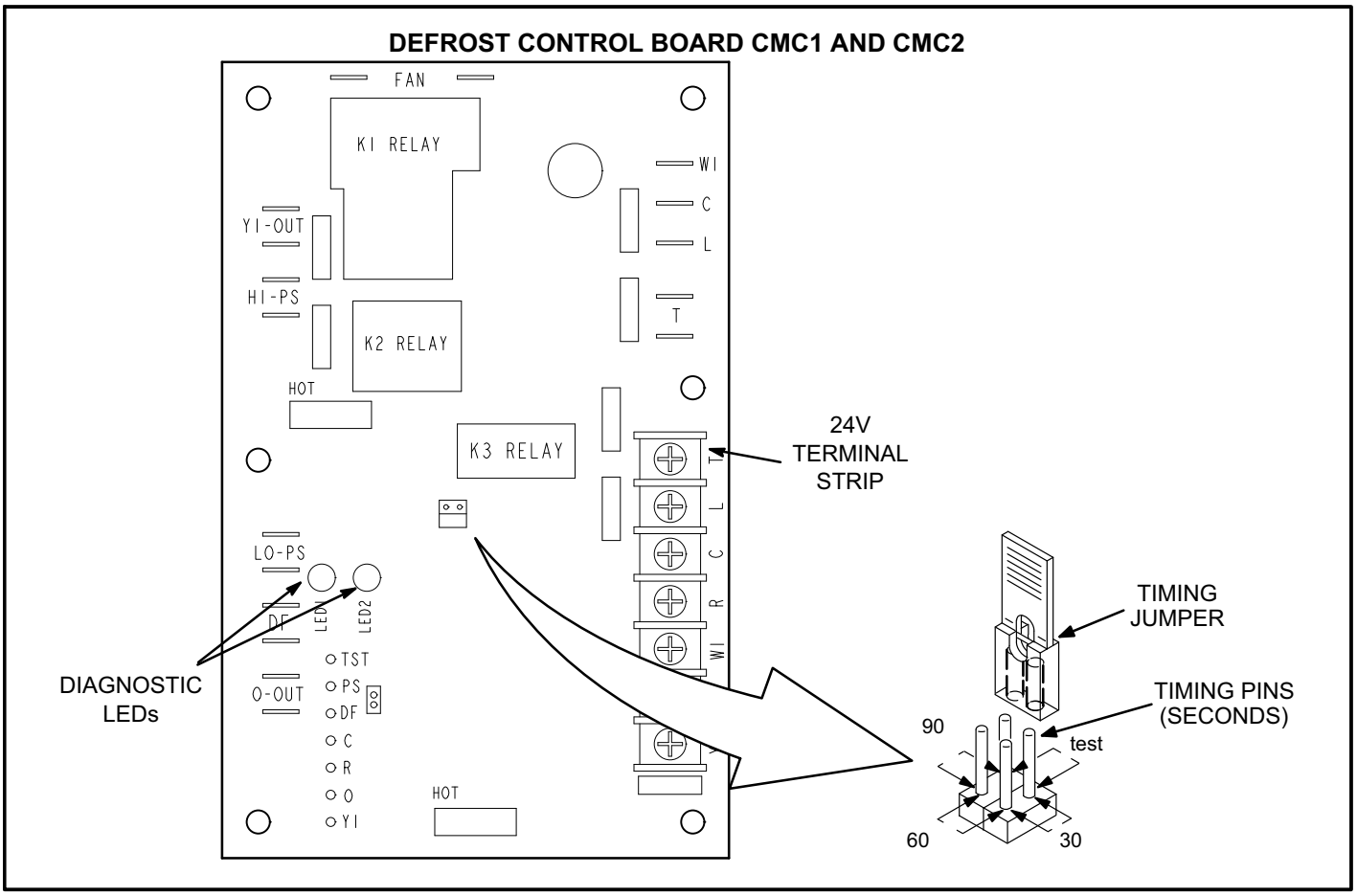


FIGURE 6

14-Defrost Control Board CMC1 100269-05

The defrost system includes a defrost thermostat and a defrost control.

DEFROST THERMOSTAT

The defrost thermostat is located on the liquid line between the check/expansion valve and the distributor. When the defrost thermostat senses 42°F (5.5°C) or cooler, its contacts close and send a signal to the defrost control to start the defrost timing. It also terminates defrost when the liquid line warms up to 70°F (21°C).

DEFROST CONTROL (CMC1)

The defrost control includes the combined functions of a time/temperature defrost control, defrost relay, time delay, diagnostic LEDs, and a terminal strip for field wiring connections.

The control provides automatic switching from normal heating operation to defrost mode and back. During compressor cycle (defrost thermostat is closed, calling for defrost), the control accumulates compressor run times at 30, 60, or 90 minute field adjustable intervals. If the defrost thermostat is closed when the selected compressor run time interval ends, the defrost relay is energized and defrost begins.

Defrost Control Timing Pins (P1)

Each timing pin selection provides a different accumulated compressor run time period for one defrost cycle. This time period must occur before a defrost cycle is initiated. The defrost interval can be adjusted to 30 (T1), 60 (T2), or 90 (T3) minutes (see figure 7). The maximum defrost period is 14 minutes and cannot be adjusted. Factory default is 90 minutes

If the timing selector jumper is missing, the defrost control defaults to a 90-minute defrost interval.

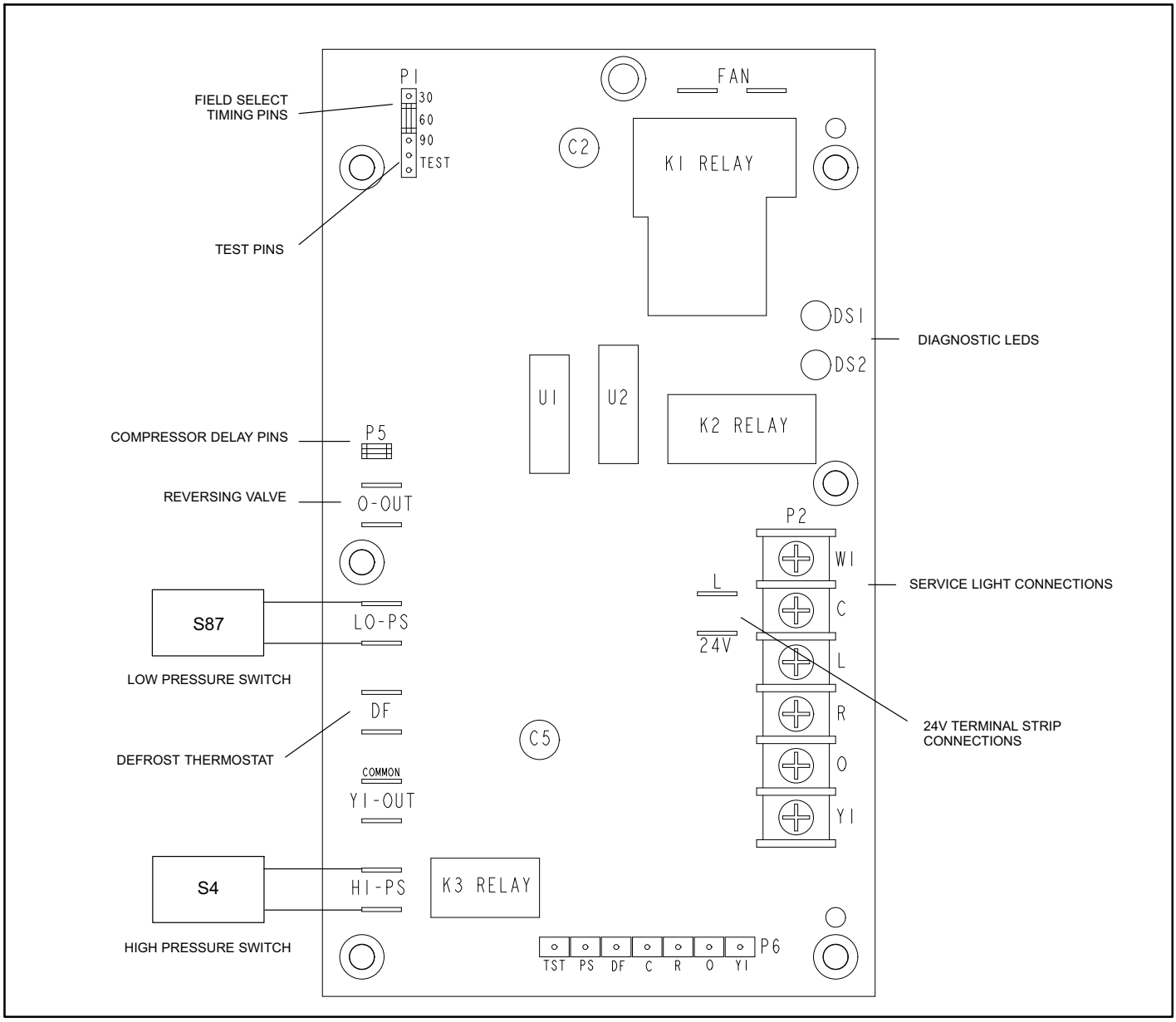


FIGURE 7

Test Mode

The **TEST** mode is activated by removing the jumper on the defrost termination pins (**30**, **60** or **90**) and placing the jumper on the **TEST** pins after 24VAC is applied to the control. The low pressure input is ignored in **TEST** mode.

⚠ IMPORTANT

The TEST pins are ignored and the TEST function is locked out:

- If the jumper is applied on the TEST pin before 24VAC is applied to the control.
- If there is a jumper on the 30 or 60 minute defrost termination pins.

Bypass-Anti-Short Cycle Delay

The **Y1** input must be active **ON**, the high pressure switch must be closed or a jumper must be installed on the high pressure terminals of the control.

Initiate a Forced Defrost

The **Y1** input must be active **ON**, the high pressure switch must be closed or a jumper must be installed on the high pressure terminals of the control, the defrost thermostat must be closed or a jumper must be placed across the **DF** terminals on the control and the **O** terminals must not have 24VAC (no power to reversing valve) before control will enter into a force defrost.

Test Mode Sequence

Using the defrost termination pin, short the **TEST** pins for a period of two seconds:

- Clear timed lockout / or pressure switch lockout function.
- Enter defrost mode

After entering forced defrost, if the jumper is removed before 5 seconds has elapsed, the unit will remain in forced defrost mode until defrost thermostat opens or terminated on maximum defrost time (14 minutes). If the jumper is not removed, once 5 seconds has elapsed (7 seconds total), the unit will terminate defrost and return to heat mode. The **TEST** mode will then be locked-out and no further **TEST** mode operation will be executed until the jumper on the **TEST** pins is removed and re-applied to the applicable defrost termination pins.

⚠ IMPORTANT

NOTE - After testing has been completed, properly reposition test jumper across desired timing pins.

Compressor Delay (P5)

The 100269-05 control, with the 30 second field- selectable delay, is active when the pins are jumpered. This feature helps reduce occasional sounds that may occur while the unit is cycling **In** and **Out** of the defrost mode.

NOTE — The 30-second compressor feature is ignored when jumper is installed on TEST pins.

Compressor Anti-Short-Cycle Delay

The timed-off delay is five minutes long. The delay helps protect the compressor from short-cycling in case the power to the unit is interrupted or a pressure switch opens. The delay is bypassed by placing the timer select jumper across the TEST pins for 0.5 seconds.

NOTE - The defrost control must have a thermostat demand for the bypass function to operate

Pressure Switch Circuits

The defrost control includes two pressure switch circuits. The factory-installed high pressure switch (S4) wires are connected to the defrost control's HI PS terminals (figure 7). The defrost control also includes LO PS terminals to accommodate an optional field-provided low (or loss-of-charge) pressure switch.

During a single thermostat cycle, the defrost control will lock out the unit after the fifth time that the circuit is interrupted by any pressure switch that is wired to the defrost control. In addition, the diagnostic LEDs will indicate a pressure switch lockout after the fifth occurrence of an open pressure switch (see table 9). The unit will remain locked out until 24V power from the indoor unit is broken then remade to the control or until the jumper is applied to the TEST pins for 0.5 seconds.

NOTE - The defrost control ignores input from the low pressure switch terminals during the TEST mode, during the defrost cycle, during the 90-second start-up period, and for the first 90 seconds each time the reversing valve switches heat/cool modes. ***If the TEST pins are jumpered and the 5-minute delay is being bypassed, the LO PS terminal signal is not ignored during the 90-second start-up period.***

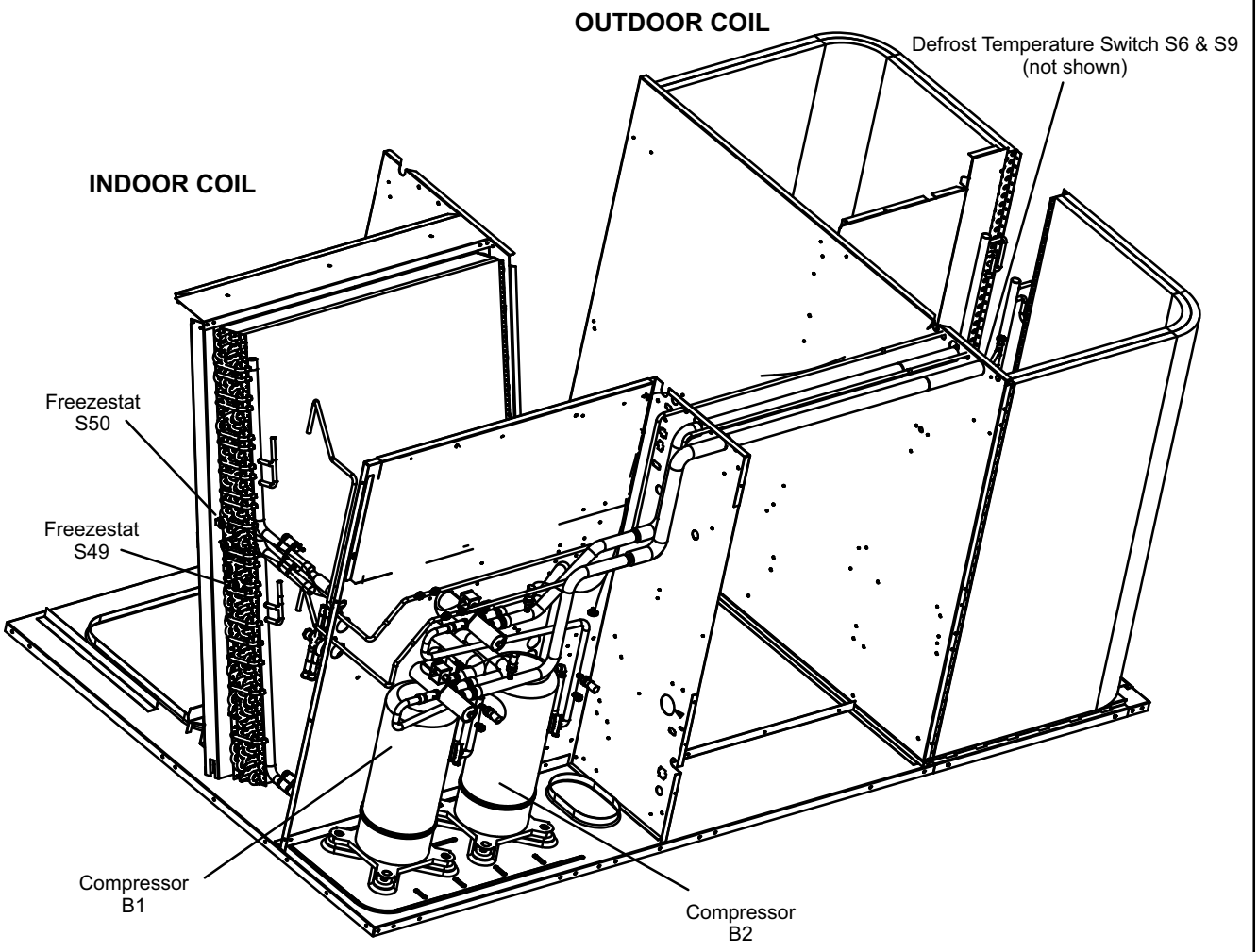
DIAGNOSTIC LEDS

The defrost control uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the diagnosis. See table 9.

TABLE 9

DS2 Green	DS1 Red	Condition
OFF	OFF	Power problem
Simultaneous Slow Flash		Normal operation
Alternating Slow Flash		5-min. anti-short cycle delay
OFF	Slow Flash	Low Pressure Fault
OFF	ON	Low Pressure Lockout
Slow Flash	OFF	High Pressure Fault
ON	OFF	High Pressure Lockout

THA PLUMBING COMPONENTS



COMPRESSOR DETAIL
front view

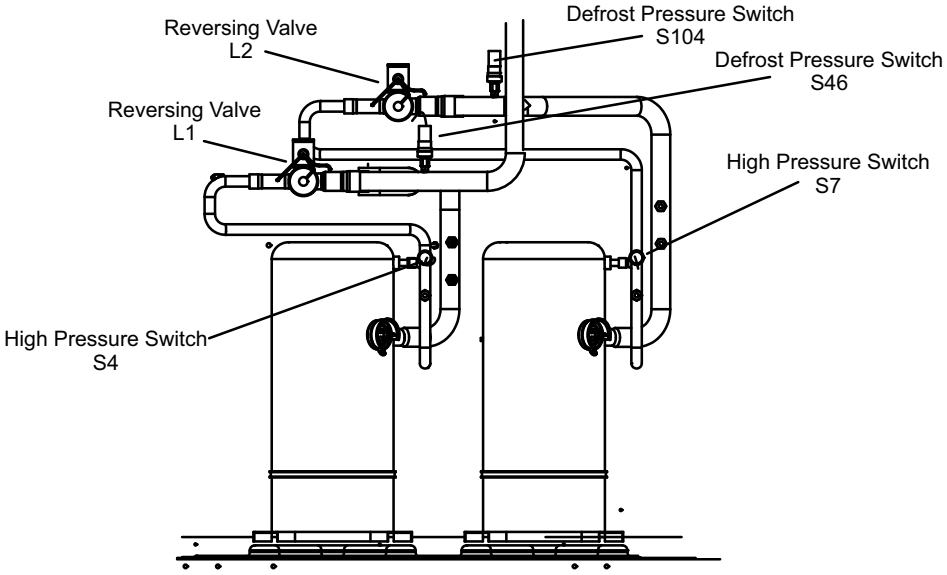


FIGURE 8

B-Cooling Components

THA units use independent cooling circuits consisting of separate compressors, outdoor coils and indoor coil (with 2 seperate stages). See figure 8. Units are equipped with two draw-through type condenser fans. All units are equipped with belt-drive blowers which draw air across the indoor coil during unit operation.

Cooling may be supplemented by a factory- or field-installed economizer. The indoor coils are slab type and are stacked. Each indoor coil uses a thermostatic expansion valve as the primary expansion device. Each indoor coil is also equipped with enhanced fins and rifled tubing. In all units each compressor is protected by a freezestat (on each indoor coil) and a high pressure switch (S4, S7). Low ambient switches (S11, S84) are available as an option for additional compressor protection.

1-Compressors B1 and B2

All THA090/150 units use two scroll compressors. All compressors are equipped with independent cooling circuits. 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. See “SPECIFICATIONS” and “ELECTRICAL DATA” (table of contents) or compressor nameplate for compressor specifications.

⚠ 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-Freezestats S49 and S50

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

Each freezestat is wired to the main control module A45. 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 indoor coil ice buildup.

3-High Pressure Switches S4 and S7

The high pressure switches is a manual reset SPST N.C. switch which opens on a pressure rise. The switches are located in the compressor discharge line and is wired to the defrost control board CMC1 and CMC2.. See unit diagram.

When discharge pressure rises to 450 ± 10 psig (3103 ± 69 kPa) (indicating a problem in the system) the switch opens and the respective compressor is de-energized (the economizer can continue to operate).

4-Low Ambient Switches S11 & S84 (optional)

The low ambient switch is an auto-reset SPST N.O. pressure switch which allows for mechanical cooling operation at low outdoor temperatures. In all models a switch is located in each liquid line prior to the indoor coil section.

In the THA090/150, S11 and S84 are wired in series with outdoor fan relay K10 (compressor one) and K68 (compressor two).

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 indoor coil and losing capacity.

5-Reversing Valve L1 and L2

A refrigerant reversing valve with a 24 volt solenoid coil is used to reverse refrigerant flow during unit operation in all THA units. The reversing valve is connected in the vapor line of the refrigerant circuit. The reversing valve coil is energized during cooling demand and during defrost.

Reversing valves L1 and L2 are controlled by the defrost control boards CMC1 and CMC2 in response to cooling demand or by defrost.

6-Defrost Pressure Switch S46 and S104

The defrost pressure switch S46 and S104 are auto-reset SPST N.C. pressure switches which open on a pressure rise. All THA units are equipped with these switches. The switches are located on thedischarge line. S46 is wired to the main control board A45.

When discharge pressure reaches 275 ± 10 psig (1896 ± 69 kPa) (indicating defrost is completed) the switch opens. The switch automatically resets when pressure in the suction line drops by 80 ± 10 psig (552 ± 69 kPa).

7-Defrost Temperature Switch S6 and S9

Defrost thermostat switches S6 and S9 have S.P.S.T. N.O. contacts which close on a temperature fall (initiating defrost). The switches are located on the expansion valve distributor assembly at the inlet to the outdoor coil. The switch monitors the outdoor coil suction temperature to determine when defrost is needed. When the outdoor coil suction temperature falls to 35°F ± 4°F (1.7°C ± 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 ± 5°F (15.6°C ± 2.8°C) the switch opens.

8-Filter Drier (all units)

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

9-Freezestats S49 and S50

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

Each freezestat is wired to the main control module A45. 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.

10-Condenser Fan Motors B4 and B5

See specifications section of this manual for specifications of condenser fans B4 and B5. All motors are ball bearing type single-phase motors. The fans may be removed for servicing and cleaning by removing the fan grilles.

C-Blower Compartment

The blower compartment in all THA090/150 units is located between the indoor coil and the outdoor coil section. The blower assembly is accessed by disconnecting the blower motor and all other plugs and removing the screws in front of the blower housing. The blower pulls out as shown in figure 9.

1-Blower Wheels

All THA090/150 units have one 15 in. x 15 in. (381 mm x 381 mm) blower wheel.

2-Indoor Blower Motor B3

All 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 SPECIFICATIONS (table of contents) in the front of this manual. 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

Initiate blower demand at thermostat according to instructions provided with thermostat. Unit will cycle on thermostat demand. The following steps apply to applications using a typical electro-mechanical thermostat.

1- Blower operation is manually set at the thermostat subbase fan switch. With fan switch in **ON** position, blowers will operate continuously.

2- With fan switch in **AUTO** position, the blowers will cycle with demand. Blowers and entire unit will be off when system switch is in **OFF** position.

Blower Access

The blower assembly is secured to a sliding base which allows the entire assembly to be pulled out of the unit. See figure 9.

1- Remove the clamp which secures the blower wiring to the blower motor base.

2- Remove and retain screws on either side of sliding base. Pull base toward outside of unit.

3- Slide base back into original position when finished servicing. Replace the clamp and blower wiring in the previous location on the blower motor base. Re-install screws on blower sliding base.

Determining Unit CFM

1- The following measurements must be made with a dry indoor coil. Run blower without a cooling demand. Measure the indoor blower shaft RPM. 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- Refer to blower tables in BLOWER DATA (table of contents) in the front of this manual. Use static pressure and RPM readings to determine unit air volume.

4- The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See figure 9. Do not exceed minimum and maximum number of pulley turns as shown in table 10.

TABLE 10
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT

Belt	Minimum Turns Open	Maximum Turns Open
A Section	No minimum	5
B Section	1*	6

*No minimum number of turns open when B belt is used on pulleys 6” O.D. or larger.

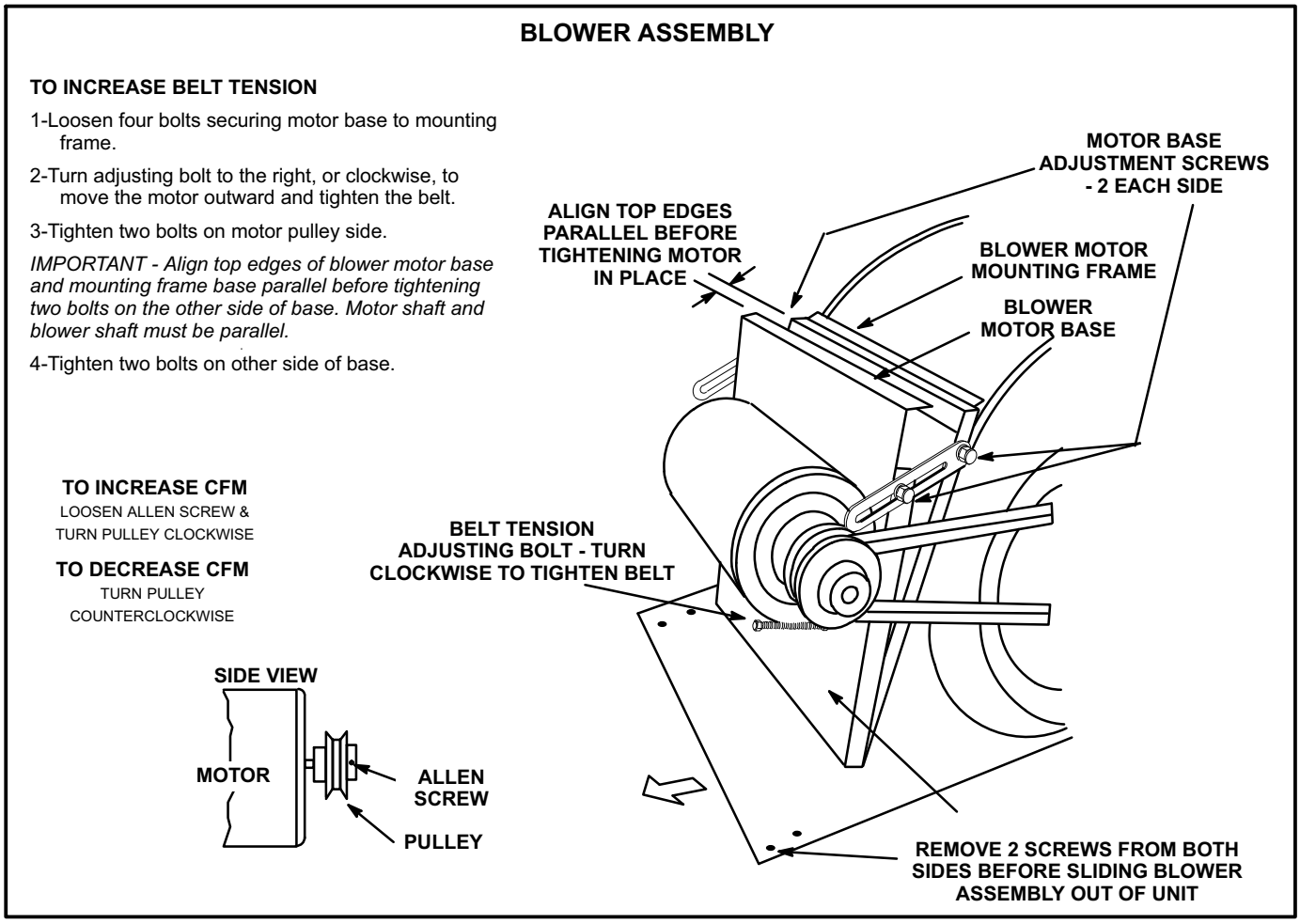


FIGURE 9

Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat grooves. Make sure blower and motor pulley are aligned as shown in figure 10.

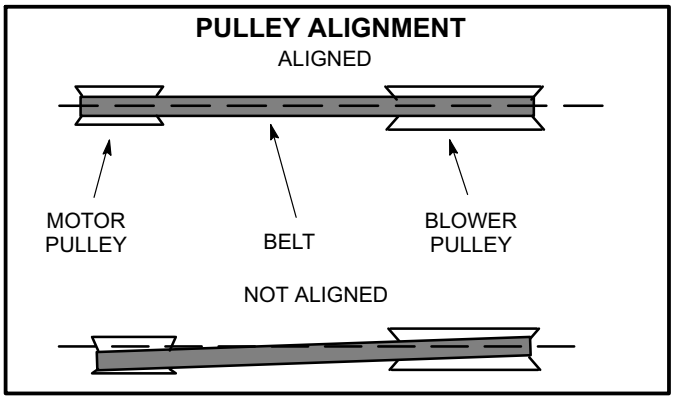


FIGURE 10

1- Loosen four bolts securing motor base to mounting frame. See figure 9.

2- *To increase belt tension -*
Turn adjusting bolt to the right, or clockwise, to move the motor outward and tighten the belt. This increases the distance between the blower motor and the blower housing.

To loosen belt tension -
Turn the adjusting bolt to the left, or counterclockwise to loosen belt tension.

3- Tighten two bolts on motor pulley side.

IMPORTANT - Align top edges of blower motor base and mounting frame base parallel before tightening two bolts on the other side of base. Motor shaft and blower shaft must be parallel.

4- Tighten two bolts on other side of base.

Check Belt Tension

Overtensioned belts shortens belt and bearing life. Check belt tension as follows:

1- Measure span length X. See figure 11.

2- Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 1.5mm per 100mm of span length.

Example: Deflection distance of a 40" span would be 40/64" or 5/8".

Example: Deflection distance of a 400mm span would be 6mm.

3- Measure belt deflection force. For a used belt, the deflection force should be 5 lbs. (35kPa). A new belt deflection force should be 7 lbs. (48kPa).

A force below these values indicates an undertensioned belt. A force above these values indicates an overtensioned belt.

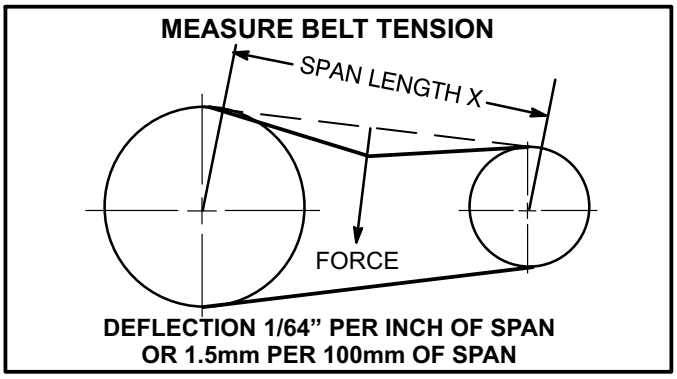


FIGURE 11

D-Optional Electric Heat Components

Tables 12 through 16 show all possible THA to EHA matchups and electrical ratings.

All electric heat sections consist of electric heating elements exposed directly to the airstream. See figure 12. EHA parts arrangement is shown in figures 13 and 14. Multiple-stage elements are sequenced on and off in response to thermostat demand.

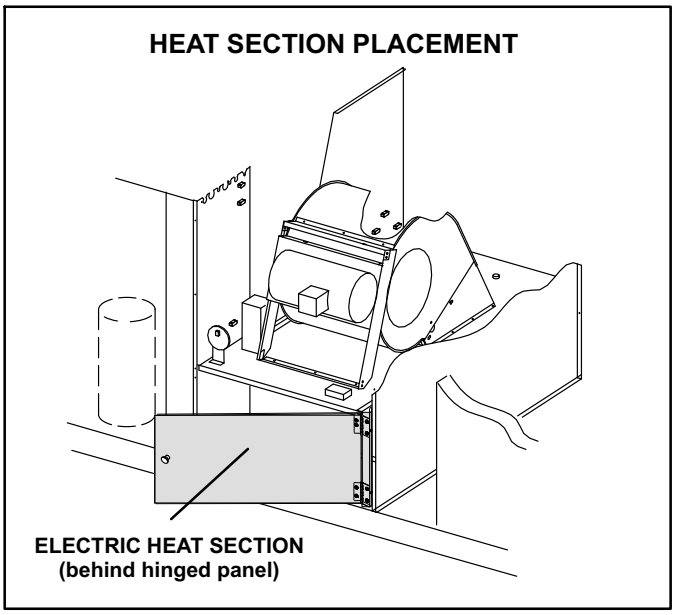


FIGURE 12

1-Main Control Box Components A55 and F4

The main control box (see figure 14) houses a few of the electric heat controls, such as: the main control module A45.

2-Contactors K15, K16

Contactors K15 and K16 are three-pole double-break contactors located on the electric heat vestibule. All contactors are equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by the main control A45. Contactor K15 energizes the first stage heating elements, while K16 energizes the second stage heating elements.

3-High Temperature Limits S15 (Primary)

S15 is a SPST N.C. auto-reset thermostat located on the back panel of the electric heat section below the heating elements. S15 is the high temperature limit for the electric heat section. When S15 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. For EHA102/150 units, the electric heat section thermostat is factory set to open at 170°F ± 5°F (76°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. For EHA100 units, the electric heat section thermostat is factory set to open at 160°F ± 5°F (71.0°C ± 2.8°C) on a temperature rise and automatically reset at 120°F ± 6°F (49.0°C ± 3.3°C) on a temperature fall. The thermostat is not adjustable.

4-High Temperature Limit S20 (Secondary)

S20 is a SPST N.C. manual-reset thermostat . Like the primary temperature limit, S20 is wired in series with the first stage contactor coil (K15) and second stage contactor coil (K16). When S20 opens, contactors (K15, K16) 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 220°F ± 6°F (104°C ± 3.3°C) on a temperature rise and can be manually reset when temperature falls below 160°F (71.0°C).

5-Terminal Strip TB2

Terminal strip TB2 is used for single point power installations only. TB2 distributes L1, L2 and L3 power to TB3. Units with multi-point power connections will not use TB2.

6-Terminal Strip TB3

Electric heat line voltage connections are made to terminal strip TB3 located in the upper left corner of the electric heat vestibule. TB3 distributes power to the electric heat components.

7-Heating Elements HE1 through HE7

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.

8-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 13 and table 11 show the fuses used with each electric heat section. For simplicity, the service manual labels the fuses F3 - 1 through F3 - 4.

9-Unit Fuse Block & Fuse F4

Three line voltage fuses F4 provide short circuit and ground fault protection to all cooling components in the THA units with electric heat. The fuses are rated in accordance with the amperage of the cooling components. The F 4 fuse block is located inside a sheetmetal enclosure (figure 1).

10-Electric Heat Relay K9

All THA series units with 22.5 to 60kW electric heat use an electric heat relay K9. K9 is a N.O. SPDT 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 A45. K9-1 closes, energizing timer DL2.

11-Time Delay DL2

DL2 is a factory installed solid state timer used in 22.5 to 60 kW electric heat units. DL2 allows staging by providing a timed-interval between the first and second heating elements. When the timer is energized, the contacts are delayed for 30 seconds before closing. When the timer is de-energized, the contacts are delayed 1 second before opening.

TABLE 11

THA ELECTRIC HEAT SECTION FUSE RATING					
EHA QUANTITY & SIZE	**VOLTAGES**	**FUSE (3 each)**			
		F3 - 1	**F3 - 2**	**F3 - 3**	**F3 - 4**
EHA100-7.5	208/230V	25 Amp 250V	-----	-----	-----
	460V	15 Amp 600V	-----	-----	-----
	575V	10 Amp 600V	-----	-----	-----
EHA100-15	208/230V	50 Amp 250V	-----	-----	-----
	460V	25 Amp 600V	-----	-----	-----
	575V	20 Amp 600V	-----	-----	-----
EHA100-22.5	208/230V	50 Amp250V	-----	-----	25 Amp 250V
	460V	25 Amp 600V	-----	-----	15 Amp 600V
	575V	20 Amp 600V	-----	-----	10 Amp 600V
EHA100-30	208/230V	50 Amp 250V	-----	-----	50 Amp 250V
	460V	25 Amp 600V	-----	-----	25 Amp 600V
	575V	20 Amp 600V	-----	-----	20 Amp 600V
EHA100-45	208/230V	50 Amp 250V	-----	60 Amp 250V	60 Amp 250V
	460V	25 Amp 600V	-----	-----	50 Amp 600V
	575V	20 Amp 600V	-----	-----	40 Amp 600V
EHA102-7.5	208/230V	25 Amp 250V	-----	-----	-----
	460V	15 Amp 600V	-----	-----	-----
	575V	10 Amp 600V	-----	-----	-----
EHA150-15	208/230V	50 Amp 250V	-----	-----	-----
	460V	25 Amp 600V	-----	-----	-----
	575V	20 Amp 600V	-----	-----	-----
EHA360-22.5	208/230V	50 Amp 250V	-----	-----	25 Amp 250V
	460V	25 Amp 600V	-----	-----	15 Amp 600V
	575V	20 Amp 600V	-----	-----	10 Amp 600V
EHA150-30	208/230V	50 Amp 250V	-----	-----	50 Amp 250V
	460V	25 Amp 600V	-----	-----	25 Amp 600V
	575V	20 Amp 600V	-----	-----	20 Amp 600V
EHA150-45	208/230V	50 Amp 250V	-----	60 Amp 250V	60 Amp 250V
	460V	25 Amp 600V	-----	-----	50 Amp 600V
	575V	20 Amp 600V	-----	-----	40 Amp 600V
EHA150-60	208/230V	60 Amp 250V	60 Amp 250V	60 Amp 250V	60 Amp 250V
	460V	50 Amp 600V	-----	-----	50 Amp 600V
	575V	40 Amp 600V	-----	-----	40 Amp 600V

EHA 7.5, 15, 22.5, 30, 45, 60KW
ELECTRIC HEAT SECTION PARTS ARRANGEMENT

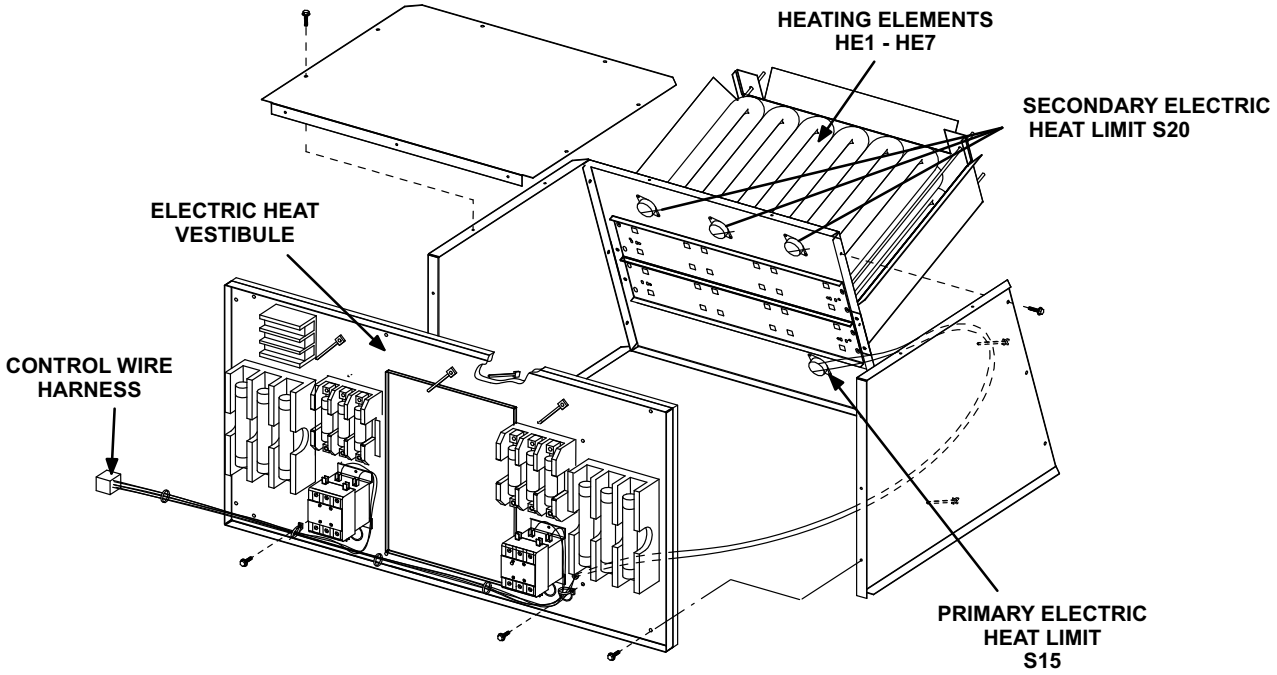


FIGURE 13

ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

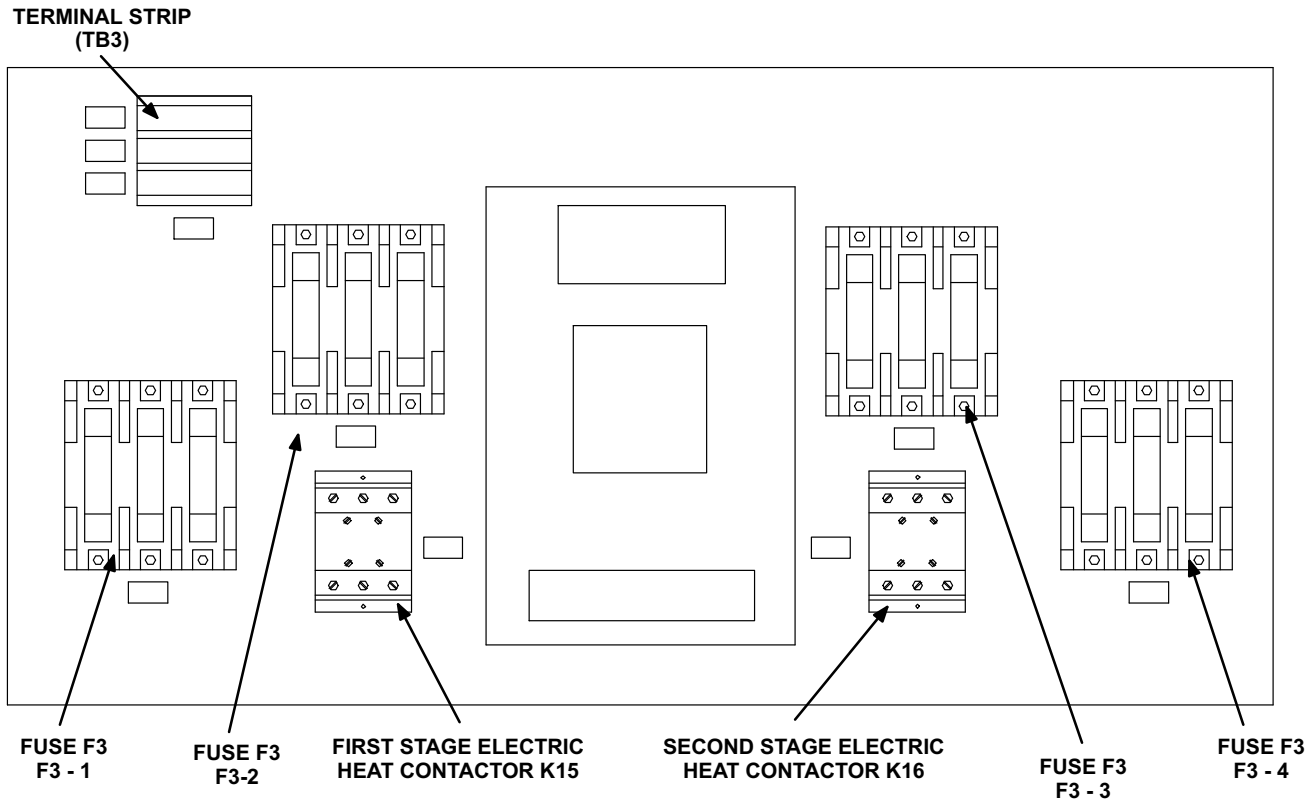


FIGURE 14

TABLE 12

7.5 TON STANDARD EFFICIENCY - THA090

[1] REQUIRES UNIT FUSE BLOCK, TERMINAL BLOCK AND HEATER CONTROL MODULE

Electric Heat Model No. & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	[2] Total Unit + Electric Heat Minimum Circuit Ampacity (with Power Exhaust Fans)			[3] Total Unit + Electric Heat Maximum Fuse Size (with Power Exhaust Fans)		
					2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)	2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)
7.5 kW Heat	1	208	5.6	19,100	66	69	75	70	70	80
EHA102-7.5	1	220	6.3	21,500	66	69	75	70	70	80
	1	230	6.9	23,600	66	69	75	70	70	80
208/230V **99J01**	1	240	7.5	25,600	66	69	75	70	70	80
	1	440	6.3	21,500	33	35	38	35	35	40
460V **99J02**	1	460	6.9	23,600	33	35	38	35	35	40
	1	480	7.5	25,600	33	35	38	35	35	40
575V **99J03**	1	550	6.3	21,500	26	27	29	30	30	30
	1	575	6.9	23,600	26	27	29	30	30	30
31 lbs. (14 kg)	1	600	7.5	25,600	26	27	29	30	30	30
15 kW	1	208	11.3	38,600	82	85	91	90	100	100
EHA150-15	1	220	12.6	43,000	88	91	97	90	100	100
	1	230	13.8	47,100	88	91	97	90	100	100
208/230V **99J04**	1	240	15.0	51,200	88	91	97	90	100	100
	1	440	12.6	43,000	45	46	49	45	50	50
460V **99J05**	1	460	13.8	47,100	45	46	49	45	50	50
	1	480	15.0	51,200	45	46	49	45	50	50
575V **99J06**	1	550	12.6	43,000	35	36	38	35	40	40
	1	575	13.8	47,100	35	36	38	35	40	40
31 lbs. (14 kg)	1	600	15.0	51,200	35	36	38	35	40	40
22.5 kW	[4] 2	208	16.9	57,700	102	105	111	125	125	125
EHA360-22.5	[4] 2	220	18.9	64,500	111	114	120	125	125	125
	[4] 2	230	20.6	70,700	111	114	120	125	125	125
208/230V **99J28**	[4] 2	240	22.5	76,800	111	114	120	125	125	125
	[4] 2	440	18.9	64,500	56	57	60	60	60	60
460V **99J29**	[4] 2	460	20.7	70,700	56	57	60	60	60	60
	[4] 2	480	22.5	76,800	56	57	60	60	60	60
575V **99J30**	[4] 2	550	19.0	64,500	44	45	48	45	50	50
	[4] 2	575	20.7	70,700	44	45	48	45	50	50
38 lbs. (17 kg)	[4] 2	600	22.5	76,800	44	45	48	45	50	50
30 kW	[4] 2	208	22.5	76,800	121	124	130	150	150	150
EHA150-30	[4] 2	220	25.2	86,000	133	136	143	150	150	150
	[4] 2	230	27.6	93,900	133	136	143	150	150	150
208/230V **99J07**	[4] 2	240	30.0	102,400	133	136	143	150	150	150
	[4] 2	440	25.2	86,000	67	69	72	70	70	80
460V **99J08**	[4] 2	460	27.6	93,900	67	69	72	70	70	80
	[4] 2	480	30.0	102,400	67	69	72	70	70	80
575V **99J09**	[4] 2	550	25.2	86,000	53	54	56	60	60	60
	[4] 2	575	27.6	93,900	53	54	56	60	60	60
38 lbs. (17 kg)	[4] 2	600	30.0	102,400	53	54	56	60	60	60
45 kW	[4] 2	208	33.8	115,300	160	163	170	200	200	200
EHA150-45	[4] 2	220	37.8	129,000	178	182	188	200	200	200
	[4] 2	230	41.3	141,000	178	182	188	200	200	200
208/230V **99J10**	[4] 2	240	45.0	153,600	178	182	188	200	200	200
	[4] 2	440	37.8	129,000	90	91	94	100	100	100
460V **99J11**	[4] 2	460	41.3	141,000	90	91	94	100	100	100
	[4] 2	480	45.0	153,600	90	91	94	100	100	100
575V **99J12**	[4] 2	550	37.8	129,000	71	72	75	80	80	80
	[4] 2	575	41.3	141,000	71	72	75	80	80	80
42 lbs. (19 kg)	[4] 2	600	45.0	153,600	71	72	75	80	80	80

[1] 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] 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).

[3] HACR type breaker or fuse.

[4] Can be used with two stage control.

TABLE 13

8.5 TON STANDARD EFFICIENCY - THA102

[1] REQUIRES UNIT FUSE BLOCK, TERMINAL BLOCK AND HEATER CONTROL MODULE

Electric Heat Model No. & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	[2] Total Unit + Electric Heat Minimum Circuit Ampacity (with Power Exhaust Fans)			[3] Total Unit + Electric Heat Maximum Fuse Size (with Power Exhaust Fans)		
					2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)	2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)
7.5 kW Heat	1	208	5.6	19,100	71	74	80	80	80	90
EHA102-7.5	1	220	6.3	21,500	71	74	80	80	80	90
	1	230	6.9	23,600	71	74	80	80	80	90
208/230V **99J01**	1	240	7.5	25,600	71	74	80	80	80	90
	1	440	6.9	21,500	35	36	39	35	40	40
460V **99J02**	1	460	6.9	23,600	35	36	39	35	40	40
	1	480	7.5	25,600	35	36	39	35	40	40
575V **99J03**	1	550	6.3	21,500	27	28	30	30	30	30
	1	575	6.9	23,600	27	28	30	30	30	30
31 lbs. (14 kg)	1	600	7.5	25,600	27	28	30	30	30	30
15 kW	1	208	11.3	38,600	93	96	103	100	100	110
EHA150–15	1	220	12.6	43,000	93	96	103	100	100	110
	1	230	13.8	47,100	93	96	103	100	100	110
208/230V **99J04**	1	240	15.0	51,200	93	96	103	100	100	110
	1	440	12.6	43,000	46	48	51	50	50	60
460V **99J05**	1	460	13.8	47,100	46	48	51	50	50	60
	1	480	15.0	51,200	46	48	51	50	50	60
575V **99J06**	1	550	12.6	43,000	36	37	39	40	40	40
	1	575	13.8	47,100	36	37	39	40	40	40
31 lbs. (14 kg)	1	600	15.0	51,200	36	37	39	40	40	40
22.5 kW	[4] 2	208	16.9	57,700	116	119	125	125	125	125
EHA360–22.5	[4] 2	220	18.9	64,500	116	119	125	125	125	125
	[4] 2	230	20.7	70,700	116	119	125	125	125	125
208/230V **99J28**	[4] 2	240	22.5	76,800	116	119	125	125	125	125
	[4] 2	440	18.9	64,500	58	59	62	60	60	70
460V **99J29**	[4] 2	460	20.7	70,700	58	59	62	60	60	70
	[4] 2	480	22.5	76,800	58	59	62	60	60	70
575V **99J30**	[4] 2	550	18.9	64,500	45	46	48	45	50	50
	[4] 2	575	20.7	70,700	45	46	48	45	50	50
38 lbs. (17 kg)	[4] 2	600	22.5	76,800	45	46	48	45	50	50
30 kW	[4] 2	208	22.5	76,800	138	142	148	150	150	150
EHA150–30	[4] 2	220	25.2	86,000	138	142	148	150	150	150
	[4] 2	230	27.5	93,900	138	142	148	150	150	150
208/230V **99J07**	[4] 2	240	30.0	102,400	138	142	148	150	150	150
	[4] 2	440	25.2	86,000	69	70	73	70	70	80
460V **99J08**	[4] 2	460	27.5	93,900	69	70	73	70	70	80
	[4] 2	480	30.0	102,400	69	70	73	70	70	80
575V **99J09**	[4] 2	550	25.2	86,000	54	55	57	60	60	60
	[4] 2	575	27.5	93,900	54	55	57	60	60	60
38 lbs. (17 kg)	[4] 2	600	30.0	102,400	54	55	57	60	60	60
45 kW	[4] 2	208	33.8	115,300	184	187	193	200	200	200
EHA150–45	[4] 2	220	37.8	129,000	184	187	193	200	200	200
	[4] 2	230	41.3	141,000	184	187	193	200	200	200
208/230V **99J10**	[4] 2	240	45.0	153,600	184	187	193	200	200	200
	[4] 2	440	37.8	129,000	91	93	96	100	100	100
460V **99J11**	[4] 2	460	41.3	141,000	91	93	96	100	100	100
	[4] 2	480	45.0	153,600	91	93	96	100	100	100
575V **99J12**	[4] 2	550	37.8	129,000	72	73	75	80	80	80
	[4] 2	575	41.3	141,000	72	73	75	80	80	80
42 lbs. (19 kg)	[4] 2	600	45.0	153,600	72	73	75	80	80	80

[1] 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] 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).

[3] HACR type breaker or fuse.

[4] Can be used with two stage control.

TABLE 14

10 TON STANDARD EFFICIENCY - THA120

[1] REQUIRES UNIT FUSE BLOCK, TERMINAL BLOCK AND HEATER CONTROL MODULE

Electric Heat Model No. & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	[2] Total Unit + Electric Heat Minimum Circuit Ampacity (with Power Exhaust Fans)			[3] Total Unit + Electric Heat Maximum Fuse Size (with Power Exhaust Fans)		
					2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)	2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)
15 kW	1	208	11.3	38,600	97	102	108	100	110	110
EHA150-15	1	220	12.6	43,000	97	102	108	100	110	110
	1	230	13.8	47,100	97	102	108	100	110	110
208/230V **99J04**	1	240	15.0	51,200	97	102	108	100	110	110
	1	440	12.6	43,000	51	52	55	60	60	60
460V **99J05**	1	460	13.8	47,100	51	52	55	60	60	60
	1	480	15.0	51,200	51	52	55	60	60	60
575V **99J06**	1	550	12.6	43,000	40	41	44	40	45	45
	1	575	13.8	47,100	40	41	44	40	45	45
31 lbs. (14 kg)	1	600	15.0	51,200	40	41	44	40	45	45
22.5 kW	[4] 2	208	16.9	57,700	122	125	131	125	125	150
EHA360-22.5	[4] 2	220	18.9	64,500	122	125	131	125	125	150
	[4] 2	230	20.7	70,700	122	125	131	125	125	150
208/230V **99J28**	[4] 2	240	22.5	76,800	122	125	131	125	125	150
	[4] 2	440	18.9	64,500	62	63	66	70	70	70
460V **99J29**	[4] 2	460	20.7	70,700	62	63	66	70	70	70
	[4] 2	480	22.5	76,800	62	63	66	70	70	70
575V **99J30**	[4] 2	550	18.9	64,500	49	50	53	50	50	60
	[4] 2	575	20.7	70,700	49	50	53	50	50	60
38 lbs. (17 kg)	[4] 2	600	22.5	76,800	49	50	53	50	50	60
30 kW	[4] 2	208	22.5	76,800	144	147	153	150	150	175
EHA150-30	[4] 2	220	25.2	86,000	144	147	153	150	150	175
	[4] 2	230	27.5	93,900	144	147	153	150	150	175
208/230V **99J07**	[4] 2	240	30.0	102,400	144	147	153	150	150	175
	[4] 2	440	25.2	86,000	73	75	77	80	80	80
460V **99J08**	[4] 2	460	27.5	93,900	73	75	77	80	80	80
	[4] 2	480	30.0	102,400	73	75	77	80	80	80
575V **99J09**	[4] 2	550	25.2	86,000	58	59	62	60	60	70
	[4] 2	575	27.5	93,900	58	59	62	60	60	70
38 lbs. (17 kg)	[4] 2	600	30.0	102,400	58	59	62	60	60	70
45 kW	[4] 2	208	33.8	115,300	189	192	199	200	200	200
EHA150-45	[4] 2	220	37.8	129,000	189	192	199	200	200	200
	[4] 2	230	41.3	141,000	189	192	199	200	200	200
208/230V **99J10**	[4] 2	240	45.0	153,600	189	192	199	200	200	200
	[4] 2	440	37.8	129,000	96	97	100	100	100	100
460V **99J11**	[4] 2	460	41.3	141,000	96	97	100	100	100	100
	[4] 2	480	45.0	153,600	96	97	100	100	100	100
575V **99J12**	[4] 2	550	37.8	129,000	76	77	80	80	80	80
	[4] 2	575	41.3	141,000	76	77	80	80	80	80
42 lbs. (19 kg)	[4] 2	600	45.0	153,600	76	77	80	80	80	80
60 kW	[4] 2	208	45.0	153,600	198	202	208	200	225	225
EHA150-60	[4] 2	220	50.4	172,000	198	202	208	200	225	225
	[4] 2	230	55.1	188,000	198	202	208	200	225	225
208/230V **99J13**	[4] 2	240	60.0	204,800	198	202	208	200	225	225
	[4] 2	440	50.4	172,000	100	102	104	100	110	110
460V **99J14**	[4] 2	460	55.1	188,000	100	102	104	100	110	110
	[4] 2	480	60.0	204,800	100	102	104	100	110	110
575V **99J15**	[4] 2	550	50.4	172,000	80	81	83	80	90	90
	[4] 2	575	55.1	188,000	80	81	83	80	90	90
49 lbs. (22 kg)	[4] 2	600	60.0	204,800	80	81	83	80	90	90

[1] 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] 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).
[3] HACR type breaker or fuse.
[4] Can be used with two stage control.

TABLE 15

12.5 TON STANDARD EFFICIENCY - THA150

[1] REQUIRES UNIT FUSE BLOCK, TERMINAL BLOCK AND HEATER CONTROL MODULE

Electric Heat Model No. & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	[2] Total Unit + Electric Heat Minimum Circuit Ampacity (with Power Exhaust Fans)			[3] Total Unit + Electric Heat Maximum Fuse Size (with Power Exhaust Fans)		
					2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)	2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)
15 kW	1	208	11.3	38,600	104	107	113	110	110	125
EHA150–15	1	220	12.6	43,000	104	107	113	110	110	125
	1	230	13.8	47,100	104	107	113	110	110	125
208/230V **99J04**	1	240	15.0	51,200	104	107	113	110	110	125
	1	440	12.6	43,000	51	52	55	60	60	60
460V **99J05**	1	460	13.8	47,100	51	52	55	60	60	60
	1	480	15.0	51,200	51	52	55	60	60	60
575V **99J06**	1	550	12.6	43,000	41	42	44	45	45	45
	1	575	13.8	47,100	41	42	44	45	45	45
31 lbs. (14 kg)	1	600	15.0	51,200	41	42	44	45	45	45
22.5 kW	[4] 2	208	16.9	57,700	126	129	135	150	150	150
EHA360–22.5	[4] 2	220	18.9	64,500	126	129	135	150	150	150
	[4] 2	230	20.7	70,700	126	129	135	150	150	150
208/230V **99J28**	[4] 2	240	22.5	76,800	126	129	135	150	150	150
	[4] 2	440	18.9	64,500	62	63	66	70	70	70
460V **99J29**	[4] 2	460	20.7	70,700	62	63	66	70	70	70
	[4] 2	480	22.5	76,800	62	63	66	70	70	70
575V **99J30**	[4] 2	550	18.9	64,500	50	51	53	50	60	60
	[4] 2	575	20.7	70,700	50	51	53	50	60	60
38 lbs. (17 kg)	[4] 2	600	22.5	76,800	50	51	53	50	60	60
30 kW	[4] 2	208	22.5	76,800	149	152	158	150	175	175
EHA150–30	[4] 2	220	25.2	86,000	149	152	158	150	175	175
	[4] 2	230	27.5	93,900	149	152	158	150	175	175
208/230V **99J07**	[4] 2	240	30.0	102,400	149	152	158	150	175	175
	[4] 2	440	25.2	86,000	73	75	77	80	80	80
460V **99J08**	[4] 2	460	27.5	93,900	73	75	77	80	80	80
	[4] 2	480	30.0	102,400	73	75	77	80	80	80
575V **99J09**	[4] 2	550	25.2	86,000	59	60	62	60	60	70
	[4] 2	575	27.5	93,900	59	60	62	60	60	70
38 lbs. (17 kg)	[4] 2	600	30.0	102,400	194	60	62	60	60	70
45 kW	[4] 2	208	33.8	115,300	194	197	203	200	200	225
EHA150-45	[4] 2	220	37.8	129,000	194	197	203	200	200	225
	[4] 2	230	41.3	141,000	194	197	203	200	200	225
208/230V **99J10**	[4] 2	240	45.0	153,600	194	197	203	200	200	225
	[4] 2	440	37.8	129,000	96	97	100	100	100	100
460V **99J11**	[4] 2	460	41.3	141,000	96	97	100	100	100	100
	[4] 2	480	45.0	153,600	96	97	100	100	100	100
575V **99J12**	[4] 2	550	37.8	129,000	77	78	80	80	80	80
	[4] 2	575	41.3	141,000	77	78	80	80	80	80
42 lbs. (19 kg)	[4] 2	600	45.0	153,600	77	78	80	80	80	80
60 kW	[4] 2	208	45.0	153,600	203	206	212	225	225	225
EHA150–60	[4] 2	220	50.4	172,000	203	206	212	225	225	225
	[4] 2	230	55.1	188,000	203	206	212	225	225	225
208/230V **99J13**	[4] 2	240	60.0	204,800	203	206	212	225	225	225
	[4] 2	440	50.4	172,000	100	102	104	100	110	110
460V **99J14**	[4] 2	460	55.1	188,000	100	102	104	100	110	110
	[4] 2	480	60.0	204,800	100	102	104	100	110	110
575V **99J15**	[4] 2	550	50.4	172,000	81	82	84	90	90	90
	[4] 2	575	55.1	188,000	81	82	84	90	90	90
49 lbs. (22 kg)	[4] 2	600	60.0	204,800	81	82	84	90	90	90

[1] 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] 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).

[3] HACR type breaker or fuse.

[4] Can be used with two stage control.

TABLE 16

12.5 TON STANDARD EFFICIENCY - THA150-3

[1] REQUIRES UNIT FUSE BLOCK, TERMINAL BLOCK AND HEATER CONTROL MODULE

Electric Heat Model No. & Net Weight	No. of Steps	Volts Input	kW Input	Btuh Output	[2] Total Unit + Electric Heat Minimum Circuit Ampacity (with Power Exhaust Fans)			[3] Total Unit + Electric Heat Maximum Fuse Size (with Power Exhaust Fans)		
					2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)	2 hp (1.5 kW)	3 hp (2.2 kW)	5 hp (3.7 kW)
15 kW	1	208	11.3	38,600	106	109	115	110	110	125
EHA150–15	1	220	12.6	43,000	106	109	115	110	110	125
	1	230	13.8	47,100	106	109	115	110	110	125
208/230V **99J04**	1	240	15.0	51,200	106	109	115	110	110	125
	1	440	12.6	43,000	52	54	56	60	60	60
460V **99J05**	1	460	13.8	47,100	52	54	56	60	60	60
	1	480	15.0	51,200	52	54	56	60	60	60
575V **99J06**	1	550	12.6	43,000	42	43	46	45	45	50
	1	575	13.8	47,100	42	43	46	45	45	50
31 lbs. (14 kg)	1	600	15.0	51,200	42	43	46	45	45	50
22.5 kW	[4] 2	208	16.9	57,700	128	131	137	150	150	150
EHA360–22.5	[4] 2	220	18.9	64,500	128	131	137	150	150	150
	[4] 2	230	20.7	70,700	128	131	137	150	150	150
208/230V **99J28**	[4] 2	240	22.5	76,800	128	131	137	150	150	150
	[4] 2	440	18.9	64,500	63	65	68	70	70	70
460V **99J29**	[4] 2	460	20.7	70,700	63	65	68	70	70	70
	[4] 2	480	22.5	76,800	63	65	68	70	70	70
575V **99J30**	[4] 2	550	18.9	64,500	51	52	55	60	60	60
	[4] 2	575	20.7	70,700	51	52	55	60	60	60
38 lbs. (17 kg)	[4] 2	600	22.5	76,800	51	52	55	60	60	60
30 kW	[4] 2	208	22.5	76,800	151	154	160	175	175	175
EHA150–30	[4] 2	220	25.2	86,000	151	154	160	175	175	175
	[4] 2	230	27.5	93,900	151	154	160	175	175	175
208/230V **99J07**	[4] 2	240	30.0	102,400	151	154	160	175	175	175
	[4] 2	440	25.2	86,000	75	76	79	80	80	80
460V **99J08**	[4] 2	460	27.5	93,900	75	76	79	80	80	80
	[4] 2	480	30.0	102,400	75	76	79	80	80	80
575V **99J09**	[4] 2	550	25.2	86,000	60	61	64	60	60	70
	[4] 2	575	27.5	93,900	60	61	64	60	60	70
38 lbs. (17 kg)	[4] 2	600	30.0	102,400	60	61	64	60	60	70
45 kW	[4] 2	208	33.8	115,300	196	199	205	200	200	225
EHA150-45	[4] 2	220	37.8	129,000	196	199	205	200	200	225
	[4] 2	230	41.3	141,000	196	199	205	200	200	225
208/230V **99J10**	[4] 2	240	45.0	153,600	196	199	205	200	200	225
	[4] 2	440	37.8	129,000	97	99	101	100	100	110
460V **99J11**	[4] 2	460	41.3	141,000	97	99	101	100	100	110
	[4] 2	480	45.0	153,600	97	99	101	100	100	110
575V **99J12**	[4] 2	550	37.8	129,000	78	79	82	80	80	90
	[4] 2	575	41.3	141,000	78	79	82	80	80	90
42 lbs. (19 kg)	[4] 2	600	45.0	153,600	78	79	82	80	80	90
60 kW	[4] 2	208	45.0	153,600	205	208	214	225	225	225
EHA150–60	[4] 2	220	50.4	172,000	205	208	214	225	225	225
	[4] 2	230	55.1	188,000	205	208	214	225	225	225
208/230V **99J13**	[4] 2	240	60.0	204,800	205	208	214	225	225	225
	[4] 2	440	50.4	172,000	102	103	106	110	110	110
460V **99J14**	[4] 2	460	55.1	188,000	102	103	106	110	110	110
	[4] 2	480	60.0	204,800	102	103	106	110	110	110
575V **99J15**	[4] 2	550	50.4	172,000	82	83	85	90	90	90
	[4] 2	575	55.1	188,000	82	83	85	90	90	90
49 lbs. (22 kg)	[4] 2	600	60.0	204,800	82	83	85	90	90	90

[1] 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] 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).

[3] HACR type breaker or fuse.

[4] Can be used with two stage control.

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 (LARMF).

III-START UP - 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-Heating Start Up

1- Set thermostat or temperature control device to initiate a first-stage heating demand.

A first-stage heating demand (W1) will energize compressors 1 and 2. Both outdoor fans are energized with a W1 demand.

Note - L1 and L2 reversing valves are de-energized in the heating mode.

THA Units With Optional Electric Heat -
An increased heating demand (W2) will energize electric heat. Electric heat is also energized during the defrost cycle (W1) to maintain discharge air temperature.

C-Cooling Start Up

⚠IMPORTANT

If unit is equipped with a crankcase heater. Make sure heater is energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

1- Set thermostat or temperature control device fan switch to **AUTO** or **ON.** Set thermostat or temperature control device to initiate a first-stage cooling demand.

A first-stage Y1 cooling demand will energize L1 and L2 reversing valve solenoids and compressor 1. An increased cooling demand Y2 will initiate compressor 2.

Units With Optional Economizer -
The optional economizer will start on a first stage (Y1) cooling demand when outdoor air enthalpy is suitable. An increased cooling demand (Y2) with the conomizer open will energize 1 compressor only.

2- Refrigerant circuits are factory charged with HCFC-22 refrigerant. See unit rating plate for correct amount of charge.

3- Units contain two refrigerant circuits or systems. See figure 15.

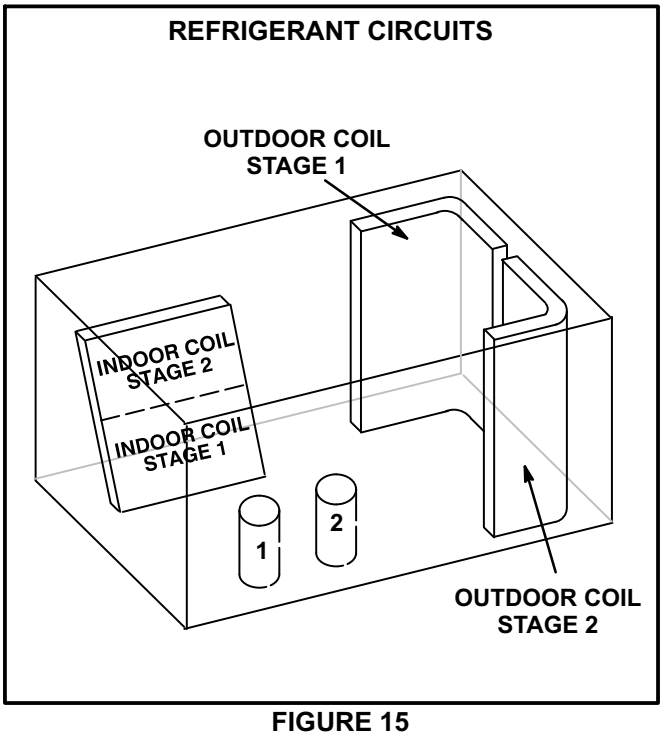


FIGURE 15

D-Safety or Emergency Shutdown

Turn off power to the unit.

IV- SYSTEMS SERVICE CHECKS

⚠ WARNING

Refrigerant can be harmful if it is inhaled. Refrigerant must be used and recovered responsibly.

Failure to follow this warning may result in personal injury or death.

A-Charging

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).

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 17 through 21 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.**

TABLE 17
THA090S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig
65°F	150	77	146	76
75°F	180	82	178	77
85°F	210	83	210	79
95°F	240	84	242	81
105°F	270	85	277	83
115°F	300	86	310	85

TABLE 18
THA102S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	156	77	154	77
75°F	185	78	185	78
85°F	215	80	216	79
95°F	244	81	247	80
105°F	273	82	277	82
115°F	303	83	309	83

TABLE 19
THA120S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig
65°F	166	77	166	75
75°F	196	78	196	76
85°F	228	80	228	78
95°F	260	82	260	79
105°F	290	84	290	81
115°F	321	85	321	82

TABLE 20
THA150S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig
65°F	150	77	148	76
75°F	178	78	176	77
85°F	207	80	208	79
95°F	236	81	240	81
105°F	266	83	270	83
115°F	295	84	300	84

TABLE 21
THA150S-3 NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig
65°F	169	66	182	69
75°F	196	71	212	74
85°F	226	75	244	76
95°F	258	77	277	78
105°F	293	80	314	79
115°F	331	81	352	80

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.

B-Charging - 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 table 22. 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 17 through 20. The approach method is not valid for grossly over or undercharged systems.

TABLE 22
APPROACH TEMPERATURE

Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
090S	7°F ± 1 (3.9°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
102S	10°F ± 1 (5.6°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
120S	9°F ± 1 (5°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)
150S	9°F ± 1 (5.0°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
150S-3	13°F ± 1 (7.2°C ± 0.5)	13°F ± 1 (7.2°C ± 0.5)

V-MAINTENANCE

The unit should be inspected once a year by a qualified service technician.

⚠ CAUTION

Electrical shock hazard. Turn off power to unit before performing any maintenance, cleaning or service operation on the unit.

⚠ CAUTION

Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.

⚠ WARNING

Product contains fiberglass wool.
Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)
Fiberglass wool may also cause respiratory, skin, and eye irritation.
To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown on unit nameplate or contact your supervisor.

A-Lubrication

All motors are lubricated at the factory. No further lubrication is required.

B-Filters

Units are equipped with four 18 X 24 X 2" filters. Filters should be checked and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters. See figure 16.

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

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-Indoor Coil

Inspect and clean coil at beginning of each cooling and heating season. Clean using mild detergent or commercial coil cleanser. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

E-Outdoor Coil

Clean outdoor coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season.

Outdoor coils are made of two formed slabs. Dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs *(no more than 4 inches)* and wash them thoroughly. See figure 17. Flush coils with water following cleaning.

F-Filter Drier

The unit is equipped with a biflow filter drier. if replacement is necessary, order another of like design.

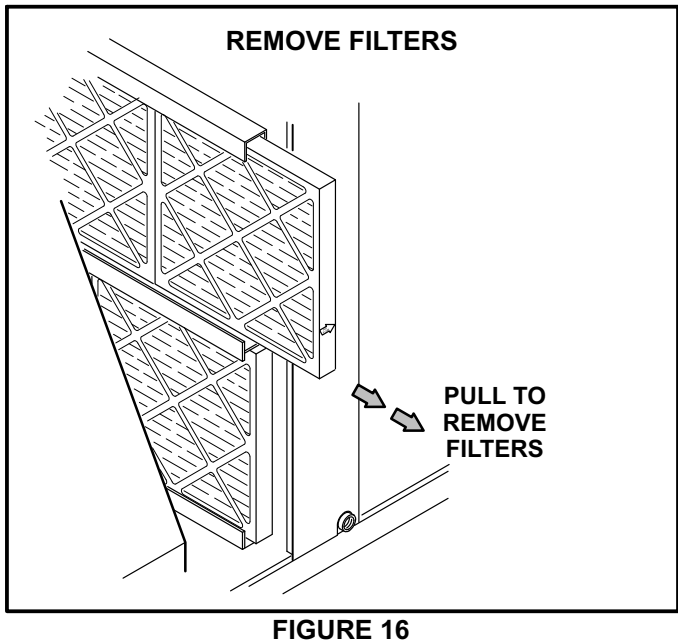


FIGURE 16

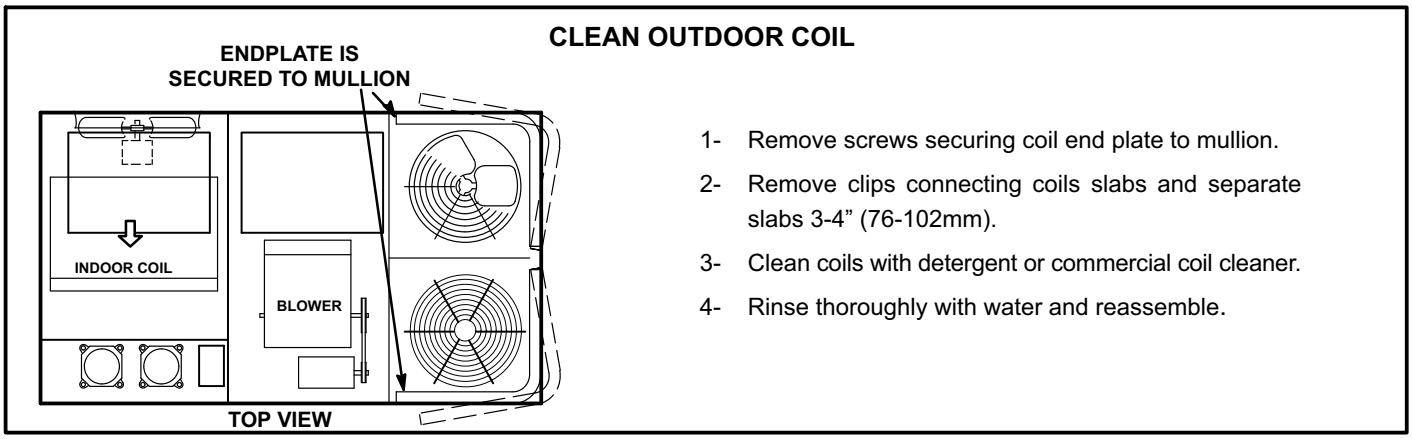


FIGURE 17

VI-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory or field installed to the THA units. OPTIONAL FIELD INSTALLED ACCESSORIES section (see table of contents) show specific size per unit.

A-LARMF Mounting Frames

When installing the THA units on a combustible surface for downflow discharge applications, the Lennox LARMF08/10 or 10/15 14-inch or 24-inch (356 mm or 610mm) height roof mounting frame is used. The roof mounting frames are recommended in all other applications but not required. If the THA 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.

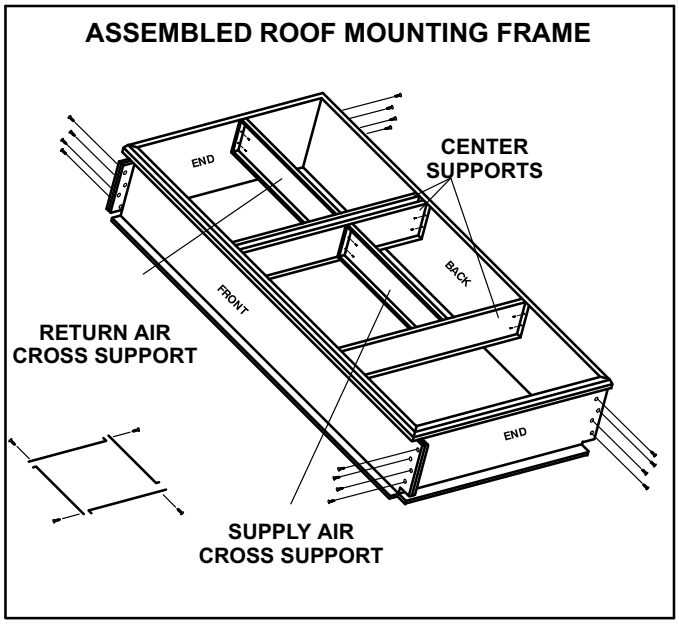


FIGURE 18

The assembled LARMF mounting frame is shown in figure 18. 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 19. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

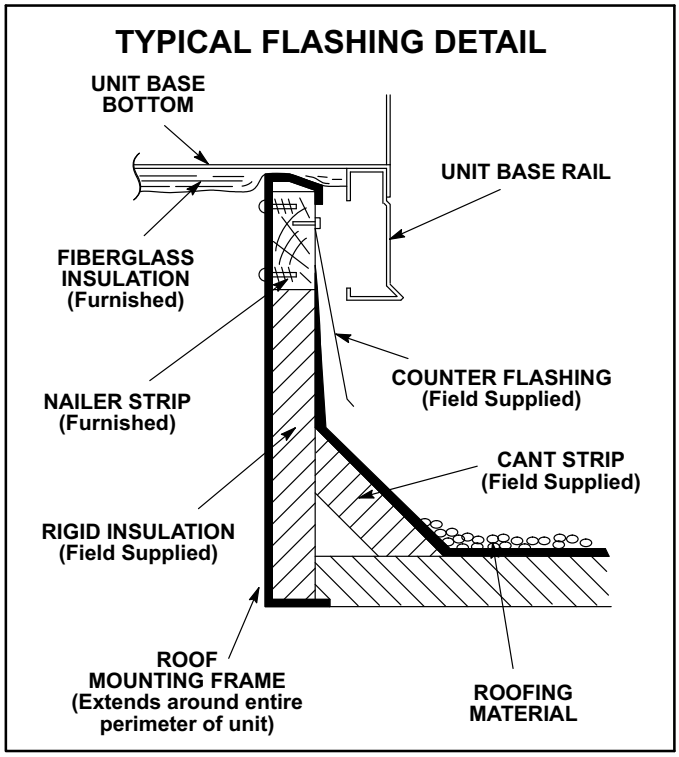


FIGURE 19

B-Transitions

Optional supply/return transitions LASRT08/10 and 10/12 are available for use with THA 7.5, 8.5, and 10 ton series units, utilizing optional LARMF08/10 and 10/15 roof mounting frame. THA 12.5 ton units will use LASRT15 with LARMF10/15 roof mounting frame. Transition must be installed in the LARMF mounting frame before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures. LASRT10/12 and LASTR15 are included with factory installed economizers.

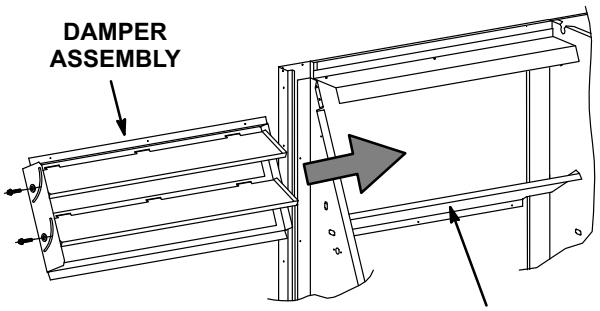
C-Supply and Return Diffusers

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

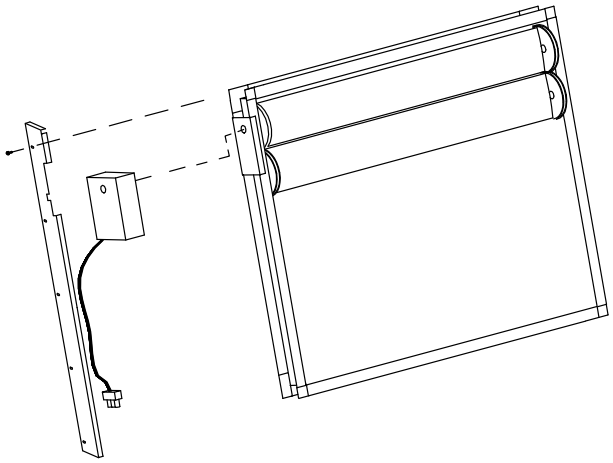
D-TAOADM10/15 and LAOAD10/15 Outdoor Air Dampers Field or Factory Installed

TAOADM and LAOAD10/15 consists 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 20). Washable filters 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.

LAOAD MANUAL OUTDOOR AIR DAMPER



TAOADM MOTORIZED OUTDOOR AIR DAMPER



FILTER BRACKET SIDE VIEW

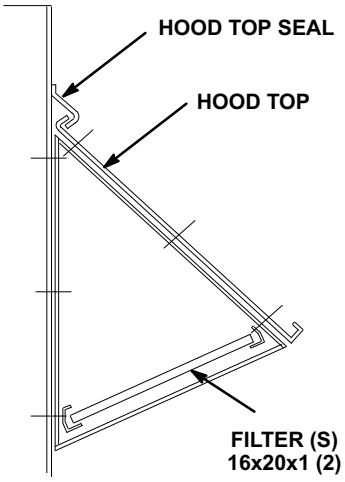


FIGURE 20

E-TAREMD10/15 Economizer

(Field or Factory Installed)

Unit may contain an optional factory-installed three-position economizer equipped with an A6 enthalpy control and an A7 outdoor enthalpy sensor. The three-position economizer opens fully to use outdoor air for free cooling when temperature is suitable and opens to minimum position during the occupied time period.

The A6 enthalpy control is located in the economizer access area. See figure 21. The A7 enthalpy sensor is located on the division panel between horizontal supply and return air sections.

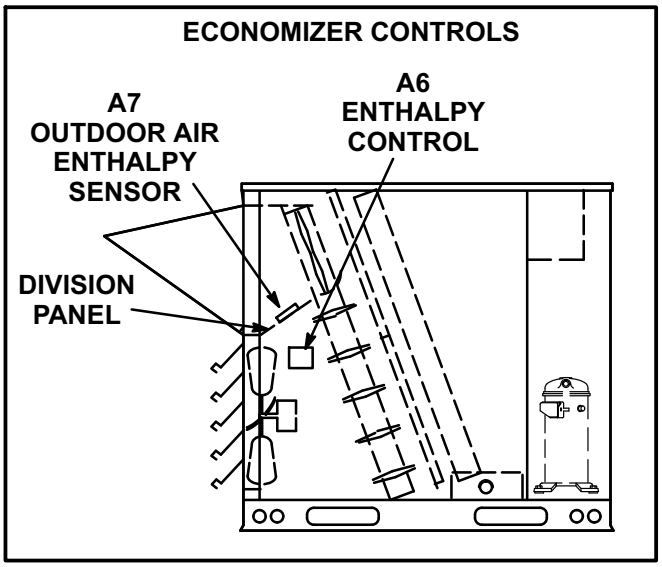


FIGURE 21

Optional Sensors

An optional differential sensor (A62) may be used with the A7 outdoor sensor to compare outdoor air temperature to return air temperature. When the outdoor air temperature is below the return air temperature, outdoor air is used for free cooling.

An optional mixed air sensor (R1) may be used to modulate dampers to 55°F (13°C) discharge air.

An optional IAQ sensor (A63) may be used to lower operating costs by controlling outdoor air based on CO_2 level or room occupancy (also called demand control ventilation or DCV). Damper minimum position can be set lower than traditional minimum air requirements; dampers open to traditional ventilation requirements when CO_2 level reaches DCV (IAQ) setpoint.

Refer to instructions provided with sensors for installation.

A6 Enthalpy Control LED's

A steady green Free Cool LED indicates that outdoor air is suitable for free cooling.

When an optional IAQ sensor is installed, a steady green DCV LED indicates that the IAQ reading is higher than setpoint requiring more fresh air. See figure 22.

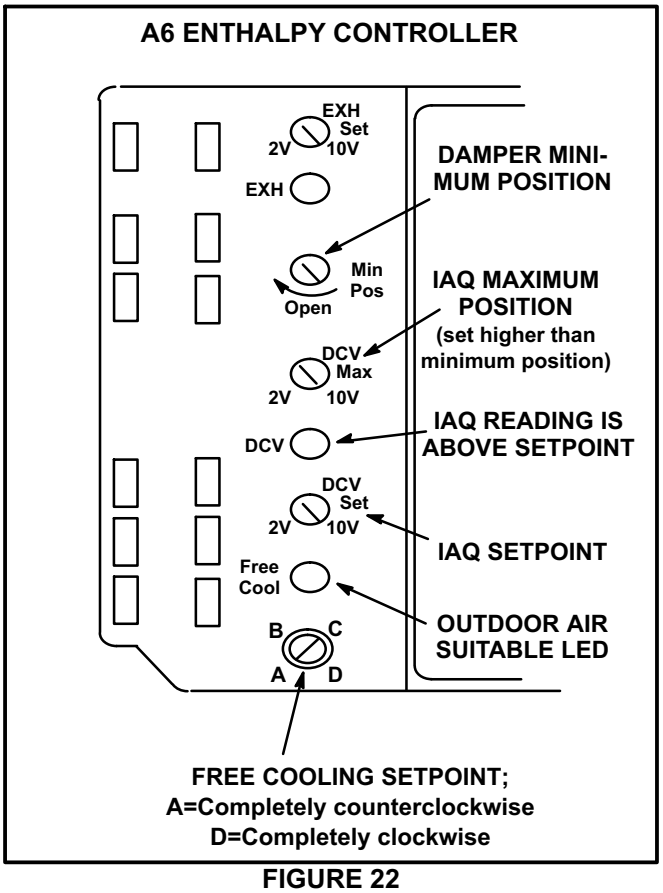


FIGURE 22

Free Cooling Setpoint

Outdoor air is considered suitable when temperature and humidity are less than the free cooling setpoints shown in table 23. Setting A is recommended. See figure 22. At setting A, free cooling will be energized when outdoor air is approximately 73°F (23°C) and 50% relative humidity. If indoor air is too warm or humid, lower the setpoint to B. At setting B, free cooling will be energized at 70°F (21°C) and 50% relative humidity.

When an optional A62 differential sensor is installed, turn A6 enthalpy control free cooling setpoint potentiometer completely clockwise to position “D”.

TABLE 23
ENTHALPY CONTROL SETPOINTS

Control Setting	Free Cooling Setpoint At 50% RH
A	73° F (23° C)
B	70° F (21° C)
C	67° F (19° C)
D	63° F (17° C)

Damper Minimum Position

NOTE - A jumper is factory-installed between TB1 A1 and A2 terminals to maintain occupied status (allowing minimum fresh air). When using an electronic thermostat or energy management system with an occupied/unoccupied feature, remove jumper.

1- Set thermostat to occupied mode if the feature is available. Make sure jumper is in place between A45 control board TB1 terminals A1 and A2 if using a thermostat which does not have the feature.

2- Rotate MIN POS SET potentiometer to approximate desired fresh air percentage.

Note - Damper minimum position can be set lower than traditional minimum air requirements when an IAQ sensor is specified. Dampers will open to DCV MAX setting (if CO2 is above setpoint) to meet traditional ventilation requirements.

3- Measure outdoor air temperature. Mark the point on the bottom line of chart 1 and label the point “A” (40°F, 4°C shown).

4- Measure return air temperature. Mark that point on the top line of chart 1 and label the point “B” (74°F, 23°C shown).

5- Measure mixed air (outdoor and return air) temperature. Mark that point on the top line of chart 1 and label point “C” (70°F, 21°C shown).

6- Draw a straight line between points A and B.

7- Draw a vertical line through point C.

8- Draw a horizontal line where the two lines meet. Read the percent of fresh air intake on the side.

9- If fresh air percentage is less than desired, adjust MIN POS SET potentiometer higher. If fresh air percentage is more than desired, adjust MIN POS SET potentiometer lower. Repeat steps 3 through 8 until calculation reads desired fresh air percentage.

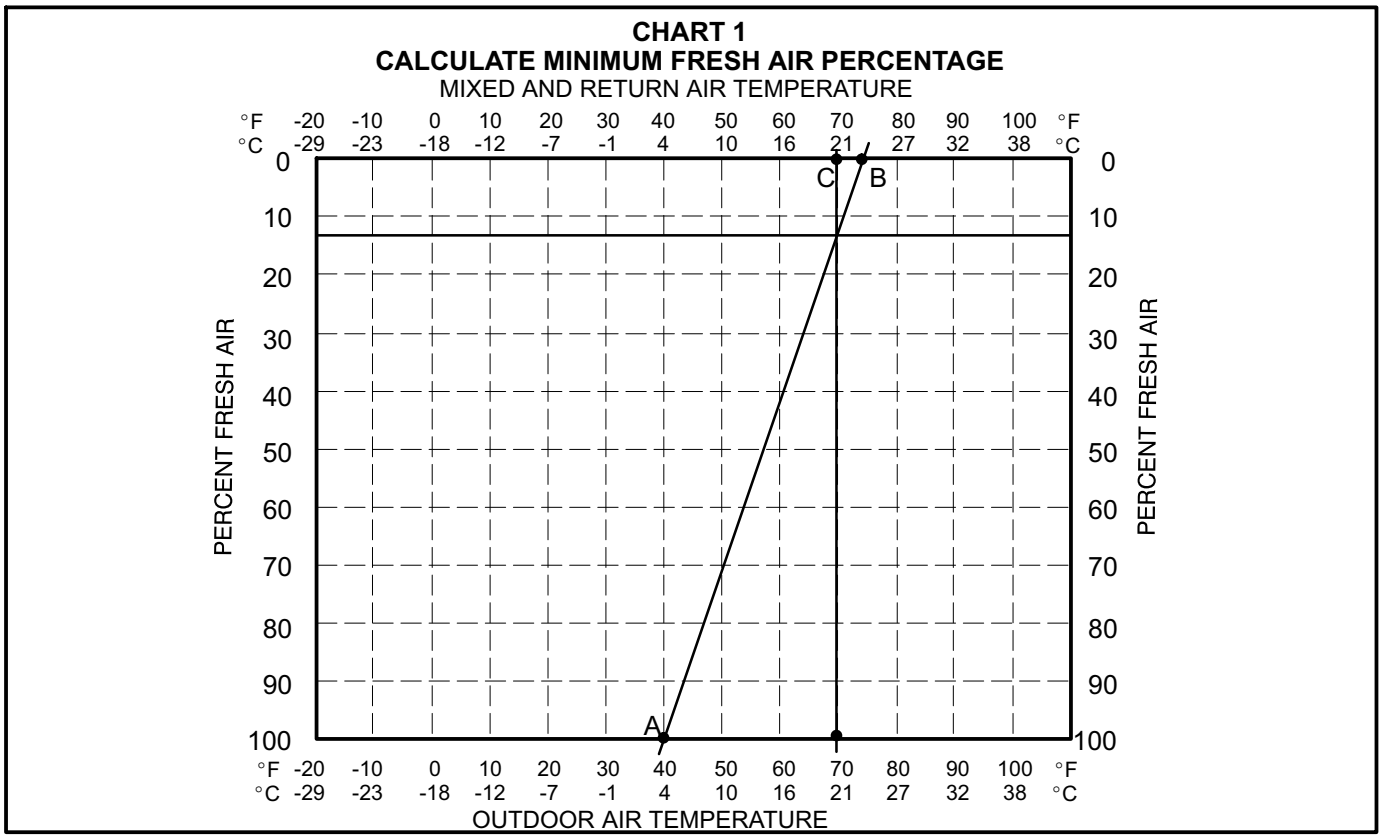
DCV Set and Max Settings

Adjust settings when an optional IAQ sensor is installed.

The DCV SET potentiometer is factory-set at approximately 50% of the potentiometer range. Using a standard 1-2000ppm CO_2 sensor, dampers will start to open when the IAQ sensor reads approximately 1000ppm. Adjust the DCV SET potentiometer to the approximate setting specified by the controls contractor. Refer to figure 22.

The DCV MAX potentiometer is factory-set at approximately 50% of the potentiometer range or 6VDC. Dampers will open approximately half way when CO_2 rises above setpoint. Adjust the DCV MAX potentiometer to the approximate setting specified by the controls contractor. Refer to figure 22.

Note - DCV Max must be set higher than economizer minimum position setting for proper demand control ventilation.



Economizer Operation

The occupied time period is determined by the thermostat or energy management system.

Outdoor Air Not Suitable:

During the unoccupied time period dampers are closed.

During the occupied time period a cooling demand will open dampers to minimum position and mechanical cooling functions normally.

During the occupied time period dampers will open to DCV MAX when IAQ reading is above setpoint (regardless of thermostat demand or outdoor air suitability).

Outdoor Air Suitable:

See table 24 for economizer operation with a standard two-stage thermostat.

During the occupied period, dampers will open to DCV MAX when IAQ reading is above setpoint (regardless of thermostat demand or outdoor air suitability). DCV MAX will NOT override damper full-open position. When an R1 mixed air sensor for modulating dampers is installed, DCV MAX may override damper free cooling position when occupancy is high and outdoor air temperatures are low. If R1 senses discharge air temperature below 45°F (7°C), dampers will move to minimum position until discharge air temperature rises to 48°F (9°C).

B-Outdoor Air Dampers

Optional manual and motorized outdoor air dampers provide fresh outdoor air. The motorized damper assembly opens to minimum position during the occupied time period and remains closed during the unoccupied period. Manual damper assembly is set at installation and remains in that position. See figure 23.

Set damper minimum position in the same manner as economizer minimum position. Adjust motorized damper position using the thumbwheel on the damper motor. See figure 24. Manual damper fresh air intake percentage can be determined in the same manner.

TABLE 24
ECONOMIZER OPERATION
OUTDOOR AIR IS **SUITABLE** FOR FREE COOLING – FREE COOL LED "ON"

THERMOSTAT DEMAND	DAMPER POSITION		MECHANICAL COOLING
	UNOCCUPIED	**OCCUPIED**	
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	OPEN*	OPEN*	NO
Y2	OPEN*	OPEN*	STAGE 1

** Dampers will open to maintain 55°F (13°C) supply air when an R1 mixed air sensor is installed.*

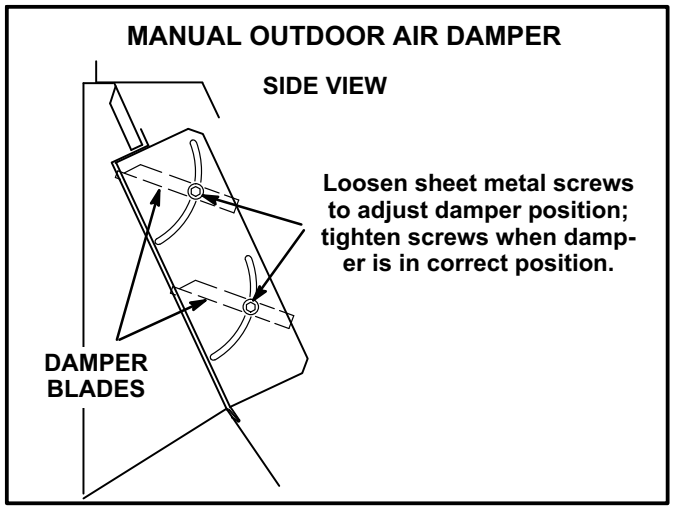


FIGURE 23

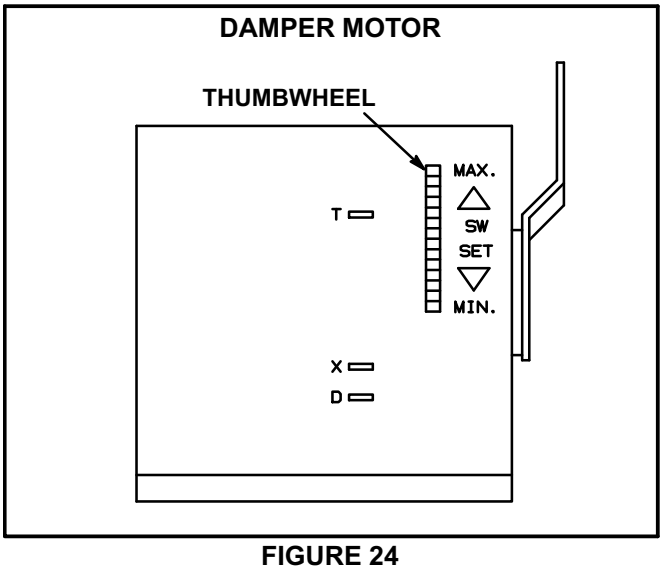


FIGURE 24

F-LAGED010/15 and LAGEDH10/15 Gravity Exhaust Dampers

LAGED08/10 and 10/15 and LAGEDH10/15 dampers are used with THA series units. LAGED dampers are used in downflow (see figure 25) and LAGEDH are used in horizontal air discharge applications. LAGEDH gravity exhaust dampers are installed in the return air duct. The dampers must be used any time an economizer and a power exhaust fan is applied to THA 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.

NOTE- GED is optional except required with power exhaust dampers.

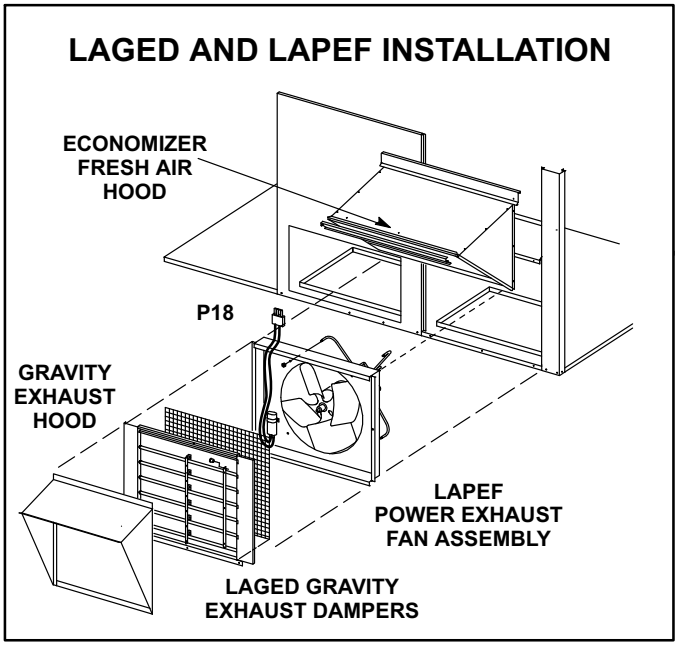


FIGURE 25

G-LAPEF10/15 Power Exhaust Fan

LAPEF10/15 power exhaust fan is used with THA series units. LAPEF (requires optional down-flow gravity exhaust dampers and TAREMD economizers) is used in downflow applications only. The power exhaust fan provides exhaust air pressure relief and also runs when return air dampers are closed and the supply air blower is operating. Figure 25 shows location of the LAPEF. See installation instructions for more detail.

H-Control Systems

Three different types of control systems may be used with the THA series units. All thermostat wiring is connected to terminal block TB1 located on the MCC control. Each thermostat has additional control options available. See thermostat installation instructions for more detail.

NOTE-Lennox THA heat pumps use standard heat cool type thermostats. Attempted use of heat pump type thermostat on THA unit will result in improper operation.

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 (37L54)

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

I-Smoke Detectors A17 and A64

Photoelectric smoke detectors are a field 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.

J-Blower Proving Switch S52

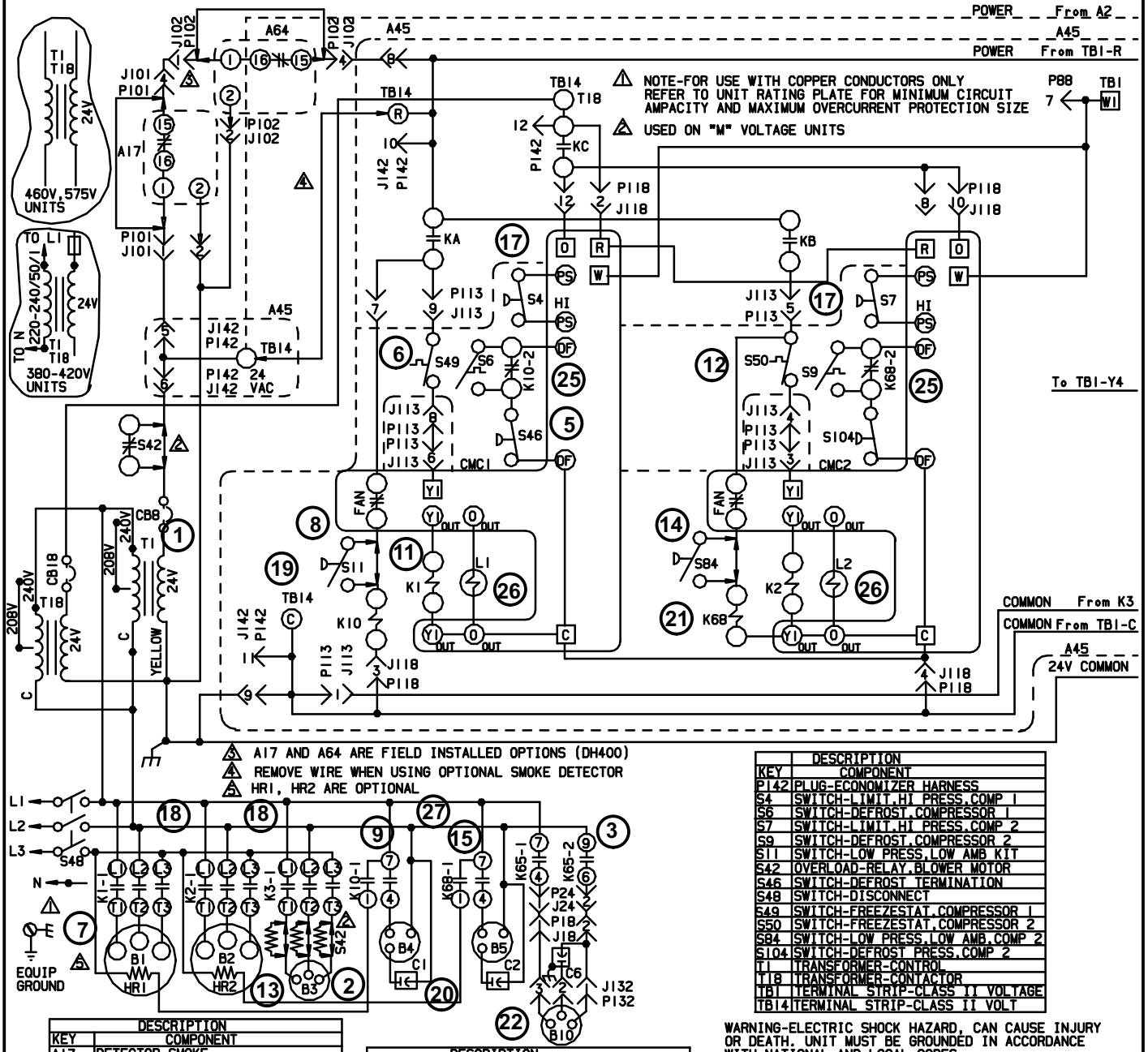
The blower proving switch monitors blower operation and locks out the unit in case of blower failure. The switch is N.O. and closes at .14" W.C. (34.9 Pa) The switch is mounted on the upper left hand corner of the blower deck.

K-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.

VII- WIRING DIAGRAMS / SEQUENCE OF OPERATION

THA UNIT WIRING SCHEMATIC



KEY	DESCRIPTION COMPONENT
P142	PLUG-ECONOMIZER HARNESS
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,COMPRESSOR 1
S50	SWITCH-FREEZESTAT,COMPRESSOR 2
S84	SWITCH-LOW PRESS,LOW AMB,COMP 2
S104	SWITCH-DEFROST PRESS,COMP 2
T1	TRANSFORMER-CONTROL
T18	TRANSFORMER-CONTACTOR
TB1	TERMINAL STRIP-CLASS II VOLTAGE
TB14	TERMINAL STRIP-CLASS II VOLT

KEY	DESCRIPTION COMPONENT
A17	DETECTOR-SMOKE
A45	CONTROL-MODULE
A64	DETECTOR-SMOKE,SUPPLY AIR
B1	COMPRESSOR 1
B2	COMPRESSOR 2
B3	MOTOR-BLOWER
B4	MOTOR-OUTDOOR FAN 1
B5	MOTOR-OUTDOOR FAN 2
B10	MOTOR-EXHAUST FAN 1
C1	CAPACITOR-OUTDOOR FAN 1
C2	CAPACITOR-OUTDOOR FAN 2
C6	CAPACITOR-EXHAUST FAN 1
CB8	CIRCUIT BREAKER-TRANS T1
CB18	CIRCUIT BREAKER-TRANS T18
CMC1	TIMER-DEFROST,COMP 1
CMC2	TIMER-DEFROST,COMP 2
HR1	HEATER-COMPRESSOR 1
HR2	HEATER-COMPRESSOR 2
J18	JACK-EXHAUST FAN COMPT
J24	JACK-EXHAUST FAN
J101	JACK-SMOKE DETECTOR,RETURN AIR
J102	JACK-SMOKE DETECTOR,SUPPLY AIR

KEY	DESCRIPTION COMPONENT
J113	JACK-BLOWER & COOL 1 CONT
J118	JACK-COMPRESSOR 3 & 4 CONTROL
J132	JACK-BLOWER,EXHAUST FAN MTR
J142	JACK-ECONOMIZER HARNESS
K1,-1	CONTACTOR-COMPRESSOR 1
K2,-1	CONTACTOR-COMPRESSOR 2
K3-1	RELAY/CONTACTOR-BLOWER
K10,-1,2	RELAY-OUTDOOR FAN 1
K65-1,2	RELAY-EXHAUST FAN
K68,-1	RELAY-OUTDOOR FAN 2
L1	VALVE-REVERSING 1
L2	VALVE-REVERSING 2
P18	PLUG-EXHAUST FAN COMPT
P24	PLUG-EXHAUST FAN
P88	PLUG-HEAT CONTROL
P101	PLUG-SMOKE DETECTOR,RETURN AIR
P102	PLUG-SMOKE DETECTOR,SUPPLY AIR
P113	PLUG-BLOWER,COOL 1 CONTROL
P118	PLUG-COMPRESSOR 3 & 4 CONTROL
P132	PLUG-B10 EXHAUST FAN MOTOR

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

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

DISCONNECT ALL POWER BEFORE SERVICING

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

WIRING DIAGRAM	1/04
HEAT PUMP-PACKAGED	
THA-090,102,120,150-1-G,J,M,Y	
HEAT PUMP SECTION B4	
Supersedes Form No.	New Form No. 534.479W

SEQUENCE OF OPERATION THA090/150

Power:

1. Line voltage from unit disconnect energizes transformer T1 and T18. T1 provides 24VAC power to terminal strip TB1 found on the MCC board A45. TB1 provides 24VAC to the unit cooling, heating and blower controls and thermostat. T18 provides 24VAC to CMC1, CMC2 and reversing valves L1 and L2.

Blower Operation:

2. The main control module A45 receives a demand from thermostat terminal G. A45 energizes blower contactor K3 with 24VAC. K3 closes, energizing blower B3.

Economizer Operation:

3. The EXH (power exhaust set point) found on the face of A6, is factory set at approximate 50% of the dial range. Economizer control module A6 receives a demand and opens outside dampers 50%. Power exhaust fan relay K65 is energized 30 seconds after dampers are 50% open. K65-1 and K65-2 close, energizing power exhaust fan B10.

First Stage Cooling Demand (compressor B1)

4. First stage cooling demand energizes Y1 and G in the thermostat. G energizes blower (see step 2.)
5. A45 energizes reversing valves L1 and L2.
6. A45 proves N.C. freezestat S49 and N.C. high pressure switch S4 to energize compressor contactor K1.
7. K1 closes energizing compressor B1.
8. 24VAC is routed through optional optional N.O. low ambient pressure switch S11 (now closed) to energize outdoor fan contactor K10.
9. N.O. contacts K10-1 close energizing outdoor fan B4 .

Second Stage Cooling Demand (compressor B2)

10. Second stage cooling demand energizes Y2.
11. A45 proves N.C. freezestat S50 and N.C. high pressure switch S7 to energize compressor contactor K2.
12. K2 closes energizing compressor B2.
13. 24VAC is routed through N.O. low ambient pressure switch S84 (now closed) to energize outdoor fan contactor K68.
14. N.O. contacts K68-1 close energizing outdoor fan B5.

First Stage Heat (compressors B1 and B2)

NOTE: On first heating demand after unit has been in cooling mode, module A45 will de-energize reversing valve L1 and L2.

15. Heating demand energizes W1 in the thermostat.
16. Main control module A45 proves N.C.high pressure switches S4 and S7 and N.C. freezestats S49 and S50 compressor contactors K1 and K2 are energized.
17. K1 and K2 close energizing compressor B1 and B2.
18. 24VAC from the main control module A45 is routed through optional N.C. low ambient switch S11 to energize outdoor fan contactor K10.
19. K10 closes energizing outdoor fan B4.
20. 24VAC from control module A45 is routed through optional N.C. low ambient switch S84 to energize outdoor fan relay K68.
21. K68 closes energizing outdoor fan B5.

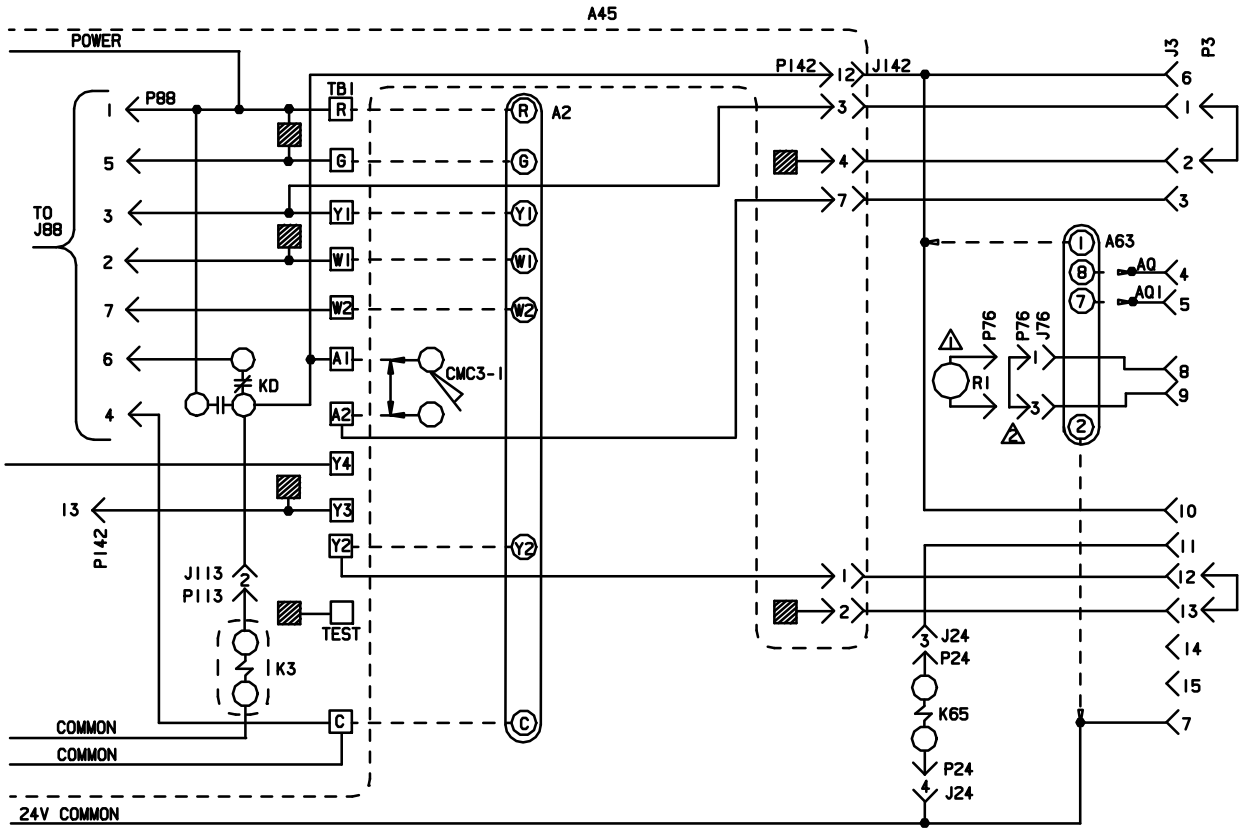
Second Stage Heat (electric heat):

22. Second stage heat demand energizes W2 in the thermostat.
23. See sequence of operation for electric heat.

Defrost Mode:

24. During heating operation, when outdoor coil drops to 35 ± 4° the defrost thermostat S6 or S9 closes initiating defrost (after minimum run time of 30, 60 or 90 minutes).
25. When defrost begins, the reversing valve L1 or L2 is energized. Supplemental electric heat (W2) is energized.
26. When L1 energizes, outdoor fan relay K10 and outdoor fan B4 is de-energized. When L2 energizes, outdoor fan relay K68 and outdoor fan B5 is de-energized.
27. Defrost terminates when the pressure switch for the circuit S46 or S104 opens, or when 15 minutes has elapsed.The defrost cycle is **not** terminated when thermostat demand ends.

ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT
THA SERIES UNITS



KEY	DESCRIPTION COMPONENT
A2	SENSOR-ELECTRONIC
A45	CONTROL-MODULE
A63	SENSOR-CO2
CMC3-I	CLOCK-TIME
J3	JACK-UNIT, ECONOMIZER
J24	JACK-EXHAUST FAN
J76	JACK-SENSOR, ECONOMIZER
J113	JACK-BLOWER & COOL I CONTROL
J142	JACK-ECONOMIZER HARNESS
K3	RELAY/CONTACTOR-BLOWER
K65	RELAY-EXHAUST FAN
P3	PLUG-LESS ECONOMIZER
P24	PLUG-EXHAUST FAN
P76	PLUG-SENSOR, ECONOMIZER
P88	PLUG-HEAT CONTROL
P113	PLUG-BLOWER & COOL I CONTROL
P142	PLUG-ECONOMIZER HARNESS
RI	SENSOR-MIXED OR SUPPLY AIR
TB1	TERMINAL STRIP-24V CLASS II

⚠1 RI IS USED WITH OPTIONAL MODULATING ECONOMIZER FIELD KIT

⚠2 REMOVE JUMPER WHEN RI IS USED

THERMOSTAT HEAT ANTICIPATION SETTING 0.1 AMP

INDICATES MICRO PROCESSER

DESIGNATES OPTIONAL WIRING

CLASS II FIELD WIRING

WIRING DIAGRAM	12/03
ACCESSORIES	
ELECTROMECHANICAL OR ELECTRONIC THERMOSTAT FOR TCA/TGA UNITS	
TEMPERATURE CONTROL SECTION CI	
Supersedes Form No.	New Form No. 534,484W

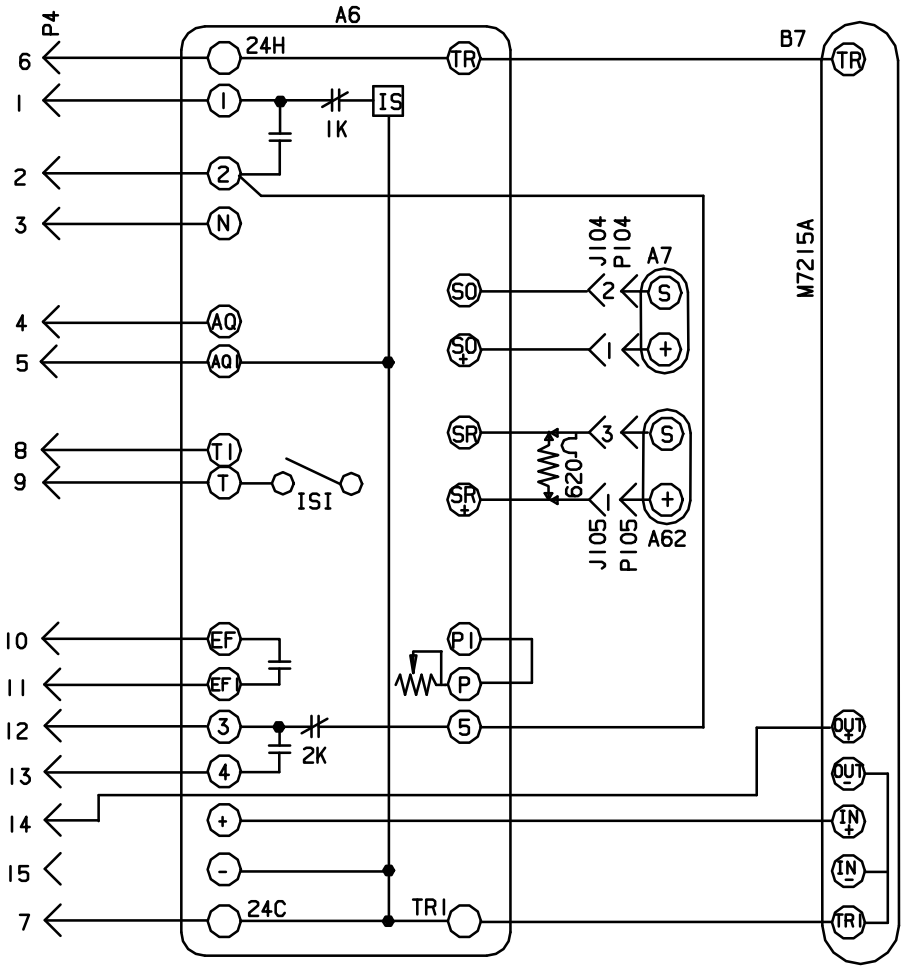
POWER:

1. Terminal strip TB1 found on the main control module A45energize thermostat components with 24VAC.

OPERATION:

2. The main control module A45 receives data from the electronic thermostat A2 (Y1, Y2, W1, W2, G, OCP) A45 energizes the appropriate components for heat or cool demand.

THA SERIES ECONOMIZER



DESCRIPTION	
KEY	COMPONENT
A6	CONTROL-SOLID STATE ENTHALPY
A7	SENSOR-SOLID STATE ENTHALPY
A62	SENSOR-ENTHALPY, INDOOR
B7	MOTOR-DAMPER, ECONOMIZER
J104	JACK-SENSOR,OUTDOOR ENTHALPY
J105	JACK-SENSOR,RETURN AIR ENTHALPY
P4	PLUG-ECONOMIZER
P104	PLUG-SENSOR,OUTDOOR ENTHALPY
P105	PLUG-SENSOR,RETURN AIR ENTHALPY

DESIGNATES OPTIONAL WIRING
CLASS II FIELD WIRING

WIRING DIAGRAM	11/03
ACCESSORIES	
ECONOMIZER FOR TCA/TGA UNITS	
ECONOMIZER SECTION DI	
Supersedes Form No.	New Form No. 534,485W

SEQUENCE OF OPERATION

POWER:

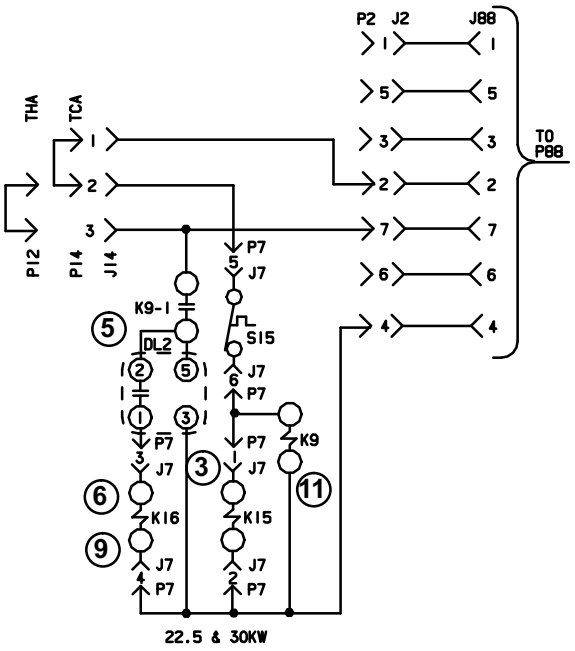
1. Terminal strip TB1 found on main control module A45 energizes the economizer components with 24VAC.

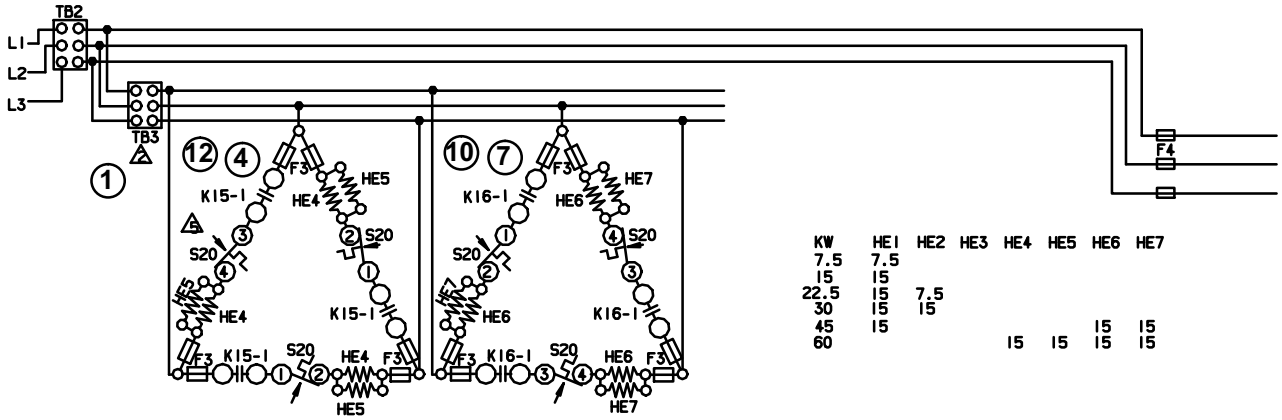
OPERATION:

2. Enthalpy sensor A7 and A62 (if differential enthalpy is used) communicates to the economizer control module A6 when to power the damper motor B7.
3. Economizer control module A6 supplies B7 with 0 - 10 VDC to control the positioning of economizer.
4. The damper actuator provides 2 to 10 VDC position feedback.

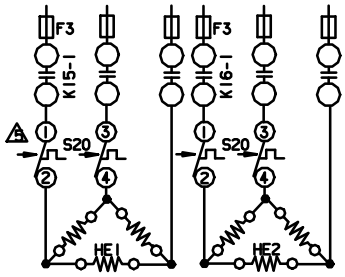
EHA-7.5, 15, 22.5, 30, 45 & 60kW Y VOLTAGE
THA SERIES UNITS

KEY	DESCRIPTION COMPONENT
DL2	DELAY-ELECTRIC HEAT
F3	FUSE-ELECTRIC HEAT
F4	FUSE-UNIT
HE1	ELEMENT-ELECT HEAT 1
HE2	ELEMENT-ELECT HEAT 2
HE4	ELEMENT-ELECTRIC HEAT 4
HE5	ELEMENT-ELECTRIC HEAT 5
HE6	ELEMENT-ELECTRIC HEAT 6
HE7	ELEMENT-ELECTRIC HEAT 7
J2	JACK-ELECTRIC HEAT
J7	JACK-ELECT HT SUB-BASE KIT
J14	JACK-WARM UP ADAPTOR
J88	JACK-CONTROL MODULE
K9,-1	RELAY-HEAT
K15,-1	CONTACTOR-ELECTRIC HT 1
K16,-1	CONTACTOR-ELECTRIC HT 2
P2	PLUG-ELECTRIC HEAT
P7	PLUG-ELECT HT SUB-BASE KIT
P12	PLUG
P14	PLUG
S15	SWITCH-LIMIT,PRIMARY,ELECT HT
S20	SWITCH-LIMIT,SECONDARY ELECT HT
TB2	TERMINAL STRIP-UNIT
TB3	TERMINAL STRIP-ELECTRIC HEAT





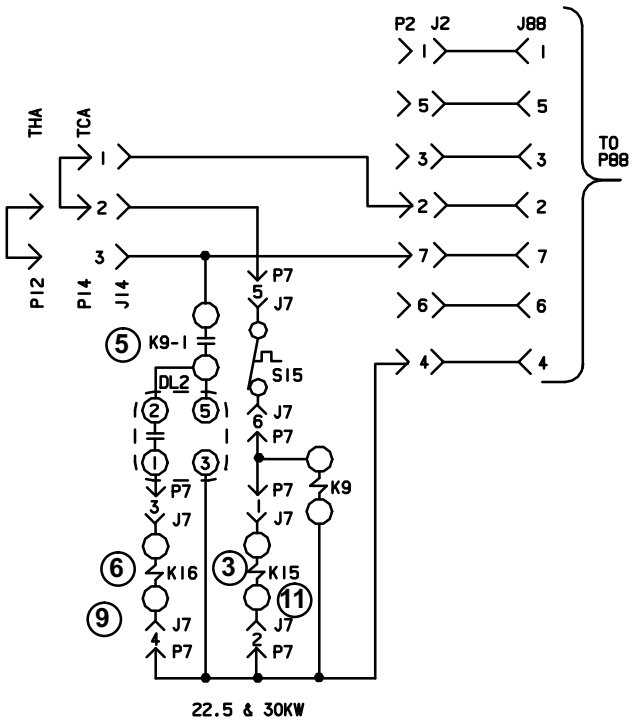
KW	HE1	HE2	HE3	HE4	HE5	HE6	HE7
7.5	7.5						
15	15						
22.5	15	7.5					
30	15	15					
45	15					15	15
60				15	15	15	15



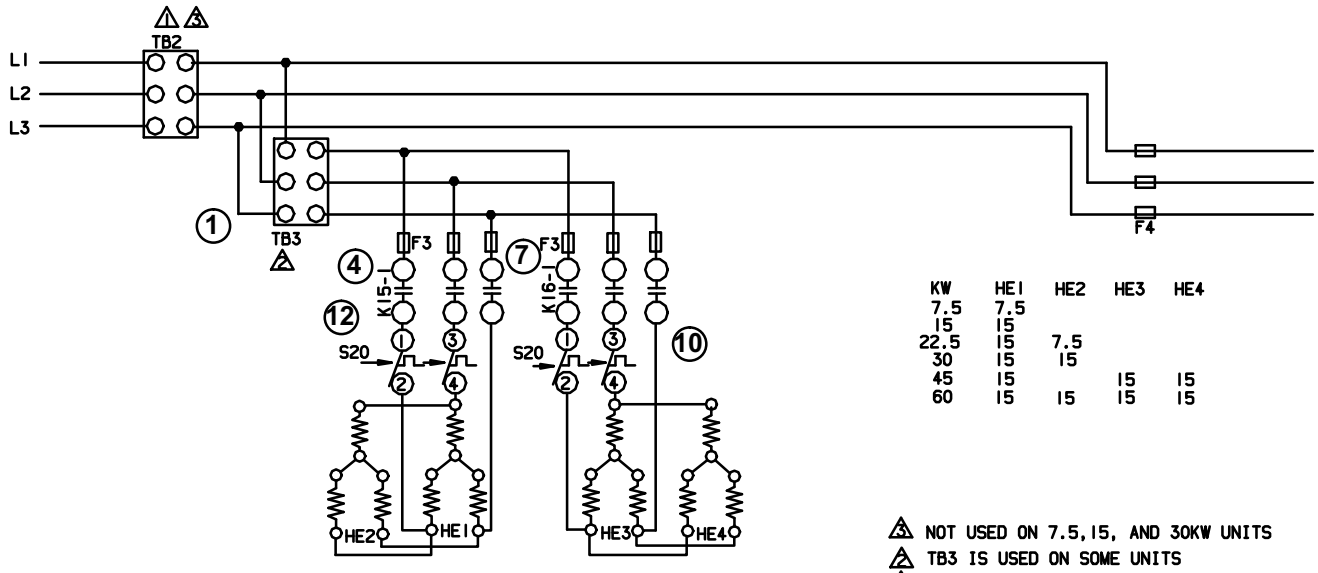
5 NOT USED ON 7.5,15, AND 30KW UNITS
4 TB3 IS USED ON SOME UNITS
1 TB2,S48 OR CB10 MAY BE USED

WIRING DIAGRAM	2/04
HEATING-ELECTRIC	
EHA-7.5,15,22.5,30,45,60-1,2-Y FOR USE WITH TCA UNITS	
HEATING SECTION-A5	
Supersedes Form No. 534,471W	New Form No. 534,647W

EHA-7.5, 15, 22.5, 30, 45 & 60kW G, J, M VOLTAGE
THA SERIES UNITS



DESCRIPTION	
KEY	COMPONENT
DL2	DELAY-ELECTRIC HEAT
F3	FUSE-ELECTRIC HEAT
F4	FUSE-UNIT
HE1	ELEMENT-ELECT HEAT 1
HE2	ELEMENT-ELECT HEAT 2
HE3	ELEMENT-ELECTRIC HEAT 3
HE4	ELEMENT-ELECTRIC HEAT 4
J2	JACK-ELECTRIC HEAT
J7	JACK-ELECT HT SUB-BASE KIT
J14	JACK-WARM UP ADAPTOR
J88	JACK-CONTROL MODULE
K9,-1	RELAY-HEAT
K15,-1	CONTACTOR-ELECTRIC HT 1
K16,-1	CONTACTOR-ELECTRIC HT 2
P2	PLUG-ELECTRIC HEAT
P7	PLUG-ELECT HT SUB-BASE KIT
P12	PLUG
P14	PLUG
S15	SWITCH-LIMIT,PRIMARY,ELECT HT
S20	SWITCH-LIMIT,SECONDARY ELECT HT
TB2	TERMINAL STRIP-UNIT
TB3	TERMINAL STRIP-ELECTRIC HEAT



KW	HE1	HE2	HE3	HE4
7.5	7.5			
15	15			
22.5	15	7.5		
30	15	15		
45	15		15	15
60	15	15	15	15

⚠5 NOT USED ON 7.5,15, AND 30KW UNITS
⚠2 TB3 IS USED ON SOME UNITS
⚠1 TB2,S48 OR CB10 MAY BE USED

WIRING DIAGRAM	2/04
HEATING-ELECTRIC	
EHA-7.5,15,22.5,30,45,60-1,2-G,J,M FOR USE WITH TCA UNITS	
HEATING SECTION-A4	
Supersedes Form No. 534,472W	New Form No. 534,648W

Sequence of Operation -EHA 7.5, 15, 22.5, 30, 45, 60 kW - Y and G, J, M

NOTE: This sequence of operation is for all Electric Heat kW ratings Y through J voltages. Each step of operation is numbered and can be followed in sequence on the diagrams. Operation for G, J, and M voltages will be the same.

HEATING ELEMENTS:

1 - Terminal Strip TB3 is energized when the unit disconnect closes. TB3 supplies line voltage to electric heat elements HE1 through HE7. Each element is protected by fuse F3.

SECOND STAGE HEAT:

2 - Heating demand initiates at W1 in thermostat.

3 - 24VAC is routed through from main control module A45. After A45 proves N.C. primary limit S15 and secondary limit S20, the electric heat contactor K15 is energized.

4 - N.O. contacts K15-1 close allowing the first bank of elements to be energized.

5 - Relay K9 is energized. N.O. contacts K9-1 close energizing timer DL2.

6 - After a 30second delay, DL2 closes energizing contactor K16.

7 - N.O. contacts K16-1 close allowing the second bank of elements to be energized.

END OF SECOND STAGE HEAT:

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

9 - Electric heat contactor K16 is de-energized.

10 - The second set of electric heat elements are de-energized.

11- Electric heat contactor K15 is de-energized.

12- The first set of electric heat elements are de-energized.